

THE RELATIONSHIP BETWEEN METACOGNITIVE
KNOWLEDGE OF LEARNING ENGLISH AS A FOREIGN
LANGUAGE AND LEARNING BEHAVIOUR IN A
VOCABULARY LEARNING COMPUTER ENVIRONMENT

Submitted by

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Abstract

This investigation comprised two studies aimed at identifying the relationship, if any, between beliefs about the formal or functional nature of learning English as a foreign language and learning behaviour in a vocabulary learning computer environment. Two measurement tools were developed. A questionnaire was developed to measure beliefs of a general nature about the task of learning a foreign language, definition of the formal-functional components of language learning activities, and beliefs about the efficacy of the same language activities. This was done to observe the correlations, if any, between formal-functional bias in general beliefs and preferences for specific activities which respondents have previously defined in formal-functional terms. A hypertext program was also developed. This program consisted of vocabulary learning materials with code built into the programming which recorded user interaction in log files. Using the logged data, general beliefs and beliefs about the efficacy of language learning activities could then be compared with preference for inductive and deductive learning, passive and productive practice, and effort invested in the task as measured by the number of screens accessed and time spent on the task.

The two studies making up the investigation consisted of a pilot study to test the questionnaire and a main study, combining the questionnaire and software. The Main Study was done in four stages with the first three stages being used to pilot the software and the final stage functioning as the source of data on subject behaviour. Questionnaire data was compared with the logged data and post-hoc interviews served to triangulate the logged data. A qualitative analysis of subject behaviour in the computer environment was also carried out.

Main findings for questionnaire data were that formal-functional bias in general beliefs may be related to preference for formal or functional activities. Beliefs regarding knowledge of target language culture or learning context may be more closely related to formal-functional preferences than beliefs regarding grammar or vocabulary. Regarding correlational relationships with logged data, beliefs appeared to be less important than prior knowledge of target vocabulary. Subjects showed a consistent pattern of variation of preferences according to level of prior knowledge while effort invested showed a bell-shaped curve with increasing prior knowledge. Formal-Functional biases in general beliefs had correlational relationships with effort invested, but the direction of the relationships varied according to the belief.

Main conclusions were that the pattern of interaction suggested subjects were acting autonomously. In exercising this autonomy, they were influenced by their beliefs, but level of prior knowledge of the task was more important in determining how they learned or practiced the target vocabulary. Regarding pedagogical implications, it was argued that the formal-functional distinction has little pedagogical value in terms of understanding language learners. Finally, it was concluded that this research has shown that language learners' metacognitive knowledge of the task of language learning is a resource which teachers ignore at their peril.

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Notes on Accompanying Material and Reading this Thesis

1. The CD supplied with this thesis contains the thesis, statistical outputs, the software used for the research, and the application necessary to run the software.
2. The reader may find it convenient to open the thesis document on the CD as this may facilitate access to appendices and statistical outputs. To open this, click on the file PhDMDoc.doc. This is a master document, so the reader should:
 - a. Go to outline view.
 - b. Expand subdocuments by clicking on the appropriate button.
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 - d. It is quite common for the program to freeze during this process as the file is quite large. If this happens, end task using the task manager, close any other applications which may be open, and try opening the file again.
3. Statistical outputs are not printed as they are very long. They can be found on the CD in two formats, HTM and SPO files. To access the statistical outputs, the reader can open the appropriate zip file on the CD (QPS.zip for the Questionnaire Pilot Study or Main Study.zip for the Main Study) and click on the file in the archive list. HTM files require Internet Explorer or Netscape. SPSS output files (SPO) require SPSS 10.0 to be read. The SPO files have the advantage of an outline pane which allows the reader to find specific sections very quickly.
4. Output files in HTM format can be opened from the thesis text if the files are copied to the hard drive or local network drive and the output files are extracted from the zip file. Instructions on doing this and also installing the software are contained in the README file on the CD.

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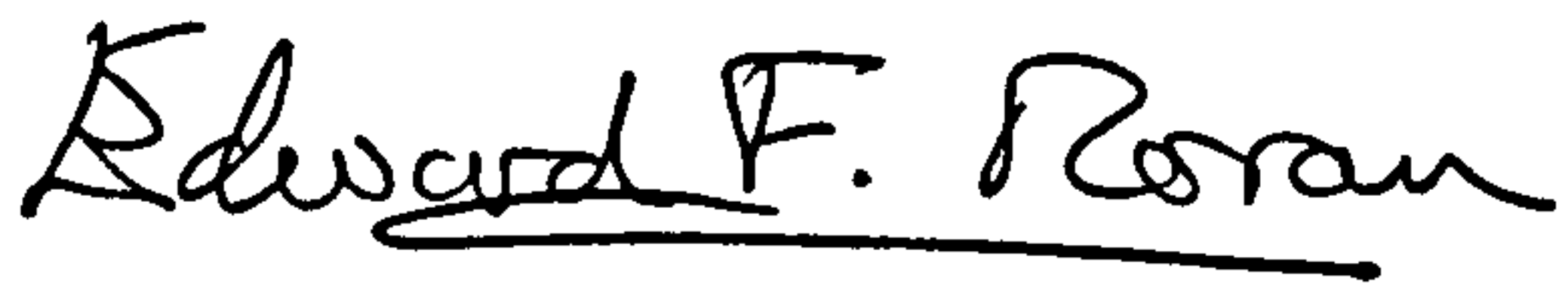
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Author's Declaration

I declare that, with the exception of parts of the Beliefs About Language Learning Inventory (Horwitz, 1987), the material and research contained in this thesis is entirely my own work.

A handwritten signature in black ink that reads "Edward F. Moran". The signature is written in a cursive style with a horizontal line underneath the name.

Edward F. Moran

Chapter 1 Introduction

1.1 Introduction

This study is concerned with the relationship between what learners believe about language learning and what they actually do when they are learning a language. More specifically, this research investigates learners' beliefs about the formal and functional aspects of the task of language learning as a whole and the formal and functional aspects of specific language learning activities. Learners' beliefs are then compared to their learning preferences in a computer environment named WordLearner, written for this investigation, in which subjects learned and practiced vocabulary. The issue of whether or not this computer environment should be termed a CALL (Computer Assisted Language Learning) program is dealt with below (see Section 1.3.6). However, while bearing this distinction in mind, the investigator believes that this research will have implications for CALL.

As a starting point for this thesis, it should be established what this investigation hopes to contribute to our understanding of language learning. Ultimately, this thesis will ask if the behaviours observed during the investigation are the result of subjects making considered decisions about how best to learn and whether the context, in this case a computer environment, facilitates this. We will not simply ask if the subjects are using their freedom to choose as the exercise of freedom alone does not necessarily imply purposeful behaviour aimed at improving language skills; we will ask if there are *reasons for* how they use their freedom to choose. In other words, we will ask if we are observing autonomous language learning in action within a computer environment.

Having two aspects to the investigation, while quite broad in conception, is a deliberate strategy of bridging CALL and mainstream second language acquisition (SLA) research. Although such a visible connection is not absolutely necessary, in the investigator's opinion, having this "bridge" to mainstream SLA improves the credibility and generalisability of the research results; the subjects of the study may be working in a computer environment, but the results may still have implications for SLA and language teaching in general (Chapelle, 1997; Chapelle, 1996, 1998).

This chapter continues with definitions of key terms. It then provides a background to this investigation, a statement of the problem being investigated, the purposes of the study, the significance of the study, and the limitations and delimitations of the research. The chapter will conclude with a brief outline of the overall structure of the thesis.

1.2 Definition of Terms

1.2.1 Epistemology

Learners' beliefs are often referred to in the literature as *personal epistemologies*.

The word *epistemology* is defined in the Oxford English Dictionary (1933) as *the theory or science of the method or grounds of knowledge*. An individual's beliefs about the nature of linguistic knowledge and how it is acquired can be referred to as that individual's personal epistemology of language learning. In this thesis, the term epistemology is used interchangeably with the phrase *beliefs about language learning*.

1.2.2 Autonomy

Although the concept of autonomy is quite vague, for the sake of having a working definition we can say that "autonomy is a *capacity* - for detachment, critical reflection, decision-making, and independent action." (Little, 1991, p. 4) (Little's italics). The issue of defining autonomy is discussed at length below (see Chapter 2.2.2.4.1).

1.2.3 Formal - Functional

When a particular belief is referred to as formal, the reader should take this to mean that the learner holding this belief is concerned with language as a structured, rule-bound system (Bialystok, 1981, p. 24). When a belief is referred to as functional, the reader should take this to mean that the learner holding this belief is concerned with use of language in communicative situations (Bialystok, 1981, p. 24). Therefore, in this thesis, the term *formal* refers to concern for or attention to the form of the language while the term *functional* refers to concern for or attention to meaning and the communicative use of the language. This applies to both tasks themselves and learners beliefs about them. Further to this, for the purposes of this investigation, the investigator has extended these definitions to include actual learning strategies and

preferences for particular teaching/learning methods which could be associated with formal or functional learning. The formal learner is characterised as someone who tends to:

1. Worry about accuracy.
2. View the memorisation of vocabulary and grammar as important.
3. Not take risks.
4. Take a passive, teacher-centred view of how to learn a language.

In contrast to this, the functional learner is characterised as someone who tends to:

1. Focus on meaning and communication.
2. Value fluency over accuracy so long as meaning is not obscured.
3. Take risks.
4. Take an active, self-directed view of how to learn a language.

1.2.4 Inductive vs Deductive Learning

Nation (1990, p. 55) defines inductive and deductive learning by using the idea that a word represents a concept. If we present examples first and then see the concept that they illustrate, we are *lead into* the concept inductively (in = in, duct = lead). If we present the concept first and then show examples, we are *lead away* from the concept to the examples. Inductive-Deductive learning of vocabulary is discussed in Chapter 2.3.2.3.2.

1.2.5 Passive vs Productive Learning

The terms *passive* and *productive* are frequently used in this thesis in reference to learning activities and should also be defined. When learning is referred to as passive, it is receptive and characterised by recognition and recall (Nation, 1990, p. 5).

Productive learning is receptive and also involves being able to produce language in communicative situations (Nation, 1990, p. 5). A more thorough discussion of this issue can be found in Chapter 2.3.2.2.

1.3 Background to this Study

This section will begin with something very general: the nature of the pursuit of knowledge. This is considered important as it has been argued that the organisation of subject matter in hypertext can, for example, mirror the way in which subject knowledge might be organised in semantic networks (Jonassen, 1986, pp. 269-292; Norman, 1994, p. 35) (see Chapter 2.3.1.2 for more information on semantic networks) and that if the hypertext designer can achieve a match between organisation of subject matter and subject knowledge, design may facilitate application of cognitive processes. This section will then continue with an analysis of how this investigation fits in with previous research. This will consist of an introduction to related theory and research on the two central themes of this investigation: learners' beliefs about language learning and language learning with language learning software. In addition, theory and research on autonomy in language learning and foreign language vocabulary learning will also be introduced. This section will conclude with a description of the research setting.

1.3.1 The Nature of the Pursuit of Knowledge

Wittgenstein, in the preface to his *Philosophical Investigations* (1978, p. vii), expressed his inability to mould his ideas into a cohesive whole saying that the nature of such investigation “compels us to travel over a wide field of thought criss-cross¹ in every direction” and that the ideas presented were “as it were, a number of sketches of landscapes which were made in the course of these long and involved journeyings.” This has since become known as “the landscape metaphor” and has been applied extensively in the field of computer aided instruction (CAI) where it is regarded as a foundation for cognitive flexibility theory (see for example: Jacobson, Maori, Mishra, & Kolar (1996)). Here, however, it is used as a metaphor for language acquisition.

In so far as the acquisition of the ability to communicate in a language other than your own is a process of discovery (usually combined with hard work for ordinary mortals), learning to speak another language is no different from the pursuit of any other type of knowledge. Wittgenstein's metaphor, therefore, neatly summarises much of the process that one goes through in trying to learn a language.

¹ Translator's wording.

This thesis is about this process of getting to know the landscape and finding out what it is about the learners' beliefs that influence the decision to go one way or another. Nobody really wanders aimlessly. They must know something about where they are or where they are going and there must have been some initial decision to wander in the first place. Assuming that the learner is doing this of his or her own free will, a lot of other decisions have been made, either at the time or in the murky past, about how much time to spend, how hard to work, how to approach the task and so on.

In addition to learners' beliefs and decisions, the landscape metaphor neatly encapsulates another aspect of learning: context. Just as the walker cannot ignore the weather, there are always environmental, physical or cognitive constraints that the learner must cope with and the learner's decisions must take these into account. If we investigate learners' beliefs and decision making, we cannot, therefore, ignore the context in which the learning takes place. In this investigation, context is taken to include not only the software environment but also the knowledge the learner has of the task as it has been argued (Wenden, 1995) that this is an aspect of the learning context.

1.3.2 Beliefs about Language Learning

Discussion of personal beliefs can be approached from a sociological perspective in which belief is seen as a component of attitude (see Chapter 2.1.2.1 for a discussion of this) or from a philosophical perspective in which belief is differentiated from knowledge (Abelson & Prentice, 1989; Alexander & Dochy, 1995; Flavell, 1977). Both perspectives are introduced in the literature review, but an examination of the literature on personal epistemology is more fruitful as it provides a theoretical framework for the interpretation of data obtained on learners' beliefs. Flavell's Model of Metacognitive Monitoring (Flavell, 1979) was chosen as the main theoretical standpoint for this investigation. In particular, while attitudinal research provides a wealth of detail on the complexity of actual behaviour, the framework provided by Flavell's model provides a sound classification for learners' beliefs in terms of what they believe about themselves as learners, the subject matter and the learning

strategies needed. Moreover, this perspective provides explanations for the difficulty of identifying and changing learners' beliefs.

What Flavell's Model does not do is explain or predict. For this, we need to look at what the underlying dimensions of personal epistemology might be. Views on this have developed from a unidimensional (Ryan, 1984) to multidimensional (Eklund-Myrskog, 1996; Schommer, 1990) perspective in recent years. This multidimensional perspective has been applied to SLA by Mori (1999a; 1999b) and is also reflected in research by researchers such as Yang (1993; 1999) and Cotterall (1995) in which factor analysis has identified multiple themes in learners' beliefs. This multidimensional perspective is also applied in the current investigation. A closely related approach is to see learners' beliefs in terms of how they conceive of language learning an example of which is the research carried out in Hong Kong by Benson and Lor (1999). While this approach is not taken here, much of the terminology used by Benson and Lor, particularly their quantitative-qualitative classification of learners' conceptions, is applied here.

Regarding research on beliefs which is related to this study in terms of focus and methodology (questionnaire surveys), studies have been published by Elbaum et al (1993), Horwitz (1987; 1988), Mantle-Bromley (1995), Mori (1999a; 1999b), Yang (1993; 1995; 1999), Cotterall (1995; 1999), Victori (1999), Victori & Lockhart (1995), Wen & Johnson (1997) and White (1995; 1999). Horwitz (1987, 1988), Mantle-Bromley (1995), Victori (1999), Victori & Lockhart (1995) and Yang (1993; 1995; 1999) all employed versions of the Beliefs About Language Learning Inventory (BALLI), part of which is used in this investigation. With regard to this investigation, surveys using the BALLI and other instruments have tended to find a mix of formal and functional preferences. At the same time, each sample has been found to be unique in some way, suggesting that variations in context are responsible for differences in stated beliefs (Horwitz, 1999, p. 574).

Other studies have skirted the issue of learners' beliefs. For example, several studies have compared students' vs teachers' perceptions of the efficacy of formal-functional methods (Cortazzi & Jin, 1996; McCargar, 1993; Schulz, 1996; Tse, 2000) often, and probably unavoidably, looking at a cultural explanation for the differences found.

However, these studies did not attempt to identify learners' beliefs about learning, only how they valued activities such as pronunciation work; furthermore, the degree of formality or functionality of activities was assumed by the researchers, not defined by the subjects.

No studies have so far investigated formal-functional beliefs in relation to the way in which specific activities are defined or preferences for these activities. In addition, no previous studies have investigated learners' beliefs in relation to actual learning behaviour in a computer environment.

1.3.3 The Computer Learning Environment Used in this Investigation

This section will briefly discuss the type of software used for the investigation and the principles on which the software was designed. In addition, the exact nature of the software used vis a vis whether it should be described as CALL software or simply described as a computer environment will be discussed.

The type of software created for this investigation is known as hypertext. This is a term originally used by Nelson in the 1960's. It is defined by Nelson (1987) as "non-sequential writing" (p. 35). On a computer screen, "*basic or chunk style* hypertext offers choices ... at the end of a chunk. Whatever you point at then comes to the screen." (p. 32, Nelson's italics). In practice, such a system consists of "text segments of any length and links between them" (p. 35).

It has been argued that the advantage of hypertext is that it allows learners to apply their learning styles to it (Oxford, Rivera-Castillo, Feyten, & Nutta, 1998). This argument is based on the potential for freedom of movement around the program, doing any activity in any order at a pace decided by the learner. The typical multimedia program has a variety of text-based, audio and video activities. However, this investigation explores a different aspect of materials design and learners' behaviour in relation to it; given the choice of learning and practicing a target linguistic item in either a formal or functional way, which do they choose?

The only previous study the investigator is aware of that focused on this type of choice was carried out by Manning (1996). Related research in non-CALL hypertext has focused on Cognitive Flexibility Theory (CFT). CFT is an approach to materials design for loosely structured knowledge domains which typically uses a thematic approach to presentation of content or allows different approaches to learning the same content (Lawless & Brown, 1997, p. 122). Although classed as a Constructivist approach, it allows for some limitation of learner choices (Lawless & Brown, 1997, p. 122). Although the structure and content of the hypertext used in this investigation is very simple compared to that used in CFT research, it is argued here that because the learner is presented with different methods of learning and practicing a given linguistic target, there is enough similarity to say that CFT principles underlie the design.

We now have to consider the exact nature of the program used for this investigation. The program is fully described in Chapter 4, screen shots are given in Appendix G, and the full program can be installed from the accompanying CD. Levy (1997, p. 1) gives the following definition of CALL:

"Computer Assisted Language Learning (CALL) may be defined as 'the search for and study of applications of the computer in language teaching and learning'."

According to this definition, the program produced for this investigation is a CALL program. However, we have to consider how realistic it is as a piece of software that students might actually use. Several compromises were made in the interface design for the sake of the validity and reliability of the data collected. Program content is very simple, there is no exit button until subjects reach the end of the program, no reverse movement is allowed, and multimedia content is basic. It is possible that subjects might have behaved differently if the program had been produced as fully-fledged multimedia CALL. The problem was, though, to produce an experimental platform that would have face validity as language learning software for language learners and that would produce easily analyzable, valid and reliable data on language learning-related choices made within the program; the investigator would then be able

to reach firm conclusions on the nature of the interaction observed. Consequently, the program produced is the bare bones of what a realistic CALL program should be.

This thesis, therefore, does not refer to the software produced for the research as a CALL program but rather as a computer environment. While the conclusions reached will be relevant to language learning in CALL, the investigator leaves it to the reader to decide if the research environment itself is CALL or not. Lastly, as the theory and research on learning in computer environments referred to in this thesis naturally falls into CALL or non-CALL (hypertext, computer aided instruction, and computer aided learning) categories, the term “CALL” will be used frequently.

1.3.4 Autonomy in Language Learning

Freedom of choice in computer learning environments involves the issue of autonomy in language learning. This necessitates both an examination of theory and research on autonomous language learning and autonomy computer environments. Whether or not a learner is learning autonomously is difficult to pin down; the concept itself is difficult to define (Little, 1991, p. 2; Littlewood, 1996, p. 427) and learners can exercise their freedom by doing nothing (Egbert & Jessup, 1996, p. 18; Litchfield, 1993, p. 6). Theory and research on autonomous learning has either an educational or psychological perspective (Wenden, 1995, p. 187-188). This investigation has an educational perspective. From an educational standpoint, different contexts (Little, 1991) and levels of autonomy can be identified (Littlewood, 1996, 429-430); the context assumed here is that the learner is taking part voluntarily in language learning, although within mainstream higher education, and the level of autonomy is task-specific.

If we accept that it is desirable to develop general autonomy and that developing the ability to be autonomous at task level leads to this (Littlewood, 1996, p. 429), then we must identify how we can develop task level autonomy in a computer environment. We might then make a positive qualitative difference to the learner's experience of language learning which it has been argued is what makes use of CALL worthwhile (Oxford et al., 1998). We can begin this by investigating how language learners use freedom of choice and how this varies according to learners' individual differences

and features of the task. Research on task-level autonomy in CALL has found that learners may not be able to use freedom of choice very well (Chapelle & Mizuno, 1989; Fraser, 1993; Goodfellow & Laurillard, 1993; Scott & New, 1994) or that a combination of program and learner control might be necessary (Borras & Lafayette, 1994) for better learning.

Discussion of autonomy in computer environments is closely linked to the concept of locus of control which refers to where control of learning lies, either with the learner or the software. In mainstream SLA, locus of control is most often referred to in discussion of motivation where learner control is seen as important to attribution of success to the learner's own efforts. However, it is rarely mentioned in the CALL literature. This is unfortunate as there is a large body of non-CALL hypertext and CAI research focusing on it. Research in CAI suggests that learner control of software helps the most proficient students while program control helps the least able (Belland, Taylor, Canelos, Dwyer, & Baker, 1985; Davidson-Shivers, Shorter, Jordan, & Rasmussen, 1999; Goetzfried & Hannafin, 1985; Hasselerharm & Leemkuil, 1990; Quentin-Baxter, 1997, 1998); on the whole, however, research results suggest learner control may be slightly better in terms of the amount learned (Niemec, Sikorski, & Walberg, 1996). With the caveat that, in many cases, research results on acquisition of knowledge in subject domains not related to language may not be relevant, locus of control is discussed within this investigation as the investigator believes that it can add some clarity to research in autonomy in CALL.

It is argued here that it is important to critically evaluate both the nature of the autonomy which language learning software allows, the manner in which learners exploit it and the individual differences between learners that influence this.

Although learner autonomy within a computer environment can be greater than in use of printed materials, autonomy is still limited by constraints built into the software. In a worst case scenario, lip-service is paid to the idea of autonomy within a behaviourist materials design where the learner is locked into a linear path through frame-based hypertext in which correct answers are rewarded by positive feedback and progress to the next frame. A better software design might offer a high degree of autonomy, but the learners might not exploit it. Here, again, it is important to ask what it is about the learner or the software that determines effective use of the materials.

1.3.5 Vocabulary and Individual differences

Although researching vocabulary learning is not a primary aim of this investigation, some consideration of this issue is necessary. The nature of vocabulary learning must affect the subjects' behaviour as it is a key feature of the learning context and the results obtained may have implications for teaching-learning vocabulary. The aspects of vocabulary learning considered most relevant to this investigation are, firstly, cognitive theory related to the importance of meaning and depth of processing, storage and recall of conceptual information, and language learning as a problem solving activity. Research (Fraib & Lockhart, 1972) suggests that focus on meaning rather than form and productive rather than passive, receptive practice is likely to result in deeper processing and better recall. With regard to this investigation, subjects working in autonomous mode may show preferences for activities which involve deeper processing. We may then ask if this is related to formal-functional bias or the prior knowledge which learners state they have of the target vocabulary. Research on schemas and semantic networks (Anderson, 2000) informs current ideas on organization, storage and retrieval of conceptual knowledge. This is particularly relevant to both evaluation of prior knowledge of target vocabulary and the methods chosen to learn and practice it.

Regarding language learning as a problem solving activity, Anderson (2000, p. 240) argues that "all cognitive activities are fundamentally problem solving in nature" since cognition is purposeful, goal oriented, and works towards removing anything that blocks achievement of goals. This is relevant to learning methodology; for example, we might ask which is more effective, learning from example (e.g. inferencing meaning from context) or instruction (e.g. being given a definition) or a combination of the two.

Secondly, we have to consider theory and research related to foreign language vocabulary learning. As the activities included in WordLearner involve reading a definition of the target word, inferring the meaning of a target word, multiple choice questions and reconstructing a sentence, this consideration necessarily includes the receptive and productive aspects of lexical knowledge and how vocabulary should be

learned. This is a very contentious area with opposing schools of thought on how linguistic knowledge might be acquired through implicit-explicit and deductive-inductive learning. Research and theory on implicit-explicit learning of foreign language vocabulary is based very much on first language acquisition research and has become focused on three positions:

1. The non-interface model which forms the basis for Krashen's Input Hypothesis (Krashen, 1981) and which states that linguistic knowledge is acquired only implicitly.
2. The strong interface model which states that linguistic knowledge can be acquired through explicit teaching (R. Ellis, 1994)².
3. The weak interface model (R. Ellis, 1994) which says that linguistic knowledge can be acquired explicitly in situations where difficulty in comprehension leads to the learner noticing features of linguistic input.

Theory and research on the implicit or explicit acquisition of linguistic knowledge forms the basis for the debate on the relative merits of teaching and learning methods. Nation (1990) generalizes these methods as:

1. Deductive (concept possibly followed by examples) vs inductive (examples possibly followed by concept) (Nation, 1990, pp. 55-56).
2. Direct (focus on linguistic target) vs indirect (focus on understanding overall meaning) (Nation, 1990, p. 2).

The key question regarding these methods, and one which is highly relevant to the choices available to the users of the software used in this investigation, is when and how to apply them. Authorities such as Carter (1998, p. 204) argue that it is a matter of level while Coady (1997, p. 288) argues that it depends on the time available.

A further question on the appropriacy of methods, which is addressed by this study, is how learners learning in autonomous mode might choose to apply them. The research questions formulated for this investigation required that learners evaluated their prior

² As two authorities in this area both have the same family name, Ellis, they will be differentiated by initials, N. Ellis for Nick Ellis and R. Ellis for Rod Ellis.

knowledge of target vocabulary. We, therefore, have to consider what role prior knowledge plays in vocabulary learning and the ability of learners to evaluate this. Prior knowledge is likely to be of vital importance in the comprehension and learning of both first language (Drum & Konopak, 1987; Nagy & Herman, 1987) and second language vocabulary acquisition (Barry & Lazarte, 1998; Hammadou, 1991; Laufer, 1997). Regarding learners' ability to evaluate their knowledge of vocabulary, we have to ask what word knowledge actually is. This is a complex issue as learners may recognize parts of a word (Nation, 1990, pp. 30-32), but not understand the meaning while Laufer (1997, p. 25) argues that there is strong potential for learners to guess word meanings incorrectly. However, research by Le Blanc & Painchaud (1985) suggests learners are able to evaluate themselves quite accurately if descriptors are couched in practical terms.

1.3.6 The Research Setting

The two studies comprising this investigation were conducted in the Language Centre of the University of Newcastle-upon-Tyne. The participants in the Questionnaire Pilot Study were students on Oriental Languages (Japanese, Korean and Chinese) undergraduate degrees, which, at the time of the study, were run by the Language Centre. The majority of students on these degrees are British or European, but some are from Japan, Korea or China and are studying another Oriental language as part of a BA in Combined Honours. All of these students must spend a year in the target language country in the third year of their studies. The participants in this investigation were, therefore, in the first, second and fourth year of study.

Participants in the Main Study were all overseas students on the Foundation-Bridging Year course or In-Sessional classes both of which are run by the Language Centre. Because of the variety of classes from which they were drawn, subjects varied a lot in background and age. For example, Bridging Year students tend to be young (18 to 21 years of age) and concerned much more with their English level than achieving success in an academic subject. Students in In-Sessional classes, on the other hand, tend to be older, were either under-graduate or post-graduate, and strongly focused on their own subjects. For them, English was the medium of their studies, not the object.

Lastly, the computer-based research was carried out in a computer room in the Language Centre which was usually used for IT support or In-Sessional classes. Having had classes there, all of the subjects were familiar with it. This computer room was reasonably large (16 computers) and well-lit. It could also be reserved for the exclusive use of the investigator. As there were never more than 4 subjects at a time, the environment in which the research was conducted was therefore quiet and comfortable.

1.4 Statement of the Problem

The main question investigated in the present research is what the relationship is between formal-functional biases in learners' beliefs about language learning and what they actually do in vocabulary learning software providing a choice of activities associated with formal and functional approaches. These activities were learning vocabulary by reading a definition (deductive, explicit and form focused), reading a context example (inductive, implicit and meaning focused), doing multiple choice questions (passive and therefore associated with formal learning), and reconstructing a sentence from key words (productive and therefore associated with functional, meaning-focused learning). In addition, the amount of effort as measured by the time invested in the learning task and the number of screens accessed was considered to be an important aspect of learners' preferences. For example, accessing certain activities in a certain order very quickly would suggest that the learners are skimming material rather than seriously attending to it.

To answer this question, the investigator needed a questionnaire to find out what learners believe and software that logged learners' decisions. It was decided to use a section of an existing questionnaire, the BALLI (see Section 1.3.2 above), which focused on formal-functional bias in general beliefs. The investigator also decided that as a preliminary stage in establishing learners' beliefs, the subjects would be asked to define the degree of formality and functionality of specified learning activities and then to evaluate the efficacy of these activities. Relationships shown between general beliefs and beliefs about the efficacy of activities which the learners themselves defined as formal or functional would then provide a comparison with relationships between general beliefs and actual behaviour.

Regarding the software used, some way had to be found to differentiate variations in choices made. It was decided that the most likely reason for changes in learning preference would be the learner's level of prior knowledge of the target vocabulary. This is supported by research suggesting that appropriate methods of learning vocabulary vary according to the difficulty or newness of the target (Coady, 1997). Measurement of this was accomplished by simply asking the subjects what their level of prior knowledge of the target was. The ability of learners to evaluate their own levels is supported, for example, by research by Le Blanc & Painchaud (1985).

The background to the study given above (see Section 1.3) shows that there are growing bodies of research on language learners' beliefs and on learner behaviour in software designed for language learning. However, there appears to have been no research conducted on the relationship between learners' beliefs and patterns of choice of learning preferences in such software. Moreover, there has been no attempt to measure learning preferences in computer environments in relation to prior knowledge. This gap in the research may be due to the short history of investigation in this area, but as there is now an established body of research, it is appropriate that we start looking at the bigger picture of how beliefs relate to behaviour. Five main questions were formulated to guide the investigation:

1. Does definition of language learning in general as formal or functional relate to preferences for specific learning and practice activities? If so, how?
2. Does definition of specific language learning tasks as formal or functional relate to preferences for specific learning and practice activities? If so, how?
3. Does prior knowledge of the specific language item being studied relate to preferences for specific learning and practice activities? If so, how?
4. Is there a relationship between learners' formal or functional bias in beliefs about language learning and the amount of effort subjects invest in learning and practice in the computer environment created for this investigation?
5. Does preference for formal or functional learning and practice activities relate to the amount of effort students put into learning and practice in the computer environment created for this investigation? If so, how?

Five hypotheses and 19 sub-questions were also formulated (see Chapter 4.1).

1.5 Purposes of the Study

Having stated the problem, the purposes of the investigation were to:

1. Identify learners' beliefs about the task of language learning and classify them along a scale of formality or functionality. These beliefs are referred in this study as *general beliefs*.
2. Identify learners' ratings of the efficacy of activities which they themselves had defined as more formal than functional or vice versa³. Comparisons could then be made between stated beliefs and ratings for efficacy. This is intended as a preliminary step measuring these beliefs against actual behaviour.
3. Compare stated beliefs, both general and about the efficacy of activities, with learning preferences recorded in language learning software.
4. Compare beliefs with the effort invested in the learning task as measured by the mean time spent on target items by level of prior knowledge and the mean number of screens accessed per target item by level of prior knowledge.

Both qualitative and quantitative methods were employed in the analysis of the data obtained. Qualitative methods, particularly with patterns of navigation through the hypertext, were utilised to provide answers to questions where the small sample sizes available to the investigator precluded quantitative statistical analysis. Quantitative methods, mostly non-parametric statistics, were employed in comparing general beliefs with ratings for the efficacy of activities and also beliefs with effort invested in the learning task. Research tools were primarily questionnaires and logging of user choices in the hypertext. Post-hoc interviews also provided some background data on reasons for learners' choices.

1.6 Significance of the Study

Learners' beliefs are a worthwhile focus for research for two reasons. Firstly, they matter to the individual learners. Whatever beliefs we have, we have come by them

³ In a very limited number of cases, activities were related as equally formal and functional (see Chapter 5.1.1.3.1 and Chapter 6.2.1.3).

quite possibly through difficult experience and do not give them up easily. A language learner may have spent many years studying that language, perhaps more than the teacher has spent teaching. The learner may pay lip-service to the principles espoused by the teacher, but apart from asking and trusting what the learner says, we have no way of knowing what the learner really believes or if these beliefs are changing. Secondly, as Riley (1994, p. 7) argues, they exist, so language teachers have to deal with them. To help learners develop, we have to understand what their beliefs are, why they hold these beliefs and how they influence their actions.

Regarding CALL, teaching methods based on it are still in relative infancy compared to traditional (hard copy) approaches. It seems that the technology teachers can use progresses much faster than language teachers can learn how to use it. This research does not focus on state of the art technology, but on a particular principle of materials design: offering the choice between different methods of learning and practicing a linguistic item in a hypertext environment, and observing how learners take advantage of it (see Section 1.3.3 above). Therefore, this research may be of help to future designers of hypertext language learning materials; the power of hardware and software will certainly increase very quickly, but materials design, what the learner actually sees, will progress much more slowly.

Regarding the gap in research which this investigation seeks to fill, there has been no research the investigator is aware of that specifically focuses on the relationship between beliefs about the formal-functional nature of the language learning task and behaviour in a computer learning environment. There have been studies which investigated relationships between beliefs and behaviours. For example, Yang (1993, 1999) looked for correlations between responses to the BALLI and learning strategy use and Cortazzi and Jin (1996) looked at relationships between beliefs and classroom behaviour on a quite general level. However, the investigator is unaware of any study which focuses on the relationship between formal-functional bias and preference for specific activity types. If we look at CALL, research has focused very much on learner attributes such as cultural background (Johnson and Brine, 2000) or factors which influence success or failure using CALL (Jamieson et al, 1993) or the relationship between learning styles and motivation and CALL (Soo, 1999). However,

the investigator has found nothing which focuses on the relationship investigated by the studies described in this thesis.

Lastly, the subjects of the main study, who attempted to learn vocabulary using the language learning software, were learning in autonomous mode. Although this research does not ask specific questions about autonomy, conclusions on learners' exploitation of freedom to choose how to learn cannot be avoided. Ultimately, we have to ask if the learners were really learning autonomously and, if so, how this autonomy was manifested. This research, therefore, represents a qualitative and quantitative appraisal of autonomous learning behaviour. If it can be established that learning in a computer environment encourages this type of behaviour, this would be a small step towards developing the effective application of this behaviour for language learning in computer environments.

1.7 Limitations and Delimitations of the Study

The limitations of this investigation are, firstly, that the samples for the pilot and main study are not totally reflective of the overall population of language learners. People study languages for many different reasons in many different environments. The pilot study sample consisted of specialist language learners whose focus in the university was solely on learning language. In addition to this, the pilot study subjects were studying Oriental languages. Their questionnaire responses must, to some extent, have been influenced by the differences (e.g. orthographic differences) between these and European languages. Furthermore, 9 out of the 30 respondents were overseas students from East Asia. While there appeared to be some differences between these subjects and the rest of the sample in the efficacy they ascribed to particular activities, these differences did not impact on the main research questions being asked. That is, while they suggest reasons why a subject might have a certain preference, they were not related to the relationship between beliefs and preferences for particular activities. Bearing these factors in mind, comparisons made between this group and language learners as a whole and also with the main study sample are therefore limited.

The representativeness of the main study sample is limited by the selection method. Subjects were randomly assigned to one of four groups. However, all subjects were

volunteers. They were, therefore, possibly more enthusiastic about language learning, using a computer or taking part in research for its own sake.

In addition, both samples may have been subject to bias caused by a desire to respond according to what teachers over the years have told them is a correct opinion or to please the investigator. Any questionnaire research is likely to be subject to this problem, however, and for the purposes of this investigation, it is assumed that questionnaire responses are unbiased.

A second limitation is sample size. For the purposes of the pilot study ($n = 30$) and main study ($n = 40$) questionnaires, this was not a severe problem as some quantitative analysis was possible. However, for the part of the main study involving software ($n = 10$), sample size became a problem. As the hypertext allowed a total of 17 different pathways through it, 10 subjects was not enough to allow statistical analysis of preferred pathways. Qualitative analysis was, therefore, employed. It was found, however, that this analysis provided a fairly clear picture of subject interaction with the program.

A third limitation is the nature of the questionnaire data. The rating scales used provided only ordinal data which, combined with sample size, limits analysis to descriptive analysis and use of non-parametric statistics. For example, means cannot be calculated for ordinal data and median values, a much less precise measure, have to be used. As reliability and validity are limited by the nature of the data and the sample size, conclusions are likewise limited.

A fourth limitation was the conditions under which the experiment was carried out. For the main study, availability of subjects and computer facilities was limited and the experiment could not be carried out with the subjects together in one group. In the main study, the questionnaires and computer activity were done one after the other, but subjects attended on different days at different times. Variations in conditions from one day to the next may have affected the results somehow, but this is ignored as a factor in the results as no such effects were noticed by the investigator.

Two limitations were related specifically to the computer program. Firstly, interviewing of every subject would have been ideal but this was not possible due to time constraints and individual personal factors such as leaving for vacation. The interviews which were carried out, however, were very informative and, although more interviews would have provided more information, the information already obtained was adequate for the purposes of the investigation.

Secondly, although as much as possible was done to make WordLearner a realistic learning environment as opposed to a research platform, the lack of an exit button, no reverse navigation being allowed, and limited content detracted from the aim of producing realistic learning material. In addition, the experiment was not part of a real class and target vocabulary was not related to any particular student need. The investigator paid special attention to any problems that might have arisen because of this, but none appeared to. Feedback on the program from subjects was very positive and it appeared that they were happy to learn some new words whether or not they were immediately useful to them.

The delimitations of the study were firstly that the subjects were very experienced language learners. The opinions they gave and the choices they made in WordLearner could therefore be generalisable to a wider population of experienced learners. Secondly, questionnaires were filled out voluntarily and without time constraints. Responses are therefore assumed to be considered and unhurried. Thirdly, the method of recording subject interaction with WordLearner, on-line logging, is completely invisible to the users. It is completely non-invasive and, as such, no experimenter effect originates from use of the data collection instrument. Lastly, the combination of quantitative and qualitative analysis allows greater generalisability.

1.8 Thesis Structure

This chapter is followed by a review of the published literature that is relevant to this investigation (Chapter 2). Following this, a short chapter will critique the research methods used in this study (Chapter 3). This will be followed by a description of the procedures and methods used in the investigation (Chapter 4). The next two chapters will provide a description and analysis of the data obtained in the investigation, taking

each of the two studies in turn (Chapters 5 and 6). There will then be a discussion of the research findings (Chapter 7). The final chapter will describe the research conclusions based on this discussion, the pedagogical implications of the research findings and suggestions for further research (Chapter 8).

Chapter 2 Literature Review

The issues involved in this research study have been divided into three main sections. The main body of the literature review will begin with a discussion of beliefs about language learning and relevant writings and research on the role of metacognitive knowledge in SLA (Section 2.1). We will continue with a summary of relevant theory and research into language learning preferences and strategies in mainstream SLA research (Section 2.2). This will include a detailed discussion of relevant individual differences in language learning and the role of autonomy in CALL⁴. The final section will cover relevant theory and research on vocabulary learning including a discussion of relevant cognitive processes (Section 2.3).

The basic structure of each section of this literature review is, firstly, to cover relevant theory and research from work published in mainstream second language acquisition (SLA). Secondly, relevant theory and research from work published in the field of computer assisted instruction or learning (CAI/CAL) will be discussed. The reason for this is that while we must be very circumspect in inferring implications for language learning from non-language learning research, language learning is not completely different from any other kind of learning and it would be foolhardy to ignore the possibility that work has been done in other fields that can be of help to language learning research. It is also an unfortunate fact that there may not be much directly related CALL research. Thirdly, we shall review relevant theory and research in CALL and discuss the implications of published work in SLA and CAI/CAL for CALL.

2.1 *Beliefs about Learning a Language*

2.1.1 Introduction

It is quite common for EFL teachers to hear students make statements such as “I’m too old to learn a foreign language well”. Such statements represent beliefs that these students have about learning languages. That these statements are very possibly ill

⁴ Although the software used in this investigation is referred to as “a computer environment”, the most relevant area of theory and research is CALL.

founded is irrelevant; if students believe them, they are real to the student and may have a negative effect on language learning. There is, therefore, a corresponding concern in the English teaching profession that beliefs matter. However, while an understanding of the part played by learners' beliefs about language learning is considered central to learner training (Gremmo & Riley, 1995, p. 158; Victori & Lockhart, 1995, p. 225) and to the ability to learn autonomously (Cotterall, 1995, p. 195, Ho and Crookall, 1995, p. 236), very little research has been done into the relationship between what learners believe about language learning and what they actually do (Victori, 1999, p. 538).

The next section will attempt to clarify what we mean by the term "belief". This will be followed by a description of what authorities include under the umbrella of metacognitive knowledge and a proposed framework for the analysis of metacognitive knowledge. Finally, there will be a discussion of relevant research into the role of beliefs in learning a foreign language through both traditional methods and CALL.

2.1.2 Theoretical Background

2.1.2.1 Defining Belief

This section will discuss definitions of belief from two standpoints: the relationship between belief and attitude and between belief and knowledge.

2.1.2.1.1 What's the Difference Between a Belief and an Attitude?

The answer to this question is based on analysis of the structure of attitudes. This is too large an area to do justice to here and, as the focus of this investigation is the nature of beliefs themselves, this very brief discussion is intended simply to show how, in a general sense, contemporary social psychologists view the relationship between beliefs and attitudes. This discussion is based on Ajzen's (1989) summary of work on attitude structure.

Attitude is defined here as "an individual's disposition to respond favorably or unfavorably to an object, person, institution, or event, or any other discriminable aspect of the individual's world" (Ajzen, 1989, p. 241). The key point of this definition, in common with most other definitions of attitude, is the idea that an

individual evaluates the object of the attitude positively or negatively and as attitudes themselves are difficult to access, researchers can only infer them from measurable responses (Ajzen, 1989, p. 241-242). The generally accepted categorisation for these responses is cognition, affect and conation with a further division into verbal and non-verbal (Ajzen, 1989, p. 242). Table 1 shows a more detailed breakdown of responses from which researchers can infer attitudes.

	<i>Response Category</i>		
<i>Response Mode</i>	<i>Cognition</i>	<i>Affect</i>	<i>Conation</i>
Verbal	Expressions of beliefs about attitude object	Expressions of feelings towards attitude object	Expressions of behavioural intentions
Non-Verbal	Perceptual reactions to attitude object	Physiological reactions to attitude object	Overt behaviours with respect to attitude object

Table 1: Responses used to infer attitudes (from Ajzen, 1989, p. 242)

From Table 1, we can see that expressions of belief are classified as verbal cognitive responses. The difference between verbal cognitive, verbal affective and verbal conative responses is in the emotional or behavioural content of the response. The following three statements on the role of grammar in language learning are examples of each type of verbal response:

Statement	Response Type
Learning English is mostly a matter of learning grammar rules	Cognitive
I hate learning grammar rules	Affective
I would avoid taking grammar classes	Conative

The answer to the question of what the difference is between a belief and an attitude is therefore that beliefs are verbal responses that reflect perceptions of, and information about, the attitude object (Ajzen, 1989, p. 243). Beliefs are a component of attitude and are differentiated from verbal responses with an emotional (affective) or behavioural (conative) component.

2.1.2.1.2 Believing vs Knowing

Research interest in our personal beliefs about how we acquire knowledge is based on a recognition of the importance of these beliefs to our thoughts and actions (Alexander and Dochy, 1995, p. 414). The first problem in discussing beliefs is defining what they are and to a great extent this is a process of distinguishing the concept of belief from the concept of knowledge; when do we say we believe something and when do we say we know it? This distinction is very much a matter of individual perception which may be affected by factors such as level of education or culture (Alexander and Dochy, 1995, p. 415). Moreover, knowing something is not necessarily the same as believing it (Alexander and Dochy, 1995, p. 433).

These distinctions are important for this research study because, as we will see below (see Section 2.1.2.3), individuals may hold on to their beliefs tenaciously; factual knowledge, on the other hand, may be cast off more easily. For a review of how authorities have distinguished belief and knowledge in terms of strength of conviction and objective-subjective validity, the reader is referred to Alexander and Dochy (1995). For the educational researcher, a practical approach to distinguishing belief from knowledge is that of Dewey (1910). He defined belief as a component of knowledge, avoiding the position that belief and knowledge are completely separate concepts in the sense that one either believes something or knows something, not both at the same time. Dewey's definition is useful because, in creating a framework to describe metacognitive knowledge, accepting that there is an overlap between knowledge and belief allows us to talk about belief as an element of metacognitive knowledge (Flavell, 1979, see 2.1.2.2.1). This approach to defining belief has been taken by Alexander and Dochy (1995) and Wenden (1995).

2.1.2.2 *Metacognitive Knowledge - What Does it Consist Of?*

In this section, we shall look at metacognitive knowledge from 2 perspectives. The first perspective is that provided by Flavell's Model of Metacognitive Monitoring (1979), which provides a broad framework for the classification of types of metacognitive knowledge. Secondly, we shall look at how specific beliefs can be classified. In particular, we will examine two contrasting views on this; the unidimensional (Perry, 1968, 1970; Ryan, 1984), and the multidimensional

(Schommer, 1990; Mori, 1999a, 1999b). We shall begin here with a general summary of what metacognitive knowledge could be considered to consist of.

Wenden (1998, p. 517) defines three key characteristics of metacognitive knowledge, learner beliefs, learner representations, and the learner's naïve psychology of learning. Learner beliefs are examined in further detail below in Section 2.1.2.2.1. Use of the term "learner representation" is a recognition that the "knowledge" which we internalise is not exactly the same as the reality with which we are faced. What we actually remember is what we perceive. The learner's naïve psychology of learning is metacognitive knowledge gained through experience and which through a process of hypothesis testing by the learner has been validated and incorporated into existing knowledge in a logical way.

The learner's experience of developing a naïve psychology of learning is very similar to what Flavell (1979, p. 908) terms "metacognitive experience" in which an individual has conscious experiences such as a temporary state of confusion or a feeling of not being able to communicate. Metacognitive experience (Flavell, 1979, p. 908) is important to metacognitive knowledge because it can lead to:

1. The setting of new goals or tasks
2. Modification of existing metacognitive knowledge
3. Activation of metacognitive or cognitive strategies

Metacognitive knowledge, while it is a specific type of knowledge, is also fundamentally no different from any other kind of acquired knowledge in that it is stable, statable, logical, and is a representation of the learner's experience (Flavell, 1979, pp. 907-908). Lastly, metacognitive knowledge should not be confused with metacognitive strategies. The former is purely knowledge about learning while the latter are learning skills (Wenden, 1999, p. 436).

2.1.2.2.1 Flavell's Model

In order to categorise and analyse learners' beliefs about the acquisition of a foreign language, we need a model of metacognition in which to place these beliefs. Flavell

(1979, p. 907) has proposed a model of metacognitive monitoring consisting of metacognitive knowledge, metacognitive experience, tasks, and strategies.

Metacognitive experience has been briefly described above (Section 2.1.2.2) and strategies will be discussed later (Section 2.2.1.3). Here, since metacognitive knowledge is central to this current study, it will be described in more detail.

Flavell (1979, p. 907) defines metacognitive knowledge as consisting “primarily of knowledge or beliefs about what factors or variables act and interact in what ways to affect the course and outcome of cognitive enterprises”. He proposes that there are three components of metacognitive knowledge:

1. Person knowledge refers to what you believe about yourself and others as “cognitive processors” (Flavell, 1979, p. 907). Person knowledge would, therefore, include beliefs about how factors such as age, gender and aptitude affect language acquisition (Wenden 1998, p. 518).
2. Task knowledge refers to knowing how aspects of the task such as degree of organisation or purpose relate to task management. A student attempting a badly organised activity may know that she should impose enough organisation on it to be able to learn from it. Task knowledge also refers to knowing what the task’s goals and demands are. A student of Chinese quickly comes to understand that learning to write a character means becoming automatic in writing it and that achieving this requires practice and repetition.
3. Strategic knowledge refers to beliefs about how task goals can be achieved. A student approaching a difficult reading task may believe that getting the dictionary and a highlighter pen ready might be a good idea. Wenden (1998, p. 519) proposes that knowledge about strategies is so closely related to task knowledge that it should be regarded as a subset of this. For the purposes of this research study, strategic knowledge will also be regarded as part of task knowledge.

2.1.2.2.2 Beliefs in Action: How Do We Classify Them?

Flavell’s model of metacognitive monitoring (see above Section 2.1.2.2.1) provides a very broad framework within which we can understand the nature of metacognitive knowledge, but it says nothing about what learners actually believe or how to measure

beliefs. Two theoretical approaches which do enable this, the unidimensional (Perry, 1968, 1970) and the multidimensional (Schommer, 1990) models, will be described here.

Perry (1968, 1970) classified students' general beliefs about the nature of knowledge unidimensionally, placing learners somewhere on a continuum along which they develop in a fixed progression as they become more mature learners. Accordingly, learners' understanding of the nature of knowledge and its acquisition would be somewhere on a scale between dualist (fact-oriented, right or wrong, true or false) and relativist (context-oriented, factual knowledge is interpreted and integrated) (Perry, 1968, 1970; Ryan, 1984). The simplicity of Perry's (1968, 1970) "rule of thumb" proposition that learners mature from a view of uncomplicated, unambiguous knowledge to one that is more complex is appealing. However, analysis based on this view has failed to produce consistent results as beliefs may not be unidimensional and may not develop in a series of set stages (Schommer, 1990, p. 908).

It is more likely that learners' conceptualisations of knowledge and learning consists of multiple independent dimensions (Schommer, 1990, p. 498). Schommer (1990, p. 498) proposed that these dimensions are related to beliefs about the structure of knowledge, certainty, source, control, and speed of acquisition. Her own research and that of Mori (1999a; 1999b) working in SLA (see Section 2.1.3.2.2.1 below) appears to confirm this.

2.1.2.2.3 Flavell's Model of Cognitive Monitoring: How Does it Relate to this Study?

Two of the above categories of metacognitive knowledge relate directly to this study. Firstly, beliefs about the nature of the language learning in general, as well as the nature and purpose of specific language learning activities, are task knowledge; these beliefs are investigated through Parts 2 and 3 of the questionnaires used in this study. Secondly, beliefs that form the basis for decisions on how to carry out a task are strategic knowledge. The final section of the questionnaire used in this study investigates how effective the subjects believe specific activities are. This reflects how they think the particular goal can be achieved and may therefore be regarded as an indication of strategic knowledge.

Very little research has attempted to examine the link, if any, between metacognitive knowledge and learning behaviours (Wenden, 1998, p. 519). However, Wenden (1998, p. 519) suggests that as so much of the research into learning strategies is accomplished through methods that ask students to reflect on their learning (e.g. questionnaires, interviews) the data acquired this way can be viewed as representative of their strategic knowledge. The review of the literature on research into learning strategies in Section 2.2.1.3 below will interpret it from this perspective.

2.1.2.3 Why Do Beliefs Have Such a Powerful Effect on Behaviour?

People tend to cling to their beliefs as if they were dearly held possessions (Abelson, 1986, p. 223). The argument proposed (Abelson, 1986; Alexander and Dochy, 1995) is that while factual knowledge may be held with detachment or even disdain, beliefs are not. Alexander and Dochy (1995, p. 424), when asking individuals to define knowledge and beliefs, found that knowledge tended to be seen as arising from formal learning situations, while beliefs were founded on everyday experiences. In addition, individuals' definitions of belief were often bound up with goals, intentions and decision-making.

Alexander and Dochy also found that definitions of belief were culturally biased. Strongly held religious beliefs among one group of subjects (undergraduates at a Mid-Western American university) appeared to influence their definition of knowledge with some seeing knowledge as simply declarative information. Knowing something (or "*of it*" or "*about it*") did not necessarily mean one had to believe it. For example, one might know about the theory of evolution but not believe it because it is contradicted by a higher authority, the Bible. The other group of subjects (Dutch distance learning students), who were not particularly religious, associated knowledge with truth and belief with lack of proof.

Furthermore, there appears to be a strong affective, value-related component to belief that is not found in knowledge. In the Alexander and Dochy study, the American subjects indicated a strong value relatedness for beliefs and the Dutch subjects associated beliefs with certainty (despite their associating it with lack of proof). It is

easy to accept without much thought the simple fact that two plus two equals four, but to believe something in the absence of objective proof requires an emotional commitment. One can keep arithmetic at arms length, but one embraces faith in God.

Lastly, it has been argued that beliefs tend to have a subconscious good and bad tag attached to them (Schommer, 1994) and that they can be part of a larger framework of beliefs. For this reason, desired changes in an individual's behaviour that another individual might regard as minor can result in serious resistance. Schommer (1994) uses the example of a group of women in an office who customarily make the coffee for everyone, including their male colleagues. One day, the women decide that the men should share the coffee making, but the men refuse saying that they don't mind making coffee, but if the women are going to make an issue out of something as trivial as this, then they will not do it on principle. This example provides an interesting example of the power of the value-relatedness of beliefs; although the men might not be conscious of it, changing the practice of who makes the coffee undermines the values they have grown up with. One could imagine a situation in which a belief about language learning is founded on a deep-rooted common sense assumption that is never questioned by an individual and that this belief is part of a framework influenced by culture and years of experience.

Alexander and Dochy (1995, p. 438) suggest several reasons why beliefs may be hard to change. Firstly, beliefs as opposed to knowledge are harder to convey, harder to access, and harder for the individual to relate to his/her knowledge base. Teachers might, therefore, avoid tackling beliefs about learning. Secondly, regarding language learning behaviours, a teacher attempting learning strategy training cannot tell if a student really believes what the teacher is saying; without the ability to evaluate the effect of instruction, the teacher is less likely to succeed. Lastly, Alexander and Dochy's data (1995, p. 437) suggests that there is a strong emotional investment (as indicated by the associations with affect, value-relatedness and certainty) in what students believe which means that change might only happen when they find incontrovertible evidence against what they believe or are subject to extreme experiences. Underlining this, some of the American subjects indicated that it was a sign of moral character to resist change.

2.1.3 SLA Research on Beliefs

Having discussed what beliefs about language learning are, and how they are related to attitudes and metacognition in language learning, we should now discuss why they should be researched and the methods used to collect data on them.

2.1.3.1 Why Should We Investigate Beliefs About Language Learning?

The core of this investigation is the relationship between what students believe and what they do working by themselves in a language learning computer environment. The main issue at hand, therefore, is autonomy. Learners' beliefs about language learning are recognised as having key importance to learners' abilities to learn autonomously (Wenden, 1999, p. 436). The assumption is, therefore, that beliefs about the nature, purpose and value of activities influence learning decisions in an autonomous context. Wenden (1999, p. 437) sees knowledge of beliefs as fundamental to understanding the development of the ability to make informed decisions and to learn autonomously, as, in her view, it is a logical assumption that successful self-regulated learners need appropriate metacognitive knowledge (i.e. person, task, and strategic knowledge).

To conclude, the importance of beliefs to students' learning preferences within an autonomous computer environment should not be underestimated; student's metacognitive knowledge must have as much bearing on language learning software as on any other type of learning. We will now move on to discuss research on beliefs and to establish as far as possible the links between the theory and research described above and research results from SLA and CALL/CAI. The research covered falls into two broad categories according to the data collection technique; we will firstly focus on studies that used questionnaires and secondly on studies that used interviews and/or verbal protocols.

2.1.3.2 Questionnaire Studies

2.1.3.2.1 Research With the Beliefs About Language Learning Inventory (BALLI)

2.1.3.2.1.1 What Is the BALLI?

Developed by Horwitz (1987) to investigate language learners' beliefs, the BALLI consists of statements about language learning that respondents rate on a five point

Likert scale between strongly agree and strongly disagree. It has been used to investigate the beliefs of Chinese students in Taiwan (Yang, 1993, 1995, 1999), a mixed sample of EFL students in the US (Horwitz, 1987), freshmen Modern Languages students at a US university (Horwitz, 1988), Korean students in Korea (Park, 1995), and 7th. grade American students (Mantle-Bromley, 1995). A sample of a complete BALLI is given in Appendix A. The whole questionnaire covers the following themes in language learning beliefs:

1. The difficulty of language learning.
2. Foreign language aptitude.
3. The nature of language learning.
4. Motivations and expectations.
5. Learning strategies.
6. Communication strategies.

The items in the BALLI were developed using a combination of brainstorming sessions with language teachers to produce lists of their beliefs (or what they thought their students' beliefs were) and focus groups. Beliefs thus identified were then categorised into themes.

2.1.3.2.1.2 Strengths and Weaknesses of The BALLI

A review of the BALLI (Kuntz, 1996) concluded that the limits of Horwitz's BALLI studies were that:

1. Themes had been created from opinions of teachers rather than students.
2. These themes had not been based on statistical analyses (e.g. ANOVA etc.).
3. Horwitz had only used descriptive statistics.
4. Horwitz had only sampled university students in European languages at the University of Texas at Austin, so there was probably a high percentage of false beginners and bilinguals.

In the belief that large sample sizes and the resulting ability to apply more sophisticated statistics, this review concluded that BALLI could be a good tool in

large-scale studies where multivariate analysis could be applied. Such studies are exemplified by Yang (1993) whose investigations of Taiwanese students' beliefs and strategies had sample sizes in the hundreds. Therefore, although the BALLI has strengths, it also has weaknesses, the most important of which is that it is based on teachers' rather than students' beliefs.

2.1.3.2.1.3 Studies Using the BALLI

Up to 1999, 13 known studies (Horwitz, 1999) have been carried out on students' beliefs about language learning using the BALLI. A summary of the research and its implications for this study will be given here. Particular attention will be given to Yang's research as it relates quite well to the subjects of the main study in this investigation, the majority of whom were East or South-East Asian.

Horwitz' 1988 study focused on freshman students of French, German, and Spanish. She found (pp. 288-291) that many students believed that learning a language is a matter of translating, and learning grammar and vocabulary. In addition, students also agreed (98%) that "repetition and practice" and practice in the language lab were also important. Conflicting opinions from the French students, who were slightly more functional in their preferences, indicated that opinions may be influenced by teaching. Her pedagogical conclusions were that students with such formal beliefs are less likely to adopt more effective strategies and that we should "confront erroneous beliefs with new information" (p. 292). This ignored another interpretation that it might be that their metacognitive knowledge (possibly based on learning experiences in other domains) suggested these strategies are appropriate for their level.

In a large scale study, Yang (1993) administered a translated (Mandarin) version of the BALLI together with the Strategies Inventory for Language Learning (SILL) (Oxford, 1990), an Individual Background Questionnaire, and open ended questions to undergraduate English majors in Taiwan. She found (pp. 3-6) strong beliefs that they were good at learning English (self-efficacy), that English was an easy language, high instrumental motivation, and, although a substantial minority disagreed, formal practice was highly valued. For those who felt a strong self-efficacy, there was also an emphasis on functional practice strategies such as watching movies and listening to

the radio. Within this data, learners appeared to value both functional and formal practice at the same time. Yang concluded that this conflict in beliefs stemmed from a need to succeed in the exam system combined with a realisation that fluency was based on communicative practice.

Yang's 1993 study also highlighted the importance of context. She compared these results (pp. 6-7) to a study by Horwitz (1987) of ESL students in the US who, though similar in many respects to the Chinese students, felt that English was harder and who had lower instrumental motivation. Yang suggested that the Taiwan students felt learning English was easy because they had been studying English for 6 years already and that the difference in instrumental motivation was due to the context of studying in Taiwan. The ability to speak English has a high status in Taiwan and helps in getting a good job.

Regarding the issue of conflicting formal and functional beliefs arising in Yang's 1993 study, this demonstrates that such beliefs may not necessarily be mutually exclusive. The ability to take different approaches as needed to language learning may be a distinguishing characteristic of good language learners (Gremmo & Riley, 1995, p. 158). Furthermore, Yang's Taiwanese respondents might not only have been good language learners, but might also have been aware of the need to succeed within the system; language learning cannot be divorced from the wider educational and cultural context.

Regarding the data suggesting that Chinese students in Taiwan felt that learning English was easier compared to ESL students in America (Horwitz, 1987), we might also ask how these learners conceptualised "learning English" (see Section 2.1.3.2.3.1). In Taiwan, where there is little need for the L2 in daily life, they are more likely to have a more "quantitative" conceptualisation of what it means to know a foreign language in the sense of "knowing words" or getting high scores in exams; in a US university context, however, the students may have a more "qualitative" conceptualisation in the sense that knowing the foreign language means "being able to function in an English speaking classroom".

2.1.3.2.1.4 What Accounts for the Differences and Similarities in Beliefs Measured by the BALLI?

A recent study by Horwitz (1999) compared data from 8 studies (four using American, two using Korean, one using Taiwanese, and one using Turkish subjects) that used BALLI in an attempt to see if culture accounts for differences in beliefs or whether other factors were more important. This study found that differences were more clearly attributable to learning circumstances than culture. Horwitz concluded, firstly, that groups may have a great deal of similarity within them, but a sometimes sizeable minority (as in the Yang (1993) study) that have different beliefs should be expected. Secondly, there appears to be a lot in common between groups from different cultures and that "Perhaps there is a world culture of language learning and teaching which encourages language learners of many cultural backgrounds to perceive language learning very similarly." (Horwitz, 1999, p. 575).

2.1.3.2.1.5 Summary of BALLI Studies

The BALLI has been used quite extensively in both small and large scale studies. Samples tend to be unique. On a general level, there do appear to be some cultural differences in beliefs between nationalities, but Horwitz (1999, p. 571) suggests these may be due to the differing status of language learning in the countries concerned. Comparing specific beliefs, the key difference may be learning context. No BALLI investigations have attempted comparisons across learning level (e.g. the same students at different stages of learning) or, apart from Mantle-Bromley (1995), with children.

2.1.3.2.2 Other Questionnaire Studies

2.1.3.2.2.1 Dimensions of Belief in Language Learning

In section 2.1.2.2.2 above, the probability was discussed that students' beliefs about the nature of knowledge in general might be composed of several distinct and independent dimensions. Can these dimensions be related to language learning and if so, how? Are the general beliefs described by Schommer (1990) (see Section 2.1.2.2.2 above) applicable across domains of knowledge or are they domain independent, functioning simply as the core of the learner's personal philosophy of learning (Mori, 1999b)? A number of studies provide evidence that there are several

dimensions to students' beliefs about language learning but that these beliefs are specific to language learning.

In a questionnaire study seeking to identify general beliefs and beliefs about learning Japanese and investigating the relationships between them, Mori (1999b) confirmed Schommer's dimensions of personal epistemology (see Section 2.1.2.2.2 above), but found little relationship between general beliefs and beliefs about learning Japanese. This, she argues (Mori, 1999b, p. 403), is accounted for by the abstract nature of the dimensions of general belief as compared to the more concrete, task-related nature of domain-specific beliefs; for example, one would not expect a specific belief such as "Kanji is difficult" to have any general relevance.

However, two significant correlations found (Mori, 1999b, p. 396) between general and language learning beliefs demonstrated that in some cases general beliefs can transfer. Firstly, a general dimension of belief that knowledge is simple and unambiguous correlated positively with avoidance of ambiguity in learning Japanese. Mori argues that a student who believes in the simplicity of knowledge would be likely to seek unambiguous clear-cut answers in language learning. Secondly, an indirect relationship was suggested by a negative correlation between beliefs concerning the speed of knowledge acquisition and risk taking in learning Japanese. Mori's explanation for this is that risk taking is associated with making mistakes and that learning from mistakes is a process that needs perseverance.

Indirect support for the proposition that beliefs about language learning should be seen as multiple dimensions is provided by research results from Wen and Johnson (1997). Primarily, their evidence suggests that cultural attitudes may determine perceptions of what are good and bad learning strategies. However, it is possible to interpret their results in the light of Mori's (1999a; 1999b) studies. In the Wen and Johnson study, a questionnaire on beliefs and strategy use was given to 242 2nd. year English majors from 5 institutions in Nanjing and Shanghai. They found that 3 strategies - vocabulary learning, risk-taking (inferencing words, tolerance of ambiguity), mother tongue avoidance - were directly related to achievement and that management strategies - planning, evaluation, study habits, affective control - had the strongest indirect effect. Beliefs about language learning and strategies were found to

have strong, consistent effects on strategy variables. For example, risk taking was found to have a negative relationship with achievement. The subjects perceived making guesses without using a dictionary to be lazy; the highest achievers consistently guessed and then used a dictionary to check.

2.1.3.2.2 Beliefs About the Appropriacy of Strategies

Previous experience, the learning context and the influence of culture have been investigated in several recent research studies. Elbaum et al (1993) investigated the relationship between learners' beliefs about appropriacy of learning strategies and previous learning experience and learners' definitions of language learning tasks which were categorised as combinations of declarative, formal, procedural and functional. The key conclusion of this study fits with Flavell's (1979) Model of Cognitive Monitoring in that the researchers propose that learners' experience determines learners' beliefs.

A key feature of both experience and context, "the teacher", has also been found to influence beliefs. Nolen and Haladyna (1990, p. 126) found that perceptions of teachers' goals had a strong influence on belief in the appropriacy of elaboration and monitoring strategies and that this would likely result in use of these strategies; if students perceived that teachers value certain goals, then the students value the strategies that help to achieve them.

Three other studies (Cotterall, 1995, 1999; Schulz, 1996) are of interest in discussing students' beliefs in relationship to the teacher. Schultz (1996) found that teachers' beliefs about the value of error correction and grammar did not accord with their students'. In a survey of foreign language students' and teachers it was found that students were much more positive about these than the teachers. The investigator's conclusion was that teachers, whose training and inclinations may have a bias against formal learning, need to make sure of what their students believe.

Cotterall (1995) developed a questionnaire on learners' beliefs based on interviews with students. She found (p. 197) that the two strongest factors in the data were the role of the teacher and the role of feedback. Her interpretation of the strongest factor,

the role of the teacher, was that these students were quite dependent on the teacher and not ready for autonomy. She also argued (p. 198) that the second factor, the role of feedback, indicated a dependence on the teacher for feedback, although this was somewhat ambiguous. In a follow-up study using a 90 item questionnaire based on the results of her 1995 study, Cotterall (1999, p. 505) found that while subjects agreed that making mistakes was part of learning, different people learn differently, and learning a foreign language takes a long time, the respondents also thought error-correction was valuable and also had a strong belief in the need to learn grammar.

Cotterall (1999, p. 508) argued that her research results reflected the working environment following the course in which grammatical accuracy was important to clear communication. However, the preference for error-correction and grammar learning may be more than just an adaptation to temporary circumstances; comparisons in other contexts of students' and teachers' attitudes to formal methods (Cortazzi & Jin, 1996; McCargar, 1993; Nunan, 1988; Willing, 1988) suggest that students are more favourable to formal methods than their teachers. Although negative attitudes to emphasis on grammar and vocabulary in class have been found (Tse, 2000), most of the published research suggests that formal preferences may be based on beliefs that are more entrenched than Cotterall suggests.

Lastly, in a wide-ranging study A Level foreign language students in a British high school, Graham (1997, p. 79) found that most subjects in the study seemed to have developed a philosophy of language learning with effective students combining functional belief that knowledge of the country and living there was important with emphasis on grammar and vocabulary (Graham, 1997, p. 79). Graham's findings are also relevant to issues such as anxiety and self-esteem, risk-taking, and motivation. This study will, therefore, be cited where relevant below.

2.1.3.2.2.3 Summary of Results from Other Questionnaire Studies

Mori's research (1999b) suggests that students' beliefs about language learning should be viewed as multi-dimensional and that we should not make simplistic generalisations about the structure of students' beliefs. Studies comparing students' and teachers' beliefs also show that students may have more formal preferences than

their teachers. The most consistent feature of results is the strong formal element in student responses. Taken as a whole, the research reviewed here suggests that while students do value functional strategies such as guessing or inferencing this is balanced by belief in the value of formal methods such as correction and pronunciation work.

2.1.3.2.3 Studies Using Interviews and/or Verbal Protocols

Four studies (Benson & Lor, 1999; Victori, 1999; White, 1995, White, 1999 #317) using these methods will be reported here. Victori (1999) used a combination of interviews and think aloud protocols in a case study of two “good” and two “bad” writers. She found that, in Flavell’s (1979) terminology, they differed in person, task and strategic metacognitive knowledge and that the particular metacognitive knowledge held by the learners determined the type of strategy or writing approach they adopted.

Other differences found by Victori (1999, p. 549-551) were, firstly, that good writers had a flexible, broad view of the writing task, while bad writers had limited, often inappropriate knowledge of the task. Secondly, the good and bad writers differed in the degree of personal involvement in the task and the effort they were prepared to invest. Therefore, some of the differences were due to laziness rather than beliefs or strategies. Victori concluded (1999, pp. 551-552) that this study confirmed that to understand good and bad learners and the strategies they use, it is important to understand their metacognitive knowledge.

White (1995) examined the relationship between learner autonomy, the instructional context, and strategy choice. In addition, she also investigated what, in terms of strategy use, differentiates distance learners from classroom learners. The findings that are of greatest interest here were that students appeared to make a lot of use of self-management strategy. White argued that self-management is fundamental to learning as it requires that the learner knows how s/he learns best, which is another way to say “what the learner believes about him/herself”. White also argued that autonomy in L2 learning results from how and how much the learner manages interactions with the L2.

2.1.3.2.3.1 Phenomenographic Studies

The two remaining studies (Benson & Lor, 1999; White, 1999) both made use of the phenomenographic approach, which places emphasis on the students' rather than the researchers' perceptions of reality. Benson and Lor (1999), who interviewed 16 first year Arts undergraduates at the University of Hong Kong, identified beliefs about language learning, self and the learning situation as three broad categories in their data. Belief in the importance of work and a quantitative/qualitative distinction tended to pervade all three categories (p. 466). For example, many of the students saw language as a collection of things to be learned and defined their own proficiency in terms of how many of these things they had learned (p. 467-470). Further learning was therefore defined by how much effort had to be invested for what return. These students tended to see a decline in the rate of return on effort and consequently also tended to be demoralised by this. Those who saw language more as an environment than a collection of items, saw their proficiency in terms of quality (e.g. how good they were in relation to native speakers) and saw further learning resulting from increased exposure to the language.

Benson and Lor (1999, p. 467-470) contend that conceptions and beliefs become functional or dysfunctional according to changes in context. Thus, quantitative conceptions of language learning led to success in the exam oriented Hong Kong education system but resulted in negative feelings in the university context. A transition to a qualitative conception of learning English was therefore necessary. The main pedagogical implication of their results was that to change beliefs, the learner must change the underlying conceptions and understand the context in which they apply.

White (1999), investigated the expectations and developing beliefs of novice distance language learners. Building on earlier research (White, 1995), she used a combination of interviews, open-ended questionnaires, ranking exercises, verbal protocols and scenarios in a longitudinal study lasting 8 months (a 5 month period of interviewing plus the 3-month course).

Her principal finding was that the most important issues for successful self-instruction take place between the learner and the materials (what White called "learner-context

interface”). There is a difficult and time-consuming process in which the learners had to adapt how they interacted with the materials and cope with the uncertainty inherent in the distance learning context (tolerate ambiguity). Students who perceived that they were in control of the learning (see section 2.2.2.4.2 for definitions of internal and external locus of control) tended to be more successful. White concluded that this study supports the view that beliefs help students understand and adapt to circumstances and are instrumental in defining behaviour.

2.1.3.3 *Summary of SLA Research on Beliefs*

This section on beliefs research in mainstream SLA has categorised this research primarily according to research methodology, either by questionnaire or verbal protocols and interviews. The BALLI studies reviewed have tended to point to learning context as an important influence on student beliefs (Horwitz, 1999, p. 574), which seem to be quite formal in terms of learning preferences. This formal preference is also highlighted in other questionnaire studies reviewed which have shown that students appear to want somewhat more grammar and error-correction than teachers using currently popular methodologies are prepared to give them. Several of the studies reviewed e.g. (Cortazzi & Jin, 1996; Wen & Johnson, 1997) focused on Chinese students and indicated formal preferences; however, some conspicuous exceptions such as Horwitz’ 1988 study of American university students suggested that Chinese do not have a monopoly on formal preferences.

The verbal protocol studies reviewed here have, because of the qualitative nature of the data they produce, yielded more general conclusions on the importance of beliefs. Even so, clear links can be seen. For example, in Benson and Lor’s (1999) study, Hong Kong university students were shown to conceptualise language learning in quantitative terms that parallel the preferences for grammar and error correction shown in questionnaire studies. Here, as well, we see the influence of context; Benson and Lor argue that conceptualisations of language learning become functional or dysfunctional according to the context (p. 467-470). Likewise, White (1999, p. 449) sees the most important issues for self-directed learning taking place in a process of adaptation in what she terms the “learner-context interface”.

The effects of different beliefs on learning have not been shown directly. However, research by Victori (1999, p. 549) has suggested that that metacognitive knowledge of language learning may have some influence as more able learners may be characterised by better task knowledge and a broader view of the task. The ability to adapt to materials, to cope with ambiguity and a perception of internal locus of control (see Sections 2.2.2.3.2.2 and 2.2.2.4.1.2 for discussion of this) of the materials increases the likelihood of success, at least in a distance learning situation (White, 1999, pp. 449-454).

2.1.4 Beliefs Research in CALL/CAI

2.1.4.1 CAI Research

CALL and CAI research with a direct concern for the role of beliefs is rare. To the best of my knowledge, two studies have investigated the role of epistemic beliefs in learning behaviour with hypertext (Altun, 1999; Jacobson, Maori, Mishra, & Kolar, 1996). Jacobson et al (1996), investigating the learning effects of different degrees of learner control over navigation through a hypertext program, found that students' epistemic beliefs affect learning from hypertext (p. 267). The investigators found that complex epistemic beliefs positively influenced the ability to transfer knowledge when users had been guided through themes in the hypertext materials (pp. 267-268). Although students with complex beliefs did better than those with simple beliefs when they were allowed to navigate freely (p. 267), these results suggest that some kind of learning support is needed, especially when prior knowledge is low (p. 273) and simply providing flexibility of presentation and freedom of control is not enough to help students learn (p. 266).

In a study of how two experienced users of the World Wide Web (WWW) read on-line, Altun (1999, p. 440) concluded that epistemic beliefs determine the way that computer users approach on-line reading material. In particular, he found that the belief that working on-line should be faster than with non-digital media was very important in determining whether a page was read or not; if download time was too slow, the two readers were resistant to accessing the page (p. 436). Therefore, beliefs about the technology affect the use of computers for learning.

2.1.4.2 CALL Research

Two published studies (Dhaif, 1990; Stevens, 1991), both of which were carried out in colleges in Gulf countries, provide indirect evidence on students' beliefs about learning with CALL. Both studies provide an interesting insight into the attitudes of a homogenous group of learners from a culture in which beliefs about language learning may have some similarity to those of East Asian students.

Dhaif (1990), surveying students at the University of Bahrain on their attitudes to computer lab sessions in their English course, found very formal beliefs regarding the use of CALL for learning vocabulary and grammar and concluded that these results were due to the nature of the respondents' classroom learning. These findings, which will be discussed in greater detail below (see Section 2.2.2.2.3.4), support the view that the educational context and previous experience to a large extent determines students' beliefs about the nature of language learning (Elbaum, Berg, & Dodd, 1993, p. 330); the students came from an educational background - possibly directly from classes - in which a high value was placed on formal learning and consequently pursued activities that emphasised language learning as a formal activity. However, Dhaif's study is now ten years old. Multimedia and the WWW were not in use at the time of the study and if it were carried out again, respondents' views may be different.

Stevens (1991) set out to investigate how Arab students in a college foundation course would take to use of computers to learn English. He found that attitudes were quite positive despite a general lack of experience with computers. After one semester, 52% of students surveyed attributed some of their improvement in English to use of computers. Some 49% stated that that they had received some help from the computer in learning English. On the whole, Stevens' results suggest that these students believed that CALL was beneficial in learning English. However, he reached no conclusions regarding the way in which the students thought CALL helped or what specific purpose there was in using computers.

2.1.4.3 Summary of CAI/CALL Research

Jacobson et al's study (1996) suggests that students' beliefs about the nature of learning and the structure of knowledge influence their learning in hypertext activities.

Although students who have complex epistemic beliefs appear to learn better from freedom of choice in hypertext, there is a definite implication that designers have to provide support for learning and not just expect autonomy to happen by itself. This may be equally applicable to CALL programs. Altun's (1999) study, highlighted the importance of beliefs about the technology itself. If a student expects a computer to present content very fast and this does not happen, that student will either have to develop coping strategies or give up in frustration.

Dhaif's (1990) and Stevens' (1991) studies which are the only CALL studies I have found directly referring to beliefs or perceptions are almost outdated. They suggest, however, that we cannot divorce CALL from either its educational or cultural context. If classroom learning is formal, student use of CALL may be formal also, but this does not mean that student reactions to use of the computer for language learning will be negative. If CALL is perceived to further the goals of the students, the teachers and the education system (as is suggested by Nolen and Haladyna (1990, p. 126)), its use is likely to continue.

2.2 General Background on Learning Preferences and Strategies

This section of the literature review will provide a brief summary of work on learning preferences and strategies that are considered relevant to this research study. It will begin with a consideration of individual differences that will be considered in the discussion of the research results. Learner strategies will then be discussed as learner behaviour may be regarded as a manifestation of learner beliefs (see Section 2.2.2.2).

The individual differences discussed are those which the writer considers most relevant to the variables being investigated: beliefs about language learning and learning preferences. These differences and the reasons why they are considered are:

1. Affective factors underlying risk taking: Several items in the questionnaires used in this investigation are closely related to risk taking.
2. Previous learning experience: This may to some extent determine beliefs about language learning and behaviour in WordLearner, the software used in this investigation.

3. Prior knowledge: This may be related to preferences for certain activities, the amount of effort invested in the task, and behaviour in WordLearner.
4. Socio-cultural background: This is a key factor in the education systems that the subjects in this investigation come from and plays a major role in previous learning experience. Much of the reported literature on autonomy cites the influence (or the lack of it) of culture in both language learning in general and autonomous learning in particular.

2.2.1 Relevant Individual Differences

The individual differences considered relevant to this investigation are, firstly, risk-taking. Tolerance of ambiguity, which is closely related to risk taking (Oxford & Ehrman, 1995, p. 364), will be discussed further in section 2.2.1.1.3 below. Secondly, we will examine previous learning experience and prior knowledge. Thirdly, we will discuss socio-cultural background.

2.2.1.1 Risk-Taking: Cognitive and Attitudinal Factors Related to Risk-Taking Behaviour

2.2.1.1.1 SLA Research

As far as language learning is concerned a willingness to take risks is perceived as a positive trait as it is likely to increase both exposure to language and language production in social situations and to lead to faster development of language proficiency as learners are more likely to try out new ways of saying things (Skehan, 1989, pp. 106-107). It is proposed here that two factors underlie this willingness to take risks. Firstly, risk taking involves a perception on the part of the learner that a given task is achievable. This perception of the probability of success in a task can, in general terms, be referred to as either self-confidence or self-efficacy (McClelland, 1987, pp. 506-507). Here, it will be referred to as self-confidence.

Secondly, the individual's degree of anxiety, which is defined here as "an actual fear-like response or ... a tendency to respond with fear to any current or anticipated situation that is perceived as a potential threat to self-esteem" (Ausubel, Novak, & Hanesian, 1978, p. 442), may determine whether the risk is taken. In addition, it may

influence success in a task and the type of learning tasks attempted (Ausubel et al., 1978, p. 443).

The following three sections will describe, firstly, what the literature has to say on how anxiety and self-confidence relate to achievement in foreign language learning. Secondly, we will discuss the question of specificity of anxiety to language learning skills. Thirdly, we will discuss how anxiety may influence self-ratings of language proficiency.

2.2.1.1.1 *Self-Confidence and Anxiety in Achievement in Second Language Learning*

An important question here is whether self-confident learners are more persistent and/or achieve more than anxious learners. Is self-confidence always facilitative and anxiety always debilitating?

It has been proposed that anxiety is part of a vicious circle that leads to lower achievement in language learning (Cheng, Horwitz, & Schallert, 1999, p. 437; MacIntyre, Noels, & Clement, 1997, p. 269). This cycle of low self-confidence, high anxiety and lower achievement is illustrated in Figure 1.

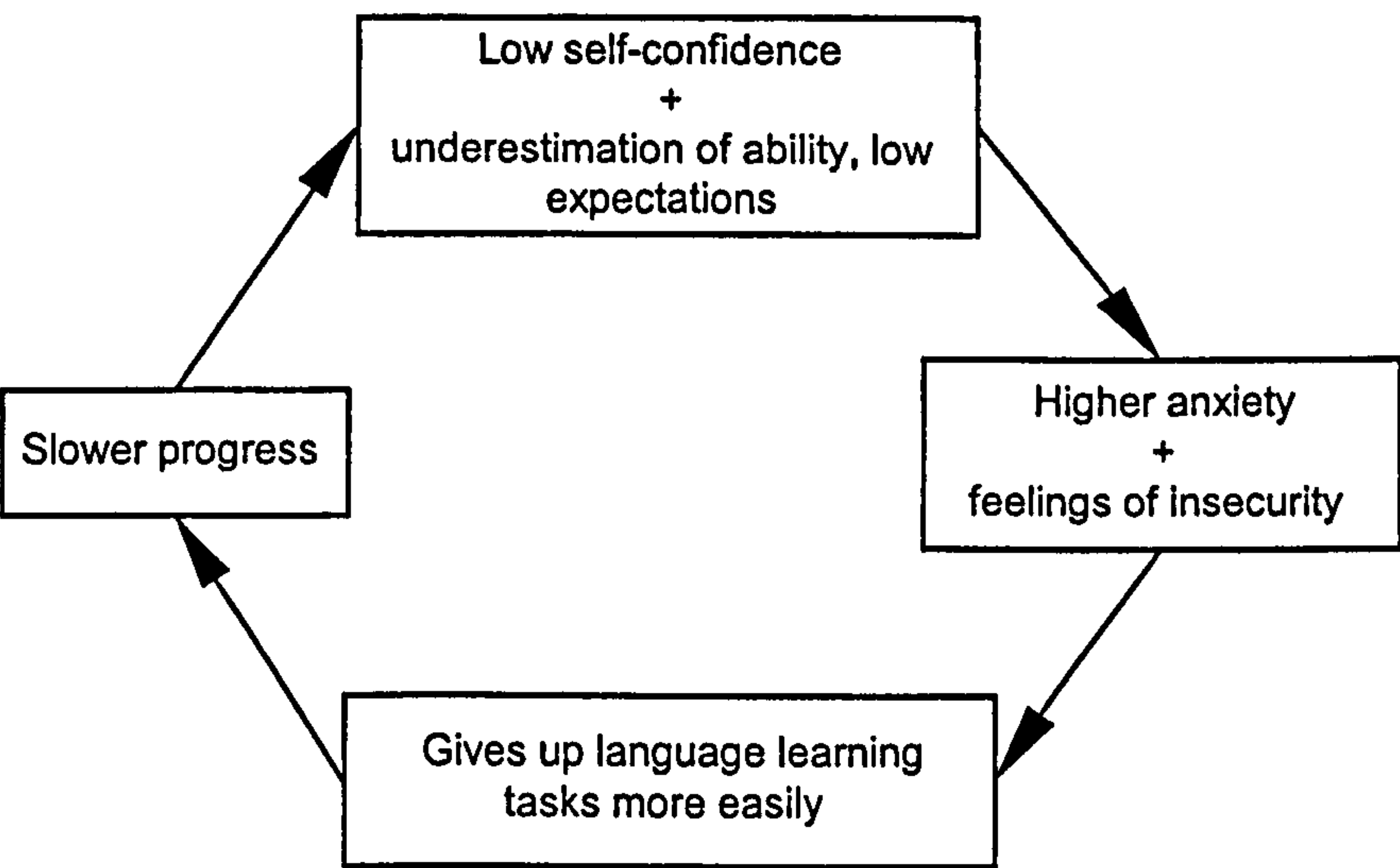


Figure 1: Involvement of anxiety in the cycle of low self-confidence leading to low achievement.

Figure 1 shows how low confidence and low expectations lead to high anxiety. This increases the likelihood that a student will give up language learning tasks more easily than someone who is less anxious. Anxiety divides cognitive resources and students

can spend more time worrying about a task than doing it (MacIntyre et al., 1997, p. 269). This leads to slower progress which in turn lowers confidence and expectations even more.

Anxiety has been shown to be facilitative in some cases and debilitating in others. Graham (1997, p. 93) found that trait anxiety, which could be regarded as a component of personality, had a negative effect on learning, while state anxiety, which arises from specific situations, was beneficial. Oxford and Ehrman (1995, p. 377) found relationships between specific types of anxiety and use of strategies and achievement. In particular, they found significant negative correlations between anxiety about self-esteem, competition and outcomes on the one hand and use of cognitive strategies on the other. Self-confidence correlated positively with use of metacognitive strategies. They concluded that anxiety may be facilitative “if not carried too far” (p. 379), but the relationship between anxiety and strategy use is generally complex (p. 377).

2.2.1.1.2 Is Anxiety Specific to Particular Language Skills?

Researchers (Cheng et al., 1999; Saito, Horwitz, & Garza, 1999) have also addressed the question of specificity of anxiety in language learning and these have established that anxiety varies according to the skill being practiced. However, apart from concluding that there were skill specific anxieties, these investigators could not make more definite claims. Saito et al (1999) found that language learners may suffer reading anxiety related to the perceived difficulty of the text, the motivation for learning, and previous foreign language learning experience, but that possibly because of the private nature of reading, this is lower than the level of general anxiety about foreign language learning.

The implications for attitudes to risk-taking are, firstly, that repeated negative experiences in language learning are likely to increase anxiety and lead to strongly held negative attitudes. Secondly, a relaxed low anxiety environment with as much positive reinforcement as possible would encourage students to evaluate themselves positively and to focus on completing the task at hand (MacIntyre et al., 1997, p. 280).

Thirdly, private practice such as use of self-access materials may lower anxiety and improve attitudes to risk taking.

2.2.1.1.1.3 Anxiety and Self-Rating of Language Proficiency

This is discussed here because a key part of the experimental design for the main study is the self-assessment of knowledge of specific vocabulary items. High anxiety is likely to be accompanied by feelings of insecurity and lower expectations (Cheng et al., 1999; MacIntyre et al., 1997). Cheng et al (1999, p. 430) found a significant negative correlation between self-rated proficiency and anxiety levels in writing and speaking. MacIntyre et al (1997, p. 276) found that anxious students tend to underestimate their competence while less anxious students tend to over-estimate it, and that reading, being a private activity with no risk of embarrassment, was unaffected in this way by negative perceptions. The implications for this study are that self-ratings of proficiency could be affected by the anxiety levels of the students.

2.2.1.1.2 Anxiety in CALL/CAI Activities

The SLA research discussed above (see section 2.2.1.1.1.1 and 2.2.1.1.1.2) suggests several areas in which anxiety could be a factor in CALL activities. Research conclusions (Cheng et al., 1999; MacIntyre et al., 1997) on the importance of learning environment apply equally well to CALL learning environments. Design features should:

1. Create a relaxed learning environment with achievable objectives that promotes feelings of security and avoids loss of self esteem.
2. Emphasise positive feedback to reinforce student self-perceptions.
3. Encourage students to complete activities.

The importance of privacy in language learning may also be an important aspect of anxiety in CALL activities for reading and other skills such as listening. Although Saito et al (1999, p. 215) suggest that difficulty (specifically the perceived difficulty of different orthographic systems) of text may produce reading anxiety, the support that can be built into CALL may potentially ease the difficulty of reading or listening and also ease any anxiety there might be.

Regarding research in CAI, de Jong and Simons (1990, p. 86) argue that anxiety can impede self-regulated learning. Among the examples of anxiety they found were students who were afraid of changing their approach and students who were over learning facts when they should have moved on. They also found students who were so fixated on, say, previous failures, that other aspects of the learning process suffered.

Regarding CALL research which addressed the issue of foreign language anxiety, three studies, all of which attempted to measure anxiety and look for change over time, have been reported. Two of these studies (Adair-Hauck, Willingham-McLain, & Youngs, 2000; Johnson & Brine, 2000) found no change over the periods of study (15 weeks in both cases); in both reports, the authors proposed that 15 weeks was too short a time to see a change take place. The other study (Sullivan & Pratt, 1996) found a significant decrease in ESL writing anxiety in a group writing on computers, but the lack of a difference between these students and a control group that did not use the computers suggested that the drop in anxiety may have resulted from practice and the passage of time.

To conclude, published research in SLA suggests that language learning in CALL may help to decrease language learning anxiety as long as the CALL environment is supportive and positive. However, the very limited amount of CALL specific research that has focused on this has found that language learning anxiety does not decrease when using CALL over the short periods studied. If CALL does help, it takes time to do so and no significant differences between CALL and traditional methods have been found so far as decreasing anxiety over time is concerned.

2.2.1.1.3 Tolerance of Ambiguity

Tolerance of ambiguity is defined by Naiman et al (1978) as “the tendency to perceive and interpret ambiguous situations as sources of threat” (p. 31). Ambiguous situations “characterized by novelty, complexity, or insolubility” (Naiman et al., 1978, p. 31).

There is a somewhat confusing situation in the literature regarding tolerance of ambiguity as it is sometimes referred to as a personality trait and sometimes as part of learning style (Oxford & Ehrman 1995, p. 365). It features prominently in the

Naiman et al (1978) Good Language Learner study in which it was proposed (p. 67) that students who have a low tolerance of ambiguity are unlikely to cope with the amount of ambiguity present in the L2 classroom and are more likely to drop out. Further to this, it was also proposed that tolerance of ambiguity is more important at lower levels while at higher levels other cognitive style factors have more influence.

Students who are able to tolerate ambiguity may be more likely to take risks in language learning (Oxford & Ehrman, 1995, p. 364). For example, tolerance of ambiguity is inherent in the risk taking strategy of inferencing. Once an inference has been made, accepting the possibility that the inference could be wrong and not checking a dictionary is both taking a risk and tolerating ambiguity.

2.2.1.1.3.1 SLA Research on Tolerance of Ambiguity

This section will cover general research on tolerance of ambiguity including research on the relationship between this and epistemic beliefs about language learning.

Regarding epistemic beliefs, Mori (1999a, p. 540), working with students learning Japanese, found modest but significant correlations between belief in the simplicity of knowledge and over-reliance on one source of information. There is, therefore, a suggestion that there may be a relationship between seeing language learning in simple, quantitative terms and an inability to cope with ambiguous language learning situations.

Wen and Johnson (1997) found that tolerance of ambiguity had a slight negative correlation with L2 success. However, a willingness to guess had a positive correlation when combined with confirmation by looking up the word in the dictionary. Confirming the guess, which cancels out the risk-taking aspect, seems to be the key part of the strategy as subjects that guessed without confirmation were not very successful and doing this was regarded as lazy. The ability to check inferences is important for CALL and I will discuss this in more detail in section 2.2.2.2.5.1 below.

2.2.1.2 What Does the Learner Bring to the Task? The Role of Previous Learning Experience and Prior Knowledge.

This section will consider the role of previous language learning experience and prior knowledge in, achievement, comprehension of text, inferencing strategy, affective factors such as anxiety and self-confidence, the development of beliefs about the nature of language learning and the appropriacy of learning strategies, and the influence these factors may have on learner behaviour in CALL. The primary design feature which aims to help the learner use prior knowledge in both text and CALL material is the advance organiser. An advance organiser helps "the learner to recognize that elements of new learning materials can be meaningfully learned by relating them to specifically relevant aspects of existing cognitive structure." (Ausubel et al., 1978, pp. 170-171).

2.2.1.2.1 SLA Research on the Influence of Previous Language Learning Experience
Following Elbaum et al (1993, p. 320), previous language learning experience is defined here as any experience a person may have had in learning of a foreign language(s) both in and out of school. It is necessary to consider previous language learning experience here as it is relevant to this study from two standpoints. Firstly, Flavell's model of metacognitive monitoring (Flavell, 1979, p. 908) proposes that the development of metacognitive knowledge is based on the learner's metacognitive experience (see section 2.1.2.2 above). This is similar to Elbaum et al's (1993, p. 330) proposition that any previous language learning experience may be of key importance in determining learner definitions of the nature of language learning tasks (e.g. as formal or functional in nature), learners' beliefs about language learning and their attitudes and strategies in self-regulated language learning.

Secondly, the importance of previous experience to affective factors in language learning was highlighted by MacIntyre et al (1998, p. 548) who proposed that previous language learning experience can lead to:

- a) The development of either self-confidence or higher anxiety
- b) Increased motivation to learn through positive learning experiences or positive stereotypes of the L2 community.

To the best of my knowledge, only three SLA research studies (Elbaum et al., 1993; Gradman & Hanania, 1991; Liu & Littlewood, 1997) discuss or evaluate the effect of previous language learning experience. We will discuss these in chronological order.

Gradman and Hanania (1991) carried out a survey of 44 variables making up the language learning background of 101 students in an intensive English program in the USA and attempted to correlate these with proficiency as measured by TOEFL scores. This investigation is significant in that it is the only published study which has attempted to get “the big picture” of the background variables that influence language proficiency.

Almost all of the significant correlations found were quite weak (less than .3). The highest correlations found were for extracurricular reading (.47 to .53), having had native English speaking teachers (.27 to .45), and for English as the language of instruction (.30 to .46). Further statistical analysis found that only two of the variables had a direct effect on proficiency: extracurricular reading and listening.

Elbaum et al (1993) investigated the relationship between previous experience, beliefs about the appropriacy and effectiveness of learning strategies and learners' definitions of learning tasks. Strategies were characterised as either functional (focusing on communication) or formal (focusing on conscious study of the language). The investigators concluded that:

- a) learners' experience determines learners' beliefs.
- b) learners' strategy beliefs are related to task definition: those who saw given tasks as involving procedural knowledge favoured functional strategies while those who saw the task as involving declarative knowledge favoured formal strategies.

Elbaum et al (1993, p. 330) suggest that the links shown between experience and task definition and between strategy beliefs and task definition may result either from different cultures of practice (the context of learning which communicates implicit messages to the learner shaping beliefs about the nature of tasks or from learners' beliefs leading them to choose learning environments which concord with these

beliefs. The investigators conclude that the first of these possibilities (i.e. experience shapes beliefs) is the most likely to be at work in this study.

Lastly, Liu and Littlewood (1997) (see section 2.2.1.3.1.3), discussed the frequently voiced opinions of frustrated language teachers that the cultural background and educational experience of Chinese students mitigates against classroom participation in communicative activities. Their research conclusion was that Chinese university students were reluctant to speak not because of any cultural taboo but because they had had little chance to practice speaking in school where listening to the teacher was the most common language activity.

2.2.1.2.2 SLA Research on the Influence of Prior Knowledge

The research described in the previous section suggested that learners develop attitudes to language learning based on their own individual experience and the contexts in which they have learned. However, as learners develop they also accumulate knowledge which can be applied to learning tasks that the learner engages in. Knowledge which the learner brings to the task and can potentially apply to it is known as prior knowledge. Prior knowledge may enhance self-confidence and, assuming it is correct, help the learner to perform well even though overall proficiency may be weak (MacIntyre et al., 1998, p. 554). Low proficiency learners may possibly rely much more on prior knowledge to comprehend text through inferencing strategies than high proficiency learners who can apply stronger linguistic abilities and need to use inferencing less (Hammadou, 1991, p. 32). Research by Poulisse and Schils (1995, p. 298) on use of compensatory strategies in conversation has also found that task demands are much more influential in determining the strategies employed in the task than proficiency.

Prior knowledge which relates specifically to a task has been termed “task knowledge” (Wenden, 1995, p. 183). Wenden (1995) argues that the development of task knowledge, what she terms “the *software* for learning” (p.192), is essential to learners becoming autonomous. She proposes that task knowledge involves knowledge of the purpose of the task, task classification and task demands.

Four research studies which have addressed the influence of prior knowledge will be described here in chronological order. Stahl et al (1989) investigated the role of vocabulary difficulty and prior knowledge on comprehension and recall of a reading passage by 6th. grade students. They found that prior knowledge in the form of preteaching affected recall of important facts; irrelevant preteaching resulted in the recall of irrelevant facts.

Hammadou (1991) reports two parallel studies using analysis of written recalls of non-native readers (1 of students of French and 1 of students of Italian). The most relevant of her results was that qualitative differences in recall between proficiency groups were found. Beginners' recalls were often longer, showing evidence of schema in the inferences produced (i.e. more of the recall comes from prior knowledge) while more proficient readers showed fewer illogical inferences.

Hammadou (1991) concluded that as comprehension improves, qualitative as well as quantitative differences emerge. Signs of prior knowledge were detectable in the written recalls and these demonstrated, if only indirectly, that prior knowledge influenced comprehension. There were also signs that there may be a threshold of difficulty below which prior knowledge cannot be applied, but Hammadou was unable to make firm conclusions on this.

Wen and Johnson (1997) found that prior learning as measured by scores in L1 and L2 on national exams had a direct effect on achievement in college. However, a finding that previous success in a highly exam-oriented education system predicts further success in the same system is not surprising.

Barry and Lazarte (1998) investigated how prior-knowledge, syntactic complexity, and reading topic influence inference generation in high school students studying Spanish. The investigators found that high knowledge readers generated a richer, more accurate (i.e. with a greater number of correct inferences) mental model, than low knowledge readers. Syntactic complexity appeared to have an effect as there was a tendency for inferencing to increase with text difficulty, but at higher levels of difficulty, low knowledge readers showed minimal inference generation and were less accurate in their inferencing.

2.2.1.2.3 CALL Research

In this section, we shall first discuss the implications of SLA research for use of CALL. We shall then look at relevant CAI/hypertext research and lastly, we shall consider research in CALL.

2.2.1.2.3.1 The Implications of SLA Research in Previous Learning Experience and Prior Knowledge for Use of CALL

Regarding previous language learning experience, MacIntyre et al's (1998, 548) contentions that previous experience can affect self-confidence, anxiety and motivation, highlight the importance of a supportive learning environment and positive, non-judgemental feedback. Elbaum et al's (1993, p. 330) conclusions that cultures of practice shape students' definitions of learning tasks and beliefs about the appropriacy of strategies suggest that the purposes for which CALL is used and the type of activities done in CALL would, like activities done in any other environment, contribute to the formation of the individual's preferred approach to language learning. For example, an over-emphasis on formal approaches in general (with CALL being a part of this) may produce individuals who believe language learning is a formal activity while use of CALL only for formal activities would lead individuals to believe that CALL can only be used for formal learning. Lastly, Gradman and Hanania's (1991) finding on the importance of reading to proficiency in L2 implies that reading in hypertext could be even more effective in promoting acquisition, with all of the text and multimedia tools that can be deployed to aid comprehension and retention.

Regarding prior knowledge, Wenden's (1995) arguments on task knowledge could provide the theoretical basis for provision of information on task purpose, classification and demands to help students tackle learning activities. Hammadou's (1991) and Barry and Lazarte's (1998) findings imply that support provided by hypertext tools such as glossaries, graphics or sound files could reduce the effect that difficulty of reading has on the ability or the need to inference meaning.

2.2.1.2.3.2 CAI/Hypertext/Hypermedia Research

Prior experience and knowledge have been cited as important individual differences in learning from multimedia/hypermedia (Dillon & Gabbard, 1998; Najjar, 1996). Multimedia presentation of information may help those with low domain knowledge as it aids in the construction of a mental model and points up key information while high domain knowledge students would not benefit as much from multimedia presentation as they already have a mental representation of the subject area within which new information can be more easily incorporated and are more able to recognise important information (Najjar 1996, pp. 136-137). It has also been suggested that low prior knowledge learners benefit more when control of the program is limited as their low domain knowledge hinders their ability to make good choices in an uncontrolled context (Dillon and Gabbard 1998, p. 337).

An interesting aspect of previous experience and prior knowledge is the influence of novelty (or the lack of experience with a new form of presentation) on learning from multimedia. While multimedia is still novel to students, the information presented may be more stimulating and they will learn more; if this is the case, it may not be as effective when it is no longer novel (Najjar 1996, p. 132). Najjar's conclusion based on results from 40 investigations was that studies of four weeks or less show that learning with multimedia is beneficial, but studies exceeding eight weeks showed a decline in learning effects. Novelty might, therefore, be an influence on research results.

Two studies (Lawless & Kulikowich, 1998; Schank & Rowe, 1993) have investigated the influence of prior knowledge on navigation (ways in which hypertext users move through a hypertext program) in hypertext while one (Jacobson et al., 1996) discusses its effect on experimental results. Schank and Rowe (1993) describe an investigation of student use of a hypermedia course for integrated circuit manufacturing and learning effects. Subjects had a choice of browsing or following a linear path. Very few differences in learning were found for navigation method or prior knowledge. Although prior knowledge had a significant correlation with time taken to complete the program, it was not predictive of the hypertext nodes visited and the evidence could not support a conclusion that prior knowledge was an important factor in learning with hypermedia.

Lawless and Kulikowich (1998), working on navigation profiles in hypertext investigated how established navigation profiles relate to interest and prior knowledge. They found (p. 66) that:

- a) low prior knowledge subjects tend to focus their attention on multimedia features at the expense of content. They argue that these students may be easily distracted because of their lack of prior knowledge.
- b) high prior knowledge subjects tend to have a linear navigation profile and do not divert to look at non-essential content.
- c) moderate prior knowledge subjects tend to access the most screens.

This research appears to suggest that students with moderate prior knowledge are most likely to be more interested in the topic and to make better use of multimedia.

Jacobson et al (1996) conclude that prior knowledge had an influence on the way their subjects navigated through case studies. Low prior knowledge students were not able to learn well when allowed freedom to navigate their way through the case studies. This confused interpretation of their results as the experiment was aimed at looking for interaction between epistemic beliefs and navigation profiles.

Altun (1999, pp. 433-435) found that prior knowledge was important in deciding whether or not to follow links when reading on the WWW. Previous learning experience was obvious in the users' tendency to apply strategic knowledge learned in traditional reading contexts as they had a preference for printing out pages so that notes could be made in the margins (p. 440). Altun concluded (pp. 440-441) that, while the experienced users in his study did develop strategies while reading on-line, prior knowledge was used to control navigating and reading processes.

Regarding the amount of program content a hypertext user is likely to access, both low and high prior knowledge users are likely to access less material than those who feel they know a little and have something to gain from further work on a topic.

At this point, we should attempt to reconcile some of the conflicting conclusions described above. Firstly, Najjar (1996, pp. 136-137) proposed that multimedia tools can help low prior knowledge students, while Lawless and Kulikowich (1998, p. 66) found that low prior knowledge users are distracted by them. Perhaps the best way to rationalize this is to suggest that prudent use of multimedia tools by CALL designers may provide less distraction for the low knowledge students while maximising the benefit in terms of helping them develop a mental model of the subject area. Perhaps more importantly, we should also note that in language learning, the importance of sound and vision should not be underestimated for students of low proficiency (i.e. low prior knowledge of vocabulary, grammar, etc.) and limited exposure to the L2 culture.

Secondly, Dillon and Gabbard (1998, pp. 338-341) report in a review of published studies that low prior knowledge students do not make good choices when allowed freedom of movement through a hypertext program while Lawless and Kulikowich (1996, pp. 395-396) found that both low and high prior knowledge students make poor use of freedom of movement. Low knowledge students do not access screens possibly because they lack the knowledge to make informed choices (Dillon & Gabbard, 1998, p. 337; Lawless & Kulikowich, 1998, p. 66) while high knowledge students lacked motivation (Lawless & Kulikowich, 1998, p. 66). Both problems may be helped by design features such as context-sensitive advice and clear “signposting” of content on screens off a linear route through a program. High knowledge students might also benefit from features that help them to make a realistic assessment of their prior knowledge.

2.2.1.2.3.3 Research Studies in CALL

To the best of my knowledge, there are only two published research studies (Chiquito, 1995; Jamieson, Norfleet, & Berbisada, 1993) which have addressed the issue of either previous experience or prior knowledge. In addition, I have found three position papers (Chun & Plass, 1997; Jamieson & Chapelle, 1988; Plass, 1998) that discuss these in passing. We shall first discuss the position papers.

Jamieson and Chapelle (1988), discussing what we need to know about learners in order to use CALL effectively, argues that two key factors teachers and designers should be aware of are student expectations (pp. 153-154) and attitudes (pp. 157-158). Student expectations and attitudes are based partly on previous learning experience and prior knowledge. For example, if CALL is designed for autonomous use, we should ask if students' previous learning experience has prepared them for this.

Chun and Plass (1997, p. 65-66) and Plass (1998, p. 35) proposed that design and presentation of multimedia CALL should be based on cognitive processes. Both of these articles focused on the activation of prior knowledge. Chun and Plass (1997, p. 63) also contend that multimedia CALL can play a key role in the creation of mental models which are seen as a key part of the process of text comprehension. Advance organisers (see section 2.2.1.2 above for a definition), be they visual (e.g. video), auditory (e.g. voice over), or textual, for the activation of prior knowledge and experience are viewed as important aids to the learner in making connections between new information and the learner's existing mental model.

Plass (1998, p. 35) made very much the same point again in proposing an approach to evaluation of interface design for CALL based on cognitive theories of information processing and problem solving that would put the learner and the task at the centre of the design process. In this approach, he proposes that activation of prior knowledge would be supported by a video or audio advance organiser. The advance organiser should be adaptable to different levels of prior knowledge and should aid comprehension for learners with low prior knowledge.

The two research studies I have located which cover prior experience or knowledge in CALL are Jamieson et al (1993) and Chiquito (1995). Regarding previous education, Jamieson et al (1993, p. 17) found that time between completing high school and college was not a significant factor in dropping out of a CALL course.

Chiquito (1995) investigated how written and spoken advance organisers and verbatim captioning (CP) facilitate L2 comprehension and recall using a Spanish CALL software called "Operation Futuro". She concluded that advance organisers

can help the students to activate schemata and make conscious connections with prior knowledge.

2.2.1.3 *Socio-Cultural Background*

2.2.1.3.1 SLA Research

Culture is discussed here as the Main Study sample has a high proportion of East and South-East Asian subjects. For this reason also, much of the research cited is focused on East Asian learners. Culture is likely to play a role in the acceptance of ideas such as autonomy in language learning which may be the product of cultures differing from that of the students (Ho & Crookall, 1995; Littlewood, 1999), but which may also be the theoretical underpinning for the design of CALL materials. The following discussion will begin with a definition of culture. It will then go on to review research findings on the relationship between culture and beliefs about language learning and provide a general background on the influence of culture on language learning. Following this, there will be a review of CALL research.

2.2.1.3.1.1 *A Definition of Culture*

Providing a definition of culture is problematic. At a very general level, it is tempting to talk in nationalistic or ethnic terms (e.g. the Chinese value group harmony, Americans value individual action), but this denies the importance of other factors such as gender or social class (Kramsch, 1993, p. 206). Dichotomous definitions such as Western vs Eastern have built in superiority in the terms used to describe our own, “Western”, culture (Kubota, 1999, pp. 11-12). For example, emphasis on harmony has a passive, and inherently negative, aspect to it while individual action has positive, progressive connotations. An effort will therefore be made in the following discussion not to over-generalise either “Western” or “Eastern” cultures.

The definition of culture used here has two parts. Firstly, culture is defined here as “the beliefs, value systems, norms, mores, myths, and structural elements of a given organisation, tribe, or society” (Collis, 1999, p. 201). Secondly, we should also acknowledge the cognitive processes and schemas which are internal to the individual (Robinson, 1988, pp. 10-12) and which underlie the components of culture focused on in the first part of this definition.

Why does this definition have two parts? While it is practical for the classroom teacher and the SLA researcher, part one of the definition is not without problems. Firstly, such a narrow perspective ignores the culturally related cognitive processes involved in perceiving and creating meaning and the cultural schemas which may develop between and within individuals (Robinson, 1988, pp. 11-12). Secondly, a definition that does not include cognition and shared meaning cannot account for the variability we see within groups that share the same culture (Atkinson, 1999, p. 640). Thirdly, while we must accept that cultures are always changing and that no two individuals have exactly the same culture (Atkinson 1999, p. 640), we must also accept that to conduct a discussion, we have to generalise about group cultures. This two-part definition, therefore, attempts to include “the cultural in the individual, and the individual in the cultural” (Atkinson 1999, p. 648-649).

2.2.1.3.1.2 Culture and Beliefs About Language Learning

Previous research has revealed no direct evidence on either a relationship between the culture of the learner and language learning or the beliefs of the learner about the need to understand the target language culture. As stated above (see Section 2.1.3.2.1.4), Horwitz (1999) concluded that culture did not account for much of the variation in the results of studies that had used the BALLI and that other factors such as context or age were more important. Studies which have attempted to identify multiple dimensions (Mori, 1999a, 1999b) or factors in learners’ beliefs (Cotterall, 1995) have also not produced directly “cultural” components in beliefs. It would be tempting to attempt to associate factors such as dependence on the teacher with the culture of the subjects, but such an association would be highly inferential.

2.2.1.3.1.3 Culture and Language Learning

Culture may be a major factor in attitudes underlying motivation to learn a foreign language; for example, descriptions of different types of motivational orientation consist to a great extent of the reasons why and how an individual wants to learn which in turn are culturally rooted (Skehan, 1989, p. 59, 68). In addition, culture is also an implicit component in materials design. The design and content of materials contains views of what “knowledge” is and how it is acquired, what is involved in

language learning, role relations within the classroom, and more general background values and attitudes (Littlejohn & Windeatt, 1989, p. 156).

Research studies have found differences in the expectations East Asian students and Western teachers have regarding class participation and error correction (Cortazzi & Jin, 1996; McCargar, 1993). Students and teachers expectations on these issues must to some degree be based on the beliefs they have about the values of fluency, accuracy and error-correction and the value of autonomous learning (see Section 2.2.1.3.1.4 below).

However reasonable such an association with culture might appear, though, a strong counter-argument has been put by Liu and Littlewood (1997). These investigators reported two large scale surveys of Chinese university students and concluded that their perceived reluctance to speak resulted from having experienced an education in which they were in large classes where they had few opportunities to speak, where, because of class size, passivity was encouraged and individual feedback was minimal. Therefore, rather than attribute learning behaviours common to an ethnic group to culture, we should look more to the limitations of an overstretched education system struggling to educate a large student population; in other words, context may be the key factor.

Further research evidence against cultural stereotypes in learning comes from two studies by Gu (1994) and Gu and Johnson (1996) both focusing on the vocabulary learning strategies of Chinese students. Both studies found that good language learners used strategies which in *western* terms would be regarded as beneficial. Though neither study attempts to say that their samples of good and bad learners were typical of the whole population, we at least have to accept that strategies such as rote-memorisation are not typical their subjects' culture.

2.2.1.3.1.4 *Autonomy*

As discussed below (see section 2.2.2.3 below), autonomy, or self-regulation, is a key issue both in language learning in general and, by extension, in the use of computers

to learn a language. What influence does culture have in the readiness of students to regulate and to take responsibility for their own learning?

Regard for the importance of autonomy in learning is rooted in Western ideals (Kubota, 1999, pp. 11-12; Littlewood, 1999, p. 72) and that it would be wise to carefully consider how autonomous learning should be employed in the East Asian context (Littlewood, 1999, p. 72-73). Neither can it be said that the collective emphasis in Eastern cultures is in opposition to self-regulation of learning. Eastern and Western cultures may have much more in common than we might assume while the wide variety of individual differences and learning contexts means the stereotypical East Asian learner does not exist in reality (Littlewood, 1999, p. 73).

2.2.1.3.2 CALL Research

Consideration of the cultural implications in materials design and methodology in the use of CALL has recently increased in importance with the mass marketing of language learning CDROMs and the use of web-based materials in language teaching. This section will begin with a consideration of the implications for CALL of SLA research in culture. It will then describe one CAI and one CALL research study which have investigated cultural influences on the design and use of computer-supported learning.

2.2.1.3.2.1 *Implications of SLA Research in Culture for CALL*

There are several cultural implications for the design and use of CALL materials. These are in the areas of error correction, feedback, classroom behaviours, and autonomy. Firstly, East Asian students seem to expect more error correction and feedback (Cortazzi & Jin, 1996; McCargar, 1993). CALL materials are able to give feedback on the correctness of an answer and to provide the correct answer immediately. There are advantages and disadvantages in the capabilities of CALL software with regard to cultural fit for East Asians. The level of support, or scaffolding, provided by software can be very high and this has the potential to match the teaching style noted by Cortazzi and Jin (1996). However, it is very difficult for feedback in CALL to inform the student *why* an answer was right or wrong. Secondly, autonomy in language learning may or may not be something that East or South East

Asian students would be happy with. However, the flexibility of CALL software allows them to regulate their own learning in ways that suit them. Observation through logging of how they do this may be very informative.

2.2.1.3.2.2 *Multimedia Materials*

The design and use of computer aided learning materials is essentially a human activity (Collis, 1999, p. 212). Multimedia materials offer the designer the opportunity to tailor learning resources to the needs of the learner and this flexibility has come to be a basic criteria for assessing the value of multimedia materials (see for example Brett (1997, pp. 39-40), Dold (1995, p. 64), and Kasper (1996, p. 55)). Here, we shall discuss an example of a set of multimedia case studies for student teachers described by Chen et al (1999). These multimedia case studies were designed specifically for a group of student teachers in Singapore. Each case study presented a school, its staff members and the problems they faced. The case-study structure allowed cultural sensitivity in two ways. Firstly, it reflected the cultural pluralism typical of the Singaporean context. Secondly, it was sensitive to the culture of the institution that the staff and students were members of as it helped to develop approaches to learning and problem solving skills which the institution valued.

Designers of multimedia learning materials must be aware that, because they are on disk or can be delivered via the WWW, these materials have the potential to be used in a wider variety of cultural contexts than printed materials. Although this has also increased the possibilities for cultural insensitivity, designers also have the ability to create materials that are flexible enough to be compatible with a variety of cultures. At the same time, specific designs can allow for adaptation to specific cultures, be they institutional or national.

2.2.2 Issues Relating To Learning Preferences In CALL

In this section, we will cover three main topics that relate to preferred learning methods in CALL. These are learning approach, learning strategies and the provision of choice for language learners in CALL.

2.2.2.1 *Learning Approach*

The term “learning approach” is used here to mean simply a student’s general preference for particular methods and strategies. The exercise of choice and the use of an array of preferred learning strategies by a learner in an unpressured, autonomous learning environment demonstrates what Oxford (see for example (Oxford, 1992) or (Oxford & Ehrman, 1995)) terms “learning style”. However, the concept of learning style is closely intertwined with personality (Cohen, 1995) which is not a focus of the present study. The definition is, therefore, reduced to learning behaviours typifying the learner’s preferred approach to language learning.

Planning and self-management of learning is closely related to the student’s preferred approach to learning. When a learner has the choice of different approaches to learning the same material, which is very possible in CALL, the decision to use one method or the other is a manifestation of management of learning. Therefore, in considering locus of control (see section 2.2.2), we should also consider structured vs exploratory learning in which learners are able to decide what to study for themselves.

Manning (1996) reported an experiment which demonstrated how learners’ approaches and learning results varied according to the nature of the CALL environment and the learning approach built into the material. Exploratory learning in CALL usually means allowing free navigation, but the type of content of each frame does not change; the style of the actual learning activities remains the same. The distinctive aspect of Manning’s research was that learners were given the choice of different ways to learn the same content.

Manning’s study consisted of three groups of children working through 3 modules (on gender, contraction, elision). One group practised with activities that gave explicit rules and another group practised with activities that relied on an implicit/inductive methodology. In the exploratory mode, the subjects had the option of practising grammar with either type of activity and navigated freely; they could choose both what and how to learn.

Exploratory learning got better results overall with a more positive user attitude. Subjects in the exploratory mode resorted to explicit activities when the target grammar was difficult implying that there is a refuge in framework and demonstrating that learners are able to adapt learning strategies to the material. Less able students, who were perhaps unable to apply effective strategies, did better with structure and the group using implicit activities did the worst. Manning's (1996) conclusion was that exploratory learning in which students are allowed to choose the approach is superior to solely implicit learning which she suggests should be reserved for the learning of simple rules.

This study was done on secondary school students, so we should ask if adults would show a similar pattern of use. Support for this is provided by Haddon et al (1995) who found that college level students were able to adapt learning strategies to the material in a multimedia program for learning Chemistry. However, the differences between young and adult language learners and between non-language learning materials and language learning materials determine that we must be circumspect in generalising from Manning's or Haddon et al's results.

2.2.2.2 *Learning Strategies*

As the focus of this investigation is on learners' beliefs about the nature of language learning and observation of learning preferences in CALL, this section aims to define strategies and examine research which is relevant to learners' beliefs about learning strategies rather than to describe learning strategy research in great detail. This section will focus on research and theory on learning strategies in so far as they are relevant to the present study. It will begin with a summary of strategy classification and then deal with each of these categories in turn.

2.2.2.2.1 *Classifying Strategies*

Learning strategies are defined here as "specific actions taken by the learner to make learning easier, faster, more enjoyable, more self-directed, more effective, and more transferable to new situations" (Oxford, 1990, p. 8). The definition of learning strategies is by no means a clear cut issue. For example, we have to consider whether or not a strategy has to be a conscious and deliberate act. Oxford (1990, p. 8) states

that strategies are often conscious, implying that they are sometimes not conscious. Cohen (1995, p. 3), on the other hand, states that they should be conscious and deliberate. His argument is that it is important to distinguish strategies from skills or habits that have become subconscious automatic behaviours. Also, there are degrees of consciousness. Behaviours may be at the periphery of our consciousness and we do not usually notice we are doing them, but if asked, we would realise that we are doing them. They would therefore be accessible to researchers (see section 2.2.2.4.1.2 below for a discussion of the relevance of consciousness to decision making). To solve this problem, the investigator has concurred with Cohen in defining strategies as conscious behaviours.

Within learning strategies research, two broad categories can be discerned - direct and indirect (Oxford, 1990, pp. 14-16). The former are behaviours acting directly upon material while the latter help learning without actually having learning as a direct aim. Within these broad categories, Cohen (1995, pp. 1-2) recognises the following four types of strategy:

1. Metacognitive: Includes planning (in advance and short-term plans in response to on-going learning situations), evaluation (before, during and after), organisation and management.
2. Cognitive: Includes various kinds of practice such as repetition, analysis, taking notes, translation and deductive reasoning.
3. Social: Includes asking for help and co-operating with others in learning activities.
4. Affective: Includes regulating emotions and attitudes and reducing anxiety.

Oxford's (1990, p. 14-17) classification includes the strategies above plus two categories not suggested by Cohen: memory and compensatory strategies (for a detailed list, please see Appendix B. Both of these categories can quite reasonably be included under cognitive strategies as they act directly on learning materials or within learning situations and for the sake of simplicity, that is where they will be included. The following list is adapted from Oxford (1990, p. 16) and shows what the investigator considers the broadest categories of direct and indirect strategies contain.

1. Direct Strategies
 - a) Cognitive strategies (inc. memory and compensatory strategies).
2. Indirect Strategies
 - a) Metacognitive strategies
 - b) Affective strategies
 - c) Social strategies

2.2.2.2.2 Metacognitive Strategies

This section begins with a review of findings relevant to metacognitive strategies made in studies with more wide ranging aims. This will be followed by descriptions of studies focusing specifically on metacognitive strategies.

2.2.2.2.2.1 *Findings on Metacognitive Strategies in Major Studies*

Rubin (1981) investigated young adult learners in traditional classroom learning. Among 6 groups of strategies identified from directed self-reports by students was one group of metacognitive strategies - monitoring. Another group of strategies - practising - reflected metacognitive abilities but were mainly concerned with actually doing practice activities.

O'Malley et al (1985) investigated strategy use among secondary school ESL learners. The researchers found that students tended to use strategies more with simpler activities; strategy use was much less evident in more complex analytical or inferencing activities and, although intermediate students used metacognitive strategies slightly more than beginning students, cognitive strategies were used more than metacognitive strategies by both intermediate and beginning students.

Perhaps the best known major study was conducted by Naiman et al. (1978). They concluded (p. 225) that good language learners (GLLs) must:

1. Be active in their approach to learning and practice
2. Recognise that language is a system.
3. Use the language in real communication.

4. Monitor use of L1 in L2.
5. Adapt to the affective demands of language learning.

Items 1 to 4 in this list directly involve metacognitive strategies. The implication of Naiman et al's conclusions is that metacognitive strategies are fundamental to more effective language learning.

2.2.2.2.2.2 Studies of Relevant Metacognitive Strategies from SLA Research

This section will describe relevant studies of metacognitive strategies. The results of these strategies will then be discussed in view of a phenomenon called cognitive overload.

Berkemeyer (1995) investigated metacognitive reading strategies used by non-native high school and college readers of German. Berkemeyer found frequent awareness and monitoring strategies, but no self correction. She speculated that this might be because:

1. They don't know how to correct.
2. Correction was too much to accommodate.
3. The method of data collection did not detect this.

Her conclusion that metacognition does not happen in isolation and that investigations should take this into account illustrates one of the inherent difficulties of metacognitive strategy research; metacognitive strategies have executive control over cognitive strategies, so one does not occur without the other. This relationship was also suggested by Wen and Johnson's (1997) findings that planning and self-evaluation had a strong indirect effect on achievement as measured by a national exam. Without planning and self-evaluation, cognitive strategies which help bring about the higher achievement are not applied.

2.2.2.2.2.3 Cognitive Overload

Cognitive overload is defined here as the point beyond which one more mental task, no matter how simple, is just too much to handle. Inherent in this is the view that our

mental capacities are finite and that, at times, they can be too occupied to do all the work we want them to do. I will now discuss how it can account for some of the results discussed above.

Evidence of the effects of cognitive overload can be seen in several studies. In a study of children's reading strategies, Paris (1991) describes children who are too occupied with decoding to comprehend or who can decode, but cannot go beyond the literal meaning. The similarity with Berkemeyer's subjects who were possibly too occupied with comprehension to self-correct is strong. Likewise, O'Malley et al. found little strategy use in conceptually difficult tasks. It seems possible, therefore, that learning strategies will not be applied unless the material is easy enough or in a small enough "chunk" to allow a student to simultaneously employ learning behaviours beyond basic comprehension.

The implications for materials designers and teachers are that if language learners are to apply strategies, they should not be overloaded. Also, we could ask if certain metacognitive strategies help learners to delay the onset of cognitive overload. If the answer is "yes", then building such strategies into activities may enhance learning. One such strategy is the activation of prior knowledge.

2.2.2.2.3 Metacognitive Strategies in CALL

2.2.2.2.3.1 *Activation of Prior Knowledge*

Activation of prior knowledge (see section 2.2.1.2 above) involves procedural as well as declarative knowledge. If we view learning strategies as problem solving behaviours (see for example (Oxford & Nyikos, 1989, p. 291)), then prior knowledge brought to bear in the employment of strategies requires procedural knowledge (Haastrup, 1991, p. 120). Moreover, one might also argue that strategic knowledge (see section 2.1.2.2.1) is prior procedural knowledge.

2.2.2.2.3.2 *Evidence from CAI Research on the Role of Prior Knowledge in Decision Making and Learning*

To some extent, metacognitive strategies employed in deciding what materials to access within hypertext are specific to this medium as linear text does not provide the

same ease or flexibility in movement from one activity to another. It would seem reasonable, therefore, to consider the potential influence of prior knowledge in the making of learning decisions in a computer assisted learning environment. It would also seem reasonable to consider the effect the learner's decisions and the design features within activities that activate prior knowledge (e.g. multimedia features) may have on what and how much is learned.

Several CAI studies (Goetzfried & Hannafin, 1985; Hasselerharm & Leemkuil, 1990; Jacobson et al., 1996) provide evidence that the ability to make appropriate learning decisions in a CAI program is partly dependant on the application of prior knowledge. Hasselerharm and Leemkuil (1990), working with secondary school low achievers found that prior knowledge was a stronger determiner of success in learning with CAI than the cognitive style field independence and that learner control was not beneficial for low achievers. These results are congruent with results from Goetzfried and Hannafin (1985) who suggested that such learners (in their case, young low achievers) lack the background knowledge to make informed decisions within a CAI program. Jacobson et al (1996), studying navigational behaviour in hypertext, found that low prior knowledge subjects were not able to make good selections.

Lastly, the findings of two authorities (Altun, 1999; Najjar, 1996) cited above (see Section 2.2.1.2.3.2) in relation to prior knowledge in non-CALL research are also relevant here. To briefly remind the reader, Altun's (1999) findings implied that strategic knowledge developed from experience of studying with traditional text may be applied to computer environments while Najjar (1996, pp. 136-137) concluded that multimedia would be more likely to help low prior knowledge users.

2.2.2.2.3.3 Self-Monitoring, Self-Evaluation and Self-Management

The research described in this section focuses on metacognition in high and low proficiency learners. To the best of my knowledge, two studies (Fleming & Walls, 1998; Victori, 1999) have attempted to identify the metacognitive strategies employed by high and low proficiency language learners. Fleming and Walls (1998), studying six "good" year 9 students in a secondary school, confirmed previous research in so far as the investigators found that these learners used a variety of cognitive and

metacognitive strategies. Victori (1999, pp. 549-551) found that good EFL writers differed from poor writers in planning, organising, evaluating, and resourcing. Victori's major finding was that good and bad writers differ in person, task, and strategic knowledge (for a description of these types of knowledge, see section 2.1.2.2.1 above) and that this knowledge determines the type of strategy or writing approach adopted by the learner.

2.2.2.2.3.4 Research into Metacognition in CALL

Chapelle and Mizuno (1989) examined use of both cognitive and metacognitive strategies in order to see if there were differences in strategy use between high and low level students in learner controlled CALL; it therefore addressed the role of individual differences in observed behaviour within the activity rather than the effects of CALL on learning and attempted only to see if strategy use was present, not to quantify it.

They found that some strategy use was evident, but not much. In particular, there was little evidence of self-evaluation. Use of self-management and self-evaluation was inferred from user actions such as when the user decided to quit. Chapelle and Mizuno (1989, p. 29) refer to these strategies as high inference strategies as the relationship between an action such as quitting and the behaviour of self-evaluation is tenuous. They concluded that teachers cannot assume students are able to manage their own learning although some clearly can do this and that guidance will probably be necessary.

Dhaif's (1990) survey of Arab students' attitudes to CALL found that students' preferences were contrary to several widely held assumptions about self-management of learning and learning preferences in CALL. Firstly, although a large majority of the students claimed that they preferred to manage their own learning, a similar majority also expressed a preference for scheduled lab time with a teacher present rather than studying independently in their own time. Secondly, the freedom to work at their own pace and manage their own learning was not attractive to these learners. The most common reason for enjoying CALL was that the students were able to practice what they had done in class. Moreover, the students showed a definite

preference for asking classmates or the teacher for help as opposed to accessing on-line help. Finally, the most popular type of activity was multiple choice grammar exercises, confounding the assumption that students will be stimulated and excited by the opportunity for exploratory and inductive learning.

2.2.2.2.3.5 Implications of Research for Use of Metacognitive Learning Strategies in CALL

The studies above have strong implications for the appropriate use of learning strategies in CALL. Both Chapelle and Mizuno (1989) and Dhaif (1990) show that what we might assume to be true very often is not. The prominence of the teacher and classmates shown in responses to Dhaif's questionnaire seems to indicate an inability or unwillingness to be independent learners and a liking for the social aspects of learning which in turn highlights the importance of socio-cultural influences which I have dealt with above in Section 2.2.1.2.3.

2.2.2.2.4 Cognitive Strategies

In this section, I shall list what I regard as cognitive strategies and then cover the major studies on strategies from the 1970's and 1980's.

2.2.2.2.4.1 Major Studies of Cognitive Strategies in the 1970's and 1980's

The Good Language Learner Study (Naiman et al., 1978) described in Section 2.2.2.2.1 above focused mainly on metacognitive strategies, but their conclusions have implications for cognitive strategies (Skehan 1989, p. 76). If, as Naiman et al found, the student takes an active approach to learning, s/he will do practice activities (Skehan 1989, p. 76). If the student recognises language as a system, s/he will analyse and compare the L2 with the L1. The good language learner uses the L2 to communicate or at least know that its purpose is communication. This will involve compensatory strategies. In monitoring output, the GLL will find errors and self-correct. These are also examples of the hazy distinction between metacognitive and cognitive strategies (see below in this section).

Rubin (1981) suggested the following set of strategies based on her observations of classroom L2 learning:

1. Clarification/Verification
2. Monitoring
3. Memorisation
4. Guessing/Inductive inferencing
5. Deductive Reasoning
6. Practice

All of these except for monitoring are cognitive, but as Skehan (1989, p. 79) points out, there is a lot of scope within these categories for self-aware metacognitive processes. Again, there is the implication that cognitive/metacognitive division is not so clear.

Lastly, O'Malley et al. (1985) in focusing strongly on metacognitive strategies found instead that use of cognitive strategies was more commonly observed. As already suggested above (see Section 2.2.2.2.3), cognitive overload may account for a lack of strategy use. However, another explanation might be that the nature of metacognitive strategies is such that they govern or put into action possibly a whole set of cognitive strategies which remain in action or are repeated for an extended period. Observing a lower frequency of metacognitive strategies than cognitive strategies should therefore be expected and the importance of metacognitive strategies should not be discounted.

2.2.2.2.5 Cognitive Strategies in CALL

2.2.2.2.5.1 *Deduction and Inferencing*

Inferencing strategy is used by learners in comprehension of reading material. They have been quite widely researched in mainstream SLA (see section 2.2.1.1.3.1 above for work on inferencing related to tolerance of ambiguity) and such research is now augmented by the power of the computer to track user actions (see Chapter 3.5.2 for a discussion of this). Using tracking techniques, Hulstijn (1993) found that all subjects read strategically. Words which were deemed to be relevant to answering comprehension questions were looked up significantly more often than non-relevant words. There was no difference in the frequency with which words deemed to be easily inferable were looked up compared to words which were not easily inferable.

Hulstijn suggests this was because students tended to verify inferences by looking up the meaning. His support for this is that students who had good inferring abilities still used the look up function as much as those who did not have such abilities. CALL research has not investigated this conclusion further and has not provided specific information on the conditions under which learners will look up meanings after making inferences.

2.2.2.2.5.2 Practice

Chapelle and Mizuno (1989, p. 29) define this strategy as formal practice to improve language skills. They found that low-level students tended to take a longer time to complete less work, but there were no statistically significant differences between the two groups. Therefore, both high and low level students did essentially the same amount of practice. They also found almost no significant differences between high and low level students in resourcing or practice strategies. Neither was there a difference in the appropriacy of strategy use.

2.2.2.2.5.3 Implications of Research for Use of Cognitive Strategies in CALL

Results of empirical research tend to contradict expectations. Where significant differences are hypothesised based on what researchers believe are reasonable assumptions, they tend not to be confirmed. As Chapelle and Mizuno (1989) conclude, the learning strategies employed in CALL will depend on the context. Because of this, they point out that if other teachers had used their materials, the results would probably have been quite different. Taking this line of discussion further, the investigators also argue that to take advantage of learning strategies, teachers must observe students carefully.

In Hulstijn's (1993) study, we again see little difference in strategy use between groups of students. What we do see, however, is that students will use look up functions to verify inferences, suggesting that definitions should be available where inferencing is expected.

2.2.2.2.6 Affective Strategies

Affective strategies are included here as they may be relevant to students in CALL. For example, it is quite common to have students who are afraid of or negative about computers. Research into affective strategies in non-CALL research may contribute to understanding and doing something positive about this problem.

Oxford (1990, p. 140) argues that a learner's emotions, attitudes, motivations and values are one of the most important factors in language learning success. However, it is a difficult area to research; as Brown (1987, p. 99) suggests, it is not possible to "describe the affective domain within definable limits." Much of what could be termed affective is culturally based or related to personality, so it is hard to discuss affective strategies without getting deeply into such individual differences.

Two studies which suggest a role for affective strategies in learning a second language are the Good Language Learner (Naiman et al., 1978) and Wen and Johnson (1997). Naiman et al (1978, p. 225) concluded that GLLs take an active approach to learning; this includes the affective strategy of having a positive attitude to learning or seeking a way to be positive. Wen and Johnson (1997, p. 39) found that management strategies, an umbrella term for metacognitive and affective strategies had the strongest indirect influence on success.

2.2.2.3 *Motivation*

Motivation is defined as "the choices people make as to what experiences or goals they will approach or avoid, and the degree of effort they will exert in that respect" (Keller, 1983, p. 389). It is discussed here because, as Dickinson (1995) has argued, motivational theory is related to learner autonomy in language learning (see Section 2.2.2.4.1) and the research studies themselves raise issues related to motivation. Specifically, this section is concerned with the motivational theories related to the three items of the BALLI which are included in the Pilot Study questionnaire (items 16 to 18) and issues raised by analysis of the logged data from the Main Study. Two main theoretical approaches are therefore discussed, social-psychological theories and cognitive theories of motivation.

2.2.2.3.1 Social-Psychological Theories: Integrative-Instrumental Orientation

Although integrative-instrumental orientations are reasons for studying rather than motivations, these orientations have become a main focus of research in L2 learning motivation. Early research by Gardner and Lambert (1972) on achievement within specific communities of language learners was based on the hypothesis that success in language learning was related to positive identification (integrative orientation) with the target language community rather than a wish for some kind of reward (instrumental orientation). Although this and subsequent research by Gardner and his associates has set the agenda for motivation research, actual research results have lent only partial support to the hypothesis (Skehan, 1989, p. 54). In addition, the validity of the research tools used has been criticised (Oller, 1977; Oller & Perkins, 1978). These criticisms have been largely refuted (Skehan, 1989, pp. 61-64). However, into the 1990's, Crookes and Schmidt (1991, p. 475) argued that the integrative-instrumental construct had become simply a convenient classification for the results of statistical analysis and that the longevity of the theory is partly a result of the convenience afforded by standard measures based on the construct.

Ideas on the issue of orientations have developed as more research has been carried out in recent years. Here, we will briefly cover developments regarding the integrative-instrumental construct and a movement to ground motivational theory in the reality of the language classroom. Regarding integrative-instrumental orientation, it has now been acknowledged that both may have positive effects on language learning (Gardner & MacIntyre, 1991, p. 69) and that the original interpretation of the construct may have lacked flexibility (Gardner & Tremblay, 1994, p. 366). In addition, there is a clear trend towards integrating theory with language pedagogy. To this end, Dornyei (1994, pp. 279-280) has argued that intrinsic-extrinsic components (see Section 2.2.2.3.2.1 below) should be integrated into the integrative-instrumental construct. In addition, Oxford and Shearin (1994, p. 13) argue that a range of motivational theories should be integrated into language learning motivation research and that this will have important implications for language pedagogy.

2.2.2.3.2 Cognitive Theories

This section will briefly cover three theoretical approaches to motivation, attribution theory, intrinsic-extrinsic theory and self-efficacy theory.

2.2.2.3.2.1 *Intrinsic-Extrinsic Theory*

Current ideas on the relationship between intrinsic-extrinsic motivation and language learning is based on the work of Deci and Ryan (1985). This theory differentiates between those who are intrinsically motivated (doing something for its own sake) and those who are extrinsically motivated (doing something for a reward or because of some external pressure). To be intrinsically motivated, the locus of control for doing the activity has to be internal to the learner. Deci and Ryan argue that intrinsic motivation leads to better learning and that when locus of control is with the learner, they are more likely to be motivated; that is, self-determination leads to greater intrinsic motivation.

2.2.2.3.2.2 *Attribution Theory*

Attribution theory focuses on *causal perception*, which is defined by Child (1997, p. 70) as what individuals attribute their success or failure to and how this influences their future performance. Four categories of causes are posited, ability, task difficulty, effort, and luck (see Table 2). These are then analysed along two dimensions, stability, the degree to which these factors are changeable, and locus of control, whether these factors are internal or external to the individual. Ability and task difficulty are considered unchangeable while effort and luck are considered changeable.

Attribution of failure to stable factors has a negative influence on learners' expectations of future performance while attribution of failure to unstable, internal factors is likely to lead to persistence (Child, 1997, p.70). Likewise, for language learners, the psychological prominence of effort or luck (unstable factors) is likely to result in greater persistence than if ability or difficulty are more prominent (Skehan, 1989, p. 52).

	Locus of Control	
	Internal	External
Stable	Ability	Task difficulty
Unstable	Effort	Luck

Table 2: Attributional analysis of causes (from Skehan, 1989, p. 51)

2.2.2.3.2.3 *Self-Efficacy Theory*

Self-efficacy theory (Dornyei, 1994, p. 277) proposes that the confidence in the ability to succeed in a task is related to the amount of effort invested in performing it and in developing skills. Strong self-efficacy will enable a learner to persist in the face of failure. It might also be argued that there is a link between this view of motivation and risk-taking. If learners perceive that there is little to gain but a lot to lose from, say, attempting to use language in a communicative situation, they are less likely to attempt it (Graham, 1997, p. 97) and if they do, they are likely to invest less effort. This may be related to results found in the Main Study on the pattern of effort invested in the learning task (see Chapter 6.3.1.3).

2.2.2.3.3 *Links Between Motivation Theory and CALL*

It could be argued that these theories are highly relevant to learning in CALL. As Dickinson (1995, p. 169) points out, intrinsic-extrinsic theory proposes that a learning environment which allows freedom of choice and in which feedback is informational and supportive rather than evaluative promotes the learner’s capacity for self-determination. It may therefore be a worthwhile research aim to demonstrate that CALL software has such features and promotes autonomy to some productive end. We shall now develop this by moving on to a discussion of theory and research on autonomy in CALL.

2.2.2.4 *Autonomy in CALL: The Provision of Choice*

The section will begin with a discussion of literature on autonomy in language learning and will then consider how autonomy, or self-directed learning as it is often referred to, is a factor in the design, development and use of CALL software.

2.2.2.4.1 What is Autonomy?

There are several problems involved in defining what autonomy is. The first of these problems stems from overuse of the term. Autonomy in language learning is generally taken to mean that the learner learns independently of a teacher; this statement, however, has become both a truism (van Lier, 1996, p. 12) and a tenet of “language teaching faith” (Littlewood, 1996, p. 427). The term “autonomy”, like the terms “authentic” or “learner-centred”, has become a buzz word (Gremmo & Riley, 1995, p. 152; Little, 1991, p. 2); it has become so vague that it has little use (Littlewood, 1996, p. 427).

Next, it is very difficult to pin down exactly what autonomy is. In attempting this, Little (1991, pp. 3-4) found it better to begin by describing what it is not. First, autonomy is not self-instruction; it is internal to the learner while self-instruction is defined by organisation and delivery. Second, student autonomy does not require the teacher to give up all control while an intervention by the teacher (and by extension, the CALL designer) does not demolish student autonomy. Third, it is not a methodology; it is something teachers aim to develop in students. Fourth, it is not a single behaviour but a combination of behaviours that are affected by individual differences and needs. Finally, it is not stable over time or consistent across domains.

A further problem is that analysis of the concept soon reveals that there are a variety of contexts. For example, development of autonomy in formal or informal educational settings takes up much of Little’s (1991) discussion. Furthermore, we must consider general and task-specific aspects, and different levels of autonomy (Littlewood, 1996, pp. 429-430). We have also seen that the concept of autonomy is culturally loaded (see section 2.2.1.3.1.4 above). Moreover, descriptions of the relationship between autonomy and other factors in learning, particularly motivation, are sometimes contradictory. For example, Littlewood (1996, pp. 430-431) sees motivation as one of several components of autonomy while van Lier (1996, pp. 103-104) sees it the other way completely.

Finally, differences in interpretation of what student autonomy is stem from differing theoretical standpoints. Two approaches to the discussion or investigation of a learner’s ability to learn independently can be distinguished in the literature (Wenden,

1995, pp. 187-188); authors writing from an educational perspective refer to this ability as autonomy (e.g. (Little, 1991; Littlewood, 1996; Wenden, 1995)) while those writing from a cognitive psychological perspective refer to it as self-regulation (van Lier, 1996). In addition, justifications for the adoption of a self-access mode of learning, which assumes autonomy on the part of the learner, may be political/philosophical or psychological in nature (Windeatt, 1981, p. 47). As the ultimate aim of this investigation is to make a contribution to language education, an educational definition of the term autonomy will be used. The terms “self-direction” and “self-regulation” will be used interchangeably with “autonomy”. The following definition, which bridges the Educational-Psychological gap, is provided by Little (1991, p. 4):

"Essentially, autonomy is a *capacity* - for detachment, critical reflection, decision-making, and independent action. It presupposes, but also entails, that the learner will develop a particular kind of psychological relation to the process and content of his learning. The capacity for autonomy will be displayed both in the way the learner learns and in the way he or she transfers what has been learned to wider contexts." (Little's italics).

Having defined the term, we can now briefly discuss the Educational and Psychological approaches.

2.2.2.4.1.1 *Educational Approach*

As mentioned above, we can identify differing contexts, kinds and levels of autonomy. Firstly, we will discuss contexts. Little (1991, pp. 38-43) distinguishes between language learning outside the traditional education system and inside it. Outside the system, individuals who decide to study may be well-motivated and may have very specific needs. Such individuals are ideally suited to an autonomous learning environment, but probably end up enrolling in a private language school that differs little in principle from the state system. On the other hand, inside the education system, the young student is there because they have to be, not because they want to be, while the teacher is confined by methods, syllabi and schedules that are seemingly “carved in stone”.

Secondly, two kinds of autonomy can be discerned: what Littlewood (1996, p. 429) terms *general* and *task-specific*. Teachers can seek to further the general educational aim of developing *autonomous individuals* who can function independently in society or they can seek to develop *autonomous students* who can regulate their own learning and the application of their knowledge. The latter contributes to the former. For example, language teachers seek to develop their students to a point at which they can function independently in communicative situations. Ultimately, this contributes to their ability to function independently in society (Littlewood, 1996, p. 429).

Thirdly, we have to take into account that there are levels of autonomy. There is a difference between high level, executive, decisions such as whether or not to actually study a language and low level decisions such as which word to put in a gap in a cloze exercise. Lower level decisions are related to immediate or very short term needs in which the consequences of incorrect decisions are less severe. As we move up the decision hierarchy, language learning decisions are more likely to be related to actual communication and become more demanding in the sense that there may be less time to make them, more alternatives or more serious results for incorrect decisions. Good judgements may also be founded on a higher level of prior knowledge. The aim of the language teacher who wants to develop a capacity for autonomy in students is to gradually increase the level of autonomy so that learners can act independently in a range of communicative situations (Littlewood, 1996, p. 430).

Littlewood (1996, p. 430) proposes the following model (Figure 2) for the components of autonomy. In Littlewood's view, autonomy is composed of willingness and ability. One cannot be autonomous unless one is both able to perform the task and willing to do it. Willingness is based on motivation and confidence, while ability is based on knowledge and skill. Autonomy, which is defined in this model as the making and carrying out of choices, is, therefore, ultimately dependent on a combination of affective variables and prior knowledge. These choices are then applied to communication, learning in general and life in general.

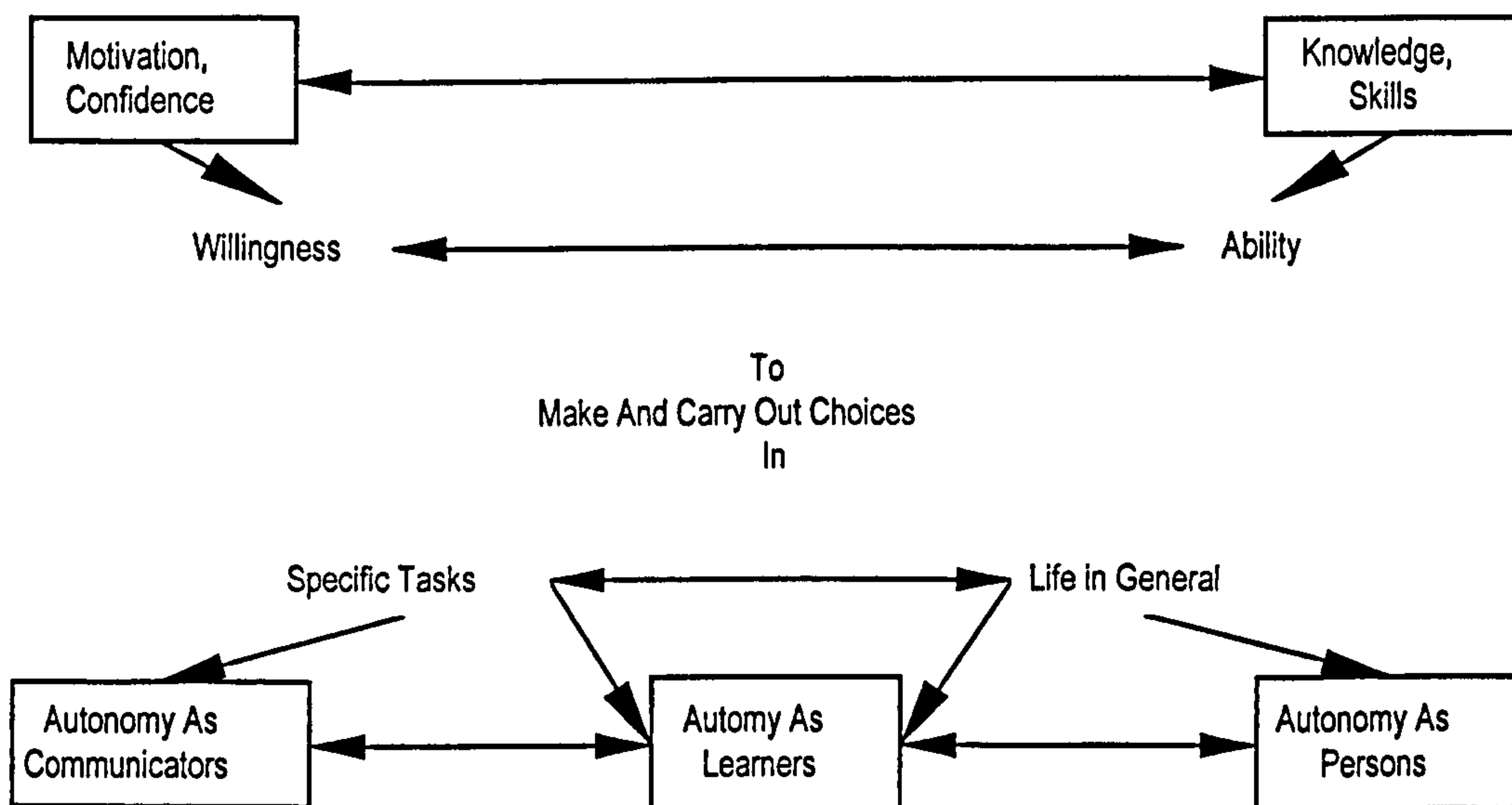


Figure 2: Components of autonomy (Littlewood, 1996, p. 430)

2.2.2.4.1.2 Psychological Approach

An alternative view (e.g. (Dickinson, 1995; van Lier, 1996)) emphasises the close relationship between autonomy and motivation. Dickinson (1995, 168-172) describes theoretical links between autonomy and intrinsic-extrinsic motivation theory (see Section 2.2.2.3.2.1 above) and attribution theory (see Section 2.2.2.3.2.2 above). According to the first of these theories, intrinsic motivation is promoted in learning contexts in which learners are able to take responsibility for learning. If the learning context is "informational" as opposed to "evaluative" and when learning goals rather than performance goals are set, perception of internal control is enhanced.

Attribution theory suggests that when the learner has control over learning and success or failure is attributed to controllable factors such as effort or strategy, the result is likely to be greater achievement. Learners who believe they have control over learning through increased effort or improved strategies (as in intrinsic-extrinsic theory) tend to be more persistent and hence more successful. Therefore, they are more likely to function well as autonomous learners.

Van Lier (1996, pp. 108-109) sees autonomy, or what he calls self-regulation, in relation to psychological needs which when satisfied contribute to motivation. He proposes (p. 103) that motivation is composed of:

1. Intentionality (choice): the process of focusing on reality which allows the individual to effectively process this reality.
2. Affect: the individual's emotions, moods, inclinations.
3. Effort: the individual's ability to direct cognitive and affective energy to create opportunities to learn.

Van Lier (1996, pp. 103-104) further proposes that we should also consider *consciousness* as this is essential to the notion of *choice* and to having *options* which are the subject of choice. Moreover, the individual cannot have *reasons* for choices without consciousness.

To conclude this section, it can be argued that the development of autonomy in language learning can be supported from either Educational or Psychological perspectives. The Educational approach taken by Little (1991) and Littlewood (1996) positions the development of task-specific autonomy as something which supports one of the ultimate aims of education and therefore by implication needs no further justification. It focuses more on the logic that the language learner eventually becomes a language user. Developing the capacity to communicate independently is justification enough because an autonomous individual needs to be an autonomous communicator.

The Psychological approach focuses on the position that:

- a) External control is detrimental to the learner's autonomy.
- b) The learner having control of the learning process leads to continued effort and eventual achievement.

These arguments are a corner-stone of the theoretical opposition to imposing controls on learners. This position, however, makes no reference to how learners reach the point where they can take effective control. For example, anybody who comes to a new field or new level of study needs help at first. This help necessarily includes external determination of learning activities. Neither does it acknowledge that we cannot be completely detached from others; as social animals, our natural state is interdependence (Little, 1991, p. 5).

Can we take one position and ignore the other? As far as this thesis is concerned, I believe we cannot. On the one hand, as teachers or researchers in the field of education, we cannot forget what our long term educational aims are. On the other hand, attribution of success and perception of control over learning may be components of an individual's framework of beliefs. A Psychological approach to discussion of research results on how autonomy is exploited at a task level may therefore be necessary. With this in mind, we shall now move to a discussion of learner control within CALL.

2.2.2.4.2 Control of Learning Within Computer Aided Learning Environments

Perhaps the most widely cited advantage of CALL is that it can provide freedom of choice allowing adaptation of individual learning styles (Oxford, Rivera-Castillo, Feyten, & Nutta, 1998) and promoting autonomy (Pawling, 1999, p. 170-172). In theory, learners can learn what they want, how they want, when they want and all of this at a pace decided by the learner. In computer aided learning environments, autonomy is referred to as *learner control* and the issue of where control actually lies, either with the program or the user, is described as *locus of control*. Learner control has much the same problem of definition as autonomy; for example, Higginbotham-Wheat (1990, p. 258) comments that "learner control" is not actually a single concept but a collection of strategies that work in different ways depending on "what is being controlled by whom". Furthermore, perception of control, as opposed to actually exerting it, is also important (Egbert & Jessup, 1996, p. 18; Litchfield, 1993, p. 6).

Control can be applied to pacing (the rate at which information is displayed (Gavora & Hannafin, 1995, p. 446)), sequence (the order in which activities are done and the way that the learner navigates through the material), instructional support (number of examples), and context (theme and text density) (Higginbotham-Wheat, 1990, pp. 254-258). The learner could, therefore, have control of some of these aspects while the program controls others; as Litchfield (1993, p. 6) suggests, learner control of text density would give a feeling of control, while control of navigational path would be with the program.

When the software decides when and where the student should proceed, locus of control is with the software (program control). If the user is completely free to navigate without constraint and do activities in any order, locus of control is with the user (user control). In addition, the rate at which information is presented is an important aspect of locus of control (Gavora & Hannafin, 1995, p. 446). When the software controls the rate of presentation (e.g. time limits on quizzes) this is referred to as external pacing. When the user paces him/herself, this is referred to as internal pacing.

The provision of choice and the decisions that students can make as a result are central to consideration of design, content and ultimately the effectiveness of CALL software. This section will now consider how varying the locus of control can effect learning.

2.2.2.4.2.1 How Does Varying Locus of Control Affect the Amount Learned?

In CAI/hypermedia research, a number of investigations have found that less able students are not effective in making learning decisions under learner-controlled, unstructured conditions (Belland, Taylor, Canelos, Dwyer, & Baker, 1985; Davidson-Shivers, Shorter, Jordan, & Rasmussen, 1999; Goetzfried & Hannafin, 1985; Hasselerharm & Leemkuil, 1990; Quentin-Baxter, 1997, 1998), while others have found that imposing controls can get better learning effects (Canelos, Dwyer, Taylor, Belland, & Baker, 1989; Smith, 1990). Literature reviews on this topic have concluded that results of investigations of learner control are inconsistent (Higginbotham-Wheat, 1990, p. 252) or that the balance of results suggests learners may be slightly better off without it (Niemec, Sikorski, & Walberg, 1996, p. 169).

The way in which content is presented under learner controlled conditions has also been found to effect the amount of work done. Schnackenberg and Sullivan (1997, pp. 351-352) concluded in a review of the literature that the amount of practice learners will do depends on the type of decision they have to make. That is, if the program default is for students to consciously decide not to do practice (i.e. they are presented with the total amount of content to practice), they will do about 80% of the available content, while if they have to consciously decide to do practice (i.e. they are asked if

they want to do the practice or do more practice), they select 30-40% of available practice.

It is, perhaps, the most consistent conclusion in the literature that less able students do less well with learner control (Dillon & Gabbard, 1998, p. 345; Lawless & Brown, 1997, pp. 119-121). The balance of evidence suggests that it may be necessary to adjust CALL materials design to allow for learners who require some structure. In addition, a discussion of how locus of control in CALL effects learning should consider how it effects the efficiency of learning, how it relates to proficiency, and how it effects attitudes to both CALL and the language being learned.

2.2.2.4.2 Can Program Control Help Learners to Learn More Efficiently?

The ability of software to control what the user does, how much the user does, and when he or she does it has the potential to help the learner cover a given amount of material in a shorter time. In other words, to work more efficiently. Results are mixed. Moderate external pacing, in which the software pushes the learner to work faster and/or to stop at certain points (Belland et al., 1985; Canelos et al., 1989; Smith, 1990) has been found to help learners achieve equal results in a shorter time as measured by immediate post-tests, but research in this area has not continued.

Goetzfried and Hannafin (1985) and Hasselerharm and Leemkuil (1990) compared the effects of three types of program control:

1. Adaptive control: no student control, with the program deciding when/where to branch.
2. Learner control with advisement: students decided when/where to branch with advice from the program.
3. Linear control: students had no advice, no review, no additional examples. Their only control was to proceed when ready.

Neither of these studies found conclusive results. However, Goetzfried and Hannafin (1985) concluded that poor prior knowledge resulted in faster completion of activities under condition 3 because subjects could not exploit the material as well while

Hasselerharm and Leemkuil (1990) found that not reading feedback and not accessing help resulted in faster completion under condition 1.

2.2.2.4.2.3 How Does Locus of Control Affect Attitudes?

I have only found one study that tried to measure attitudes to different control conditions. Hasselerharm and Leemkuil (1990) found that although students who had control of the program got lower scores on a post-test, they had more positive attitudes to the program than students who had no control. Thus, although possibly not immediately beneficial in terms of learning results, user control may encourage persistence through students' enjoyment of the program.

2.2.2.4.2.4 Summary of The Effects of Locus of Control on the Amount Learned

Much commercially produced software today still claims that allowing the user to learn at his or her own pace is an advantage. It would seem from these results that such claims are at best an over-generalisation as the evidence suggests that low-achievers benefit from program control. Against this, attitudes to the software might be better under user-control.

The research has some weaknesses, however. Concerning the amount learned, this can only be measured in a relatively superficial manner; immediate post-tests are not necessarily an accurate indicator of acquisition of knowledge while delayed post-tests to measure longer term learning were not employed in any of the studies cited above.

2.2.2.4.3 Locus of Control in CALL

There is a frequently made assumption that allowing learners to pace themselves and to move around in a program wherever they wish caters to individual differences and results in better learning. For example, Kenning (1996, p. 126) comments that not all CALL software allows the degree of learner control "desirable for the development of cognitive and metacognitive autonomy" while Healey (1999, p. 398) suggests that although this technology may not always meet expectations "it can help most learners in some ways" and that allowing the student to choose the most appropriate learning methods for themselves may get better results. Soo (1999, p. 301) argues that the versatility of the computer has the potential, as yet unrealised, to match the variety of

learners' learning styles. However, the argument that allowing complete freedom of choice caters to individual learning preferences is flawed. Some learners may not want such freedom or may not use it to the best effect; giving them freedom of choice does not cater to their needs. As Chapelle and Mizuno (1989, p. 43) point out, allowing learners to guide themselves through software assumes a degree of self-regulation that they may not be capable of. These investigators concluded that guidance may be of key importance in learner controlled CALL. Also, Robinson argued that we should recognise that students need:

“(1) to develop the beliefs that they are going to become competent at the new task, and (2) to acquire the actual competencies needed to perform successfully, through a series of graduated tasks...” (Robinson, 1991, p. 159)

Apart from Chapelle and Mizuno (1989), Scott and New (1994) and Fraser (1993) also found negative effects of user control. On the other hand, Borrás and Lafayette (1994) found that a combination of program and user control resulted in increased attention to task. Another factor that cannot be ignored is proficiency level and task type. Goodfellow and Laurillard (1993) concluded that a failure to anticipate problems related to proficiency level and task type resulted in their subject seeking off-line resources.

Manning's (1996) study comparing exploratory, implicit and explicit learning to some extent disagrees with the above results. In this study, exploratory learning proved to be significantly better in terms of learning results; this could be taken to indicate that user control is superior, but the picture is not that simple. As with the Borrás and Lafayette (1994) study, there was a variation within the program. In Manning's study, students in the exploratory mode had the choice of changing from implicit learning to explicit learning. It could be argued that learner strategies could be exploited to enhance learning by offering:

1. User control combined with appropriate choice of activities (in Manning's case, a very simple and clear decision) and/or

2. A balance between user control of movement between modules and increasing program control within modules as an adaptation to user performance (Borras and Lafayette, 1994).

2.2.2.4.4 Cognitive Flexibility

Cognitive Flexibility Theory (CFT) is a theoretical basis for CAI case-study design (Jacobson et al., 1996) in which users can follow themes in the information provided and switch themes whenever they wish. Fundamentally, CFT allows learners to study the same ideas in different ways. Programs based on this approach attempt to provide the student with a flexible approach to learning while compromising between complete program control and complete freedom to explore (Lawless & Brown, 1997). Jacobson et al's application of CFT was in the construction of case-studies which learners could move freely through. However, it is argued here that CFT is also applicable in the construction of programs with less complex structure and content in which the user can access screens that either present similar ideas in different ways or offer different ways to practice applying knowledge of those ideas.

2.3 *Vocabulary Learning*

Vocabulary learning is not a focus of the research studies described in this thesis. However, vocabulary learning was chosen as a vehicle for the investigation of subjects' learning preferences in the main study (see Chapter 6). This section, therefore, will firstly outline the cognitive theory which is relevant to vocabulary learning in this study. Secondly, relevant issues foreign language vocabulary learning will be considered.

2.3.1 Cognitive Theory in Vocabulary Learning

As this is intended to be only an overview of theory, only general principles will be considered here. We will cover cognitive theory relating to:

1. The importance of meaning to storage and recall.
2. The way in which the human mind may organise stored conceptual information.

3. The importance of time and effort in understanding and remembering information.
4. Our tendency to repeat previously successful problem solving behaviours.

2.3.1.1 The Importance of Meaning and Depth of Processing

The task of storing vocabulary in memory is one of organising and categorising meanings or concepts in what Anderson terms *meaning-based representations* (Anderson, 2000a, p. 137). It is argued that it is easier to remember vocabulary if we can attach meaning to it. For example, it has been shown that the meaning of a given sentence is much easier to remember than the exact words which make up that sentence (Anderson, 2000a, p. 139). The importance of meaning is further emphasised by what Craik and Lockhart (1972) term *depth of processing*; to be remembered, new knowledge must be processed in a deep and meaningful way. Passive practice is, therefore, unlikely to be as effective as practice which involves the learner in active meaningful production.

2.3.1.2 Storage and Recall of Conceptual Information

Anderson argues (p. 151) that the storage and recall of conceptual information involves the creation of categories which allow prediction and reduction of cognitive processing. Two theories which attempt to explain this process of categorising centre on schemas and semantic networks (pp. 152-167).

A schema is a representational structure that allows us to assign values to slots attached to attributes of a concept (Anderson 2000, p. 155). This compensates for the inherent weakness of semantic networks which cannot encapsulate the specific nature of our knowledge about concepts. A schema for shark is given here (adapted from Anderson 2000, p. 155). This includes aspects of sharks, such as the range of size, which would not be included in a semantic network.

Shark

- *Isa*: fish
- *Parts*: mouth, teeth, tail, gills, fins
- *Function*: predator
- *Shape*: streamlined
- *Size*: 1m to 6ms in length

Semantic networks (Anderson 2000, pp. 152-154) are concept categories linked in a network structure. Figure 3 illustrates this idea. Category nodes such as canary and bird are joined by *isa* links (as in “a canary *is a* bird”). Properties associated directly with each fact are attached to each node.

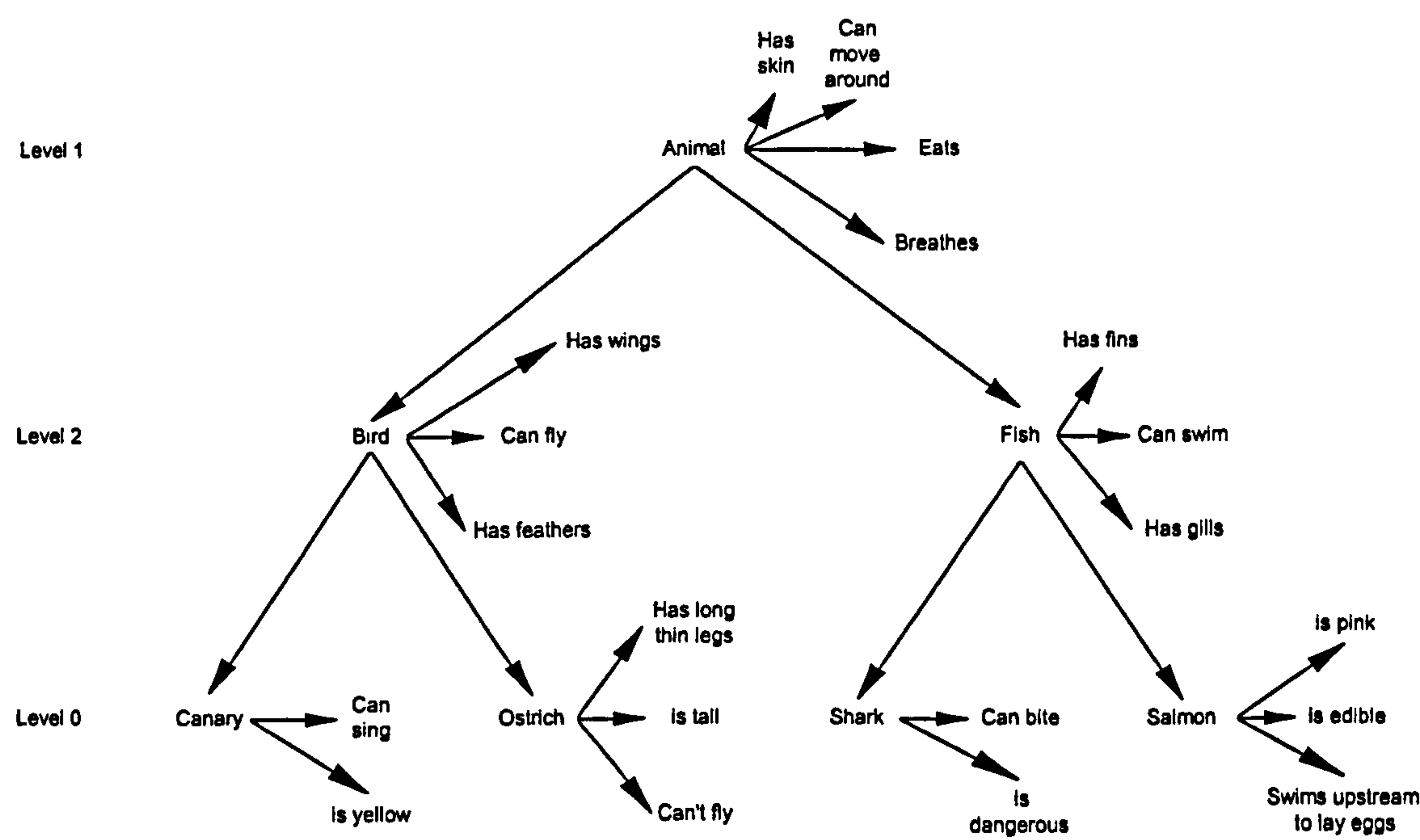


Figure 3: Hypothetical memory structure for a three-level hierarchy.
(from Collins & Quillian (1969) cited in Anderson (2000, p. 152))

2.3.1.3 Language Learning As a Problem Solving Activity

Solving a problem that has been encountered before involves the application of a learned sequence of steps; knowledge of these steps is procedural (Anderson 2000, p. 240). Cognitive theory and research on problem solving therefore have a great deal to contribute to our understanding of how students learn a foreign language. This section will firstly focus on how we learn problem solving procedures. We will then consider relevant features of problem solving behaviour and finally, we will discuss the persistence of learned problem solving procedures.

2.3.1.3.1 How Do We Learn Problem Solving Procedures?

Anderson (2000b, p. 246) proposes that we can learn how to solve a problem by discovery, by example or by being told. Learning by example, which is a process of

analogy and imitation, and direct instruction are the most relevant to language learning pedagogy. Learning by discovery is also relevant to this discussion as CALL materials can (and in the case of this study, do) offer the opportunity for students to discover combinations of activities that best suit their language learning needs; however, we will focus here on learning by instruction and learning by example.

One might think that being told something is a quicker and easier way to learn than following an example. However, research has shown that this is probably not the case (Anderson, 2000b, pp. 246-247). Instruction by itself lacks context; so the learner has no way to know how the terms used in the instruction apply to the real world. At least with an example only, we have a context and a general rule can be inferred. The problem with an example only is that it is difficult to apply rules learned from an example and sometimes the inference can be wrong. With both instruction and example, however, it is much easier to see how the instruction can be applied to other problems.

2.3.1.3.2 Set Effects

Set effects are the tendency people have to repeat problem solving procedures that have been effective in the past (Anderson, 2000b, p. 268). It is mentioned here as exercise types, both in print and CALL tend to be repeated and the way in which learners perform them might also be repeated. When a procedure is successful, it is reinforced. This is referred to as set effect. Assuming the procedures applied are appropriate, the ability to repeat problem solving procedures increases our efficiency and effectiveness in real world situations.

Set effects are manifested in language learners applying learning strategies. When learners use strategies that are beneficial, set effects can be said to be helpful. However, when strategies are inappropriate and applied repeatedly despite negative results, set effects can be said to be harmful to the learner's performance.

2.3.1.3.3 How Does Theory and Research on Problem Solving Contribute to Our Understanding of Language Learning Preferences?

Depth of processing theory would suggest that trying to infer a meaning from a context example results in better learning. However, research suggests that learning through a combination of example and instruction is more effective than either of these alone. For vocabulary learning, learners would be well-served to learn by inference while reference to a definition would enable the learner to more easily extend the knowledge gained to a wider context.

Negative set effects are demonstrated when established learning preferences which were previously effective may prove to be inappropriate. The example given by Benson and Lor (1999, pp. 467-470) (see section 2.1.3.2.3.1) of university students who persist in taking a quantitative rather than qualitative view of language learning is relevant here. Students who recognised that a quantitative approach was no longer effective and were able to develop new procedures based on a new, qualitative view of language learning tended to be more successful at the university level.

2.3.2 Foreign Language Vocabulary Learning

The importance of vocabulary-related variables cannot be ignored in interpreting the results of this research. The factors considered to be important in this respect are how much vocabulary a foreign language learner needs to know, the nature of vocabulary knowledge, how vocabulary should be learned, and the ability of learners to evaluate their vocabulary knowledge. We will begin with a brief introduction to the teaching and learning of vocabulary.

2.3.2.1 *A Brief Background to the Teaching and Learning of Vocabulary*

Historically, vocabulary has been a neglected area of language teaching and learning, but it is a critical concern to the language learner (Zimmerman, 1997, p. 5). Methods such as grammar-translation or audio lingual methodology saw vocabulary in a supportive rather than central role (Zimmerman, 1997, pp. 6-15). However, in recent years vocabulary development has become recognised as a key element of teaching methodology; for example, communicative methodology emphasises the role vocabulary knowledge plays in fluency while Krashen's Input Hypothesis (Krashen,

1981) emphasises the role of comprehensible input, which vocabulary comprehension forms a key part of, rather than correct output (Zimmerman, 1997, pp. 12-16). Finally, we are now witnessing a movement away from a view of language production as a rule-based activity towards one in which it is seen as a process in which chunks of language are retrieved from memory. Such a view is typified by Lewis's argument that "language consists of grammaticalised lexis, not lexicalised grammar" (Zimmerman, 1997, p. 17).

2.3.2.2 *The Nature of Vocabulary Learning: Receptive Vs Productive Knowledge.*

Nation (1990, p. 5) distinguishes between receptive vocabulary learning which involves the recognition and recall of a word when the learner meets it and productive learning which involves receptive learning plus being able to produce the word in speech or writing when necessary. Many of the reading strategies that we hope EFL learners would apply are L1 reading strategies which rely on receptive knowledge. Laufer (1997, pp. 22-23) describes the receptive vocabulary needed to apply L1 reading strategies in L2 reading as *sight vocabulary*, which she defines as words which are automatically recognised without the reader having to give conscious effort and which consequently do not add to cognitive load. This does not include words which are a little familiar or unfamiliar words that are inferred from context. If we accept this, the question is "How does receptive become productive?". Nation argues that "real vocabulary learning" comes through actual productive and receptive use (p. 6). Therefore, the development of vocabulary knowledge from receptive to productive really comes through use of the vocabulary.

2.3.2.3 *How Should Vocabulary Be Learned: Deductive vs Inductive Learning.*

Coady (1997, p. 287) argues that "Words and phrases are essential to language learning. The only real issue is the best manner in which to acquire them." In this section, we will examine approaches to learning and teaching vocabulary.

2.3.2.3.1 Explicit vs Implicit Learning of Vocabulary

The problem of the extent to which a language is learned implicitly or explicitly is fundamental to the study of second language acquisition and ideas on this form the

foundation of teaching methodologies. In addition, theory and research on this issue may inform discussion of learner behaviour, especially in a situation in which learners decide for themselves the degree and type of exposure to language learning materials. As there is some degree of overlap, or confusion, between the concepts of implicit/explicit, inductive/deductive and direct/indirect learning, it is important to define what we mean by implicit and explicit learning. N. Ellis (1994, p. 1) defines these in the following way:

“Implicit learning is acquisition of knowledge about the underlying structure of a complex stimulus environment by a process that takes place naturally, simply and without conscious operations. Explicit learning is a more conscious operation where the individual makes and tests hypotheses in a search for structure.”

Discussion of implicit and explicit learning of vocabulary is based very much on L1 theory suggesting that the learning of L1 vocabulary is such a huge job that there is no plausible explanation other than implicit acquisition from written and oral contexts (Nagy & Herman, 1987, p. 24). This is known as the “default argument” (Nagy & Herman, 1987, p. 24).

The implicit learning of a second language and whether or not explicitly learned material can become implicit knowledge is a matter of some debate. The two sides of the argument are the non-interface position which says that explicit knowledge cannot become implicit and the strong interface position which says this can happen (R. Ellis, 1994, pp. 86-87). While acknowledging the strengths of non-interface theories such as Krashen’s input hypothesis (R. Ellis, 1994, p. 92) and arguing that strong interface theories are somewhat inexact (R. Ellis, 1994, p. 87), R. Ellis (1994, p. 92) points out that there is substantial support for another view - a weak interface model. The weak interface model is based on the proposition that comprehension does not necessarily involve linguistic processing and that, therefore, acquisition is more likely to occur when input is not comprehended. It is on such occasions that the learner attends to the features that are not understood.

Because the learner is definitely conscious of it, explicit learning is much more available to be researched. The learning of explicit knowledge involves processes and procedures that are general to the learning of any form of declarative knowledge. For example, a word or phrase can be memorised in the same way that a historical fact can be memorised. Problem solving procedures of the type described above (see section 2.3.1.3) are also applied in consciously attending to meaning.

2.3.2.3.2 Inductive Vs Deductive Learning

Whether an inductive or deductive approach is used to teach or learn a word depends very much on how difficult it is to define the word (Nation, 1990, p. 55). Nation (pp. 55-56) argues that a word which is difficult to define is best taught inductively by providing several examples of sentences containing the word. This allows for repetition and gives students the opportunity to put some effort into learning the word. A word that is easy to define can be quickly explained deductively allowing time to practice with it and for students to make their own examples.

2.3.2.3.3 Direct Vs Indirect Learning

This is discussed here rather than in the next section on approaches to learning as it serves to illustrate the differences between implicit/explicit and inductive/deductive learning. Within actual teaching and learning situations, Nation (1990, p. 2) differentiates between direct and indirect approaches. A direct approach uses exercises and activities such as clozes or games to focus attention on vocabulary. An indirect approach focuses the learner's attention on the message rather than the words themselves.

The key feature of these definitions is where the learner's attention is. If a student is asked to guess the meaning of a word in a sentence, this is direct learning as the student's attention is on the word and its meaning. This is explicit learning, but it is also inductive because the student is lead to the meaning from the example sentence. If a student is asked to read a short paragraph and to understand what it means, this is indirect. If vocabulary is picked up as a by-product of reading the paragraph, this is also implicit learning.

2.3.2.3.4 The Relative Merits of Different Approaches to Teaching and Learning

What does the research suggest regarding which methods to use and when? Carter (1998, p. 204) concludes from his survey of the research that at advanced levels where the vocabulary learners need is more abstract and less frequent, implicit learning from reading is better. At lower levels, where vocabulary is more concrete and more frequent and where it is important to learn how to pronounce and write a word, explicit instruction with strategies such as rote memorisation is better. This contrasts somewhat with Coady (1997, p. 288) who concludes that the balance of research suggests that if students are not under pressure and have the time, the right approach is an emphasis on implicit learning with lots of extensive reading. On the other hand, if students are under pressure to learn quickly, research suggests that the most effective method is an approach employing memorisation strategies combined with reading and instruction.

2.3.2.4 *Can Language Learners Accurately Evaluate Their Own Level of Vocabulary Knowledge?*

Two issues are considered here. Firstly, can learners evaluate their own language level, and secondly, when learners state that they know a word, what do they really mean?

Two “common sense” objections to the reliability of self-assessment of language ability are that learners cannot be subjective about their own ability and that they may be untrustworthy (Dickinson, 1987, p. 150; Holec, 1985, p. 143). However, there are strong arguments in favour of the reliability of self-assessment. Objections based on the likelihood of cheating become irrelevant when there is nothing to be gained from dishonesty (e.g. when it is not a placement tool) (Dickinson, 1987, pp. 150-151). Furthermore, from a theoretical point of view, it has been argued that the learner knows best what his/her abilities are (Underhill, 1987, p. 22).

Research suggests that method of measurement appears to be of key importance. Le Blanc and Painchaud (1985, p. 684) emphasise that in asking students to self-evaluate, they should be asked what they can actually do with the L2, not how good they think they are. Le Blanc and Painchaud found highly significant correlations of .80 and .82 (for questionnaires containing differently formulated questions) between self-

assessment questionnaires and standardised proficiency tests. Where simple rating scales, lacking any kind of relevance to authentic tasks, are used, self-assessment tends to be less reliable; for example, Rolfe (1990, p. 181), using such a scale, found that self-assessment of oral proficiency lacked reliability compared to teacher or peer assessment.

Regarding self-assessment of vocabulary knowledge, there are three aspects to this problem. Firstly, what does it mean to say that one knows a word? Secondly, to what extent are learners aware of their passive or productive abilities with vocabulary? Thirdly, what are the practical difficulties in making judgements of vocabulary knowledge?

To answer the first question, Nation (1990, pp. 30-32) proposes that word knowledge is composed of knowledge of form (spoken and written), position (grammar and collocation), function (frequency and appropriateness), and meaning (concept and associations). He then further distinguishes between receptive and productive knowledge within these components. For example, knowledge of spoken form involves recognition of what the word sounds like (receptive) and ability to pronounce the word (productive). A further qualitative aspect of word knowledge is that it may take a number of encounters with a word for knowledge of that word to develop (Nagy & Herman, 1987, p. 25). This is acknowledged by Nation (1990, p. 6) in his differentiation between increasing vocabulary in which new words are introduced and establishing vocabulary in which words are strengthened.

To answer the second question, Le Blanc and Painchaud's work suggests that as long as the descriptors provided to learners are set in practical terms related to what they can actually do with a word, then a fairly accurate self-evaluation is possible. Holec (1987, p. 150), in discussing the abilities of learners to discriminate between general language level and specific weaknesses provides the following quote from a learner, which he argues, is quite typical:

"I had no real difficulty understanding this text; it's just the proper nouns I regularly miss".

To answer the third question, Laufer (1997, p. 25) discusses a feature of vocabulary which she calls “deceptive transparency”. This term refers to specific aspects of vocabulary which for one reason or another deceive the learner into believing that a word is easy to understand when the word is, in fact, unknown. Laufer summarises the features which produce deceptive transparency as:

- a) *Deceptive morphological structure*: "discourse" could be taken to mean "without direction".
- b) *Idioms*: "miss the boat" might be interpreted word by word so that the learner believes somebody really missed a boat.
- c) *False friends*: False cognates can confuse because similar form does not mean similar meaning.
- d) *Words with multiple meanings*: Students who know one meaning are reluctant to give it up and will try very hard to apply it to the context.
- e) *Synforms*: Similar lexical forms (e.g. the similar pronunciation of price and prize or the similar morphology of deduce and induce) can deceive learners.

Whether the problems put forward by Laufer really hinder comprehension of vocabulary are not confirmed by research. Laufer’s arguments are based as much on logical possibilities as on research findings. The investigator would argue that Nation’s (1990) and Le Blanc and Painchaud’s (1985) conclusions, which are based on research, should inform the creation of rating scales for self-evaluation of vocabulary knowledge and interpretation of the self-evaluations made. Laufer’s (1997) conclusions, which make a lot of sense from a logical standpoint, should also be born in mind as they would certainly help the researcher to use vocabulary with less potential for the student to mistakenly believe that he or she knows a word.

2.3.2.5 The Role of Prior Knowledge in Vocabulary Learning

The role of prior knowledge, or background knowledge, in the ability to infer meanings from context has already been discussed briefly above (see section 2.2.1.2.2). We have also discussed the relevance of cognitive theory on semantic networks and schemas (see section 2.3.1.2). This section will discuss prior

knowledge's importance to the learning of vocabulary, which, if theories of implicit learning are to be believed, is intertwined with the process of language acquisition.

It is very likely that prior knowledge, in the form of general world knowledge and lower level declarative and procedural knowledge contained in schemata, plays a key role in the comprehension of and the implicit, incidental learning of L1 vocabulary from oral and written texts (Drum & Konopak, 1987, pp. 78-81; Nagy & Herman, 1987, p. 28). Research suggests this is also likely to be true of L2 vocabulary learning from inferencing (Barry & Lazarte, 1998; Hammadou, 1991; Laufer, 1997). Schema theory suggests that comprehension of input involves a process of activating relevant schema (see section 2.3.1.2 above). When the relevant schema have been activated, any newly acquired vocabulary would then be incorporated into them. There is, therefore, a two-way relationship between new vocabulary and schema in which activation of schema aids comprehension and comprehension of new linguistic items leads to their incorporation into schema.

Activation of prior knowledge may also have a negative effect. Laufer (1997, p. 30) argues that it is also possible that background knowledge can result in the reader disregarding context clues that do not conform to the reader's world view. She reports research which used a passage written by the anthropologist, Margaret Mead, which argued for the separate education of boys and girls. The subjects misinterpreted the passage as arguing in favour of educating boys and girls together as this conformed to currently held beliefs.

2.3.2.6 Metacognition and Vocabulary Learning

Theory and research into vocabulary learning in the areas of implicit-explicit and inductive-deductive learning have several implications for possible connections to metacognition in language learning. N. Ellis (1995, p. 16) argues that advanced learners are able to apply metacognitive strategies to the learning of vocabulary and that this learning will be conscious at least as far as metacognition is concerned. Such learners will be able to plan and manage their learning so that the best conditions prevail for implicit or explicit learning to take place.

If we take a step further back from strategies to the metacognitive knowledge which underlies them, we could also argue that beliefs about the value of learning strategies and the way in which individuals perceive the task of vocabulary learning are likely to influence not only the approach to learning but also the degree to which implicit or explicit learning take place.

2.3.2.7 *Summary*

This section has outlined the relevant theory and research on cognitive processes and foreign language vocabulary learning. Theory and research on cognitive processes strongly suggests that meaning-focused learning activities will enhance retention of new vocabulary. In addition, seeing the processes involved in vocabulary learning as problem-solving procedures enables us to interpret learners' applications of learning strategies in terms of set effects which may be either beneficial or detrimental. There is a range of theoretical positions on the issue of whether explicitly learned knowledge can become implicit, and classroom practice appears to reflect this. However, the particular teaching/learning methodology or strategy employed depends on the level of the learner and the difficulty of defining the vocabulary. Lastly, it appears that learners are able to evaluate their knowledge of vocabulary quite well, but that there are difficulties in doing this.

2.4 *Conclusion*

This review of the relevant published literature has attempted to bring together three main areas of interest, beliefs about language learning, individual differences including learning strategies and autonomy, and vocabulary learning. Certain of these areas such as learning strategies, autonomy in language learning and vocabulary learning are very well researched already. However, personal beliefs about language learning, learning preferences in CALL and autonomy in CALL are not well researched. In particular, the relationship between personal beliefs about language learning and what learners actually do is under-researched while no one has yet attempted a study of the relationship between beliefs about the formal-functional nature of the task of language learning and learning preferences in CALL.

Chapter 3 Critique of Research Methods

3.1 *Introduction*

This chapter is intended to give a brief critique of the research methodologies used in this investigation to identify aspects of metacognitive knowledge in language learners and learners' interaction with the computer environment created for the investigation. As belief is a component of attitude (see Section 2.1.2.1.1 above), the problems of researching beliefs outlined here are based on attitude research. We shall begin with a brief discussion of the difficulty of relating an attitude to actual behaviour. Following this, we will describe the theoretical background to the three methods of data collection used in this research study: questionnaires, interviews and on-line data collection. As on-line data collection is a central feature of this investigation's research methodology, this method will be discussed in some detail.

3.2 *Relating Attitudes to Behaviour*

As stated above (see 2.1.2.1.1 above), attitudes are difficult to identify, firstly, because they cannot be directly observed and can only be inferred (Ajzen, 1989, p. 242; Best, 1981, p. 179; Henerson, Morris, & Fitz-Gibbon, 1987, p. 12). Secondly, attitudes involved in ordinary situations can be too complex to disentangle as it is difficult to identify if a person's behaviour towards one object is determined by attitude towards that object or by another attitude towards another object that has over-riding importance (Greenwald, 1989, pp. 4-5). Strong correlations between attitude and behaviour are therefore rare (Greenwald, 1989, p. 2). Greenwald (1989, p. 7) also argues that although attitudes do not explain very much of the actual behaviour towards the object of the attitude, they do explain a great deal about behaviour towards other objects, or, conversely, observed behaviour towards the attitudinal object is explained by an attitude towards another object. For example, a student may state that she believes learning grammar rules is not an important part of learning English. However, she might actually do a lot of this because memorisation, attention to form and the display of this type of knowledge are highly regarded as characteristics of good students in her culture; her desire to be regarded as a good student determines her behaviour, not her considered opinion that learning grammar rules is not very important.

3.3 Research Tools and Methods

3.3.1 Reliability and Validity in Research

Much of the following discussion of research methods concerns validity and reliability.

The concept of validity refers to whether the instrument is appropriate for the research question that needs to be answered while reliability refers to whether the results are consistent (Henerson et al., 1987, p. 133). A research instrument can be reliable but invalid (Bell, 1987, p. 51). On the other hand, a research instrument that is valid is usually reliable (Henerson et al., 1987, p. 134). A clock that is always ten minutes fast is reliable in that it is consistent, but the information it gives you, the time, is invalid. If, however, you checked that a clock was telling the correct time on at least two occasions, you could be fairly sure that the information it was giving you was valid and also that it was reliable.

There are two basic forms of validity, internal, which refers to the internal logic of the research instrument, and external, which refers to the meaningfulness of the research to a wider area of study (Brown, 1988, p. 36). Beyond this basic dichotomy, there are several types of validity; the following types (with a classification of internal, external or both in brackets) are related to this research:

1. Face validity (external): Face validity is based on whether or not the measurement tool “looks right”. It has been defined as

"making a decision about the appropriateness of use of some particular measuring instrument in a given assessment situation through the process of simple inspection of that instrument." (Roberts, 2000, p. 5).

The key point about face validity is that it is based on a simple inspection. Whether or not this means anything at all comes down to who is doing the inspection and if this person is qualified in some way to make a judgement on the validity of the instrument (Roberts, 2000, p. 5). The inspection might be simple, but it is not necessarily casual and judgements are not necessarily made from a position of ignorance.

2. Content validity (internal): This is based on asking the right questions in the least ambiguous way. The range of topics of the questions should be a fair representation of the area being researched, and unless questions are asked as simply as possible with

clearly defined terms, the same questions will have different meanings for different people. An attempt should, therefore, be made to evaluate the relevance and clarity of questionnaire items.

3. Predictive validity (internal and external): Do responses to the questionnaire match actual behaviour (Henerson et al., 1987, p. 144). In the case of this investigation, we could ask if questionnaire results match the behaviour recorded in WordLearner.
4. Convergent validity (external): The extent to which the results of one investigation agree with another (Cohen & Manion, 1994, p. 281).
5. Ecological validity (external): The extent to which research results can be generalized to another setting (as opposed to being generalized to the population from which the sample is drawn). For example, would the same behaviour be observed in a setting in which no study is being conducted? This is a type of external validity (Cobb, 2001).
6. Construct validity (internal): The extent to which the instrument measures the underlying construct (Henerson et al., 1987, p. 136). To understand this, it is important to differentiate between the variable and the construct that the variable represents. The variable is what we observe or quantify of a human characteristic while the construct is the actual characteristic being measured (Brown, 1988, p. 8).

3.3.2 Questionnaires

3.3.2.1 Types of Questions in Questionnaires

There are two basic question types: closed, which give respondents simple choices, and open, which allow respondents to express their answers in their own words. Each has its own advantages and disadvantages and question types can be combined. For the investigator, questionnaires consisting of closed (or structured) questions are easy to administer and the data obtained is easier to analyse (Bell, 1987, p. 59), while for the respondent, they are easy to fill out. The disadvantage is that it is hard to construct questions with preset answers that obtain data with any depth to it.

Open questions solve the problem of superficiality of data by allowing respondents free expression of what they think while offering the possibility that these responses may draw the investigator's attention to the unexpected (Henerson et al., 1987, p. 61). This solves the problem of having to construct questions with the precision required of closed questions and the lack of flexibility that respondents have in answering such questions. The disadvantages are that it is more difficult to analyse the data as it may require content analysis (Bell, 1987, p. 59), and it takes more effort on the part of the respondent.

Only closed questions were used in this investigation. The reasons for this were:

- a) The use of verbal protocols in the development phase of the questionnaire gave the investigator a high degree of confidence in the content and construct validity of the questionnaire items.
- b) Part 2 of the questionnaire was based on the BALLI which had already been extensively used by other investigators.
- c) Open-ended questions would have produced data that would have been very difficult to analyse.

Three types of closed questions were used, fill-in-the-blank, multiple choice, and rating scales. Fill-in-the-blank questions can produce nominal data with no quantitative meaning (e.g. gender), ordinal data (e.g. grades at A Level) or interval data (e.g. number of years of English study). Multiple choice questions are simply lists of items which respondents choose from. They can range from binary alternatives such as Yes/No, which produce nominal data, to longer lists of choices, which, if they have some logical order, produce ordinal data. Rating scales made up the bulk of the questions in the questionnaires used and will now be dealt with at greater length.

3.3.2.2 Rating Scales

Two types of rating scales were used in this investigation: Likert scales and two scales which were developed specifically for this study. We will discuss Likert scales first.

3.3.2.2.1 Likert Scale

The Likert Scale typically involves a statement with which the respondent agrees or disagrees on a five or seven point scale ranging from strongly disagree to strongly agree with the middle point being a neutral “neither agree nor disagree”⁵. There are several advantages to Likert scales (Anderson & Arsenault, 1998, p. 175):

1. They are good for getting data on opinions and attitudes.
2. They can provide a lot of information in a short time.
3. They are easy to analyse.

⁵ The wording of the scale can vary. For example, the wording used could be approve/disapprove or like/dislike.

Likert scales produce ordinal data as there is a logical order in the degree of agreement and disagreement.

3.3.2.2.2 Rating Scales Specific to this Investigation

Rating scales in the questionnaires used in this investigation were constructed to measure degree of functionality or formality of specific language learning activities and also to measure the value respondents put on these activities. These scales have the same advantages as Likert scales. However, it is difficult to convey to the respondent exactly what is being evaluated and how to evaluate it (Best, 1981, p. 162). Best (1981, p. 162) suggests that a brief description of behaviour would help much more than abstract adjectives. In this investigation, care was taken to define the object and method of evaluation as precisely as possible.

3.3.2.3 *Validity and Reliability of Questionnaires*

The evaluation of questionnaire validity is often not as rigorous as it could be. Best (1981, p. 179) argues that this is probably because questionnaires tend to have very limited purposes and are used once only within a narrow context. Face validity is often the only form of validity considered with a short pilot study to confirm it (Anderson & Arsenault, 1998, p. 165). Best (1981, p. 179) argues, however, that questionnaire designers could do something about this by focusing on content and predictive validity.

Henerson et al (1987, pp. 148-149) describe three reliability measures that can be applied to questionnaires. “Test-retest reliability” involves comparing responses after giving the questionnaire to the same group on two occasions. The time between administrations is important. If it is too short, the subjects may remember their responses and if it is too long the opinions or attitudes being measured may have changed. “Alternate form reliability” attempts to solve the memory problem by administering two equivalent forms of the questionnaire, but this is only a partial solution as format remains similar. “Split-half reliability” involves only one administration and compares results from items within the questionnaire. Thus, the correlation coefficient between the scores from each half of the questionnaire is calculated to establish internal consistency.

“Split-half reliability” has two disadvantages. It does not work very well with attitude questionnaires as they tend to have too few items and these items are often not similar

enough in content to make correlation valid (Henerson et al., 1987, p. 148). For example, statistical measurement of reliability of the questionnaires used in this investigation is problematic as the underlying constructs measured by the questions are very diverse. Evaluation of reliability therefore has to be based on validity which in turn is based on very careful development and piloting of questionnaire items. In addition, split-half reliability says nothing about how results could change from one administration to another, so it does not demonstrate reliability when a questionnaire is used more than once.

A further difficulty, which is specifically related to Likert Scales, is the neutral point as it is difficult to interpret the real meaning of a neutral response. Does it mean the strength of the respondent's attitude is half way between, say, strong agreement and strong disagreement or does it mean the respondent is thinking "it depends", and, if so, on what does it depend? For this reason, constructors of Likert Scales often drop the neutral point. However, Anderson and Arsenault (1998, p. 175) recommend keeping the neutral point as some people will leave an item without a neutral point blank or mark a mid-point anyway. Further to this, they add that research shows no statistical difference in the results of items with or without the neutral point.

3.4 Interviews

In comparison to questionnaires, which determine what people say they believe, want, or do, interviews, or verbal reports in general, give the researcher a better idea of what was going through a person's mind while performing a task (McDonough, 1995, p. 10) as there are opportunities for clarification and expansion of responses. They are time consuming and open to criticism, but for the researcher working with a small group (e.g. a teacher doing research with his/her own class), they are a rich source of qualitative data on students' perceptions and strategies (McDonough, 1995, p. 10).

Interviews between the investigator and the subject vary between being very formalised, structured events to being informal and unstructured (Bell, 1987, pp. 71-72). Structured interviews follow a questionnaire which the interviewer follows closely. Unstructured interviews are very open and the only constraint is to keep the subject to a specific topic. The semi-structured interview does not follow a strict questionnaire format, but typically the investigator still uses some questions based on prior analysis of the research area to

guide the interview. Both the interviewer and interviewee have more flexibility, but the interviewer still has to stay on topic.

The advantages of structured interviews are that data obtained from them is easily analysed (Bell, 1987, p. 73) and it is simple to keep the interview on topic. Information that comes up in the interview that does not come under one of the questions can still be recorded on the form. Less structured interviews are more flexible and get a lot of data, but it is harder to stay on topic and data analysis is more difficult when the data lacks the organisation imposed by a structured interview.

Regarding interviews in general, Anderson and Arsenault's (1998, p. 190) summary of their advantages and disadvantages is:

Advantages

1. People get more interested in an interview than a questionnaire, so there's a better response.
2. The interviewer can clarify and probe, so the information obtained is more complete and in-depth.
3. The interviewer can pick up non-verbal cues.

Disadvantages

1. It can be difficult to record responses.
2. The validity and reliability of responses depends on the interviewer.
3. The context sometimes affects responses because of interruptions and time pressure

3.4.1 Validity and Reliability of Interviews

Regarding validity, lack of honesty by the interviewee and bias in the interviewer, the interviewee and the interview content can threaten this (Cohen & Manion, 1994, p. 281). Cohen and Manion (1994, pp. 281-282) argue that the best way to improve validity would be to reduce the sources of this bias. It might also be more appropriate to consider convergent rather than face validity of interviews (Cohen & Manion, 1994, p. 281).

There are several threats to the reliability of interviews. If questions are not asked in the same way in each interview, reliability is undermined. The fundamental advantage of interviews over other instruments is the human element: one person talking to another

with some degree of freedom in questioning and response. It has been argued that as the human element increases, so does validity of the data obtained, but with a corresponding loss in reliability (Cohen & Manion, 1994, p. 282). Another way to put this might be to say that the less structured the interview the less reliable the data will be. However, it has been argued that communication between two people on a specific topic has, in itself, an inherent validity and reliability and that it is enough for the researcher to do his or her best to minimise threats to reliability (Cohen & Manion, 1994, p. 282). Reliability is also weakened if the interviewee figures out what the interviewer would like to hear and tries to please or show herself in a good light. Finally, the interview questions might be directed at something the interviewee knows little about, which would have to include the interviewee herself. The assumption that the interviewee knows the cause of her behaviour is often likely to be incorrect (Cohen & Manion, 1994, p. 283).

3.5 Research Methods in CALL

Research methodology in CALL is informed by SLA and Human-Computer Interaction (HCI) research methods. Process oriented, or qualitative, methods such as interviews and verbal protocols are common in both. However, the recording of interactions between users and software, as opposed to measurement of variables such as attitude or discourse between students, is specifically an HCI research and software evaluation method. In HCI, a record of interaction with a program often contributes to better design of software; ultimately, the aim may be to make retrieval of information from a database more efficient or to facilitate access to tools in a word processor. In CALL research, on the other hand, the same type of data contributes, ultimately, to an understanding of how language learners acquire language through use of the material.

The recording of learner-computer interactions (key presses or clicks on buttons) must be based on careful observation, video recording, or automatic tracking (logging) of these interactions. Although interview or verbal protocol techniques can provide much useful data on what the student is doing, they cannot provide an accurate record of the actual interaction between students and software in terms of buttons clicked or text input by the student. This section will consider the relative merits of personal observation, video recording and logging. Since logging is one of the main data collection techniques used in this research study, it will be given a more detailed treatment.

3.5.1 Personal Observation and Video Recording

Personal observation and video recording can be used to obtain the same information as logging, but there are disadvantages to both of these methods. With personal observation, reliability and validity are undermined by the ease with which the observer can be distracted or the danger of the observer seeing what she or he wants to see (Preece et al. 1994, p. 627). Video recording is as accurate as logging in addition to providing extra information about student behaviour. However, input and analysis of video data can be very time consuming and the presence of video equipment can make students self-conscious (Preece et al., 1994, p. 627). Reliability is therefore compromised by mistakes in data input and validity is equally compromised if students do not behave as they normally would. If observation or video recording are used, therefore, they are more usefully focused on aspects of user behaviour such as hesitancy, facial expression, body language, and tone of voice that cannot be recorded in any other way.

3.5.2 Logging

There are two basic types of logging or automatic tracking. Firstly, we can create log files, also known as audit trails, dribble files, or customized trackers (Gay & Mazur, 1993, p. 47), that can record every decision (as represented by a click) made by a user and the exact time of the decision. These log files therefore consist of what Preece et al (1994, p. 627) term *time-stamped keypresses*. Hegelheimer and Chapelle (2000, p. 47) refer to this method of observation as *concurrent assessment*. The second type of automatic tracking, which can also be combined with dribble files, is termed *interaction logging* (Preece et al. 1994, p. 627). This has also been called *player piano* (Gay & Mazur, 1993, p. 48) and, as the name suggests, it can be played back so that the investigator can see exactly what happened in real-time or possibly at a faster speed.

The literature describing the use of log files has quite a long history (see Curtin, Avner & Provenzano (1981) for an early use of log files in language learning software) and can be categorised according to whether it discusses how to do it (Collentine, 2000; Gay & Mazur, 1993; Hegelheimer & Chapelle, 2000), what can be gained from it (Collentine, 2000; Hegelheimer & Chapelle, 2000; Liou, 1995), or whether it describes research results based on it (Collentine, 2000; Hulstijn, 2000; Liou, 1997; Lomicka, 1998; Manning, 1996). The purpose of the research may differ and whether it be for logging how the learner proceeds (navigates) through learning materials (Desmarais, Laurier, & Renie, 1998; Manning, 1996) or uses tools such as sound and video files (Collentine,

2000; Harben, 1999) or how the learner uses on-line reference (Hulstijn, 1993; Liou, 1997; Lomicka, 1998), the raw data can still consist of a record of the buttons that have been clicked and the exact times they were clicked; in other words, the data will simply be a list of time-stamped keypresses.

3.5.2.1 Validity and Reliability of Logged Data

Software that tracks user-interaction looks no different from any other software; the programmer has introduced code that records user actions, but has not changed the interface. Research can be done with real materials, in realistic learning environments with participants who really are studying a second language, so research results based on logged data has the potential to have strong ecological validity (Hegelheimer & Chapelle, 2000, p. 42). Since the user is unaware of being logged, it not only has the advantages of accuracy, immediacy and reliability but also does not interfere with the subject (Liou, 1995, p. 4). The subjects' lack of awareness of the data collection instrument reduces threats to validity from experimenter effects.

When the researcher seeks to triangulate (using a combination of methods focused on the same target variable) logging with other data collection methods such as verbal protocols or video, the resulting "thick descriptions" form a very detailed record of user behaviour (Gay & Mazur, 1993, p. 46). This not only contributes to the reliability and validity of the research but also provides both quantitative and qualitative insight into the learning processes taking place (Preece et al. 1994, p. 627).

Like any other method of collecting data, logging is not perfect. The following threats to validity, which cannot be compensated for by the reliability of logged data, have been discussed in the literature:

1. Novelty: Najjar (1996, p. 132) concluded from a survey of published multimedia research that studies lasting less than 8 weeks showed some effects of novelty, but with a decrease in this in studies longer than 8 weeks.
2. IT familiarity: Egbert and Jessup (1996, p. 19) found a statistically significant relationship between IT-familiarity and attention to task, which suggests that IT-familiarity influences behaviour and should be controlled if possible. However, IT familiarity may not be a problem if a small amount of training is given; Taylor et al (1999, p. 259) found that once a person has achieved a low threshold level of IT

familiarity by, for example, completing a short tutorial, task performance is not significantly affected.

3. Lack of ecological validity: The ecological validity (and generalisability) of CALL research that uses this methodology can be questioned on the grounds that observed behaviour does not necessarily mirror that which would take place in more naturalistic learning situations (Collentine, 2000, p. 45; Salaberry, 2000, p. 29).
4. Lack of generalisability: Small sample size still means generalisability is a problem even with the large amount of data that can be acquired. Using the Internet to collect data at a distance from very large samples is theoretically possible, but to the best of my knowledge no studies using this have been published as yet. This may be partly due to the difficulty of programming across platforms commented on by Hegelheimer and Chapelle (2000, p. 49), limitations of the programming languages used, and the lack of control on learning conditions at a distance.

Regarding logged data itself, its one great weakness is that it is context-bound; it records nothing more nor less than user actions within a given program (Liou, 1995, p. 18) and it cannot tell us directly about the cognitive processes going on during learning (Hammond, Long, Clark, Barnard, & Morton, 1980, p. 18). Construct validity can therefore present a problem as the researcher still has to establish the connection between the variable and the construct being measured. A record of a click on a button does not by itself indicate the reason behind the decision to make the click; a repetitive pattern of choices could represent the establishment of a preferred method of learning, but if we take, for example, the conclusions reached by Lawless & Brown (1997) and Lawless & Kulikowich (1996, 1998), similar behaviour could be interpreted as apathy. The ever present need for inference is further exemplified by Hegelheimer and Chapelle's (2000) research on noticing linguistic input which inferred such noticing from requests for on-line glosses, the logic of the inference being that subjects must be noticing that they do not understand a word because they are requesting a definition.

3.5.2.2 Solutions to Problems Associated With Interpretation of Logged Data

Two solutions to the problems outlined above are suggested here. Firstly, to make log files meaningful, use of other data collection techniques (triangulation) may be, in many cases, not only desirable but necessary. This will provide more support for construct validity (Hegelheimer & Chapelle, 2000, p. 54). Secondly, summarisation of the data in

graphic form may aid interpretation by demonstrating the relationship between the variables measured and may provide some idea of trends when sample size is too small.

Use of graphs and charts is certainly not a new idea. However, I make the point here because research data from student behaviour in CALL hypertext lends itself to graphic representation. A spatial metaphor is often used to represent hypertext structure as a physical space that users move around in and this naturally leads to hypertext structures being graphically represented with maps. The spatial metaphor also conveniently complements Wittgenstein's landscape metaphor (Wittgenstein, 1968, p. vii) in which the acquisition of knowledge is compared to continually criss-crossing a landscape and gaining deeper understandings of the ground beneath. Although we do not usually see the learning process represented by a map, there is no reason why it should not be and for learning in hypertext it is natural to do this.

Shifting from metaphor to materials, from both an educational and a research perspective, hypermedia differs from traditional materials in that it can be seen as both the object and the process of learning (Norman, 1994, p. 35). In effect, a diagram showing how students follow particular pathways through hypertext CALL can show not only what material was covered but how it was covered (and possibly learned). We can claim this because the route the student navigates from node to node and the time spent at nodes reflects a series of decisions that the student makes to achieve the learning goal. In hypertext, therefore, learning can be seen as having direction, duration and, in the case of multiple use (i.e. an individual navigating through more than once and/or individuals navigating through the same software by themselves), volume.

To summarise, triangulation of data and graphic representation of navigational behaviour in hypertext can be used to balance the weaknesses of on-line data collection.

Appropriate use of charts is a simple way to visualise what raw data is telling the researcher and is a practical solution to showing results of research where it has not been possible to acquire an adequate number of subjects to do valid statistical analyses.

Careful diagramming of the pathways taken can indicate strong trends and highlight useful directions for future research (Orey & Nelson, 1994, p. 639). Most importantly, diagrams of hypertext use can show not only what the learner attempted to learn but how this attempt was made.

3.6 Conclusion

This chapter has described the research methods used in this investigation. No single method can be said to be free from threats to the validity and reliability of the data obtained through its use. The main problem in researching attitudes (and by extension, beliefs) is that they cannot be measured directly; they can only be inferred from subjects' actions or words (Best, 1981, p. 179; Henerson et al., 1987, p. 12). Thus, no matter how valid and reliable the research is in its measurement of variables, the researcher's conclusions are only as good as his or her inferences. Logged data, which appears at first sight to be unquestionably reliable, really has only one unquestioned quality: accuracy. Even this depends on the quality of the programming. Triangulation of data collection methods and sources is therefore necessary to reach valid and reliable conclusions.

Chapter 4 Procedures and Methodology

This chapter will be divided into four main sections. Firstly, the research questions and hypotheses will be described (section 4.1). Secondly, the techniques and methods used in the study will be described in detail (section 4.2). Thirdly, we will cover data collection procedures and subjects (section 4.3). Lastly, the methods used for data storage, analysis and display will be described (section 4.4).

4.1 Hypotheses and Research Questions

The starting point for the development of specific research questions and hypotheses in this investigation is the fundamental question of what the relationship between beliefs and behaviour is. Logically, we must assume that there is a connection between the two, and in assuming this, we also have to accept the truism that learning does not take place in a vacuum. This means that we must examine the extent to which other factors have a role in the decisions learners make.

It is not within the scope of this investigation to ask if the beliefs that are stated by subjects, their learning decisions and their learning behaviours are right or wrong. However, we can ask if the behaviours observed indicate a decision making process that takes variations in the task and its context into account. The answer to this might then contribute to further investigation of the development and the benefits (if any) of autonomous language learning and the use of computer software to facilitate this.

The aspects of belief about language learning focused on in this investigation and specific factors that may influence their relationship to actual learning behaviours will be described in section 4.1.1 below. Hypotheses, main research questions and related subquestions will then be stated in section 4.1.2.

4.1.1 Learning Context, Specific Beliefs, and Other Factors Influencing Learning Preferences

In this investigation, the context is a hypertext program aimed at learning and practicing vocabulary. This offers the opportunity to observe learning processes

which are not easily observed in conventional learning contexts. Moreover, it provides the opportunity to ask questions directly relevant to the theoretical arguments regarding autonomous learning which are used to justify hypertext CALL design. This investigation did not attempt to measure acquisition, but it did ask if the learning behaviours shown by subjects in WordLearner demonstrated conscious use of the flexibility in learning made possible in hypertext software; if such behaviour were shown, this could, at least, provide some empirical support for the theory on autonomy which underpins CALL software design (see Chapter 2.2.2.4 above).

As it was clearly necessary to limit the research, the investigation had to focus on specific aspects of metacognitive knowledge of language learning and specific behaviours. It was decided to look closely at 2 aspects of metacognitive knowledge which all fall under Flavell's (1979, p. 907) category of task knowledge. These were:

1. Definition of language learning in general as formal or functional in nature.
2. Definition of specific language learning tasks as formal or functional in nature.

In addition, it was decided that prior knowledge of the specific language item being studied (in this case, vocabulary) should be measured. This was because it was thought highly unlikely that a learner would approach the learning task in the same way for vocabulary at different levels of prior knowledge. The data obtained would, therefore, have to be categorised according to levels of prior knowledge and relationships analysed within these categories.

The specific behaviours examined, which fall under Flavell's (1979, p. 907) category of strategic knowledge, were learning preferences within a computer environment for:

1. Inductive or deductive learning.
2. Productive or passive practice.

Limiting the investigation in this way had two main advantages as it allowed data analysis to focus, firstly, on specific links between metacognitive knowledge and learning behaviours and, secondly, on how autonomous learning behaviours within

WordLearner may be related to prior knowledge of the target language item and subjects' language proficiency.

The following research questions and hypotheses provide a framework for observing behaviour, and describing and analysing data related to these aspects of metacognitive knowledge.

4.1.2 Hypotheses, Research Questions and Sub-Questions

The main hypotheses, research questions and sub-questions for this investigation are given below. Research questions 4 and 5 refer to effort invested in the task and rely on calculations of path-length, duration of study and the amount of time subjects spend per screen (mean duration of study per screen). These are explained in Section 4.4.2 below.

Research Question 1

Does definition of language learning in general as formal or functional relate to preferences for specific learning and practice activities? If so, how?

Sub-Questions

- 1 A: Do subjects whose beliefs about the nature of language learning are more formal value formal learning activities more than functional learning activities?
- 1 B: Do subjects whose beliefs about the nature of language learning are more functional value functional learning activities more than formal learning activities?
- 1 C: Does definition of language learning in general as formal lead to a preference for deductive learning activities?
- 1 D: Does definition of language learning in general as functional lead to a preference for inductive learning activities?
- 1 E: Does definition of language learning in general as formal lead to a preference for passive practice activities?
- 1 F: Does definition of language learning in general as functional lead to a preference for productive practice activities?

Hypothesis 1

Definition of language learning in general as formal or functional relates to preferences for specific learning and practice activities.

Research Question 2

Does definition of specific language learning tasks as formal or functional relate to preferences for specific learning and practice activities? If so, how?

Sub-Questions

- 2 A: Does valuing formal learning tasks lead to a preference for deductive learning activities?
- 2 B: Does valuing functional learning tasks lead to a preference for inductive learning activities?
- 2 C: Does valuing formal learning tasks lead to a preference for passive practice activities?
- 2 D: Does valuing functional learning tasks lead to a preference for productive practice activities?

Hypothesis 2

There is a relationship between belief in the efficacy of formal and/or functional activities and preferences for specific learning and practice activities.

Research Question 3

Does prior knowledge of the specific language item being studied relate to preferences for specific learning and practice activities? If so, how?

Sub-Questions

- 3A i: Is level of prior knowledge of the target language item a factor in determining the type of learning activities preferred?
- 3A ii: Is level of prior knowledge of the target language item a factor in determining the type of practice activities preferred?
- 3A iii: How does the level of prior knowledge of the target language item relate to the amount of effort expended on the target language item?

Hypothesis 3

Subjects vary their learning preferences in the program according to their prior knowledge.

Research Question 4

Is there a relationship between learners' formal or functional bias in beliefs about language learning and the amount of effort subjects invest in learning and practice in the computer environment created for this investigation?

Sub-Questions

- 4 A: Is formal or functional bias in general beliefs about language learning related to path-length?
- 4 B: Is formal or functional bias in general beliefs about language learning related to duration of study?
- 4 C: Is formal or functional bias in general beliefs about language learning related to the amount of time subjects spend on each screen?⁶

Hypothesis 4

There is a relationship between formal and/or functional bias in general beliefs about language learning and the amount of effort subjects invest in learning and practice in the computer environment created for this investigation.

Research Question 5

Does preference for formal or functional learning and practice activities relate to the amount of effort students put into learning and practice in the computer environment created for this investigation? If so, how?

Sub-Questions

- 5 A: Is belief in the efficacy of formal or functional activities related to path-length?

⁶ See Section 4.4.2 for a description of how path-length, duration of study, and mean duration of study per screen are calculated.

5 B: Is belief in the efficacy of formal or functional activities related to duration of study?

5 C: Is belief in the efficacy of formal or functional activities related to the amount of time subjects spend on each screen?

Hypothesis 5

There is a relationship between belief in the efficacy of formal and/or functional activities and the amount of effort subjects invest in the computer environment created for this investigation.

4.2 Methods and Techniques Used in the Study

The primary tasks in this investigation were to collect data on what students believe about language learning and compare them to the learning preferences they show in a language learning computer environment. Collecting data on personal beliefs about learning depends on the subjects being able to articulate them accurately. The method chosen to obtain data on students' beliefs was a questionnaire survey. This method was chosen as the particular beliefs addressed could be operationalised in a concrete way. Interviews could also have been used, but this method was rejected as too time consuming.

Students' learning preferences are an easier matter as they are observable, but observation must be as unobtrusive as possible so as to avoid experimenter effect. The methods chosen for this observation were on-line data collection and interviews.

Before continuing, it would be a good idea to sketch out the experimental design and briefly discuss the research paradigm that this investigation fits into. A questionnaire was piloted in the Questionnaire Pilot Study and then used in the Main Study with a language learning computer environment (WordLearner). WordLearner was also piloted before use in the Main Study. Correlational relationships were then sought between questionnaire data and logged data. There was, therefore, a simple pilot study – main study structure to this investigation. Analysis and description were a combination of the quantitative approach just mentioned and a qualitative analysis of navigation patterns based on the logged data.

The question also arises of the research paradigm in which this investigation should be viewed. Much of the data is obtained by logging interactions in a computer learning environment. However, the questionnaire data and content, the program content and the learning taking place in the program determine that the research should be seen in an SLA research paradigm.

Each of the research instruments will now be described in turn.

4.2.1 Data Collection Instruments

As mentioned above, the main data collection instruments were questionnaires and on-line data collection for use of software. We shall first describe the questionnaires used and we shall then describe the program used and its built-in data collection tool.

4.2.1.1 *Questionnaire Introduction*

Two questionnaires were used (see Appendix C and Appendix D). The first was used in the Questionnaire Pilot Study and the second, an abbreviated version of the first was used in the main study.

4.2.1.1.1 Pilot Study and Main Study Questionnaires

4.2.1.1.1.1 *Aims*

The ultimate aim was to develop a research tool that could gather background data on the subject as well as data on the subject's general and specific beliefs related to the formal and functional aspects of language learning, and the value the subject puts on specific language learning activities. The pilot questionnaire was intended primarily to assess the validity of the questions, the methods of scaling and the overall practicality of the questionnaire as a research tool.

4.2.1.1.1.2 *Structure*

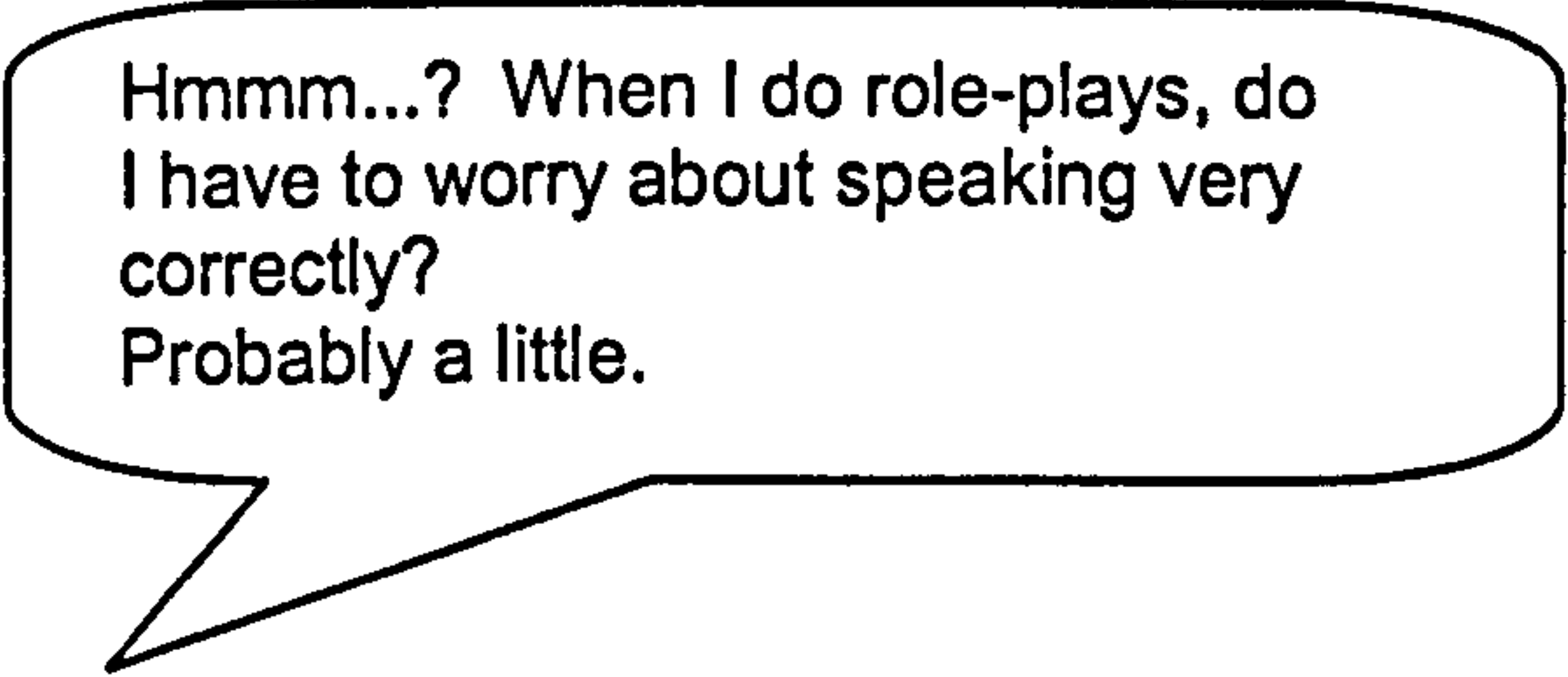
Both versions of the questionnaire had four sections. These were:

1. Part 1: Background information.

- 2. Part 2: Beliefs about language learning.
- 3. Part 3: Definition of specific language learning tasks.
- 4. Part 4: Beliefs about the value of specific language learning tasks.

4.2.1.1.1.3 *Design Principles*

Before describing these questionnaires in detail, certain aspects of the overall design and layout of the questionnaire should be explained. Firstly, although the questionnaires are long, the design is as user-friendly as possible, both for the respondent and the investigator; small fonts are avoided and text is spaced out on the page as much as possible (Wooten, 1997). Secondly, the wording of the scale keys is as natural as possible so that the speech bubbles used in the instructions can place them directly into a sentence that a subject might think when deciding how to rate an item (Wooten, 1997). For example, the first speech bubble in the instructions for part 3 says:



The purpose of this was to help respondents make better decisions by giving them wording with which they could think through their judgements. The phrase “speaking very correctly”, for example, while approximating to the concept of *formal* as it may be understood by Applied Linguists, allows respondents to think in a way that may be more natural to a student.

Thirdly, in parts 3 and 4, which are quite long and require quite a lot of thought, the direction of the scale is clearly indicated at the top of each skill section. This was to avoid respondents forgetting this.

Lastly, data obtained in the development phase suggested that parts 3 and 4 required more thorough explanation. For this reason, two examples rather than one are given for both part 3 and part 4.

4.2.1.1.1.4 Question Types

A variety of question types were used in the questionnaires depending on the type of data required. Table 3 summarises these by questionnaire and question type.

Questionnaire	Questionnaire Pilot Study	Main Study
Question Type		
Fill-in-the-blank	Part 1: Qs. 1, 2, 4	Part 1: Qs. 1, 2
Combination of fill-in-the-blank and check-lists	Part 1: Q. 8	N/A
Binary	Part 1: Qs. 3, 7, 9	Part 1: Qs. 3, 8
Check lists	Part 1: Qs. 5, 6, 10, 11	Part 1: Qs. 4, 5, 6, 7
Ratings (Likert)	Part 2: Qs. 1-18	Part 2: Qs. 1-10
Ratings (Double scales)	Part 3: Qs. a to x	Part 3: Qs. a to h
Ratings (Single scale)	Part 4: Qs. a to x	Part 4: Qs. a to h

Table 3: Question types in questionnaire pilot and main study questionnaires.

4.2.1.1.2 Part 1: Background Data

Background questions for each version of the questionnaire and the purposes for including them are summarised in Table 4 and Table 5. For the Questionnaire Pilot Study, questions were included on both the target language and other languages studied as it was felt that this could affect beliefs. For example, the study of Chinese tends to be quite formal as there is no other way apart from memorisation and repetition to learn to read and write characters. Apart from the possibility that age and gender might be related to beliefs about language learning, it was also felt that beliefs on the formal or functional nature of language learning might be affected by language learning experience (length of time and the nature of the learning), language study in the target language country, and current priorities in language learning.

Question	Purpose Of Question
1. Name	For follow up if necessary.
2. Age	Possible relationship with beliefs.
3. Gender	Possible relationship with beliefs.
4. What language are you studying now (your target language)? If you are studying more than one, please give the one you feel is most difficult.	Identify the target language (and in cases where more than one language is being studied to get the subject to nominate one). Beliefs may vary according to target language.
5. How long have you been studying your target language. Please include lengths of time which you may regard as useless (e.g. time spent studying in high school)?	Possible relationship with beliefs. "Useless" time was included because subjects in the development phase often did not want to include high school study. There was a perceived difference between "studying for real learning" and "studying for passing exams".
6. Year in college/university (Please circle):	Possible relationship with beliefs.
7. Do you speak/study or have you ever studied any other languages apart from your native language(s) and the language you are studying now?	Possible relationship between number or type (e.g. European or Oriental) of languages studied and beliefs.
8. If the answer to question 7 is "yes", please list the languages (please circle the level achieved).	As above.
9. Are you living or have you ever lived in the country of your current target language? (please circle):	Possible relationship between living in the target language environment and beliefs. "Are you living" was included because the survey was also going to be used for EFL students.
10.If "yes", for how long?	Possible relationship with beliefs.
11.My language learning so far has been characterised mainly by:	Possible relationship between previous language learning methodology and beliefs.

Table 4: Questionnaire Pilot Study background questions and their purposes.

Question	Purpose Of Question
1. Computer Login Name	This is unique for each subject and was requested to link the questionnaire with the logged data, which also included the login name.
2. Age	Possible relationship with beliefs and/or behaviour.
3. Gender	Possible relationship with beliefs and/or behaviour.
4. I am: (followed by student type categories)	Possible relationship between student type and beliefs and/or behaviour.
5. How long have you been studying English. Please include lengths of time which you may regard as useless (e.g. time spent studying in high school)?	Possible relationship with beliefs and/or behaviour.
6. What is the total time you have spent living in English native speaking countries (e.g. UK, Australia, America)?	Possible relationship with beliefs and/or behaviour.
7. My language learning so far has been characterised mainly by:	Possible relationship between previous language learning methodology and beliefs.
8. At the moment, I believe the most important thing I need to do to develop my English is:	Possible relationship between perceived current needs and beliefs and/or behaviour.

Table 5: Main study background questions and their purposes.

4.2.1.1.3 Part 2: General Beliefs About Language Learning

In general terms, one way to define the task of language learning is to describe the degree to which it is a formal or functional exercise (see Chapter 1.1 above for a definition of these terms). It can be said that there is a continuum between these two positions; that is to say that an individual's definition of language learning lies somewhere between saying that fluency in the target language comes from learning rules and words and saying that it comes from using the language as much as possible in real communicative situations. To find out if the subjects defined the task of language learning in these terms, questions were extracted from the Beliefs About Language Learning Inventory originally developed and used by Horwitz (1987) (see Section 2.1.3.2.1.1).

4.2.1.1.3.1 *Testing of BALLI for this Study*

The BALLI appeared to be a “ready made” tool for the investigation of language learning beliefs. However, only some of the questions were relevant to this particular study, which focused on beliefs about the formal or functional nature of language learning. The investigator needed to find out how subjects would interpret the statements. For example, was there any confusing or vague wording that would invalidate responses? It was also important to establish if it was possible to extract items from the BALLI to form a new questionnaire that would be a valid and reliable research tool.

Testing of the BALLI consisted of a detailed personal analysis by the investigator and by doing a series of six think aloud protocols with overseas students. The conclusions reached from the analysis were that eighteen of the statements in the BALLI might be useful to the investigation. This decision was made based on the relevance of the questions to formal or functional beliefs (see Table 6 for specific details).

Regarding the verbal protocols, their purpose was to refine the questionnaire rather than obtain data for research. Subjects were recruited from the population of overseas students at the University of Newcastle and the method of recruitment was purely opportunistic with the main criterion being that their level of English was good enough to articulate actions and opinions. The protocols took place in a quiet office

and subjects were recorded for later transcription. They were asked to read the questionnaire items aloud and to voice any thoughts or questions they had regarding the items. An example of one protocol transcription is given in Appendix E.

The protocol data suggested that the main problem was subjects' interpretations of the questions; there was a definite tendency of subjects, perhaps encouraged by the nature of the statements, to think of what might be true generally rather than what was true for themselves. The protocols also highlighted problem items such as item 8. A typical response for this item was "What kind of practice?"

This problem was partly solved in the Questionnaire Pilot Study through the reduction of the number of questions, which allowed the deletion of the problematic questions. It had also been found in discussions with subjects in the final stages of questionnaire development that when they filled out the questionnaire under realistic conditions (i.e. with time pressure), they tended to answer instinctively and their responses represented personal experience. The solution in the Main Study, apart from a further reduction in the number of questions, was for the investigator to administer the questionnaire in person. On these occasions, the investigator gave a very clear explanation making it very clear that:

1. The subjects must answer for themselves only, not for what they think was true of others.
2. The statements refer to language learning in general. For example, the subjects were told to answer as if the phrase "Generally speaking" were put at the beginning of every statement.

4.2.1.1.3.2 Choice of Statements for Questionnaire Pilot Study.

A total of 18 statements from the BALLI were included in the Questionnaire Pilot Study. These are shown in the complete questionnaire in Appendix C and in Table 6 with their associated theme. As Table 6 shows, these were drawn from the themes addressing beliefs about the nature of language learning, learning strategies, communication strategies and motivations and expectations.

Question	Theme	Agreement Indicates Beliefs Are Likely To Be:
1. My target language is structured in the same way as my own language.	Nature of language learning	Formal/Functional ⁷
2. It is necessary to know the target language culture in order to speak that language well.	Nature of language learning	Functional
3. It is better to learn my target language in a country that speaks that language	Nature of language learning	Functional
4. Learning a foreign language is mostly a matter of learning many new vocabulary words.	Nature of language learning	Formal
5. Learning a foreign language is mostly a matter of learning many grammar rules.	Nature of language learning	Formal
6. Learning my target language is different from learning other school subjects.	Nature of language learning	Either formal or function
7. Learning my target language is mostly a matter of translating from my own language.	Nature of language learning	Formal
8. It is important to repeat and practice often.	Learning strategies	Formal
9. It is important to practice in the Open Access Centre.	Learning strategies	Either formal or function
10. It is important to speak my target language with an excellent accent.	Communication strategies	Formal
11. I should not say anything in my target language until I can say it correctly.	Communication strategies	Formal
12. If I heard someone speaking my target language, I would go up to them so that I could practice speaking the language.	Communication strategies	Functional
13. It is OK for me to guess if I do not know a word in my target language.	Communication strategies	Formal
14. I feel self-conscious speaking my target language in front of other people.	Communication strategies	Formal
15. If you are allowed to make mistakes in the beginning, it will be hard to get rid of them later on.	Communication strategies	Formal
16. If I learn to speak my target language, it will help me to get a good job.	Motivations and expectations	Formal (instrumental motivation related to formal preferences)
17. People in my country think it is important to speak my target language.	Motivations and expectations	Formal (instrumental motivation related to formal preferences)
18. I would like to learn my target language so that I can get to know people better in the country where my target language is spoken.	Motivations and expectations	Functional (integrative motivation related to functional preferences)

Table 6: Questionnaire Pilot Study - Part 2 statements and themes.

⁷ This item focuses on awareness of language structure. Agreement with the statement may not necessarily indicate a formal or functional approach.

Responses to these statements (Table 6) can be interpreted as indicating the respondent's beliefs regarding the formal or functional nature of language learning. For example, it could be inferred from a respondent's agreement with statement 3 in Table 6 that this respondent feels that the functional practice opportunities provided by living in a native speaking environment would help in learning the target language; one might say that this indicates a functional bias in the overall definition of the task of language learning.

Statements 10 to 15 (Table 6), which focus on communication strategies, were included because responses may also indicate a formal or functional bias in how subjects define language learning. Statements 16 to 18 (Table 6), which focus on motivations and expectations are included because instrumental and integrative orientations (Gardner and Lambert, 1972, p. 3) may be linked to language learning preferences. For example, an instrumentally oriented learner (statements 16 and 17 in Table 6) is likely to see the passing of formal school or college exams as very important and will therefore value the formal methods which contribute to this form of success. On the other hand, integratively oriented (statement 18 in Table 6) learners may prefer the meaning-focused functional methods which may appear most closely related to the development of communicative abilities.

4.2.1.1.3.3 Choice of Statements for Software Pilot and Main Study.

For the main study, the number of statements taken from the BALLI was reduced to ten. These can be seen as part of the complete questionnaire in Appendix D and in Table 7 with their associated theme. As Table 7 shows, the wording of the statements was changed to fit the language being studied, English, and the focus of the statements was on subjects' beliefs about the nature of language learning, learning strategies and communication strategies. For an explanation of how and why these statements were selected from the original 18 statements, please see Section 4.2.1.1.4.4.

Question	Theme	Agreement Indicates Beliefs Are:
1. It is necessary to know English culture in order to speak English well.	Nature of language learning	Functional
2. It is better to learn English in an English speaking country	Nature of language learning	Functional
3. Learning English is mostly a matter of learning many new vocabulary words.	Nature of language learning	Formal
4. Learning a foreign language is mostly a matter of learning many grammar rules.	Nature of language learning	Formal
5. Learning English is different from learning other school subjects.	Nature of language learning	Either formal or function
6. Learning English is mostly a matter of translating from my own language.	Nature of language learning	Formal
7. It is important to repeat and practice often.	Learning strategies	Formal
8. You should not say anything in English until you can say it correctly.	Communication strategies	Formal
9. It is OK to guess if you do not know an English word.	Communication strategies	Functional
10. If you are allowed to make mistakes in the beginning, it will be hard to get rid of them later on.	Communication strategies	Formal

Table 7: Main study questionnaire, Part 2 statements and themes.

4.2.1.1.4 Definition of Language Learning Tasks Questionnaire: Full Version

The aim of the Definition Of Language Learning (DLLT) section of the questionnaire in both its full and short form was to obtain data on how students define the task of language learning in terms of the functionality or formality of specific tasks. The BALLI attempted to discover task definition at a general level. However, a subject’s disagreement with a statement such as “It is necessary to know English culture in order to speak English well” finds out a general opinion, but it tells us little about that subject’s beliefs about particular skills or activity types; a general opinion does not necessarily translate to specific situations or instances. Since the aim of the investigation was to find out the relationship between beliefs about language learning and specific preferences within a language learning computer environment, it was decided to develop an instrument which would tell the investigator what the subjects believed about specific activities.

4.2.1.1.4.1 Questionnaire Development Procedures

The basic requirements for the DLLT were two-fold. Firstly, find out how subjects define specific tasks in formal or functional terms, and secondly, find out how

valuable subjects think these activities are in developing language skills. These two aspects of the data collection were closely connected; respondents define the task and also say how effective they think the task is. The questionnaire was developed over a series of 21 think aloud protocols with overseas students. The selection of subjects, the conduct of the protocols and analysis of the data obtained was exactly the same as described above for testing the BALLI (see Section 4.2.1.1.3.1). A major difference, however, was that the questionnaire items were developed incrementally. That is, after several protocols were done, the questionnaire instructions and items would be refined and several more protocols would then be done to refine the items further. This process resulted in the development of items and instructions which the investigator was confident had both face and construct validity (see Section 4.5.1 below for further discussion of this). Please see Appendix E for example transcripts of these verbal protocols.

It was found that respondents regarded relevance to particular skills as very important. An activity could be defined as functional or effective within one skill but not in another. Description of activities in very concrete terms was found to be important. Even experienced language learners either found it hard to understand the point of an activity unless it was clearly defined or perceived slight variations as being very important. For example, activity x which is concerned with listening skills had to be described in this way:

Teacher reads a paragraph and the students write it down. Teacher collects the students work, corrects it, and returns it after a week.

There are better ways than this to do dictation, but *returns it after a week*, for example, was deliberately included to reflect reality (some teachers might do this) and make the activity more formal. Think aloud subjects had pointed out that they thought dictation could be a very functional and effective activity, but only if they got immediate feedback on their mistakes.

4.2.1.1.4.1.1 Explanation of Terms

In developing the DLLT, it soon became clear that asking subjects to define a task as formal or functional was not clear cut. The words “formal” and “functional” are technical terms which subjects are unlikely to understand in their intended sense. It was found that the terms “correctness” and “performance” with the following explanation succeeded in operationalising the technical meanings:

Situation: Imagine you are in a language learning class in which everyone speaks the same language as you. The teacher can also speak that language if he or she needs to.

Let's say that in this class, you can do activities that help you learn to:

- A. be correct. For example, you learn grammar rules, but you don't worry very much about practising for real life communication. The teacher may be very active and you are quite passive. This is good for passing exams. Here, we call this “Correctness”.
- B. communicate or perform tasks in real life. For example, you learn how to tell someone your opinion. You don't worry about small mistakes and you practice with other students. This is good for real life. Here, we call this “Performance”.

Why were these particular words used and not words such as “accuracy” or “fluency”? The answer to this is that, while “accuracy” and “fluency” are quite clear and easily understood, it was felt that they did not cover the intended meanings as well as “correctness” and “performance”. For example, the idea of being correct has connotations which one might associate with traditional classrooms where teachers might constantly be saying “That's correct”. There was a danger was that the terms “accuracy” and “fluency” would be associated too much with spoken English, while the terms used here covered wider ranges of meaning. The utility of the terms used was also confirmed by the verbal protocols (see Appendix E for example scripts).

4.2.1.1.4.1.2 How to Define the Task: Double Rating Scales

A more important issue was that the purposes of language learning activities are never purely formal or functional; they are always a combination. As Bialystok (1981, p. 25) points out, we cannot study form in the complete absence of meaning or meaning in the absence of form. A valid measure of a subject's beliefs about specific activities

requires a method of scaling that reflects this duality. The following question type and rating scale (with its accompanying explanation) were devised to achieve this:

The questions below ask you how much you think certain activities are about correctness or performance. Please mark on the scales your opinion on how weakly or how strongly they relate to correctness or performance.

Scale:

1. Very little or not at all
2. A little
3. Neither a little nor a lot
4. A lot
5. Very much

Doing role plays:

Correctness:	1.	2.	3.	4.	5.
Performance:	1.	2.	3.	4.	5.

Hmmm...? When I do role-plays, do I have to worry about speaking very correctly? Probably a little.

*Hmmm...? Do role plays help me with real life communication?
Probably very much.*

This item names a specific activity type, role plays, and asks the respondent to rate the degree to which role plays are concerned with developing correctness in language use or with the ability to perform language skills in real situations. If a respondent rated role plays as 5 for performance and 3 for correctness, it indicates that she believes that they were not only very much concerned with developing the ability to function in a communicative situation, but also that, to some extent, they help to develop the formal aspects of language. A further measure to ensure the validity of the response was to separate tasks into skill areas and to make it clear to the respondent that this task is performed for the purpose of, say, vocabulary development. The activity is therefore anchored in a clearly defined learning situation with the context and purpose providing a frame of reference within which the respondent can make a judgement. For the subjects, this clarifies the criteria to be used in making their judgements.

4.2.1.1.4.1.3 Rating the Effectiveness of Activities

Creating questionnaire items and a scale for respondents to judge the value of an activity was less complex. The following question type and scale (with the accompanying explanation) was developed for this purpose:

Situation: You are going to start a language learning class. Before the class, the teacher gives you a list of the kind of activities that could be done in the class and asks you to score the activities according to how effective you think they (and activities like them) are for learning.

- Scale:
- 1. Not effective at all
 - 2. Not very effective
 - 3. Neither effective nor ineffective
 - 4. Effective
 - 5. Very Effective

For learning vocabulary:

Activities like.....

Repeating words after the teacher: 1. 2. 3. 4. 5.

*Is repeating words after the teacher an effective way to learn vocabulary?
No, I don't think it's very effective.*

This format retains explanation of context and purpose so that respondents can make more valid judgements. In addition, although it is a more common single rating scale, it also retains a similar layout for the activity type and numbering.

4.2.1.1.4.2 Choice of Activities

The activities chosen for definition in the DLLT were developed with a view to their relevance to skill areas and with the expectation that they would be defined as either formal or functional. These skills were:

- 1. Vocabulary
- 2. Grammar
- 3. General Writing (not Business or Academic)
- 4. Reading
- 5. Speaking
- 6. Listening

The complete list of activities and how they were laid out can be seen in Appendix C, Parts 3 and 4. Within each skill area four activities were described. During the development phase these activities were fine tuned so that they would most likely be defined either as more functional or more formal.

4.2.1.1.4.3 DLLT: Short Version

The complete questionnaire used in the Questionnaire Pilot Study was very long. To elicit more thoroughly thought out responses, it was necessary to shorten it. To make it more relevant to the software activity which the subjects were going to do, descriptions of the activities in the program were included.

4.2.1.1.4.4 Choice of Questions

Items from Part 2 of the Questionnaire Pilot Study were retained on the basis of correlations between them and items in Part 4, because they were relevant to formal or functional beliefs, or because of relevance to vocabulary learning. Analysis of the data obtained from the Questionnaire Pilot Study showed that there were quite a few significant correlations between the scores for items 2, 3, and 6 and items in Part 4. Items 8, 11, 13 and 15 showed a clear relevance to an overall formal-functional bias. Items 4, 5, and 7 had a clear relevance to the content and purpose of the software, which was aimed at vocabulary learning. Item 6 was retained because it produced a relatively high number of correlations. Parts 3 and 4 were reduced to 8 activities: four original vocabulary skills activities and the four activities from WordLearner.

4.2.1.2 Software

In order to observe user preferences for inductive-deductive learning and productive-passive practice, software had to be produced containing these types of learning and practice. To achieve on-line data collection, code was written into the program, provisionally called WordLearner, to record user interaction with the materials. One version of the program content was produced, but four versions of increasingly complex hypertext structure were developed. In other words, the learners' movement around the content of the program was restricted to different degrees. The first stage of the program allowed very little choice of movement from one screen to another, the second a little more, the third even more and finally, the fourth stage, which would serve as the software for the main study, allowed the greatest amount of freedom of movement. This is described in Section 4.2.1.2.3 and Figure 5 below. The reason for this was that the first three levels of complexity in hypertext structure could be used as test-beds to debug the program code, to establish efficient collection and storage of data, to evaluate the activities that made up the materials and to make some initial

observations of learner behaviour. The final version, very similar to the first but with improvements in coding, constituted the main study.

Control of language learning and teaching variables for experimental purposes creates the danger of creating a pseudo-learning environment in which learners do not behave as they normally would. The most fundamental problem faced by the investigator in designing the experiment was the compromise between rigour in controlling variables such as subjects exiting the program before finishing it and creation of a language learning environment in which subjects would respond in as natural a way as possible. For example, a subject might exit just for the sake of it even though they are given a chance to confirm that they really want to exit. That subject might restart the program believing that no harm had been done while, in fact, their data would be invalidated by repeating the target vocabulary. The program now described represents the investigator's attempt to make the most reasonable compromise between rigour and reality. Program content, hypertext structure, and the implementation of on-line data collection will now be described. Where questions of experimental design arise, they will be addressed by the investigator. We will begin with a description of the software used to develop the language learning computer environment used in the investigation.

4.2.1.2.1 Software Used for Program Development

The software used for program development was an authorable hypertext application called Guide[®]. Guide's main weakness is that it does not handle graphics as well as other hypertext applications might (Hemard & White, 1995, p. 68), so screen design in Guide does not look quite as good as it could. However, for the purposes of this investigation, in which there were very few graphics, its ability to handle text was more than adequate. Materials created with Guide can be packaged and distributed to users using Guide Reader[™].

Guide also allows the incorporation of audio and video into the document. Again, Guide may not be as strong in this respect as other applications, but this investigation only required the playing of short audio (wav) files. The real weakness of Guide for this is that code has to be specially written to play the files.

Guide comes with a proprietary programming language called LOGiiX™. This allows great flexibility in the design of activities as the author is not limited to the ready-made functions that come with the package. The downside of this flexibility is, however, that the programming takes time. LOGiiX has no specialised development environment that can speed up programming and debugging.

As Guide is a Windows® program, more than one file can be opened at a time. These files can be opened in windows whose size and position can be set. Guide's built-in hypertext functions and the LOGiiX programming language allow the author to take the user from one file to another, one frame to another and one window to another. Data can be saved, copied and printed to other files. Despite Guide's undoubted weaknesses, its capabilities were more than enough to satisfy the needs of this investigation.

It should be noted here that Guide was designed to run under Windows 3.1 and this was the environment in which the research was carried out. No versions of Guide have been produced to run under Windows 95 or above. The Guide program produced for this investigation and supplied on the accompanying CD will run under Windows 98 in stand alone mode using the Guide authoring program. Using Guide Reader, it will run once. A second use of the program produces error messages and the program will not function. To run it a second time, the user must reboot.

4.2.1.2.2 Activities and Content

As the purpose of the program from the student's point of view was to learn and/or practice vocabulary, fourteen words were chosen and activities were based around the words. Please see Appendix E for a complete list of content. Fourteen was chosen as the number of words to study simply as a compromise. There was a need to have enough words for individual subjects to have a range of prior knowledge of, but there could not be so many that the units could not be finished in a reasonable time. The basic format was for the student to be presented with a word in visual and audio form; the student would then state what his or her prior knowledge of this word was, and then choose either to skip to the next word or to do activities to learn and practice it.

To understand this in detail, activities and content are best described screen by screen. Examples of content will be used in the following description. We will begin with an overview of the basic screen and navigational design.

4.2.1.2.2.1 Screen and Navigation Design

To see what the screens actually look like, please refer to the screen shots shown in **Appendix G**. The basic screen design for the main content screens consisted of two windows which were arranged as in Figure 4 below:

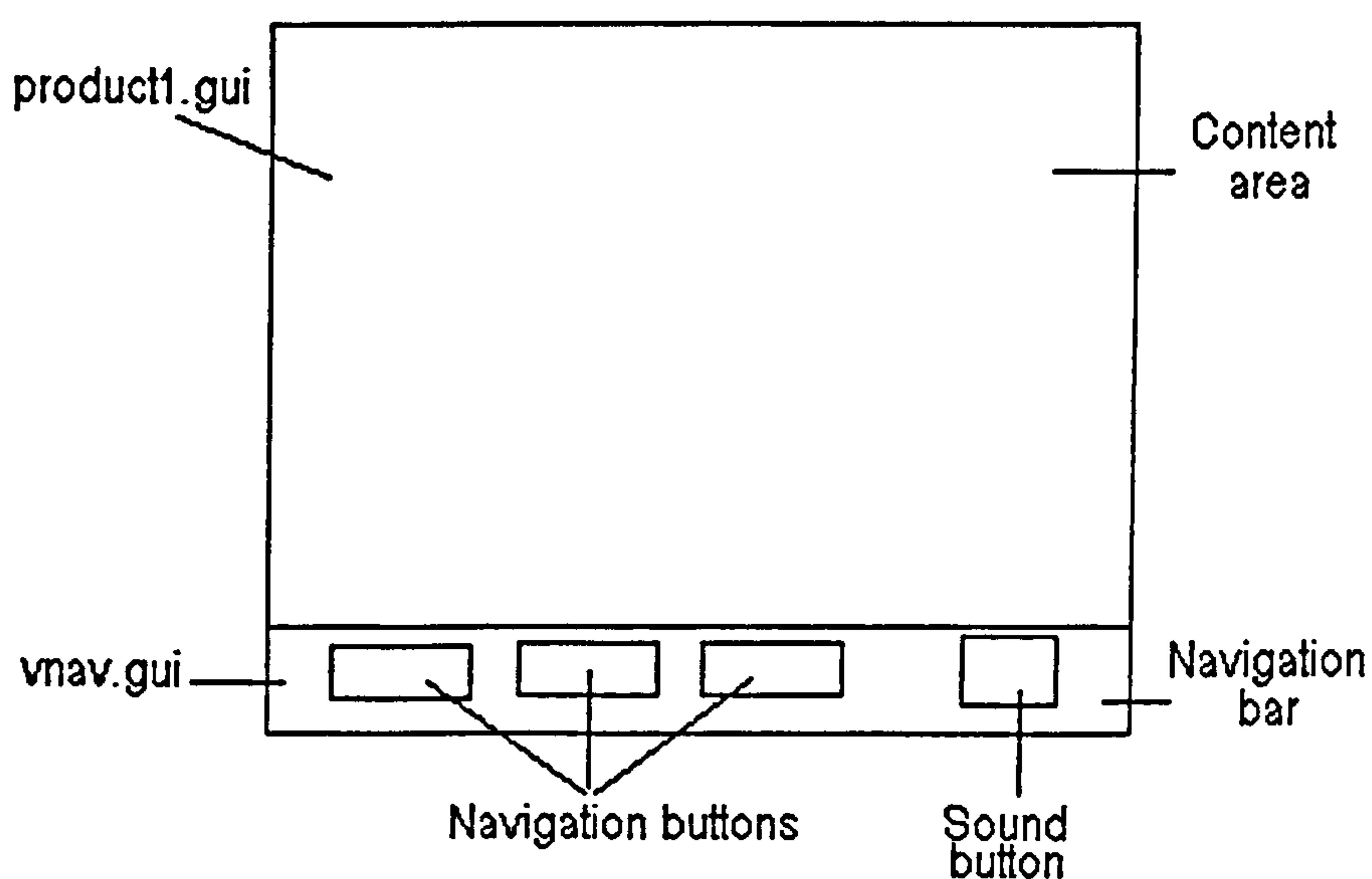


Figure 4: Basic screen design for the content and activities section of Word Learner.

Both windows were borderless and the same background colour so they looked like one document. The lower window served as a container for the navigation buttons and a button to play the audio file of the target word. The upper window contained the learning materials.

When a navigation button was clicked, the lower window remained in the same frame while the upper window changed to a new frame. However, the navigation buttons in the lower frame would change. For example, in the main study program, if a subject was in the Figure It Out screen (see Section 4.2.1.2.2.4 below), she would see a button to go to Guided Production, Multiple Choice and See The Definition. If the subject

clicked on the See The Definition button, the upper window would change to the See The Definition frame (see Section 4.2.1.2.2.5 below) and the See The Definition button would disappear from view.

The purpose of making buttons appear and disappear was to control the subject's movement from screen to screen. If the only way to go to a frame is by clicking on a button, the subject can only go there if the button is visible. The only real difference between the four versions of the program from the programming point of view was which buttons were available or unavailable to the subjects.

4.2.1.2.2.2 Prior Knowledge Screen

The prior knowledge screen is the first screen the student sees for each word. The word is printed in 24 point Arial font at the top of the screen and an audio file of the word plays once automatically. The main feature of the screen is a scale of prior knowledge for the word shown composed of five short and simple statements describing the student's knowledge. These statements are short as space on a computer screen is very limited. To comply with Le Blanc and Painchaud's (1985) findings that description of what a student can actually do with language produces much more accurate self-evaluation of language ability, subjects were given detailed descriptions of what these levels mean in practice during the orientation phase of the experiment (see sections 4.3.1.1.1 and 4.3.2.1.1). These statements are:

- Level 5: I know this word and all its meanings very well.
- Level 4: I know this word fairly well.
- Level 3: I know this word in its simple forms, but I need to practice it.
- Level 2: I'm not sure if I know this word.
- Level 1: I definitely do not know this word.

These statements are printed on buttons which the subjects click when they decide their knowledge of the word at the top of the screen. The subjects could listen to the word as many times as they liked by clicking on a button in the bottom right of the screen or on the word itself.

It should be noted here that evaluating knowledge of a word in this way is not intended to activate schemata or background knowledge. The question for the subject is simply *How well do I know this word?* No attempt is made to encourage the student to integrate the word into an “existing cognitive structure” (Ausubel et al, 1978, pp. 170-171); the scale is not, therefore, an advance organiser according to Ausubel’s definition (see Chapter 2.2.1.2 above for more details on advance organisers). While asking the subjects this question raises the possibility that awareness of prior knowledge was raised, data from the post hoc interviews (see 6.3.3.1.3 and 6.3.3.1.8) suggests that this was not a factor in decision making.

4.2.1.2.2.3 *Decision Screen*

After clicking on the statement corresponding to their level of prior knowledge, the Decision screen (Appendix G, Figure 31) appears. This presents the target word at the top of the screen below which is a copy of the statement they just clicked on. The main feature of this screen is a statement, “Please decide what you would like to do now:” followed by a set of 3 large buttons offering the subject choices of where to proceed. These choices and the type of learning they correspond to are shown in Table 8. The particular aspects of lexical knowledge (based on Nation’s (1990, pp. 30-32) description of word knowledge referred to in 2.3.2.4 above) that may be acquired from use of the program are given in Table 9. When the learner decides what to do and clicks on the appropriate button, the decision is confirmed with a dialogue box which asks if he or she is sure about this decision.

Activity Name	Type Of Learning
Figure It Out	Inductive
See The Definition	Deductive
Go To The Next Vocabulary Word	Subject does not want/need to learn this word.

Table 8: Activity names and types of learning.

Activity	Aspects of Lexical Knowledge
Figure It Out	Receptive knowledge Recognition of written form. Position (grammar and collocation – to the extent that these are inferable from the context). Meaning (concept and associations – to the extent that these are inferable from the context). Appropriateness (within ranges of use inferable from the context).
See The Definition	Receptive knowledge Recognition of written form. Position (grammar) Meaning (concept). Appropriateness (within ranges of use inferable from the definition).
Multiple Choice	Receptive knowledge Recognition of written form. Position (grammar and collocation – to the extent that these are inferable from the question content) Meaning (concept and associations - to the extent that these are inferable from the question content). Appropriateness (within ranges of use inferable from the question content).
Guided Production	Productive knowledge (ability to produce the written form). Position (grammar and collocation – to the extent that these are reinforced by attempting to answer and are inferable from the example of a correct answer). Meaning (concept and associations – to the extent that these are reinforced by attempting to answer and are inferable from the example of a correct answer). Appropriateness (within ranges of use inferable from the example of a correct answer).
Listening to sound file of target item	Recognition of spoken form.

Table 9: Aspects of lexical knowledge that may be learnt from the program.

4.2.1.2.2.4 Inductive Learning Screen (Figure it Out)

This screen is titled “Figure It Out” (Appendix G, Figure 32). The content of the screen is a sentence or sentences containing the word. The subject attempts to learn what the word means by guessing from context. To help the subject, the sentences were written to help make the meaning of the word inferable from context. For the word “cynical”, the following sentence is given:

Don't be so cynical. He did it to help us. Not for the money.

4.2.1.2.2.5 *Deductive Learning Screen (See the Definition)*

This screen is titled “See The Definition” (Appendix G, Figure 33). As the name implies, a dictionary definition of the word is presented with information such as part of language. For the word “cynical”, the following definition is provided:

Adj. - Describes a person who believes that others only do things for selfish reasons.

4.2.1.2.2.6 *Productive Practice Screen (Guided Production)*

This screen is titled “Guided Production” (Appendix G, Figure 36). As the name implies, the aim of the activity is to produce a sentence with the help of clues. A sentence is reduced to key words by taking out the target word plus all the articles, prepositions and conjunctions. The key words are presented in the order in which they occur in the original sentence. For the word “cynical”, the key words given are:

TV, reporter, took, view, politics

The original sentence is:

The TV reporter took a cynical view of politics.

The subject has to reconstruct the sentence from these key words. This is done by typing the sentence into an “ask box” which permits free input of text. When the student submits a sentence by clicking on the OK button in the “ask box”, the sentence is typed out on the screen and the program compares the input to the original sentence stored in the code. If the student's input does not exactly match the original sentence, feedback takes the form of a message that reads:

"This is not exactly the same as the answer that we have. Pay attention to capitals, spelling and punctuation. Do you want to try again?"

The student can try as many times as s/he likes, but if the student does not want to try again, the complete original sentence is typed out on the screen for comparison with the student's attempt.

4.2.1.2.2.7 *Passive Practice Screens*

The passive practice consists of two multiple choice questions. The first question (Appendix G, Figure 34) is a simple definition question while the second (Appendix G, Figure 35) focuses on word usage; it is more subtle requiring the student to find an incorrect sentence. The incorrect sentences are logically incorrect rather than grammatically incorrect. For the word “cynical”, the questions are:

Testing knowledge of the definition

Please choose which of the following is most likely to be correct.

Cynical is an adjective that describes a person:

- a) who is very pessimistic
- b) who does things only for selfish reasons
- c) who believes that others only do things for selfish reasons

Testing knowledge of word usage

Please choose which of the following is most likely to be incorrect.

- A. "Sure I believe you", the police detective laughed cynically. "Just like I believe in Santa Claus and the Tooth Fairy."
- B. I always knew my parents would believe me because they were so cynical.
- C. You couldn't blame Peter for being cynical. He'd been working in advertising for so many years and had seen how the public could be tricked.

The incorrect sentence here is “B”.

Although these activities certainly require an intellectual effort by the student, they are defined here as passive since they involve recognition rather than output. There is immediate "correct-incorrect" feedback.

The fact that there are two screens, one for each question, used for the passive activity compared to one screen for the productive activity may seem unbalanced and contrary to sound experimental design. There were two reasons for doing this. Firstly, two questions were used rather than one as it was felt that one question only would be so quick and easy compared to the Guided Production exercise that comparison of time and effort (if this were ever needed) might not be valid. Secondly, the program needed to function as realistic language learning material. It was felt that one question only would be boring and adding a different type of question would make the activity more attractive for the student. For the sake of balance in terms of time, effort and interest, therefore, two multiple choice questions were used.

4.2.1.2.2.8 Quiz⁸

This was a multiple choice test consisting of fourteen questions. Subjects worked through a short tutorial and practice question in the program (see Appendix G, Figure 37) with explanation and supervision from the investigator. They were, therefore, familiar with the format and the scoring system before starting the quiz.

The format for the questions was as follows:

His _____ attitude to his wife's family only increased the distrust between them.

- a) Belt and braces.
- b) cynical
- c) megabucks
- d) hype
- e) turn of phrase
- f) don't know

Questions were presented one at a time. Each target word had a corresponding quiz question. The word being tested in the example above is "tabloid". Points to note are,

⁸ Data from the quiz section was not used as the investigation was not concerned with learning effects. It was included simply to give the subjects a feeling of having learned something from their participation.

firstly, that subjects answer by clicking on the word they think is correct. Secondly, guessing was discouraged by awarding one point for a correct answer, deducting one point for an incorrect and zero for a “don’t know”.

4.2.1.2.3 Hypertext Structure

The term “hypertext structure” refers here to the way in which the hypertext nodes, the screens containing the learning material, were linked together. For the user, this means what movement is permitted from screen to screen. As mentioned above (see Section 4.2.1.2), four different hypertext structures were used.

The four hypertext structures used are shown in Figure 5 below. The lines between nodes indicate hypertext links and the direction of the arrows between them indicates direction of permitted movement. For example, subjects using the Stage 1 program could move from Figure It Out to Guided Production, but they could not move in the reverse direction from Guided Production to Figure It Out. Neither could they move from Figure It Out to See The Definition as there was no link between these nodes (for a discussion of restrictions such as these in relation to the program as a learning activity, see Section 4.2.1.2 above).

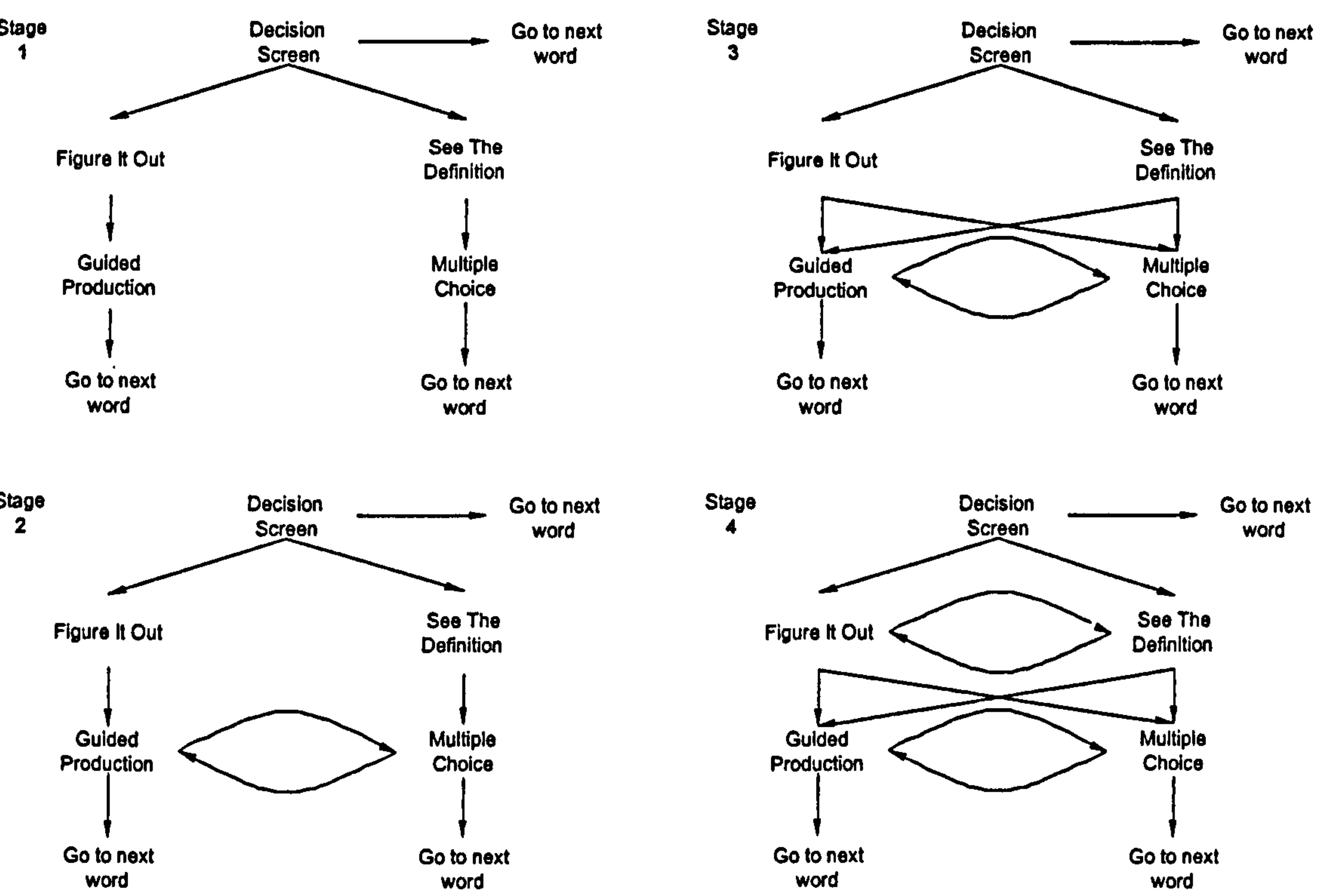


Figure 5: Hypertext structure of Word Learner for each stage of the Main Study.

General restrictions on movement for each stage were:

1. No reverse movement is allowed. Once a node has been visited, it cannot be revisited.
2. Once subjects decided to go to a practice activity, they could not return to a learning activity even if they had not done this activity.

The key features of each version were as follows:

Stage 1: When subjects made their initial decision to go to either Figure It Out or See The Definition, they were locked into either an inductive-productive pattern if they chose Figure It Out or a deductive-passive pattern if they chose See The Definition.

Stage 2: Subjects were allowed to visit both Guided Production and Multiple Choice nodes if they wanted, but could only visit one learning node. Moreover, they were not given a choice of practice nodes from the learning node they were in. They were given this opportunity when they completed their first practice node. Therefore, there was flexibility in doing practice activities but not in learning activities.

Stage 3: Subjects were allowed to visit both practice nodes if they wished but not both learning nodes. Stage 3 differed from stage two in that subjects could choose which practice activity to do from the learning node they were in (note the diagonal lines). Therefore, there was flexibility in practice but not learning and they could choose which order to do the practice activities in.

Stage 4: Subjects could visit all of the nodes.

4.2.1.2.4 On-Line Data Collection

The general theoretical considerations involved in on-line data collection have been discussed in Chapter 3.5.2. The problems and procedures specific to on-line data collection in this investigation will be discussed here.

4.2.1.2.4.1 Procedures

Logging user interaction is essentially a simple process. Normally, when a user clicks on a button, a script attached to the button executes the action for that button. For

example, in Guide, a button to go to another screen would have a script that executes the move to the next screen. Recording the execution of this move involves the inclusion of a few lines of code which, for example:

1. Identify the action and saves it as the value of a named variable. For example, the action of going to the Figure It Out screen could be identified as “Figure”. This can be done because objects such as frames or buttons can be given names; the software can get the name of, say, the target frame, which in this case would be “Figure”. A variable, which might be called “ThisMove” would then be assigned the value of the text string “Figure” as in “ThisMove = Figure”.
2. Gets the exact time of the click on the button and saves it as the value of a named variable. For example, a variable called “Time” could be assigned the time of the move in the form of a text string as in “Time = 15:33:21”. This is possible because every computer has a built-in clock and computer languages have commands which access this clock.
3. Prints these two values into another file. This is possible because code can be written to create and save a file with a unique name. This file is used as the log file; it remains open for the duration of the session, but its operation is invisible to the subject and does not interfere with subject interaction with the program. Program code can pass the data contained in the variables from the file the subject is working in to the log file. When a line of code says “print ThisMove” or “print Time”, it types the values that these variables contain, not the variable name. In the case of the examples we have just given, the log file would contain “Figure” or “15:33:21”.

The resulting log file contains strings of text as shown in Figure 6.

25---2	15:33:21	tabloid	2	I definitely do not know this word.	0
Figure	0	Guided Production	0	Multiple Choice	0
To Nx				Go	

Figure 6: Sample of logged data

The efficiency of this method is that the variables “ThisMove” and “Time” are always available to be reassigned new values once the relevant data has been passed to the

log file. The string of text above shows that the activity took place on February 25th. and the exact time of the action was 15:33:21. The action was to go to the prior knowledge screen for the word “tabloid”. The number “2” indicates that the subject listened to the word twice by clicking on the button to play the audio file for “tabloid”. The subject indicated that she definitely did not know this word and proceeded to go to the Figure It Out screen (Figure), Guided Production, the Multiple Choice questions and finally on to the next word (Go To Nx). The zeros following each screen name show that the subject listen to the word when viewing any of these screens.

The data logged in this investigation consisted of:

The date and time of starting work on a new word: The technical term for this type of data is *time-stamped key presses* (Preece et al., 1994, p. 627). In the print out of the log file, this looks like it belongs to the prior knowledge screen, but it is actually the time of clicking on the button to go there. In effect, it is the same thing. An example of this is shown in Figure 6 above.

The screens (nodes) visited: This is text data that is designed to be meaningful and give a quick picture of movement through the hypertext. This was included as it can be manipulated in Excel and could provide a backup method of calculating the traffic through the hypertext structure in the event of the purely numerical data on this being corrupted. This data is shown in the Figure 6 above.

The number of times the word was listened to: This is numerical data that represents the number of times the button was clicked to listen to the audio file of the word. This can be seen along side the other data described in Figure 6.

The number of times a particular link was traversed for a given level of word knowledge: This is numerical data calculated within Word Learner which is passed to the log file ready for input into an Excel spreadsheet. This data is printed in the log file as shown in Figure 7.

→	2	→	4	→	3	→	3	→	0	→	0	→	0	→	0	→	0	→	0
→	0	→	0	→	0	→	0	→	0	→	0	→	0	→	0	→	0	→	0
→	0	→	0	→	0	→	0	→	0	→	0	→	0	→	0	→	0	→	0
→	0	→	0	→	2	→	4	→	3	→	3	→	0	→	2	→	2	→	3
→	0	→	0	→	0	→	0	→	0	→	0	→	0	→	0	→	0	→	1
→	2	→	2	→	3	→	2	→	0	→	0	→	2	→	0	→	1	→	0

Figure 7: Sample of logged numerical data on link usage
(arrows represent tab characters).

This data is meaningless until it is pasted into an Excel spreadsheet with column titles that indicate the link and the level of knowledge. Table 10 clarifies this by showing a copy of part of the actual spread sheet using the first 5 values from above.

Decision Screen to Figure It Out				
DecToFgr1	DecToFgr2	DecToFgr3	DecToFgr4	DecToFgr5
2	4	3	3	0

Table 10: Example of how data on usage of links is organised in an Excel spreadsheet.

Table 10 shows that for the link between the Decision Screen and Figure It Out, the subject decided to go to Figure It Out twice at level 1 of prior knowledge (DecToFgr1). In other words, on two occasions, the subject stated that she definitely did not know this word and chose to try to guess the word from context. At level 2 of prior knowledge, the subject chose to try to guess the word from context four times. The rest of the spread sheet tells the story of what the subject did following these initial decisions, but this example demonstrates the basic principle of how the data in the log file becomes more meaningful when it is transferred to the spread sheet.

Scores for individual questions in the post activity quiz: This is numerical data. A sample is shown in Figure 8. A “1” represents a correct answer, a “0” represents a “don’t know” response, and a “-1” represents an incorrect answer. Negative values were changed to zeros in the spreadsheet.

→ 1 → 0 → -1 → 1 → 1 → 0 → 1 → -1 → 1 → 1 → 1
→ 1 → 1 → 1

Figure 8: Sample of logged numerical data on quiz scores
(arrows represent tab characters).

Sentences constructed by subjects in the Guided Production exercise: This is text data and is a record of their attempts to construct the sentences. An example of this data is shown in Figure 9.

0 → Tabloid·newspapers·were·full·of·news·of·politician.→0 → Tabloid·
newspapers·were·full·of·news·of·politicians.→2

Figure 9: Sample of logged data from input to the Guided Production screen
(arrows represent tab characters).

The final number represents the number of attempts. The other numbers represent the number of times the subject listened to the word.

Multiple choice answers: This is text data representing choices made by the subject in the multiple choice activities. An example of this data is shown in Figure 10.

→ tabloid·0 → mc1·--A·--Correct → tabloid·0 → mc2·--A·--Incorrect
→ tabloid·0 → mc2·--A·--Incorrect → tabloid·0 → mc2·--B·--Correct·

Figure 10: Sample of logged data from multiple choice questions
(arrows represent tab characters).

We can see from this that the definition question (MC1) in the multiple choice activity was answered correctly (answer A) on the first attempt. The second multiple choice question (MC2) in which the subject must find the incorrect answer was harder for the subject. We can see that the subject clicked on “A” twice even though she new this was incorrect after the first attempt. On the third attempt, she chose “B” which was correct. The numbers after the word “tabloid” represent the number of times the subject listened to the audio file of the word.

Word knowledge: This is text data and is displayed as in Figure 11.

tabloid	→	I·definitely·do·not·know·this·word.↵
broadsheet	→	I·know·this·word·in·its·simple·forms,·but·I·need·to·practice·it.↵
sensationalism	→	I'm·not·sure·if·I·know·this·word.↵
muck-raking	→	I·definitely·do·not·know·this·word.

Figure 11: Sample of logged data on word knowledge
(arrows represent tab characters).

This data is also recorded with the screen visited. It was printed to the file this way too so that it could be put into Excel without having the trouble of extricating it from a lot of other data.

4.2.1.2.4.2 Problems

Having stated that logging user interaction is essentially a simple process, we now have to explain the problems that go with it. These problems fall into three categories:

1. Programming
2. Networking and data storage
3. Organisation of data

We will describe these one by one.

4.2.1.2.4.2.1 Programming Problems

Programming problems arise from the large number of variables needed to save and transfer data and the limitations of the programming language used. It is very hard to keep track of so many variables and make sure that they are holding the values that they are meant to. This can be looked at as a syntactic-semantic problem. A syntactic error in programming is easy to detect because the program does not run properly and error messages are produced. A semantic problem is extremely difficult to detect because the program runs smoothly; it just does not do what it is supposed to do.

In the case of the data logged in this investigation, semantic problems could be very easily detected in the text data such as that recording the screens visited as it had obvious meaning and could be read through. Nevertheless, it still required multiple trials of all possible combinations of links or inputs to make sure that the data was logged. This was done using a chart on which all combinations were checked off one by one.

Numerical data, on the other hand, has no obvious meaning. For the numerical data on the number of times links were traversed, the investigator planned a set of complete trial runs through the materials with a prediction of the numerical print out for these. A trial spreadsheet with column titles was also prepared to paste the data into. The data from the trial runs was compared item by item with the predicted data to identify problems. When the data from the trial runs was pasted into the spreadsheet, false, missing or extra values were revealed.

Although no serious programming problems were encountered, this stage of program development was characterised by very slow and careful checking and rechecking of the program code. A further step in the process was to create a small but complete data set by working through the materials several times and then putting it into Excel. Calculations were then done with the data in Excel to make sure everything “added up” correctly. Strange looking numbers may be a sign of something going wrong in the program.

There were three limitations of the programming language, LOGiiX. Firstly, there is no dedicated development environment for LOGiiX as there is with languages such as C++ or Java. This means that very little information apart from a line number is provided to the programmer when the program fails to run. The line number given is often not the actual location of the fault. Faults have to be located by putting a message box into the code and working through line by line until the position of the fault is located. Secondly, variables in LOGiiX can only hold a maximum of 255 characters, so data had to be passed to the log file in small chunks. Lastly, LOGiiX allows use of “if” and “while”, but it does not allow “case” and “switch” which

provide for much simpler coding. This limitation makes branching and looping a little unwieldy in LOGiiX.

After debugging by the investigator, the program was tried out by several “guinea pigs”. This had several other functions as it also identified problems with content and activity types. Bad spelling and poor wording was identified at this stage. It also made network related problems obvious.

4.2.1.2.4.2.2 Network and Data Transmission and Storage Problems

It was found in this investigation and also in a previous investigation carried out by the researcher for his MA dissertation (Moran, 1995) that network management has a serious impact on the way data is transmitted and stored. Unfortunately, networks vary according to the idiosyncrasies of software, hardware and the technicians who manage them. With the best will in the world, the network manager may be unable to help when things go wrong. Problems may not be insoluble, but it may not be worth the time and effort it takes to solve them.

Two very important problems with logging over a network are the issues of sharing files and permissions to write to the network drives where the log files are saved. The problem of sharing files was identified by the investigator when doing research for his MA dissertation (Moran, 1995). These sharing violations (i.e. simultaneous attempts to use the same file by two or more users or applications when such use is not permitted) prevented the use of a single log file by multiple subjects. Early trials of single log files in the current investigation indicated that there was still a problem with this despite a new network set-up. The idea of using a single file for the logging of multiple users was therefore abandoned.

In the earlier MA research, it was also found that sharing violations restricted the automated transfer of data between applications using the Windows function, dynamic data entry (DDE). This would have had the advantage of saving work and allowing the automatic processing and analysis of data in Excel. This proved difficult not only because of the problems with sharing violations, but also because the investigator’s experience of DDE was that it was unreliable and slow. In addition,

data is not simply pasted into a spread sheet; several macros had to be written to handle the data and save the Excel file. In the MA research, these macros were used but the data transfer operation had to be initiated by the investigator after the subjects had finished the program.

These difficulties determined that the automated entry of logged data into Excel could not be risked for this investigation.

The issue of permissions arises because certain drives will allow users to read files but not to write files to them. During the initial trials, the investigator found, unexpectedly, that certain people whom he had assumed had permission to write to network drives or parts of these drives did not have this permission. The log files could be written to, but when the program attempted to save the files, the saving operation was prevented.

The investigator's solution was to avoid this problem completely by not using the network and running programs individually on the hard drives of each machine. Although it was disappointing that the full potential of the computer to record and store data could not be exploited with the accompanying problem of extra work, using stand alone computers completely cut out the danger of subjects being denied permission to save files to network drives.

4.2.1.3 Guided Interviews

These were carried out after the main study. The aim of doing guided interviews was to establish the reliability of the data obtained through on-line data collection and to answer questions raised by the analysis of this data by obtaining qualitative retrospective data on:

1. How subjects decided to do certain activities at different levels of prior knowledge.
2. Why subjects put more time and effort into certain words.
3. Subjects' opinions on the scale of prior knowledge.
4. Subjects' opinions of the quantity and quality of the materials.

The term “guided interview” is used because a form (see Appendix H) was used to structure the interview with the subject. This method was chosen as the issues focused on ranged from consideration of materials design to consideration of specific instances of subject behaviour. The use of a form allowed for the recording of specific information required from all of the subjects who were interviewed and at the same time for the recording of information which was specific to the subject.

4.3 Data Collection Procedures and Subjects

4.3.1 Questionnaire Pilot Study

4.3.1.1 Procedures

4.3.1.1.1 Questionnaire Administration

The questionnaire was administered by class teachers. Some of the questionnaires were completed in class and others were handed in to the teachers in the following classes. The questionnaires were then given to the investigator.

4.3.1.1.2 Subjects

The subjects were first, second and fourth year students⁹ in the Oriental Languages classes taught in the Language Centre of the University of Newcastle. These students were all taking at least one Oriental language as part of their degree. Some of these students were native Japanese or Koreans who were taking another Oriental language as part of the Combined Honours degree.

4.3.1.1.3 Response

Out of a total of 60 students in Oriental languages classes, 45 returned questionnaires. Of these, 15 were discarded after checking for features such as missing answers, incomplete questionnaires and response patterns such as ticks made in a straight line down the page suggesting unconsidered, rushed responses that invalidated the data. A total of 30 questionnaires (50% response) were found suitable for analysis.

⁹ There are no third year students as this is their year abroad.

4.3.2 Main Study

The main study consisted of a questionnaire, which has been described above (see section 4.2.1.1.4.3), one unit of a hypertext program designed to teach vocabulary (see section 4.2.1.2), and guided interviews with two of the subjects carried out after initial analysis of the data. In this section, we will first describe the experimental procedures for administration of the questionnaire, completion of work with the program and finally the guided interviews.

4.3.2.1 Procedures

4.3.2.1.1 Session Format and Content

The basic procedure (see Figure 12) for each stage did not vary.

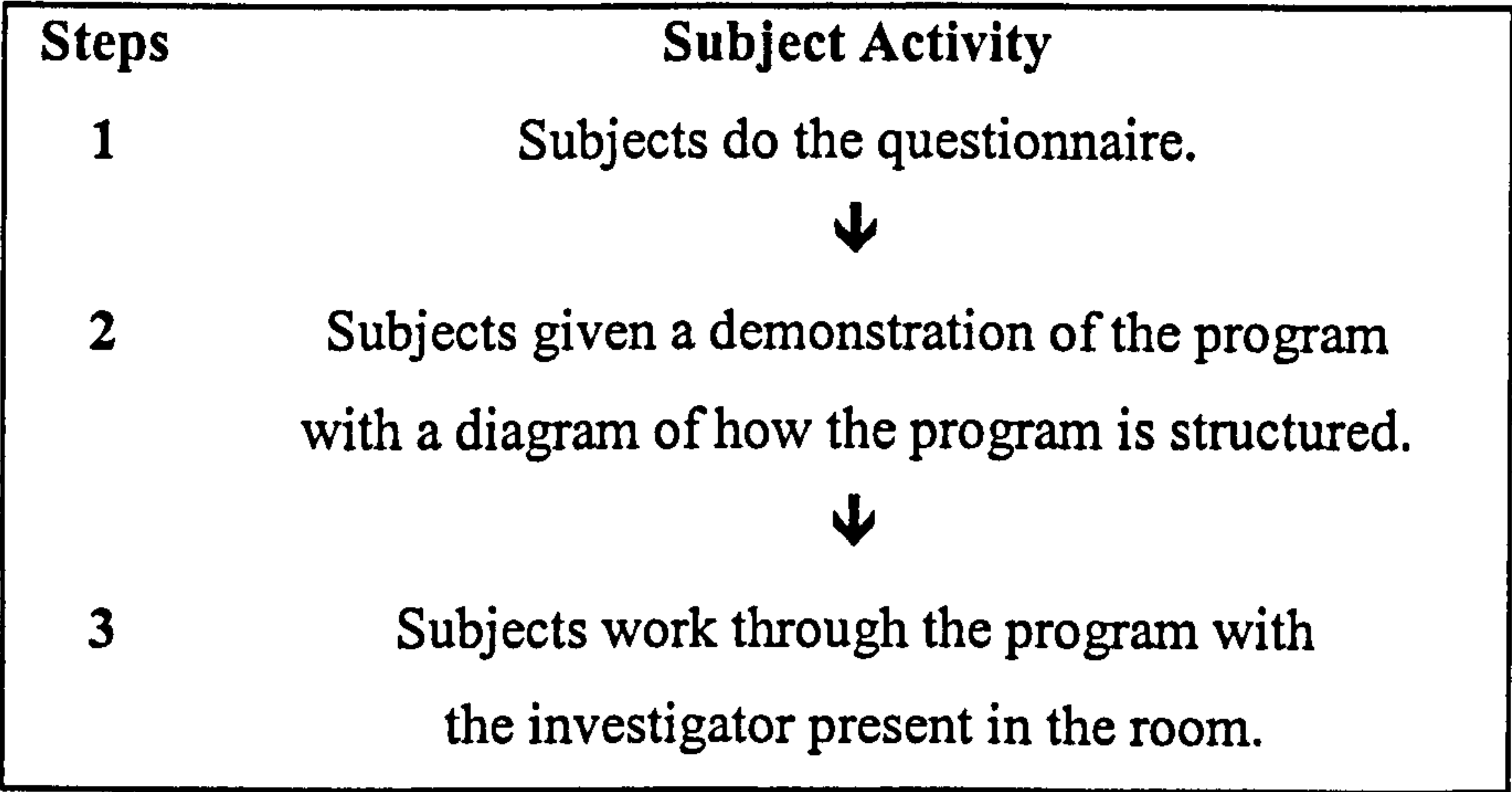


Figure 12: Main Study procedure.

Initial preparation for each session consisted of:

- 1. Preparation of questionnaires.
- 2. Booting the computer to stand alone mode.
- 3. Getting the program ready for the subject to start work.

4.3.2.1.1.1 Questionnaire Administration

When students came to the computer room to do the research session, they were given a copy of the questionnaire and the first section was explained to them question by question. As each section was completed, the next section was explained. Care was taken in part 2 (based on BALLI) to emphasise that:

1. Answers were to be given according to how the respondent felt, not according to what the respondent thought should be true for others.
2. The statements given should be interpreted as generalisations about the nature of language learning and that they might not be applicable in all situations.
3. If there was any problem with understanding a statement, to ask the investigator.

For part 3, it was expected that the unfamiliarity of the terminology and of the dual scaling would cause problems. Thus, the subjects were “walked” through the printed instructions with care taken to ensure understanding. At first, several subjects were a little confused, but by the end of the introduction, all appeared to understand clearly and very little had to be added verbally to the written instructions. As expected, the main cause of confusion was the terminology, but with a little oral explanation from the investigator that the terms “correctness” and “performance” corresponded to a focus on traditional teacher-centred learning and a more communicative style of learning the instructions were easily understood. Emphasis was also placed on the idea that activities were evaluated in relation to vocabulary learning. Subjects appeared to have no trouble with this.

Explanation for part 4 was much simpler as the activities described were the same as in part 3 and there was a similar emphasis on vocabulary learning.

The time taken to complete the questionnaire, including explanation time, was about 30 minutes.

4.3.2.1.1.2 Working Through WordLearner

In this study, subjects were asked to complete one unit of work in a language learning computer environment focusing on vocabulary learning. There was no specific topic for the vocabulary. A complete list of vocabulary and content for this unit is given in Appendix E.

The basic materials format is summarised in Figure 13. The subject first entered his or her name and computer user ID. The user ID was used by the program to create a unique name for the log file and the subject’s name was entered into the file to

identify it. The subjects then did the vocabulary learning activities immediately followed by a multiple choice quiz. The multiple choice quiz functioned as a “rounding off” activity.

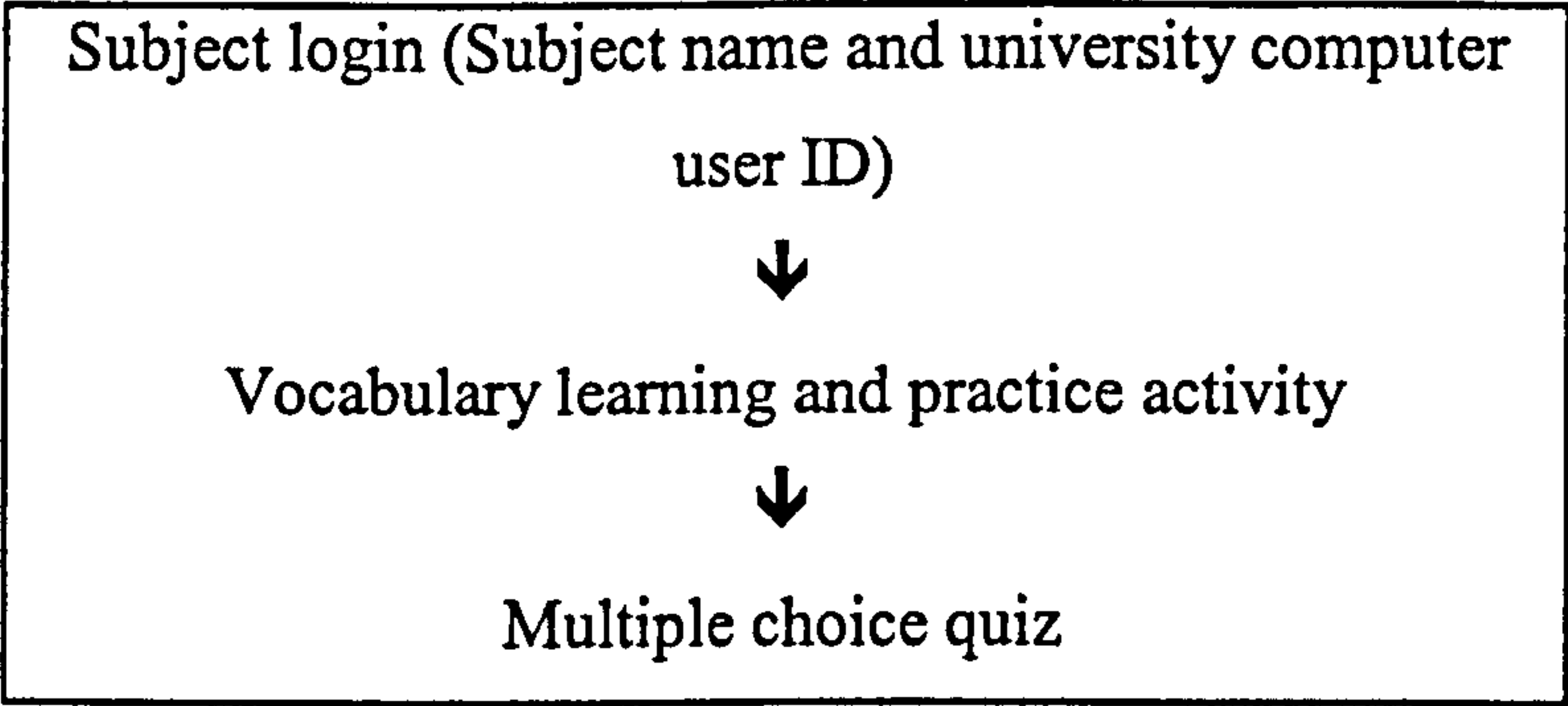


Figure 13: Main Study software materials format.

4.3.2.1.2 Session Scheduling

Each subject was asked to attend the computer room on one occasion. Computer facilities, room scheduling and the individual schedules for each subject determined that the subjects could not attend as whole groups. To get four groups of 10 subjects to complete the four versions of the program, the investigator had to take a flexible approach to scheduling. As the Main Study was divided into four stages with the first three stages focussed on debugging, the investigator scheduled the subjects to attend over a four week period, some attending alone and some attending in small groups of 3 or 4. The ten subjects who attended in week one did stage one of the program, the subjects who attended in week two did stage two and so on.

4.3.2.1.3 Subjects

Subjects were recruited from the overseas student body of Newcastle University. Subjects were assigned to the four treatments in the order in which they volunteered. For example, the first ten volunteers were assigned to stage one, the second ten did stage two and so on. Frequency tables of subject background data is given in [QPS BACKGROUND DETAILS FREQUENCIES.HTM](#). Overall, the sample was 80% female and 20% male, with an average age of 27.1.

4.3.2.2 Guided Interviews

It should be noted here that the reasons for doing the guided interviews were to:

1. Check for unknown problems with design features that may have required consideration in data analysis and interpretation. For example, was the scale of prior knowledge appropriate?
2. Find out if the subjects could say anything about why they had made certain choices or, for example, why they had spent more time at certain levels of prior knowledge.

The guided interviews are not regarded by the investigator as a primary source of data. Therefore, they are not subject to detailed analysis and reference is made to them as a secondary, supporting source of evidence in the qualitative analysis of subject interaction with WordLearner. Subjects 3 and 8 were chosen, at random, to be interviewed. Relevant interview data can be found in the qualitative analysis of their interaction (see Chapter 6.3.3.1.3 for Subject 3 and Chapter 6.3.3.1.8 for Subject 8). In addition, the completed interview forms for both subjects are provided in Appendix K and Appendix L.

4.3.2.2.1 Guided Interview Questions

Collection of data from the guided interviews relied on the use of a form (see Appendix H). The questions on this form were designed to answer queries arising from initial analysis of the log file data that could only be answered by the subjects themselves and to get subjects' input on the quantity and quality of the materials. To find out why students made specific learning decisions, they were presented with all possible levels of prior knowledge and all possible choices and asked:

“For each of the following levels of word knowledge, what was the most likely choice to make? Were you consistent in this? If not, why not?”

After this, they were asked six questions concerning time and effort students put into the activities (Q. 5), materials design (Qs., 6, 7 and 9), and how they saw themselves as learners (Q. 10). These questions are given here with the reasons why they were asked (question numbering from the form is retained):

5. More time and effort is put into certain words. Can you explain why this is so?

Reason: Logged data indicated that subjects spent more time on words at the mid-levels of prior knowledge. Asking the subjects directly may shed light on this.

6. Was there enough practice material? Y N

Reason: It was important to find out if the students felt there was too much or too little material in the program.

7. Are there any exercise types that you think should have been included? Why?

Reason: It was important to find out if students felt the activities were appropriate to the task of learning this vocabulary.

8. When did you make your decisions about the activities you wanted to do? Right at the beginning or on the fly? Why?

Reason: It was thought important to find out if subjects were following a plan or reacting to material screen by screen. It should be noted that the term “on the fly” was not actually used with the subjects and was used by the investigator only as a “short hand” for “as you proceeded through the materials”.

9. Any comments on the scale for prior knowledge? Was it confusing at all? If you hadn't been asked, would you have thought about it anyway? Would the activities be different without it?

Reason: Were there problems understanding the scale and were there inconsistencies in interpretation between subjects? In addition, the investigator needed to find out if asking subjects about their prior knowledge influenced their learning behaviours. This question was added after the interview with Subject 3. In earlier versions, this issue was covered when asking question 8 and this question was added in case the interviewer forgot to ask.

10. How would you describe yourself as a language learner? (e.g. Do you like to practice grammar and memorise vocabulary? Do you think you learn more from real life communication?)

Reason: The way subjects perceived themselves as learners and how they related to the materials may have affected their learning decisions in the program.

4.3.2.2.2 Guided Interview Subjects

A sample of 2 subjects who had completed the stage 4 version of the software volunteered to participate in the interviews.

4.3.2.2.3 Guided Interview Schedule

Each of these subjects were interviewed at a time that was convenient to them.

4.3.2.2.4 Guided Interview Procedure

Initial preparation for the interviews, which were carried out at a computer, was first to have the program open at the prior knowledge screen and second, to have the subject's log file open and ready to show the subjects what they had actually done. The interview was carried out by going through the questions one by one. When necessary, subjects were shown the log file and asked why they thought they had followed certain paths or spent time on certain activities. Extra or unexpected information was written on the back of the form.

4.3.3 Ethical Considerations

The following discussion of the ethical considerations of the two studies described here is based on the British Association for Applied Linguistics (BAAL) Recommendations for Good Practice in Applied Linguistics (baal.org.uk). In particular, it is based on Section 6 of the BAAL recommendations (Responsibilities to Informants). In summary, these recommendations state that confidentiality and anonymity should be respected, consent should be informed, subjects should be free not to participate, there should be no deception, and subjects should be consulted on completion of the research. Each study will be taken in turn.

4.3.3.1 Ethical Considerations in the Questionnaire Pilot Study

The following statements were placed at the top of the first page of the questionnaire:

The following questionnaire looks at the way people who study languages define the task of learning a language.

To begin, please answer the following questions. All data will be held in the strictest confidence.

The subjects were, therefore, fully informed of the purpose of the research and assured of confidentiality. Respondents' names were requested in case there was a need for clarification of the data, but these were removed from all statistical files and outputs.

While the questionnaire surveys were administered by class teachers during class time, administration was at the end of the very last class of the academic year and potential respondents were under no pressure to take part. They were free to opt out if they wished. The administration of the survey and the analysis of the data therefore conform to BAAL's recommendations on confidentiality, informing subjects of the research purpose and respecting the freedom of potential informants not to take part. Unfortunately, due to the timing of the questionnaire administration, the analysis of the data, and the time lag to completion of the project, respondents were not available to be consulted on the completion of the research project.

4.3.3.2 Ethical Considerations in the Main Study

The main study questionnaire form began with the same statements given above and related ethical considerations of respect for confidentiality and anonymity and informed consent are therefore the same.

Recruitment of subjects and administration of the survey were somewhat different, however. The following procedure ensured that students gave informed consent. As much as possible was done to make sure they felt no pressure to take part. Subjects were recruited by the investigator going to Foundation Year, In-Sessional and post-

graduate classes in person and briefly introducing the research project. Students were told that their participation was requested in a study of how language learners define the purpose of language learning and, as part of this research, they would work through a short vocabulary learning program. A form was given to the class teacher to hand around on which students could write their names and email addresses if they wished to participate. The investigator left the room before the form was given to the students. On receiving the form back from the class teacher, the investigator contacted the student to confirm the student's willingness to participate. When enough volunteers had been found for each stage of the Main Study, they were again contacted to make appointments for participation in the research.

Regarding working through the program and the collection of data during this procedure, subjects were unaware that their choices were being logged. However, though the data tracking was covert, the subjects were fully aware that they were taking part in research.

As with the Questionnaire Pilot Study, the time lag between performing the research and analysing the data precluded informing the subjects of the results of the research. The investigator believes the above procedure satisfies as far as was possible in the circumstances BAAL's recommendations on responsibilities to informants.

4.4 Data Storage, Analysis and Display Methods

4.4.1 Storage and Analysis

Data obtained on-line was initially kept in the text files created by WordLearner. After each session, the data was copied and pasted to an Excel file containing data from all of the subjects. Calculations and graphics based on the data were done in Excel. When this was done, the data was copied and pasted into SPSS for statistical analysis. Excel was used as the investigator was experienced with it and the spreadsheet structure was more suitable for converting the long series of numbers that constituted the raw data into single numbers which could be analysed within SPSS. Also, graphics can be manipulated in Excel with greater ease.

4.4.2 Calculations

Three types of calculation are frequently referred to in the analysis and discussion of the data. These are:

1. **Path-length:** This is the number of links the learner makes between the Decision Screen and starting the next word. Mean path-length is calculated for each level of prior knowledge.
2. **Duration of study:** This is the time taken from first seeing the target vocabulary word to starting the next word. Mean duration of study is calculated for each level of prior knowledge.
3. **Mean duration of study per screen:** This is based on path-length and duration of study. Duration of study is divided by path-length to give the mean duration per screen. In other words, it is a measure of the average amount of time the subjects spend on each screen.

4.4.3 Data Display

It was felt by the investigator that customised graphics that could show something of the flexibility and dynamism of user interaction with hypertext needed to be developed. In looking for any trends in the data, the investigator was primarily concerned with:

1. Prior knowledge of the target vocabulary.
2. Preference for either inductive or deductive learning.
3. Preference for active or passive practice.
4. Effort invested in the task according to level of prior knowledge of the target vocabulary.

Graphic presentation of subject behaviour presented two problems. These were how to show:

- 1) Navigation patterns by level of prior knowledge.

- 2) Individual exploratory behaviour by level of prior knowledge. Exploratory behaviour is defined here as changes in subject behaviour suggesting that the subject is trying out different activities or combinations of activities to discover:
- a) what the program contains, or
 - b) if a s/he is more comfortable with a certain combination of activities.

The following sections illustrate how the results of this research are shown graphically and focus on preferred learning methods and pathways, comparison of behaviour between different levels of prior knowledge, and exploratory behaviour.

4.4.3.1 User Choices from One Node

To show users' navigational choices from one node, a simple directional graph such as the one used below (Figure 14) was used. This follows examples given by Orey and Nelson (1993, p. 633) and illustrates the percentage of choices made between 3 choices (go to the inductive node, the deductive node, or skip to the next word). Thicker lines indicate higher percentages. The percentages are calculated using the number of decisions made at this level of prior knowledge.

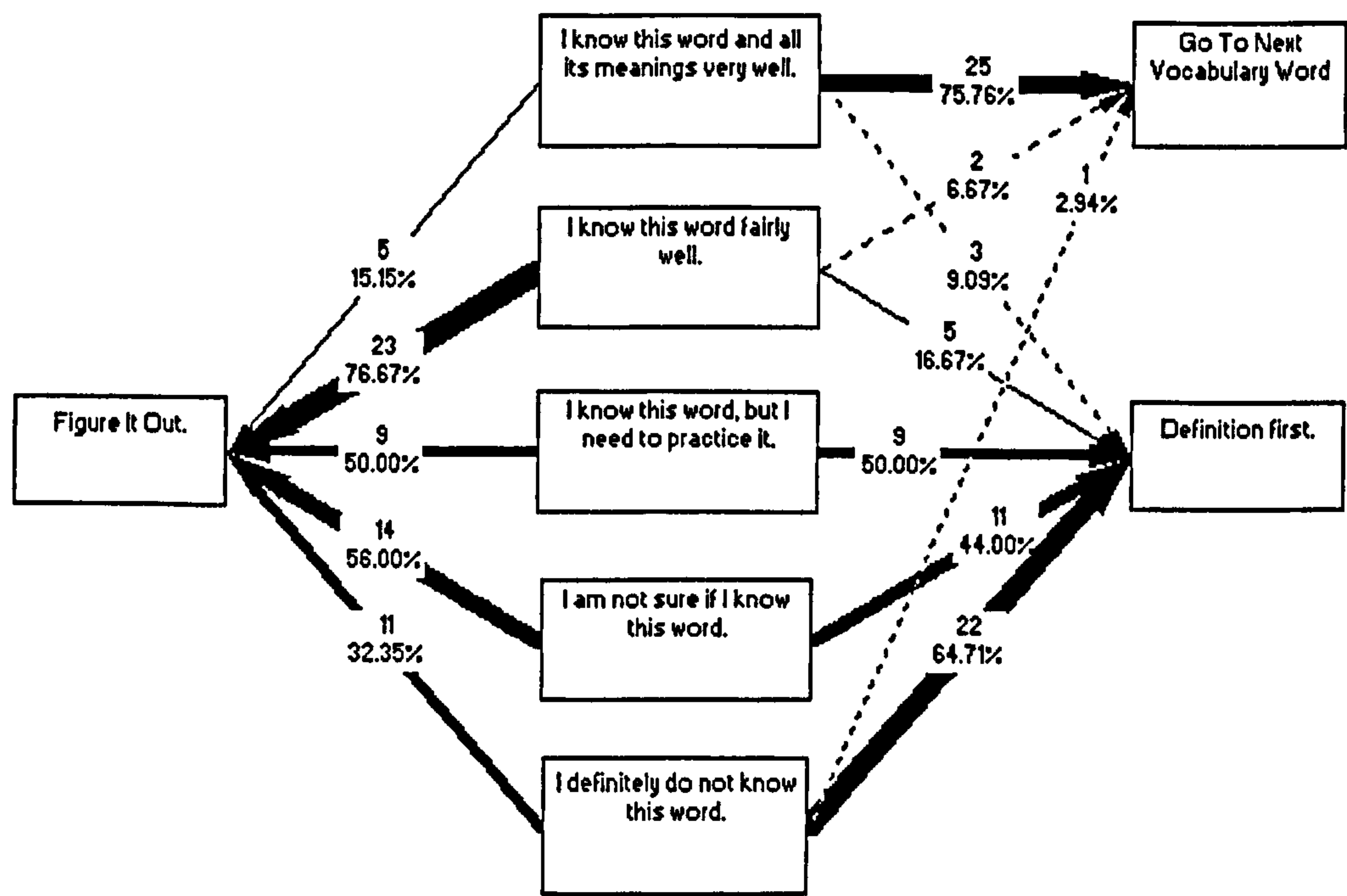


Figure 14: User choice diagram

4.4.3.2 Decision Flow Diagrams

The following graphic (Figure 15) is an example of how language learning pathways taken through the program were shown. As with the User Choice diagrams (Figure 14), thicker lines indicate heavier traffic (higher percentages). These are also based on suggestions made by Orey & Nelson (1994, p. 633).

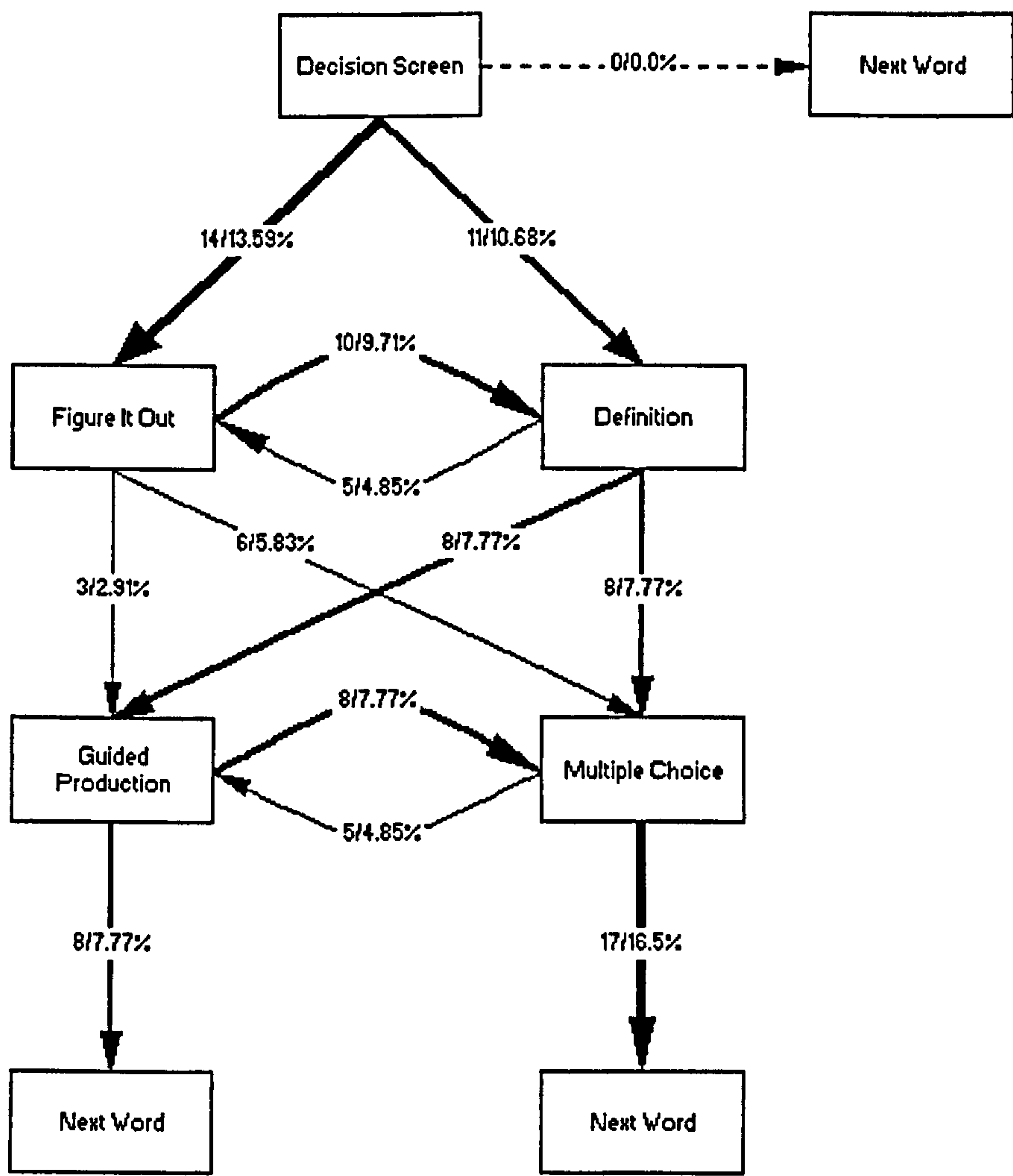


Figure 15: Decision flow diagram

The problem with this graphic was to decide a method of calculating percentages of choices made. The method chosen was to calculate a percentage of the total number of navigational choices made at this level of prior knowledge. For example, if we look at choices made from the decision node in Figure 15, on 14 occasions, subjects chose inductive learning (Figure It Out) and on 11 occasions, subjects chose deductive learning (Definition). The total number of navigation choices made at this

level of prior knowledge was 103, so the percentages are 13.59% for the decision to the inductive node and 10.68% for the decision to the deductive node.

The advantage of this method of calculation (i.e. percentages of the total number of choices) is that as the users work their way through the program, branching out through the hypertext structure, there is a trend for the “traffic” to become more and more diluted. Traffic volume along some links might be very low, but if a certain pathway is more popular, it will stand out more in relation to the other possible pathways. If percentages were calculated based on the number of choices from a particular node or at a particular level in the hypertext structure, the relative popularity of pathways would not be so obvious.

4.4.3.3 *Summaries for Quick Comparison*

Summaries of changes in learning preferences were made with the graphic (Figure 16) shown on the following page. This is produced by tracing the most common pathways shown by the decision flow diagrams. If there are equally popular pathways, they are both shown. Pathways that are within a 10% range of the most popular pathway at the same learning level are shown with a broken line. It was decided to do this because the numbers of subjects were so low that a difference of one subject choice could represent a large percentage.

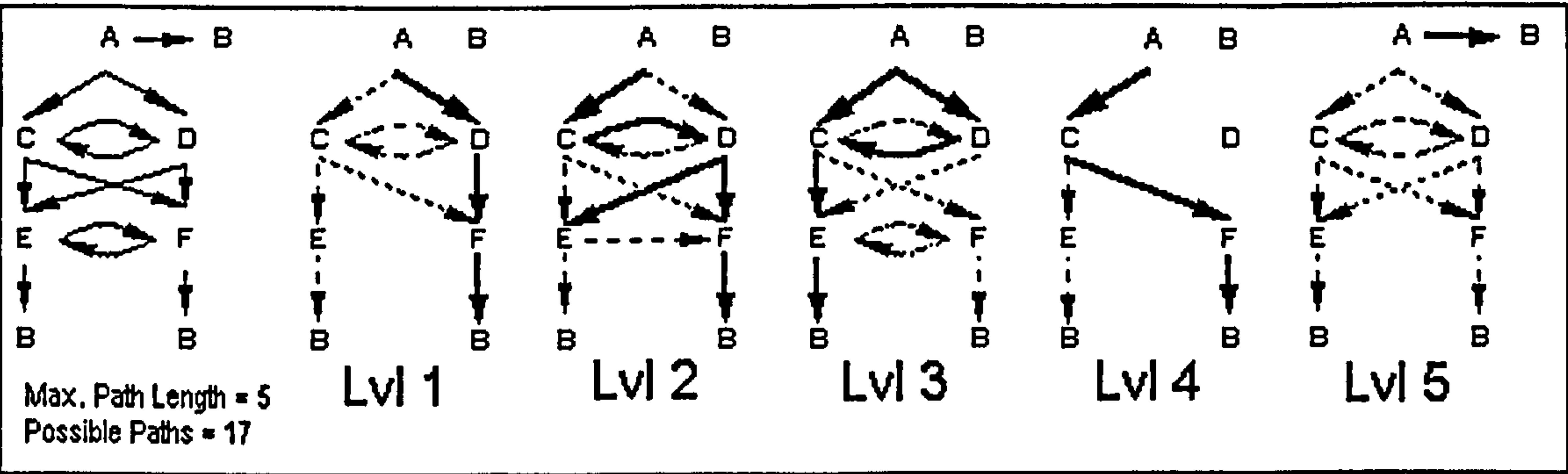


Figure 16: Path summary diagram

Line Key:
—————> Most popular link from node.
-----> Link with traffic volume within 10% of most popular link from node.

Letter Key: A = Decision screen, B = Go to next word, C = Inductive screen (Figure it Out), D = Deductive screen (See the Definition), E = Productive practice screen (Guided Production), F = Passive practice screen.

4.4.3.4 Showing Individual Interaction and Whether The Same Individuals Are Exploring Different Pathways

One of the proposed advantages of hypermedia materials is that they facilitate autonomy and allow students to choose what they think is the best way to learn something (Healey, 1999, p. 138; Soo, 1999, p. 301). This being the case, we would expect to see students experimenting with different approaches to solving their language learning problems. Such exploratory behaviour was illustrated with a “Cross Link” diagram (Figure 17 above), so named because of the way changes in choice are shown by lines that cross over¹⁰. This graphic is created by counting first, second, third and so on moves at a given level from a specific node. In Figure 17, for example, the choice is between going to the next word (“Nx” on the Y axis), and the inductive (“In” on the Y axis) or deductive (“Dd” on the Y axis) node from the decision node. A subject’s first choice at, say, level one of prior knowledge, to go to the inductive node is shown by a horizontal line from the inductive position on the y axis to the first move position. The thickness of the lines indicates the number of people making the same decision.

The next time this subject meets a level one word, if that subject’s decision is to go to the inductive node again (i.e. the same as before), the horizontal line is continued to the second move position. If the subject had decided to change his/her behaviour and go to the deductive node instead (exploratory behaviour), a line would be drawn diagonally across to the deductive position on the second grid line. The greater the number of diagonal lines and the thicker they are, the greater the amount of exploratory behaviour within the group.

An index of exploratory behaviour can be produced by dividing the total number of moves at a given knowledge level by the number of “cross-overs”. For example, 3 cross-over moves out of a total of 21 moves would give an index of .14. The higher the index, the greater the amount of exploratory behaviour.

¹⁰ It should be emphasised here that the data displayed in these diagrams with-in subjects rather than across subjects.

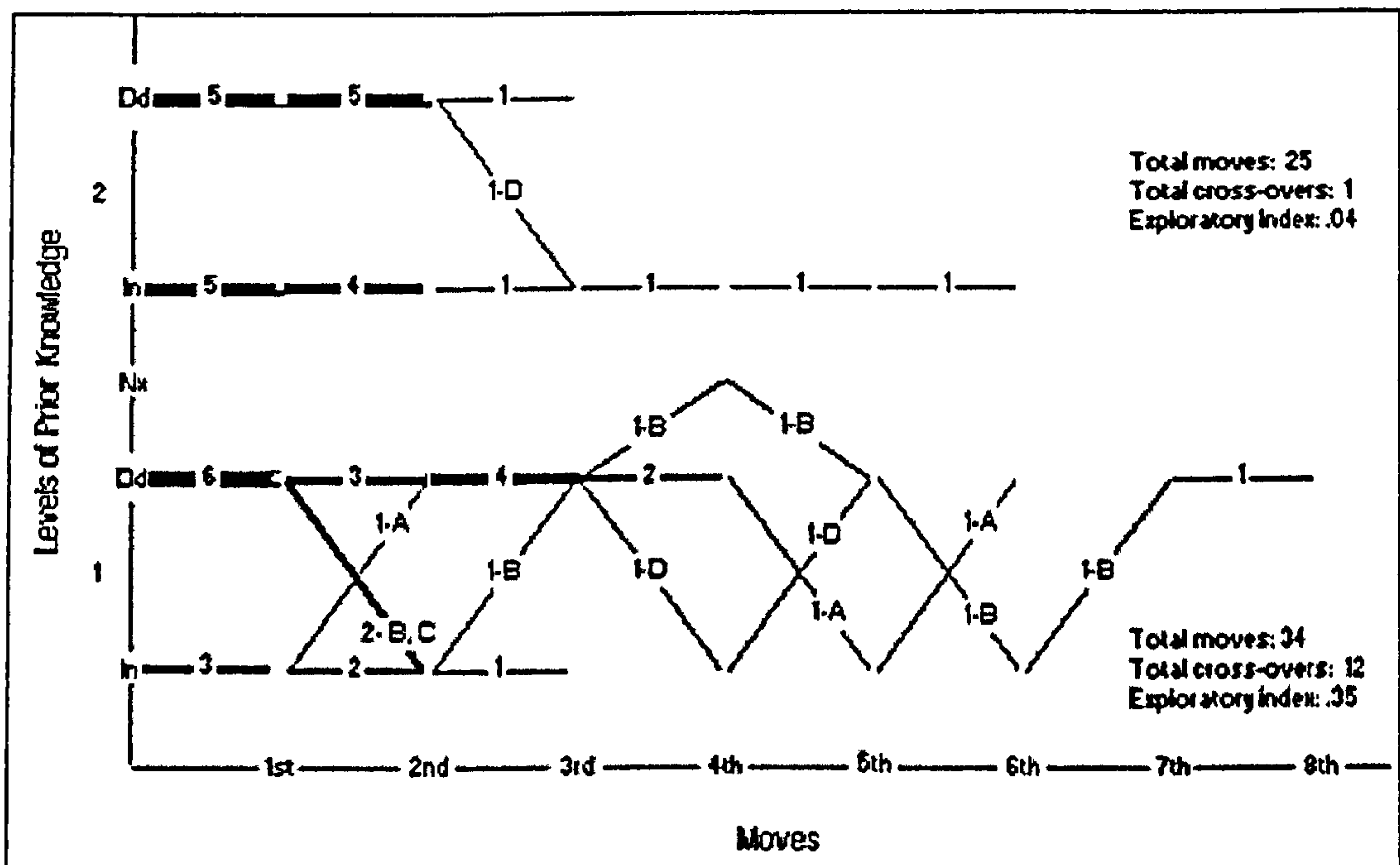


Figure 17: Sample of cross-link diagram showing choices made at levels 1 and 2 of prior knowledge.

Key: In = Inductive node is first choice, Dd = Deductive node is first choice, Nx = Go to next word is first choice.

4.4.4 Statistical Methods

The following types of statistics were used in the analysis and description of the data obtained:

Descriptive Statistics

For the background details and for Part 2 of the Questionnaire, descriptive statistics (including cross-tabulations) are relied upon to analyse and paint the broad picture of subject response. Kuntz' (1996) analysis of published investigations that have used the BALLI concluded that BALLI was best used in large studies where statistics such as factor analysis and ANOVA could be applied. However, it is argued here that the use of descriptive and non-parametric statistics is appropriate if the purpose of the questionnaire is to simply to describe the respondents' beliefs in general terms in the same way that Horwitz (1987; 1988) has.

Spearman's Rank

The non-parametric correlational statistic, Spearman's Rank, is used to look for correlations between Parts 2 and 4 of the questionnaires and between these sections and data from WordLearner. Spearman's Rank is used here because it may be applied to the type of ordinal data produced by Likert scales and has the further advantage that it can also be used with small sample sizes.

Chi-Square

This is a non-parametric test based on cross-tabulations of data from two nominal, ordinal, or interval variables. It compares the difference between observed and expected frequencies in the cross-tabulation to calculate if this observed difference occurs by chance (Exeter University, 2001). The test becomes invalid if observed frequencies are below 5 and/or expected frequencies are very low (e.g. less than one).

Fisher's Exact Test

This is similar to chi-square, but is used only with 2 x 2 tables (Exeter University, 2001). It is not subject to the chi-squares restrictions on observed and expected frequencies. In SPSS 10[©], this test is automatically calculated for 2 x 2 tables.

The Wilcoxon Signed Ranks Test

This was applied to data from Part 4 of the questionnaire to see if there was a significant difference between subjects' ratings of the efficacy of formal and functional activities. This test is a non-parametric equivalent of the t test. It can be applied to ordinal data when the same participants are measured on one variable (activity type) with two conditions (formal or functional) (Exeter University, 2001).

Mann-Witney U-Test

This was used to see if there were any significant differences between Questionnaire Pilot Study and Main Study responses to items in Part 2 of the questionnaires. It can be applied to ordinal data when different participants

(Questionnaire Pilot Study and Main Study samples) are measured on one variable (the questionnaire item) (Exeter University, 2001).

The main statistical focus for the analysis of the data obtained is descriptive and correlational. This necessarily limits the conclusions that may be drawn as no causal relationships can be assumed. However, this limitation is acceptable as the hypotheses given above do not state any causal relationships and this investigation does not seek to paint a detailed picture of the relationship between belief and behaviour. Where there is a very strong case for arguing a causal relationship, this will be done.

4.4.5 Qualitative Analysis of Main Study Subject Behaviour

A qualitative analysis of individual behaviour in WordLearner was carried out based on the logged data. For the two subjects who were interviewed, interview data was also used to support analysis of their behaviour. To avoid repetition and for the convenience of the reader, a detailed explanation of the method of analysis is given at the beginning of the analysis itself (see Chapter 6.3.3.1).

4.5 *Validity and Reliability*

In Chapter 3, we considered the validity and reliability of research methods common in the relevant areas of Applied Linguistics and learning in computer environments, while in the current chapter, we have described the procedures and methods used in this particular investigation. The validity and reliability of this research will now be briefly discussed with a focus on the questionnaires and the computer program.

4.5.1 Validity and Reliability of the Questionnaires Used

Regarding internal validity, content and construct validity were strengthened by the use of verbal protocols in the development process. These ensured that, as far as was possible, the right questions were being asked in the least ambiguous way and that the instruments were measuring what they were supposed to be measuring.

A possible threat to the construct validity of Parts 3 and 4 of the questionnaires was that the instructions for filling out the survey form may have influenced the respondents, firstly, to think in a way which they normally would not, and, secondly, to answer in a particular way. This possibility has to be admitted. However, the investigator believes that it was necessary to give very detailed instructions and examples of responses in order to ensure understanding of the survey form and the nature of the information being sought. This would actually strengthen the validity of the data obtained and increase the number of usable scripts returned. In addition, anecdotal evidence from the Main Study suggested that respondents were so capable of evaluating learning activities according to the criteria given that they may already have thought about the activities in this way.

One further weakness was the predictive validity of the questionnaires. Although responses to Part 2 of the questionnaire correlated quite well with responses to Part 4 and could therefore be said to be predictive, they did not correlate to the same extent with the logged data (see Chapter 6). Internal predictive validity was good, but external predictive validity was weak.

Regarding external validity, face validity is quite strong. The questionnaires' convergent validity could be said to be strong as data from the pilot and Main studies was quite similar in many respects (see Chapter 6). However, ecological validity is weak as it may be difficult to generalise the research results to a wider population than the one from which the samples were taken. Undergraduate students of Oriental languages (Questionnaire Pilot Study) and overseas university students studying English (Main Study) are highly specialised groups which may not be typical of the broader population of language learners. However, it would be interesting to see if research with other groups using the same questionnaires got similar results.

The investigator's evaluation of the reliability of the questionnaires was based on two points. First, Part 2 of the questionnaire was based on a questionnaire (the BALLI) that has been widely used over a period of 11 years and there is a body of research based on it published in peer reviewed journals. Secondly, Parts 3 and 4 of the questionnaires have good internal and external validity; measurement tools which have validity are also likely to be reliable (Henerson et al., 1987, p. 133). Certainly,

the similarity in results obtained from the Questionnaire Pilot Study and the Main Study suggest strong reliability.

4.5.2 Validity and Reliability of the Computer-Related Research

There are two aspects of the research which are relevant here: the logged data and the post-hoc interviews. We shall take each in turn.

The validity of logged data has already been discussed in Chapter 3.5.2.1. Both the advantages to validity and reliability and the threats to them apply to the current research. The advantages in this investigation were that the logging process is extremely reliable and the subjects were unaware of being logged, so experimenter effect was minimised. The threats to construct validity discussed in Chapter 3.5.2.1 were minimised by triangulation with the post-hoc interviews. In addition, one might question if the subjects were day dreaming rather than practicing vocabulary. There are two answers to this. First, the investigator was present while the subjects worked through the program and no behaviours suggesting lack of attention were noticed. Second, the pattern of time spent on different levels of prior knowledge was so consistent within and across subjects that if there was any lack of attention, that was probably consistent, too.

A lack of IT-familiarity was unlikely to be a problem as all the subjects have to use computers to produce their course-work. However, just in case it would be a problem, the program was carefully introduced to the students. Regarding keyboard skills, only a little typing was needed and then only if the Guided Production screen was accessed. The amount of typing was not a problem to students who are required to word-process all of their course-work. Nothing could be done about the problem of novelty. Likewise, as the sample was so small ($n = 10$), it has to be acknowledged that ecological validity is limited.

Regarding the post-hoc interviews, reliability was enhanced by the used of a form which made sure that the same questions were asked in the same way in both interviews. Care was also taken to make sure that the interviewee did not get the feeling that the interviewer wanted to hear particular answers. In addition, as there

were no right or wrong behaviours in the program, there was little incentive for the interviewee to want to appear in a good light. Regarding validity of interviews, one might argue that there is an inherent validity in two people communicating with each other (Cohen & Manion, 1994, p. 282). As the interviewer was able to show the interviewee the data on their interaction with the program, the validity of the subjects' answers was enhanced by being able to discuss what they actually did and not what they thought they did.

4.6 Summary

The chapter began with a description of the research questions and hypotheses and the reasoning behind them. As the aim of the study was to examine the relationship between metacognitive knowledge about language learning and learning preferences in language learning software, two main data collection instruments were designed and used. A questionnaire had to be used to obtain data on subjects' metacognitive knowledge while a CALL program had to be developed that could act both as a learning context and a data collection instrument. Data obtained from these instruments was analysed quantitatively. To obtain a more in depth view of subject behaviour, guided interviews were used. Data obtained from these was analysed qualitatively.

A key feature of this study is the use of hypertext software to collect data on line. This chapter has provided an account of how this was achieved. As the data was produced by subjects working through hypertext, methods had to be developed to display their movement and capture the dynamism of the learning process. There is no great achievement in recording data and graphing results. However, it is not that simple to log data in such a way that it can be easily understood. For example, the method of inserting a tab character between items of logged data while the logging was being done enabled the easy transfer of the logged data to a spreadsheet.

To sum up, a detailed account of the methods and techniques and data collection procedures which make up the overall research design has been given. To help the reader interpret the presentation of results which follows immediately after this

chapter, the methods used to store, analyse and display data have been explained. It is now time to move on to the presentation of research results.

Chapter 5 Questionnaire Pilot Study

The purposes of this Questionnaire Pilot Study were, firstly, to test the validity of the DLLT as a measurement tool. Secondly, the investigator's intention was to look for any significant relationships there may be between general beliefs about the nature of the task of language learning and beliefs about the efficacy of formal or functional language learning tasks. Analysis of the data obtained is divided into two sections. Section 5.1.1 consists of a descriptive analysis of the data from all four sections of the questionnaire while Section 5.1.2 is a correlational analysis of the relationships between items in Part 2 and Part 4.

5.1 Analysis

5.1.1 Results

5.1.1.1 Background Statistics

Part One of the questionnaire sought background details on the respondents. Complete frequency tables for these are given in QPS BACKGROUND DETAILS FREQUENCIES.HTM. Frequency tables which may be of particular interest are reproduced here. Points to note about the sample are that they are very close in age (Mean = 20.9 Std Dev 1.99) and of the 30 respondents, exactly half are male. The bulk of the sample come from the first (11 respondents) and second (15 respondents) years of their courses and have not yet done their year abroad, which is normally done in the third year¹¹. Only four of the respondents are fourth years.

Referring to Table 11, another notable feature of the sample is that although 26 of the respondents' proficiency levels in the target language might be considered beginning to intermediate (1st and 2nd year of study), the average number of other languages spoken or studied is about 2 (mean = 1.87). In addition, 14 of the respondents state that they speak another language at least to intermediate level. If we look at Table 12, we can also see that 19 of the respondents state that their classroom language learning to date is a mix of formal and functional methods. This sample could therefore be characterised as quite experienced in language learning with a classroom background that has given them a balanced exposure to formal and functional methodologies.

¹¹ Oriental Languages students do years 1 and 2 in Newcastle followed by a year studying in the target language country. They then do their third (final) year of study back in Newcastle.

N	Valid	30
	Missing	0
Mean		1.87
Std. Deviation		1.11
Minimum		0
Maximum		4

Table 11: Questionnaire Pilot Study - Number of other languages spoken by subjects.

		Frequency	Percent	Valid Percent
Valid	Mostly formal	5	16.7	16.7
	Formal and functional	19	63.3	63.3
	Mostly functional	6	20.0	20.0
	Total	30	100.0	100.0

Table 12: Questionnaire Pilot Study - Nature of previous language learning.

Nine of the respondents are East Asian (Japanese, Korean, and Chinese) students taking another Oriental language as part of a BA in Combined Studies. This was not foreseen before the questionnaire administration and information on nationality was obtained post-hoc. Cross-tabulations (see [QPS NATIONALITY CROSSTABS.HTM](#)) were performed between the nationality variable, which was categorised as either European or East Asian, and Parts 2, 3 (differences between formal and functional components of activities) and 4 of the questionnaire. One significant but invalid result was found between nationality and an item in Part 3. This will be discussed in Section 5.1.1.3.1 below. Six significant but invalid results were found between nationality and items in Part 4. These will be described in Section 5.1.1.3.2 below.

These results were invalid because of a high proportion of cells with observed cell counts below 5 and low expected frequencies (see 4.4.4 above for an explanation of Chi Square). To see if valid results could be produced by reducing the ordinal scales from 5 categories to 3 and thus increasing the cell counts, the following adjustments were made to the data for Parts 2 and 4 in SPSS:

Part 2:

- *Strongly agree* and *agree* were compressed to one category, *agree*.
- The neutral point, *neither agree nor disagree* was not changed.
- *Strongly disagree* and *disagree* were compressed to one category, *disagree*.

Part 4:

- *Very effective* and *effective* were compressed to one category, *effective*.
- The neutral point, *neither effective nor ineffective* was not changed.
- *Not effective at all* and *not very effective* were compressed to one category, *not effective*.

Cross tabulations were run again on the compressed data, but all results were invalid.

One significant but invalid result for chi square was found between nationality and item 6 of Part 2 (Learning my target language is different from learning other school subjects) ($\chi^2 = 5.000$, $df = 1$, $p = .025$). There was one extra significant but invalid result for Part 4. This was for activity *h* (Grammar used in pairs/groups) ($\chi^2 = 4.451$, $df = 1$, $p = .035$). In both cases, however, Fisher's Exact test yielded an insignificant result (Part 2, item 6: $p = .083$, Part 4, activity *h*: $p = .069$). These results will, therefore, be ignored.

These results suggest that cultural background might play some role in preferences for some specific activities. However, these results say nothing about the relationship between the beliefs held by the respondents and the value which they place on the efficacy of language learning activities. As it is this relationship, not the reasons why learners hold certain beliefs, that is the focus of the study, any relationship suggested between cultural background and responses to Part 4 does not invalidate this research.

Cross tabulations between all other background variables and Parts 2, 3 and 4 of the questionnaire show no valid significant results (see [QPS Crosstabs - Background Vs with Part 2.htm](#), [QPS Crosstabs - Background Vs with Part 3.htm](#) and [QPS Crosstabs - Background Vs with Part 4.htm](#)). In almost all cases, there is an unacceptably high proportion of cells with expected cell counts below 5 and unacceptably low expected frequencies. However, although invalid, cross tabulations between the nature of previous classroom learning and Part 4 merit comment. These are described below in Section 5.1.1.3.2.1. In addition, a cross tabulation between gender and item 12 of Part 2 will be discussed in Section 5.1.1.2.3.

5.1.1.2 Part 2 Results: What does this Group Believe?

This section is structured according to the themes within Part 2. Frequency tables and descriptive statistics for responses to Part 2 can be found in [QPS Part 2 Frequencies.htm](#).

5.1.1.2.1 Nature of Language Learning

Responses to questions 2 and 3 (see Table 13) show a strong belief that learning a language is influenced by knowledge of the target language culture and by living in the target language country. The strength of agreement with question 6 suggests a strong feeling that success in the task of learning a language is reliant on factors which may not be relevant in other subject areas. It may not be a coincidence that the response is very similar to questions 2 and 3.

	SA	A	NAND	D	SD
1. My target language is structured in the same way as my own language.					
Japanese		1		2	5
Korean	1	1		1	1
Chinese		1	1	12	4
2. It is necessary to know the target language culture in order to speak that language well.					
Japanese	3	4	1		
Korean	2	2			
Chinese	5	9	3	1	
3. It is better to learn my target language in a country that speaks that language.					
Japanese	3	5			
Korean	3	1			
Chinese	11	6	1		
4. Learning a foreign language is mostly a matter of learning many new vocabulary words.					
Japanese		2	4	1	1
Korean		1	2	1	
Chinese		2	10	6	
5. Learning a foreign language is mostly a matter of learning many grammar rules.					
Japanese		4	2	1	1
Korean			2	2	
Chinese		1	12	5	
6. Learning my target language is different from learning other school subjects.					
Japanese	5	3			
Korean	1	2	1		
Chinese	5	12	1		
7. Learning my target language is mostly a matter of translating from my own language.					
Japanese		1	3	2	2
Korean		2		1	1
Chinese		4	6	6	2

Table 13: Responses to PART 2 items on the nature of language learning by L2.

Responses to questions 4, 5 and 7 suggest there is a wide range of opinion (all ranging from “Agree” to “Strongly Disagree”) regarding the value of formal learning within this sample of Oriental languages students. Although there appears to be a tendency to disagree with these statements of formal beliefs (Q.4: the importance of vocabulary, Q.5:

the importance of grammar, Q.7: the importance of translation to L1), the high proportion of neutral responses (Q. 4 n = 16, Q. 5 n = 15, Q. 7 n = 9) suggests that respondents may have a variety of situations in mind that preclude commitment to agree or disagree.

Table 14, which shows responses by year in college, indicates no obvious changes in beliefs about the nature of language learning according to level of study.

	SA	A	NAND	D	SD
1. My target language is structured in the same way as my own language.					
Yr. 1	1	1	1	4	4
Yr. 2		2		8	5
Yr. 4				3	1
2. It is necessary to know the target language culture in order to speak that language well.					
Yr. 1	4	4	2	1	
Yr. 2	4	9	2		
Yr. 4	2	2			
3. It is better to learn my target language in a country that speaks that language					
Yr. 1	5	6			
Yr. 2	9	5	1		
Yr. 4	3	1			
4. Learning a foreign language is mostly a matter of learning many new vocabulary words.					
Yr. 1		3	6	2	
Yr. 2		1	9	4	1
Yr. 4		1	1	2	
5. Learning a foreign language is mostly a matter of learning many grammar rules.					
Yr. 1		1	7	3	
Yr. 2		3	8	3	1
Yr. 4		1	1	2	
6. Learning my target language is different from learning other school subjects.					
Yr. 1	6	3	2		
Yr. 2	4	11			
Yr. 4	1	3			
7. Learning my target language is mostly a matter of translating from my own language.					
Yr. 1		3	3	2	3
Yr. 2		4	4	5	2
Yr. 4			2	2	

Table 14: Responses to PART 2 items on the nature of language learning by year of study.

5.1.1.2.2 Learning Strategies

Responses to question 8 (see Table 15) strongly endorse the value of practice and repetition in language learning. This may seem to conflict somewhat with responses to questions 4 and 5, but it may be that the important thing is type of practice and a perceived necessity to perfect language skills such as pronunciation through repetition. Responses to question 9, which addressed use of the Open Access Centre (OAC) and, by implication, the self-directed learning which takes place there, suggest that this sample

places a high value on self-directed learning. Table 16 shows that a relatively high proportion of first year respondents (4 out of 11) gave neutral responses regarding the OAC.

	SA	A	NAND	D	SD
8. It is important to repeat and practice often.					
Japanese	4	4			
Korean	3		1		
Chinese	9	9			
9. It is important to practice in the Open Access Centre.					
Japanese	3	3	2		
Korean		3	1		
Chinese	4	8	5	1	

Table 15: Responses to PART 2 items on learning strategies by L2.

	SA	A	NAND	D	SD
8. It is important to repeat and practice often.					
Yr. 1	5	5	1		
Yr. 2	9	6			
Yr. 4	2	2			
9. It is important to practice in the Open Access Centre.					
Yr. 1	1	6	4		
Yr. 2	5	7	2	1	
Yr. 4	1	1	2		

Table 16: Responses to PART 2 items on learning strategies by year of study.

5.1.1.2.3 Communication Strategies

The balance of responses to question 10 (see Table 17 and Table 18 below) suggests that there is a bias amongst this sample towards a belief in the value of having a good accent with 16 out of 30 agreeing or strongly agreeing with the statement. This belief seems especially strong among students of Chinese, who need to master the Mandarin tone system. Six of the eleven neutral responses are from first year students. In contrast to the emphasis on accuracy suggested by question 10, responses to question 11 on the importance of speaking correctly and question 13 on the appropriacy of guessing suggest that these students believe quite strongly that in learning to communicate in the target language, mistakes have to be tolerated and guessing is necessary. Although question 14 indicates that just over half of these students feel self-conscious about speaking the target language in front of others, questions 11 and 13 suggest that the value put on trying to use the language and risk-taking outweighs this. “Nothing ventured, nothing gained” seems to aptly summarise the respondents’ beliefs.

	SA	A	NAND	D	SD
10. It is important to speak my target language with an excellent accent.					
Japanese		4	3	1	
Korean			4		
Chinese	3	9	4	2	
11. I should not say anything in my target language until I can say it correctly.					
Japanese				3	5
Korean				2	2
Chinese		1		9	8
12. If I heard someone speaking my target language, I would go up to them so that I could practice speaking the language.					
Japanese		2	3	3	
Korean	1	2		1	
Chinese		5	6	7	
13. It is OK for me to guess if I do not know a word in my target language.					
Japanese	1	4	3		
Korean		3	1		
Chinese	1	15	1	1	
14. I feel self-conscious speaking my target language in front of other people.					
Japanese	1	4	2	1	
Korean		1		3	
Chinese	1	9	2	6	
15. If you are allowed to make mistakes in the beginning, it will be hard to get rid of them later on.					
Japanese		1	3	3	1
Korean		3		1	
Chinese	1	6	2	7	2

Table 17: Responses to PART 2 items on communication strategies by L2.

Responses to question 15 on the effect of being allowed to make mistakes in the early stages of learning range from strongly agree through to strongly disagree. This may appear to contradict responses to question 11 on not saying anything until you can say it correctly, but the intent of question 15 is towards correction by the teacher when mistakes are made whereas the intent of question 11 is towards the value of attempting to speak. What the responses to question 15 indicate is a difference in beliefs about correction and insistence on accuracy by teachers; some respondents (11 out of 30) appear to want correction while others (14 out of 30) appear to prefer to be left alone to develop fluency.

If we look at the figures tabulated by year of study (Table 18 below), responses to question 15 seem to indicate a trend towards preference for developing fluency from the first year (3 out of 11), through the second year (8 out of 15) to fourth year (3 out of 4). This may reflect changing needs as proficiency increases or increasing confidence. It may also be that with the benefit of hindsight and the experience of living in the target language culture (in the case of the fourth years), more proficient students believe they would have done better with less correction and more work on fluency.

	SA	A	NAND	D	SD
10. It is important to speak my target language with an excellent accent.					
Yr. 1	1	4	6		
Yr. 2	2	8	3	2	
Yr. 4		1	2	1	
11. I should not say anything in my target language until I can say it correctly.					
Yr. 1		1		6	4
Yr. 2				8	7
Yr. 4					4
12. If I heard someone speaking my target language, I would go up to them so that I could practice speaking the language.					
Yr. 1		4	1	6	
Yr. 2	1	4	5	5	
Yr. 4		1	3		
13. It is OK for me to guess if I do not know a word in my target language.					
Yr. 1	1	8	1	1	
Yr. 2		11	4		
Yr. 4	1	3			
14. I feel self-conscious speaking my target language in front of other people.					
Yr. 1	1	5	2	3	
Yr. 2		7	2	6	
Yr. 4	1	2		1	
15. If you are allowed to make mistakes in the beginning, it will be hard to get rid of them later on.					
Yr. 1	1	5	2	3	
Yr. 2		4	3	5	3
Yr. 4		1		3	

Table 18: Responses to PART 2 items on communication strategies by year of study.

Responses to question 12 on the strategy of using opportunities to speak the target language with speakers of that language show a balance of students agreeing and disagreeing. This masks an important aspect of the responses, however. If we look at a cross-tabulation of the data (see Figure 18) to examine who exactly is agreeing and disagreeing with the strategy of approaching target language speakers to engage in conversation with them, we find a significant difference between males and females. To avoid low expected cell counts, the data was compressed using the method described above in Section 5.1.1.1 and the following cross-tabulation and chi-square test were produced.

The cross-tabulation below (Figure 18) shows that males tend to agree that they would approach a stranger to practice the L2 while females tend to be neutral or disagree. The chi square statistic ($\chi^2 = 9.673$, $df = 2$, $p = .008$). The validity of this statistic is borderline because the minimum expected frequency of 4.5 is slightly below an expected frequency of 5 while the percentage of cells with an expected frequency of less than 5 is 33%. Moreover, some information, namely, the gradation in the response, is lost in recoding.

However, bearing in mind that the result confirms the intuitive interpretation of the raw data, and that gradation in response does not effect the point being made here, the statistic certainly merits comment. No other gender differences were found.

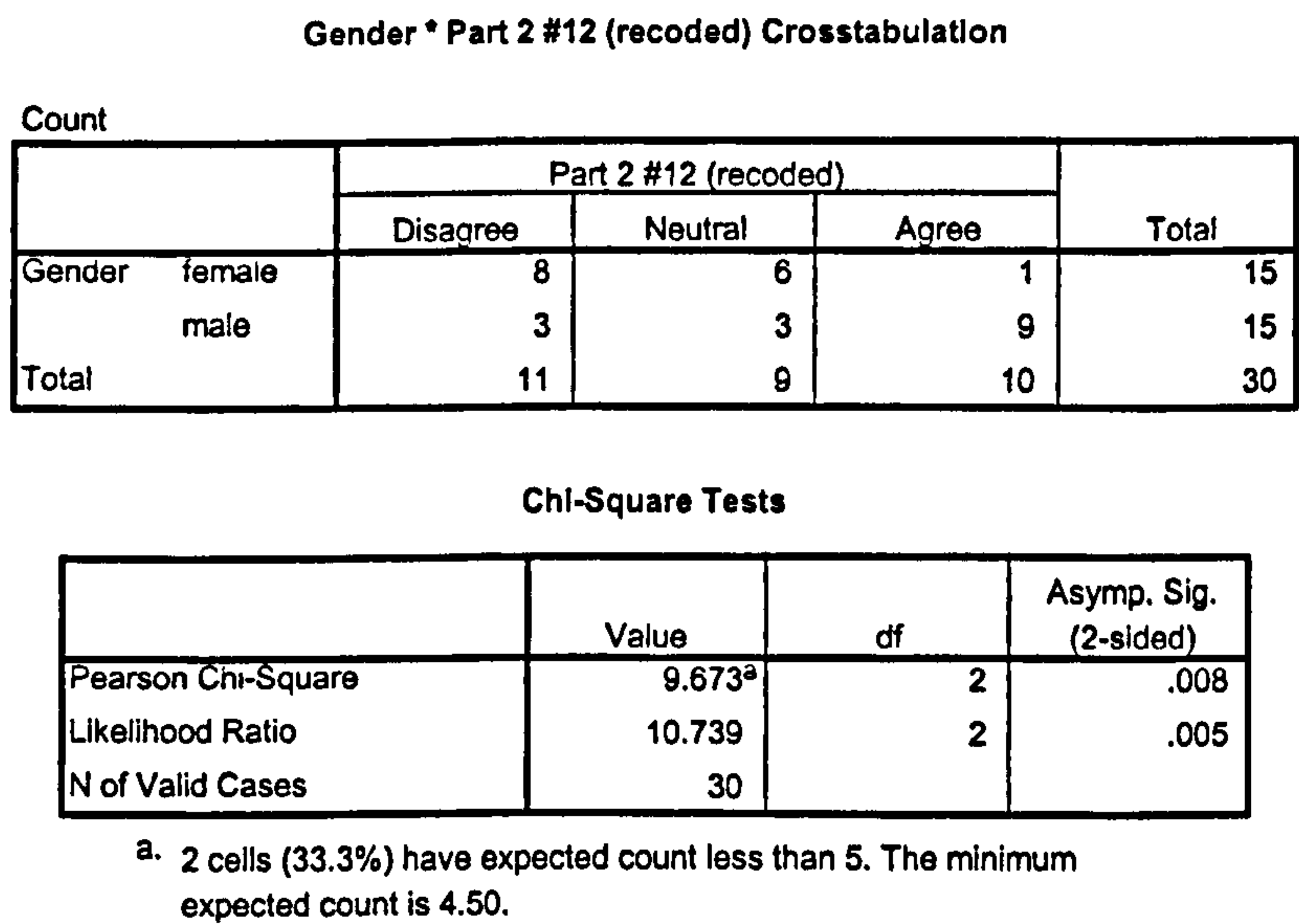


Figure 18: Cross tabulation and chi-squared statistics for gender * Part 2 #12.

5.1.1.2.4 Motivations

In this section, questions 16 and 18 (see Table 19 and Table 20) measure instrumental and integrative motivation respectively. The high degree of agreement (23 out of 30 in both questions) indicates that the subjects in this sample have both high instrumental and high integrative motivation. The neutral responses come mainly from the students of Chinese (5 out of 7 for question 16 and 6 out of 7 for question 18). It is not possible to speculate on the reason for this.

Question 17, on the status of speaking the target language, shows interesting differences between languages(see Table 19). Students of Japanese seem relatively positive about the status of speaking Japanese, students of Chinese are more evenly balanced in their opinions and students of Korean are more negative.

	SA	A	NAND	D	SD
16. If I learn to speak my target language, it will help me to get a good job.					
Japanese	4	3	1		
Korean	1	2	1		
Chinese	3	10	5		
17. People in my country think it is important to speak my target language.					
Japanese	4	3	1		
Korean	1	1	1	1	
Chinese	1	4	7	6	
18. I would like to learn my target language so that I can get to know people better in the country where my target language is spoken.					
Japanese	3	5			
Korean	2	1	1		
Chinese	8	4	6		

Table 19: Responses to PART 2 items on motivations and expectations by L2.

	SA	A	NAND	D	SD
16. If I learn to speak my target language, it will help me to get a good job.					
Yr. 1	2	6	3		
Yr. 2	6	7	2		
Yr. 4		2	2		
17. People in my country think it is important to speak my target language.					
Yr. 1		4	5	1	1
Yr. 2	1	4	4	6	
Yr. 4		1	2	1	
18. I would like to learn my target language so that I can get to know people better in the country where my target language is spoken.					
Yr. 1	3	3	5		
Yr. 2	7	6	2		
Yr. 4	3	1			

Table 20: Responses to PART 2 items on motivations and expectations by year of study.

5.1.1.3 Parts 3 and 4 Descriptive Statistics

5.1.1.3.1 Part 3

Descriptive statistics and frequency tables for responses to Part 3 of the Definition of Language Learning Tasks questionnaire are given in [QPS Part 3 Frequencies.htm](#). Table 21 and Table 22 below summarise these statistics by giving the median values for formal and functional ratings of each of the 24 activities and the median values of the respondents' ratings of the effectiveness of these activities. As described above in Chapter 4.2.1.1.4.1.2, these activities were developed so that respondents would most likely rate 12 of them as more formal than functional and 12 as more functional than formal. To see if this was the case, the functional and formal median values were compared to create four nominal categories. These categories are explained in the following list which gives the name assigned to the category followed by the criteria used

for inclusion in the category. It should be noted here that the investigator is unaware of any precedent for this exact method of categorising activities in the published literature.

Formal: For activities which were determined to be formal in the development phase, the rounded median formal rating is more than the rounded median functional rating. This confirms that this sample defines this activity as formal. For example, activity *a* (see Table 21), *Repeating words after the teacher*, was given the following median values:

Formal Median: 5
Functional Median: -3

This activity was, therefore, categorised as Formal.

FormFunc: For activities which were determined to be formal in the development phase, the rounded median functional rating is equal to or more than the rounded median formal rating. This categorises the activity as one which is formal in nature but which this sample also views as having functional purposes. For example, activity *n* (see Table 21), *Students do written vocabulary exercises after reading a short article*, was expected to be rated as formal, but was given the following median values:

Formal Median: 4
Functional Median: -4

This activity was, therefore, categorised as FormFunc.

Functional: For activities which were determined to be functional in the development phase, the rounded median functional rating is more than the rounded median formal rating. This confirms that this sample defines this activity as functional. For example, activity *b* (see Table 22), *Using new vocabulary in group discussion to express opinions/feelings*, was given the following median values:

Formal Median: 3
Functional Median: -5

This activity was, therefore, categorised as Functional.

FuncForm: For activities which were determined to be functional in the development phase, the rounded median formal rating is equal to or more than the rounded median functional rating. This categorises the

activity as one which is functional in nature but which this sample also views as having formal purposes. For example, activity *h* (see Table 22), *Using new grammar in conversation activities to express feelings/opinions or describe events*, was expected to be rated as functional, but was given the following median values:

Formal Median: 4
Functional Median: -4

This activity was, therefore, categorised as FuncForm.

Table 21 (p. 178) shows how this sample rated the formal and functional nature of the activities which were determined to be mostly formal in the development of the questionnaire. The overall definitions, based on these ratings, are given and show that, with one exception, this sample agrees that these activities are more formal than functional. The exception is activity “n” in the reading section, which applies to multiple choice vocabulary exercises. The median ratings for the formality and functionality of this activity are 4 and -4 respectively suggesting that this sample believes that this type of activity is not only very formal but also strongly related to the actual performance of reading skills.

At this point, it would be appropriate to describe the significant, but invalid cross tabulation found between the nationality variable and difference in evaluation of formal-functional components of Activity *c* (Teacher translates vocab) (see Figure 19 below).

This statistic ($\chi^2 = 14.853$, $df = 6$, $p = .021$) combined with the figures shown in the cross tabulation above suggests that, although invalid, there may be a real difference between students from European and East Asian backgrounds in the way that they perceive teacher translation of vocabulary. The cross tabulation shows that 89% (8 out of 9) of the East Asian respondents define the activity as formal (positive figures show a formal definition) while 62% (13 out of 21) European respondents define the activity as functional (negative numbers show a functional definition). This will be discussed in Chapter 7.1.1.1.

Nationality * Formal-Functional Evaluation Crosstabulation

Count		Difference03							Total
		-2	-1	0	1	2	3	4	
Nationality	European	3	2	8	4	4			21
	E_Asian		1		1	3	3	1	9
Total		3	3	8	5	7	3	1	30

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14.853 ^a	6	.021
Continuity Correction			
Likelihood Ratio	18.268	6	.006
Linear-by-Linear Association	9.186	1	.002
N of Valid Cases	30		

a. 13 cells (92.9%) have expected count less than 5. The minimum expected count is .30.

Figure 19: Cross tabulation of nationality and difference in formal-functional components of activity *c* (teacher translation of vocabulary).

Table 22 (p. 179) shows how this sample rated the formal and functional nature of the activities which were determined to be mostly functional in the development of the questionnaire. The overall definitions, based on these ratings, are given and show that, with two exceptions, this sample agrees that these activities are more formal than functional. The two exceptions are activities *e* and *h* which are both in the grammar section. They are both rated at 4 and -4 for formality and functionality suggesting that this sample sees that these activities are oriented towards performance but that performance based grammar activities are, none the less, formal in nature. The effectiveness ratings for these activities are both 4, which is equal to the ratings given to the formal grammar activities in Table 21 (p. 165).

Looking at both formal and functional activities, the differences between median ratings of formality and functionality are never more than 2. While it cannot be said that this is a large or a small difference, it can be said that respondents believed that all activities, be they formal or functional, have elements of both. Formal activities aimed at developing correctness, which may also be seen as traditional, passive and teacher-led, are also seen as having some relevance in developing the functional ability to communicate and perform specific language skills. Likewise, functional activities are also seen as having a relatively strong relevance to developing formal aspects of linguistic skills.

Formal Activities	Formal Median	Functional Median	Overall Definition	Effectiveness Rating
<u>Vocabulary</u>				
a) Repeating words after the teacher.	5	-3	Formal	3
c) Teacher translates all new words and explains what they mean in your own language.	4	-3	Formal	4
<u>Grammar</u>				
f) Repeating correct sentences after the teacher.	5	-3	Formal	4
g) Teacher teaches the grammar rules in your own language.	5	-3	Formal	4
<u>Writing</u>				
i) Focus on correct grammar in phrases and simple sentences, but no paragraph writing.	4	-2	Formal	4
k) Multiple choice grammar exercises such as those focusing on using the right verb.	4	-3	Formal	3
<u>Reading</u>				
m) Teacher translates all new words and explains what they mean in your own language.	4	-3	Formal	3
n) Students do written vocabulary exercises after reading a short article.	4	-4	FormFunc	4
<u>Speaking</u>				
r) Students memorise dialogues which they have to write down for tests.	5	-2	Formal	3
s) Whole class repeating dialogues after the teacher.	4	-3	Formal	3
<u>Listening</u>				
u) Students listen and fill in missing words in the script (missing words are random, not key words).	4	-3	Formal	4
x) Teacher reads a paragraph and the students write it down. Teacher collects the students work, corrects it, and returns it after a week.	4	-3	Formal	3
			Median of Formal Effectiveness	3.5

Table 21: Medians of formal and functional components of formal activities and medians of their effectiveness in learning the target language.

Functional Activities	Formal Median	Functional Median	Overall Definition	Effectiveness Rating
<u>Vocabulary</u>				
b) Using new vocabulary in group discussion to express opinions/feelings	3	-5	Functional	4
d) Games in which pairs and groups have to be creative with vocabulary and communicate in your target language	3	-5	Functional	4
<u>Grammar</u>				
e) Games in which pairs and groups have to be creative with grammar and communicate in your target language	4	-4	FuncForm	4
h) Using new grammar in conversation activities to express feelings/opinions or describe events	4	-4	FuncForm	4
<u>Writing</u>				
j) Students use class time to write letters to pen friends; the teacher does not correct the letters	2	-4	Functional	2
l) Writing activities in class where communicating meaning is more important than grammar	3	-4	Functional	3
<u>Reading</u>				
o) Reading for fun	3	-4	Functional	4
p) Students read stories and then tell them to other students who have not read the stories. Then they ask the other students questions about the stories.	3	-5	Functional	4
<u>Speaking</u>				
q) Games in which pairs and groups have to be creative and communicate in your target language	3	-5	Functional	4
t) Group discussion of topics	3	-4	Functional	4
<u>Listening</u>				
v) Watching a TV commercial and describing it to a student who cannot see it. The other student has to guess what the product is	3	-4	Functional	4
w) Watching a short section of a film and discussing what happens next in the story	3	-4	Functional	4
			Median of Functional Effectiveness	4

Table 22: Medians of formal and functional components of functional activities and medians of their effectiveness in learning the target language.

5.1.1.3.2 Part 4

Frequency tables of the responses to Part 4 are given in [QPS Part 4 Frequencies.htm](#). As mentioned above (see Section 5.1.1.1), cross tabulations and chi-squared statistics (see [QPS Crosstabs – Background Vs with Part 4.htm](#) and [QPS NATIONALITY CROSSTABS.HTM](#)) show no valid significant interactions between background variables and ratings of effectiveness of the language learning activities described in Part 4. However, two sets of results will be briefly described here. These results are, firstly, a possible relationship between previous classroom learning experience and ratings of the effectiveness of grammar learning activities and, secondly, cultural background (variable: nationality) and the efficacy of a range of activities in Part 4. These results have been selected for description because they show a pattern of occurrence which suggests possible underlying relationships between the background variables and the ratings of effectiveness of language learning activities. This description shall be followed by a more general treatment of responses to Part 4.

Before continuing, in order to improve the readability of the following analysis, the activities described in Parts 3 and 4 of the questionnaire will be given short forms (see Table 23 overleaf). Reference to these will be less unwieldy and help the reader to remember what the activities were.

5.1.1.3.2.1 Previous Classroom Learning Experience and Ratings of the Efficacy of Grammar Learning Activities

Ratings for all four of the grammar learning activities described in Part 4 have significant, but invalid, statistical relationships with the perceived formality or functionality of respondents' previous classroom learning. These results are as follows:

Activity e (Grammar games) (FuncForm): The significant chi square result ($\chi^2 = 11.295$, $df = 4$, $p = .023$) suggests that respondents who state that their language learning so far has been a mix of both formal and functional methods are more likely to believe that grammar games are effective for learning grammar.

Activity f (Repeating sentences) (Formal): The significant chi square result ($\chi^2 = 12.101$, $df = 4$, $p = .017$) suggests that students who state that their previous classroom learning was mostly formal tend to be neutral on the value of the highly traditional practice of

repeating correct sentences after the teacher while those who state that their previous learning was functional or mixed tend to be more positive.

Activity	Short Form
a) Repeating words after the teacher.	Repeating words
b) Using new vocabulary in group discussion to express opinions/feelings	Vocab in group discussion
c) Teacher translates all new words and explains what they mean in your own language.	Teacher translates vocab
d) Games in which pairs and groups have to be creative with vocabulary and communicate in your target language	Vocab games
e) Games in which pairs and groups have to be creative with grammar and communicate in your target language	Grammar games
f) Repeating correct sentences after the teacher.	Repeating sentences
g) Teacher teaches the grammar rules in your own language.	Grammar taught in L1
h) Using new grammar in conversation activities to express feelings/opinions or describe events	Grammar used in pairs/groups
i) Focus on correct grammar in phrases and simple sentences, but no paragraph writing.	Sentence level grammar
j) Students use class time to write letters to pen friends; the teacher does not correct the letters	Writing letters to pen friends
k) Multiple choice grammar exercises such as those focusing on using the right verb.	Multiple choice grammar
l) Writing activities in class where communicating meaning is more important than grammar	Communicative writing
m) Teacher translates all new words and explains what they mean in your own language.	Teacher translates vocab in reading
n) Students do written vocabulary exercises after reading a short article.	Vocab ex's after reading
o) Reading for fun	Reading for fun
p) Students read stories and then tell them to other students who have not read the stories. Then they ask the other students questions about the stories.	Paired paraphrasing
q) Games in which pairs and groups have to be creative and communicate in your target language	Games for speaking
r) Students memorise dialogues which they have to write down for tests.	Memorising dialogues
s) Whole class repeating dialogues after the teacher.	Class repetition of dialogues
t) Group discussion of topics	Group discussion for speaking
u) Students listen and fill in missing words in the script (missing words are random, not key words).	Random cloze for listening
v) Watching a TV commercial and describing it to a student who cannot see it. The other student has to guess what the product is	TV ad jigsaw viewing
w) Watching a short section of a film and discussing what happens next in the story	Discussion of video excerpt
x) Teacher reads a paragraph and the students write it down. Teacher collects the students work, corrects it, and returns it after a week.	Dictation

Table 23: Short forms of Questionnaire Pilot Study Part 3 and 4 activities.

Activity g (Grammar taught in L1) (Formal): The significant chi square result ($\chi^2 = 13.307$, $df = 4$, $p = .01$) suggests that students whose previous classroom learning was

formal or functional tend to be neutral on the value of grammar being taught in the L1, but students whose classroom learning was mixed think this is effective.

Activity *h* (Grammar used in pairs/groups) (FuncForm): The significant chi square result ($\chi^2 = 18.462$, $df = 2$, $p = .000$) shows that 26 out of 30 respondents believe that using new grammar in conversation activities is an effective method of learning it. However, 4 out of 6 respondents whose previous learning was functional were neutral on the value of this method of learning.

Although invalid, as stated above (see Section 5.1.1.1), the investigator believes these results merit comment as the pattern of response suggests that there may be a relationship between the style of classroom learning experienced by a student, or at least how students perceive the nature of their classroom learning, and the perceived value of the activities described in Part 4. This relationship appears to be that if a subject's experience has been formal, she or he values functional activities more highly and vice versa for subjects whose experience has been functional. Those who have been exposed to a mix of both approaches seem more likely to value either type of activity. This will be discussed further in Chapter 7.1.1.1.

5.1.1.3.2.2 Cultural Background and Ratings of the Efficacy of Translation and Games.

These statistics are categorised into two main sets. Firstly, three significant but invalid results were found between nationality and teacher translation of vocabulary, grammar and reading material. These were for Activity *c* (Teacher translates vocab) ($\chi^2 = 13.730$, $df = 3$, $p = .003$), activity *g* (Grammar taught in L1) ($\chi^2 = 10.195$, $df = 4$, $p = .037$), and activity *m* (Teacher translates new vocab in reading) ($\chi^2 = 8.254$, $df = 3$, $p = .041$). In all cases, East Asian respondents tend to place a lower value on the efficacy of teacher translation than European students. This is consistent with the result found for evaluation of the difference in formal-functional evaluation of teacher translation of vocabulary (see 5.1.1.3.1 above) in which all East Asian students except for 2 rated this as more formal than functional and the finding that functionally rated activities have a significantly higher rating for efficacy (see Figure 20 below). This will be discussed in Chapter 7.1.1.1.

Secondly, two significant but invalid results were found with games to practice vocabulary and grammar. These were activity *d* (Vocab games) ($\chi^2 = 12.109$, $df = 3$, $p = .007$) and activity *e* (Grammar games) ($\chi^2 = 21.481$, $df = 3$, $p = .000$). In addition, a

significant but invalid result was found with activity *o*, reading for fun ($\chi^2 = 9.365$, $df = 3$, $p = .025$). The cross tabulations suggest that East Asian students place a lower value on the efficacy of these activities. This will be discussed in Chapter 7.1.1.1.

5.1.1.3.2.3 *Ratings for the Efficacy of Activities*

Table 21 and Table 22 above give the median values of the effectiveness ratings. For formal activities, these ratings range between 3 and 4 with an overall median of 3.5. The only point of note concerns activity *n* (Vocab ex's after reading), which was rated as equally formal and functional. This activity has a median effectiveness rating of 4.

Although this rating is not unique (5 other activities are also rated 4), it does show that a time honoured exercise type that seems to be quite formal is not only seen by students as having a high functional component but is also seen as being quite effective.

Points to note concern the effectiveness ratings given to the functional writing activities *j* and *l*. These are given very low ratings for effectiveness of 2 and 3 respectively that correspond with relatively weak formal components (2 and 3 respectively). Although care was taken to make it clear that the type of writing was general, not business or academic, it may be that writing is seen as an inherently formal activity and that if an activity is seen as having little relevance to form, it will also be seen as ineffective.

Although the range of median ratings for the effectiveness of functional activities (min = 2 max = 4) is greater than that of formal activities, the overall median of 4 reflects the generally higher ratings given to these activities. Before going on to an analysis of possible correlations between specific items in the questionnaire, it may be useful to see if there is a significant difference between the perceived value of functional and formal activities for the group as a whole. Although it does not directly answer any of the research questions addressed in this study, it may strengthen the case for saying that the research instrument really is measuring the constructs it is supposed to be measuring (see Chapter 3.3.1 for an explanation of construct validity) any relationships found between beliefs held at a general level and beliefs about the value of specific tasks are real.

In order to test whether or not there was a difference between the perceived values of activities defined as either formal or functional, a comparison was made between the median values of effectiveness of both types of activities for each subject. The Wilcoxon

Signed Ranks Test (see Figure 20) was used for this as it is the most appropriate measure for ordinal data obtained from two observations of one sample.

Ranks		N	Mean Rank	Sum of Ranks
Median Functional Eff. - Median Formal Eff.	Negative Ranks	2 ^a	3.50	7.00
	Positive Ranks	18 ^b	11.28	203.00
	Ties	10 ^c		
	Total	30		

a. Median Functional Eff. < Median Formal Eff.
b. Median Functional Eff. > Median Formal Eff.
c. Median Formal Eff. = Median Functional Eff.

Test Statistics ^b	
	Median Functional Eff. - Median Formal Eff.
Z	-3.711 ^a
Asymp. Sig. (2-tailed)	.000

a. Based on negative ranks.
b. Wilcoxon Signed Ranks Test

Figure 20: Wilcoxon signed-ranks test on medians of scores for effectiveness of formal and functional activities.

The result ($Z = - 3.711$, $N = 20$, $p = .000$) shows that there is a highly significant difference and that the observed preference for functional over formal activities is real.

5.1.1.3.3 Summary of Parts 3 and 4 Descriptive Statistics

As judged from the median values found for ratings of formality and functionality, the general response to this questionnaire confirms that activities determined to be formal or functional in the development of the questionnaire are viewed in much the same way by this sample of students. Three activities were viewed as being equally formal and functional, but were relatively high on both scales. All of the activities are seen as having a relatively high proportion of relevance to formal and functional aspects of language learning. The median values for the effectiveness of formal and functional activities suggest that the functional activities described are seen as slightly more effective by this sample. Statistical analysis shows this difference to be highly significant.

It may be that perceptions of the inherent formality of the skill being practiced and the subjects' beliefs concerning the formality and functionality of activities influence the value subjects put on those activities. Further analysis is necessary to illuminate this issue.

5.1.2 Correlational Analysis

In order to seek answers to research questions 1A and 1B (see Chapter 4.1.2 above) and any support there is for Hypothesis 1 (see Chapter 4.1.2 above), we will compare the data from Part 2 (see Section 5.1.1.2 for the descriptive analysis) and Part 4 (see Section 5.1.1.3 for the descriptive analysis). The descriptive analysis of Part 3 confirmed that the activities described were viewed by this sample as either mainly formal or functional. Therefore, any comparisons made between responses to Part 2 and Part 4 may be taken to suggest a relationship between general beliefs about the nature of language learning and the perceived effectiveness of specific language learning activities.

5.1.2.1 *Statistics and Terminology Used*

The statistic used for this comparison is Spearman's Rank. Probability levels (p) at or below .05 are held to be significant. For the purposes of this particular analysis, if p is between .06 and .05, it will be described as "approaching significance". As both of the hypotheses state the direction of the hypothesised relationship, one-tailed significance is calculated. For the purposes of this investigation, the investigator classifies correlations of .34 or less as "weak", and those between .35 and .64 as "medium". Correlations above this will be termed "strong".

5.1.2.2 *Analysis Structure*

This analysis will be structured according to the themes in Part 2 on which the questionnaire items are based and correlations and significance levels will be tabulated according to these themes. For each theme, statistical evidence will be evaluated for its relevance to questions 1A and 1B and hypotheses 1A and 1C. For each activity from Part 4, the respondents' definition of the activity will be given in brackets. Significant and approaching significant correlations are summarised in Table 24 (p. 187) and Table 25 (p. 188). A complete tabulation of correlations can be found in [QPS Correlations between Part 2 and Part 4.htm](#).

5.1.2.3 Analysis

5.1.2.3.1 Correlations With Nature of Language Learning

1. My target language is structured in the same way as my own language.

This statement has the following significant correlations:

Activity c (Teacher translates vocab) (Formal): Agreement with this statement has a weak negative correlation approaching significance ($r = -.29, p = .06, n = 30$) with activity *c* which asks students to evaluate teacher translation in vocabulary learning. Disagreement with the statement, indicating a perception that the target language is structured differently, correlates with higher valuing of teacher translation.

Activity f (Repeating sentences) (Formal): Agreement with this statement has a weak positive correlation approaching significance ($r = .30, p = .054, n = 30$) with activity *f* which asks students to evaluate repeating words after the teacher. Agreement with the statement correlates with a higher valuing of repetition after the teacher.

2. It is necessary to know the target language culture in order to speak that language well.

This statement has the following significant correlations:

Activity a (Repeating words) (Formal): Agreement with the statement, meaning the respondent believes that knowledge of the target language culture is necessary, has a highly significant medium negative correlation ($r = -.52, p = .001, n = 30$) with the value of effectiveness placed on repeating after the teacher in vocabulary learning.

Activity d (Vocab games) (Functional): Agreement with the statement has a weak but significant positive correlation ($r = .31, p = .045, n = 30$) with the value of effectiveness placed on learning vocabulary through games.

Activity e (Grammar games) (FuncForm): Valuing knowledge of culture has a weak but significant positive correlation ($r = .31, p = .046, n = 30$) with the perceived value of learning grammar communicatively through games.

Activity m (Teacher translates new vocab in reading) (Formal): Agreement with the statement has a medium significant negative correlation ($r = -.37, p = .022, n = 30$) with the value placed on teacher translation of vocabulary in reading skills.

Activity s (Class repetition of dialogues) (Formal): Valuing knowledge of culture has a weak but significant negative correlation ($r = -.34, p = .031, n = 30$) with the perceived value of whole class repetition for speaking skills.

3. It is better to learn my target language in a country that speaks that language.

This statement has the following significant correlations:

Activity b (Vocab in group discussion) (Functional): Agreement with the statement,

meaning the respondent places a high value on living in the target language country, has a weak but significant positive correlation ($r = .33, p = .039, n = 30$) with the value put on practicing vocabulary in group discussions.

Activity *d* (Vocab games) (Functional): Agreement with the statement has a highly significant medium positive correlation ($r = .47, p = .004, n = 30$) with the value placed on learning vocabulary through games.

Activity *e* (Grammar games) (FuncForm): Agreement with the statement has a highly significant medium positive correlation ($r = .44, p = .008, n = 30$) with the value placed on learning grammar through games.

Activity *h* (Grammar used in pairs/groups) (FuncForm): Agreement with the statement has a highly significant medium positive correlation ($r = .48, p = .004, n = 30$) with the value placed on functional practice, through conversation activities, of a formal skill.

Activity *i* (Sentence level grammar) (Formal): Agreement with the statement has a weak but significant negative correlation ($r = -.32, p = .041, n = 30$) with the value placed on formal sentence level writing practice.

Activity *l* (Communicative writing) (Functional): Agreement with the statement has a weak positive correlation approaching significance ($r = .30, p = .057, n = 30$) with the perceived value of communicative writing activities.

Activity *q* (Games for speaking) (Functional): Agreement with the statement has a weak but significant positive correlation ($r = .33, p = .036, n = 30$) with the value placed on practicing speaking through communicative games.

Activity *r* (Memorising dialogues) (Formal): Agreement with the statement has a highly significant medium negative correlation ($r = -.46, p = .005, n = 30$) with the value placed on memorisation of dialogues for speaking skills.

Activity *t* (Group discussion for speaking) (Functional): Agreement with the statement has a highly significant medium positive correlation ($r = .43, p = .009, n = 30$) with the value of group discussion to improve speaking skills.

Activity *x* (Dictation) (Formal): Agreement with the statement has a weak but significant negative correlation of ($r = -.33, p = .036, n = 30$) with the perceived value of teacher dictation.

4. Learning a foreign language is mostly a matter of learning many new vocabulary words.

This statement correlates with activity *q* (Games for speaking) (Functional).

Agreement with the statement has a weak positive correlation approaching

significance ($r = .30, p = .054, n = 30$) with the value placed on practicing speaking through communicative games. This statement does not correlate significantly with any other item from Part 4.

5. Learning a foreign language is mostly a matter of learning many grammar rules.

This statement has the following significant correlations:

Activity g (Grammar taught in L1) (Formal): Agreement with the statement has a highly significant medium positive correlation ($r = .43, p = .009, n = 30$) with the value placed on the teacher giving L1 grammar explanations.

Activity q (Games for speaking) (Functional): Agreement with the statement has a weak positive correlation approaching significance ($r = .30, p = .054, n = 30$) with the value placed on improving speaking skills through communicative games.

6. Learning my target language is different from learning other school subjects.

This statement has the following significant correlations:

Activity c (Teacher translates vocab) (Formal): Agreement with the statement, indicating a perception that language learning is somehow different from other subjects, has a significant medium positive correlation ($r = .42, p = .010, n = 30$) with the value placed on teacher translation of vocabulary for vocabulary learning.

Activity l (Communicative writing) (Functional): Agreement with the statement has a weak but significant negative correlation ($r = -.34, p = .031, n = 30$) with communicative practice to improve writing skills.

7. Learning English is mostly a matter of translating from my own language.

Despite there being a specific link between this statement, focusing on translation, and 3 items in Part 4 involving translation, no significant correlations between these were found. This statement has the following significant correlations:

Activity a (Repeating words) (Formal): Agreement with the statement has a weak but significant positive correlation ($r = .31, p = .05, n = 30$) with the value placed on repeating words after the teacher.

Activity s (Class repetition of dialogues) (Formal): Agreement with the statement has a significant medium positive correlation ($r = .38, p = .02, n = 30$) with a preference for teacher-led whole class repetition in developing speaking skills.

With the exception of the weak positive correlation between statement 5 and activity q (Games for speaking) (Functional), the overall pattern of correlations is very clear; beliefs about the nature of language learning that tend towards a functional emphasis correlate positively with the valuing of functional, student-centred, communicative activities and

		Vocabulary					Grammar					Writing			
		Part 4 Item #	a) Repeating after teacher	b) Communicative practice of vocab.	c) Teacher translates	d) Games	e) Games	f) Repeating after teacher	g) L1 explanations	h) Communicative practice of grammar	i) Focus on grammar	j) Writing to pen friends (no correction)	k) Multiple choice grammar exercises	l) Communicative practice	
Part 2 Item #	Item Topic														
1.	Structural awareness				-.29*			.30*							
2.	Cultural kn.		-.52***			.31**	.31**								
3.	L2 environment			.33**		.47***	.44***			.48***	-.32**			.29*	
4.	Vocab.														
5.	Grammar								.43***						
6.	L2 learning is different				.42**									-.34**	
7.	Translation		.31**												
8.	Repetition and practice									.52***					
9.	Open Access Centre									.30*	.39**				
10.	Accent														
11.	Accuracy						-.36**			-.49***			-.47***		
12.	Seeking opportunities				-.37**										
13.	Risk-taking										-.48***				
14.	Self-consciousness														
15.	Correction											.39**			
16.	Instrumental motivation			.36**						.31**					
17.	Status of L2														
18.	Integrative motivation														

Table 24: Significant correlations between Parts 2 and 4 of the questionnaire.

* = approaching significance, ** = significant, *** = very significant.

		Reading					Speaking					Listening			
		Part 4 Item #	(m) Teacher translation	(n) Written vocab exercises	(o) Reading for fun	(p) Oral paraphrasing pairwork	(q) Games	(r) Memorising dialogues	(s) Repetition of dialogues	(t) Group discussion	(u) Random clozes	(v) Jigsaw viewing	(w) Video prediction	(x) Dictation with delayed correction	
Part 2 Item #	Item Topic														
1.	Structural awareness														
2.	Cultural kn.	-.37**							-.34**						
3.	L2 environment						.33**	-.46***		.43***				-.33**	
4.	Vocab.						.30*								
5.	Grammar						.30*								
6.	L2 learning is different														
7.	Translation								.38**						
8.	Repetition and practice					.42**				.39**		.52***	.60***	-.34**	
9.	Open Access Centre													-.45***	
10.	Accent														
11.	Accuracy					-.38**			.43**				-.33**	.39**	
12.	Seeking opportunities	-.45***													
13.	Risk-taking			.29*											
14.	Self-consciousness			.38**						-.29*					
15.	Correction				-.50***										
16.	Instrumental motivation					.53***	.31**			.34**		.48***			
17.	Status of L2														
18.	Integrative motivation														

Table 25: Significant correlations between Parts 2 and 4 of the questionnaire (continued).

* = approaching significance, ** = significant, *** = very significant.

negatively with formal, teacher-led activities while the opposite is true for more formal beliefs. Statements 2 and 3, focusing on the importance of knowledge of culture and living in the target language environment generate the most correlations with 5 and 10 correlations respectively. Beliefs about the importance of vocabulary and grammar generated very few correlations.

Although several of the statements from Part 2 yield only two or three significant correlations which in many cases are very weak, this analysis suggests that to some extent students with formal beliefs value formal activities more than functional activities and those with functional beliefs value functional activities more than formal activities. Therefore, the data provides limited support for affirmative answers to research questions 1 A and 1 B and supports Hypothesis 1.

5.1.2.3.2 Correlations With Learning Strategies

7. It is important to repeat and practice often.

This statement has the following significant correlations:

Activity *h* (Grammar used in pairs/groups) (FuncForm): Agreement with the statement, indicating the respondent values repetition and practice, has a highly significant medium positive correlation ($r = .52, p = .002, n = 30$) with the belief that the application of formal knowledge in classroom conversation activities leads to improvement.

Activity *p* (Paired paraphrasing) (Functional): A significant medium positive correlation ($r = .42, p = .010, n = 30$) with oral paraphrasing pairwork in reading skills. Those who put a higher value on repetition and practice also appear to put a higher value on active student centred practice of reading skills.

Activity *t* (Group discussion for speaking) (Functional): Agreement with the statement has a significant medium positive correlation ($r = .39, p = .017, n = 30$) with the value placed on communicative practice of speaking skills.

Activity *v* (TV ad jigsaw viewing) (Functional): Agreement with the statement has a highly significant medium positive correlation ($r = .52, p = .002, n = 30$) with the value placed on jigsaw viewing of video to practice listening skills.

Activity *w* (Discussion of video excerpt) (Functional): Agreement with the statement has a highly significant medium positive correlation ($r = .60, p = .000, n = 30$) with the value placed on video prediction to practice listening skills.

Activity *x* (Dictation) (Formal): Agreement with the statement has a weak but

significant negative correlation ($r = -.34, p = .033, n = 30$) with the value placed on teacher-led dictation to practice listening skills.

8. It is important to practice in the Open Access Centre.

This statement has the following significant correlations:

Activity *h* (Grammar used in pairs/groups) (FuncForm): Agreement with the statement, indicating a belief in the value of self-directed learning, has a weak positive correlation approaching significance ($r = .30, p = .053, n = 30$) with the value placed on communicative practice to improve grammar skills.

Activity *i* (Sentence level grammar) (Formal): Agreement with the statement has a significant medium positive correlation ($r = .39, p = .016, n = 30$) with the value placed on focus on formal sentence level practice of writing skills.

Activity *x* (Dictation) (Formal): Agreement that practice in the OAC is important has a highly significant medium negative correlation ($r = -.45, p = .006, n = 30$) with dictation to practice listening.

Regarding statement 8 on the importance of repetition and practice, the pattern of correlations appears to indicate that the respondents value student-centred communicative practice even when the nature of the linguistic skill could be seen as inherently formal (e.g. grammar) or inherently individual and receptive (e.g. reading, listening). The negative correlation with activity *x* (Formal), teacher-led dictation, is consistent with this trend.

Regarding statement 9, the positive correlation with activity *h* (Grammar used in pairs/groups) (FuncForm) and the negative correlation with activity *x* (Dictation) (Formal) seem to indicate that a belief in the value of self-directed learning concords with a belief in the value of student-centred language learning activities. On the other hand, the correlation with activity *i* (Sentence level grammar) (Formal), focusing on sentence level writing skills, does not appear to be consistent with this. However, it may be that these subjects practice sentence level writing skills in the OAC and see this as a typical self-access activity; certainly, there is no shortage of this type of text book material in the OAC.

Overall, the correlations, particularly those with statement 8, suggest that the degree of formal-functional bias in beliefs about the importance of the learning strategies described in Part 2 is associated with the value for learning assigned to specific learning activities defined by the respondents as formal or functional. These correlations, therefore, provide

some support for affirmative answers to research questions 1A and 1B and support hypothesis 1.

5.1.2.3.3 Correlations With Communication Strategies

9. It is important to speak my target language with an excellent accent.

This statement has no significant correlations with any items in Part 4.

10. I should not say anything in my target language until I can say it correctly.

This statement has the following significant correlations:

Activity e (Grammar games) (FuncForm): Strength of disagreement with the statement, focusing on the importance of accuracy at the expense of fluency in speaking the L2, has a significant medium negative correlation ($r = -.36, p = .026, n = 30$) with the value placed on grammar games, and the accompanying risk of mistakes, in the development of grammatical accuracy.

Activity h (Grammar used in pairs/groups) (FuncForm): Disagreement with the statement has a highly significant medium negative correlation ($r = -.49, p = .003, n = 30$) with a higher valuing of communicative learning activities in which mistakes will inevitably be made.

Activity k (Multiple choice grammar) (Formal): Disagreement with the statement has highly significant medium negative correlation ($r = -.47, p = .005, n = 30$) with the value placed on multiple choice grammar exercises in the development of writing skills. The sample defined these activities as formal but rated them overall as neither effective nor ineffective for learning to write.

Activity p (Paired paraphrasing) (Functional): Disagreement with the statement has a significant medium negative correlation ($r = -.38, p = .018, n = 30$) with the value placed on oral paraphrasing to practice reading skills.

Activity s (Class repetition of dialogues) (Formal): Disagreement with the statement has a highly significant medium positive correlation ($r = .43, p = .009, n = 30$) with the value placed on whole class repetition of dialogues for speaking practice, a formal teacher-led activity in which accuracy is guaranteed.

Activity w (Discussion of video excerpt) (Functional): Disagreement with the statement has a weak but significant negative correlation ($r = -.33, p = .039, n = 30$) with the value placed on video prediction to practice listening skills.

Activity x (Dictation) (Formal): There was a significant medium positive correlation ($r = .39, p = .016, n = 30$) with teacher dictation to practice listening skills. Those

respondents whose disagreement with the statement was not as strong were more likely to give a higher rating to this activity.

11. If I heard someone speaking my target language, I would go up to them so that I could practice speaking the language.

This statement has the following significant correlations:

Activity c (Teacher translates vocab) (Formal): Agreement with the statement has a significant medium negative correlation ($r = -.37, p = .023, n = 30$) with the value placed on teacher translation of vocabulary.

Activity m (Teacher translates new vocab in reading) (Formal): Agreement with the statement has a highly significant medium negative correlation ($r = -.45, p = .007, n = 30$) with the value placed on teacher translation in reading skills.

12. It is OK for me to guess if I do not know a word in my target language.

This statement has the following significant correlations:

Activity i (Sentence level grammar) (Formal): Strength of agreement with the statement, indicating a willingness to guess, has a highly significant medium negative correlation ($r = -.48, p = .004, n = 30$) with the value placed on focusing on sentence level skills in writing practice.

Activity n (Vocab ex's after reading) (FormFunc): Strength of agreement with the statement has a weak positive correlation approaching significance ($r = .29, p = .058, n = 30$) with written vocabulary exercises following reading. Respondents rated these activities equally formal and functional.

13. I feel self-conscious speaking my target language in front of other people.

This statement has the following significant correlations:

Activity n (Vocab ex's after reading) (FormFunc): Strength of disagreement with the statement, indicating that the respondent does not feel self-conscious, has a significant medium positive correlation ($r = .38, p = .018, n = 30$) with the value placed on written vocabulary exercises following reading.

Activity t (Group discussion for speaking) (Functional): There was a weak negative correlation approaching significance ($r = -.29, p = .059, n = 30$) with group discussion for practicing speaking skills. Strength of disagreement with the statement correlates with a higher rating for the value of group discussion.

14. If you are allowed to make mistakes in the beginning, it will be hard to get rid of them later on.

This statement has the following significant correlations:

Activity j (Writing letters to pen friends) (Formal): Agreement with the statement,

indicating that the respondent is in favour of teacher correction, has a significant medium positive correlation ($r = .39, p = .019, n = 30$) with the perceived value of real written communication without teacher correction. This method was defined as functional and was regarded as ineffective with a median rating of 2 for effectiveness.

Activity o (Reading for fun) (Functional): Disagreement with the statement, which could be said to indicate an emphasis on the importance of fluency, had a highly significant medium negative correlation ($r = -.50, p = .002, n = 30$) with the perceived value of leisure reading.

With three exceptions, the general trend shown by correlations between statements about communication strategies and the ratings for effectiveness of the activities in Part 4 matches the trends shown in the previous two sections; that is, formal-functional bias is, in most cases, matched by the value assigned to formal or functional activities.

Statement 11, focusing on student preference for speaking accurately, stands out among the items in this section with 7 correlations. Responses to the statement showed a strong feeling against the idea that one should not say anything until one can say it correctly with no neutral, agree or strongly agree responses. This strength of feeling and the high number of significant correlations suggests that this is a controversial issue. It may be that these subjects feel strongly that accuracy is something that develops from practice in communicative situations. Purely speculatively, they may even be conscious of different approaches taken by their teachers and have strong opinions on these approaches.

The absence of any correlations for statement 10 should also be mentioned. It is interesting that responses to this statement, focusing on the importance of a good accent do not correlate with activities involving repetition or communicative activities such as games or group discussion.

Two of the three exceptions (between statement 11 and activity *k* (Multiple choice grammar) (Formal), and statement 13 and activity *n* (Vocab ex's after reading) (FormFunc)) involve multiple choice (or possibly gap-filling) activities. The remaining exception is the correlation between statement 15 and activity *j* (Writing letters to pen friends) (Formal). Agreement with the statement indicates a preference for correction while a higher rating for the effectiveness of the activity suggests a bias against teacher correction. This is contradictory and no logical explanation for this can be proposed.

Overall, although most of the statements show only two correlations out of a possible 24, what correlations were found indicate that there is a possible link between formal-functional bias in general beliefs about communication strategies in language learning and respondents' ratings of the effectiveness of specific formal or functional activities. These correlations, therefore, provide limited support for affirmative answers to research questions 1A and 1B and support hypothesis 1. They will be discussed in Chapter 7.1.4.

5.1.2.3.4 Correlations With Motivations and Expectations

15. If I learn to speak my target language, it will help me to get a good job.

This statement has the following significant correlations:

Activity *b* (Vocab in group discussion) (Functional): Agreement with the statement, indicating an instrumental motivation, has a significant medium positive correlation ($r = .36, p = .026, n = 30$) with the perceived value of performance oriented, meaning-focused practice in the learning of vocabulary.

Activity *h* (Grammar used in pairs/groups) (FuncForm): Agreement with the statement has a weak but significant positive correlation ($r = .31, p = .049, n = 30$) with the perceived value of communicative, meaning-focused practice in the improvement of grammar skills.

Activity *p* (Paired paraphrasing) (Functional): Strength of agreement has a highly significant medium positive correlation ($r = .53, p = .001, n = 30$) with the value placed on oral paraphrasing pairwork to practice reading skills.

Activity *q* (Games for speaking) (Functional): Agreement with the statement has a weak but significant positive correlation ($r = .31, p = .046, n = 30$) with the perceived value of games to practice speaking.

Activity *t* (Group discussion for speaking) (Functional): Agreement with the statement has a weak but significant positive correlation ($r = .34, p = .033, n = 30$) with the value placed on group discussion to practice speaking skills.

Activity *v* (TV ad jigsaw viewing) (Functional): Agreement with the statement has a highly significant medium positive correlation ($r = .48, p = .004, n = 30$) with the perceived value of jigsaw viewing, a communicative activity, for the improvement of the receptive skill of listening.

16. People in my country think it is important to speak my target language.

This statement has no significant correlations with any items in Part 4.

17. I would like to learn my target language so that I can get to know people better in the country where my target language is spoken.

This statement has no significant correlations with any items in Part 4.

Only statement 16, focusing on the respondent's degree of instrumental motivation, yielded significant correlations. In this case, a total of 6 significant correlations were found ranging across all the skill areas apart from writing, indicating that higher instrumental motivation was associated with a higher rating for communicative, meaning-focused activities.

The direction of correlations for instrumental motivation (statement 16) is contrary to expectations in that this type of motivation has been associated with formal bias, the passing of exams, the achievement of status within a community and methods which support this achievement. This data, however, suggests the opposite. If we maintain the assumption that instrumental motivation should be associated with formal bias and integrative motivation with functional bias, this analysis does not support affirmative answers for research questions 1A and 1B or support Hypothesis 1. This will be discussed further in Chapter 7.1.5.

5.1.2.3.5 Summary of Correlations

Most of the statements in Part 2 of the questionnaire have from 1 to 3 significant or near-significant correlations with the rating for the effectiveness the activities described in Part 4. In addition, these correlations are, on the whole, weak. In almost all cases, however, the correlations are in the expected directions; that is, responses which show a functional bias in general beliefs have positive correlations with the perceived effectiveness of activities defined as functional with the same being true for formal beliefs and formal activities. In the area of motivations and expectations, the significant correlations shown with instrumental motivation raise an interesting question as higher instrumental motivation correlates with a higher perceived effectiveness for functional activities.

In summary, bearing in mind the question raised about motivations, the correlational analysis suggests that for beliefs about the nature of language learning, learning strategies and communication strategies, a formal bias in general beliefs correlated positively with the perceived value of formal learning activities while a functional bias correlated positively with the perceived value of functional learning activities. Therefore, this

evidence provides limited support for affirmative answers to research questions 1A and 1B and hypothesis 1.

5.2 Summary

Analysis of the data obtained from this pilot administration of the DLLT questionnaire shows, firstly, that this sample of Oriental languages students is composed of relatively experienced language learners if one accepts the number of other languages spoken and levels achieved in these by the respondents as criteria. As a group, these language learners show general beliefs biased towards a meaning-focused definition of the task of language learning in which knowledge of the target language culture and learning in the target language country are highly valued. There is a strong tendency, however, to be neutral on issues relating to grammar, vocabulary, and translation.

Regarding respondents' definitions of language learning tasks in formal or functional terms and the values they assign to their effectiveness, the data obtained generally supports the expected definition of the activities. The values for the activities given in Part 4 show that functional activities are more highly valued than formal activities and that this difference is significant for the sample as a whole. Correlations between items in Part 2 and Part 4 support affirmative answers for research questions 1 A and 1 B in addition to supporting hypothesis 1.

We shall now continue on to the next section of the investigation: the pilot study for a shorter version of the DLLT and the software to be used in the main study.

Chapter 6 Main Study

6.1 *Introduction*

This chapter falls into three main sections. It will begin with an examination of the data obtained from the revised questionnaire used in this study (see Section 6.2). We will then examine relationships between the questionnaire data and subject behaviour in WordLearner using both correlational analysis and a qualitative analysis of individual behaviour in the program (see Section 6.2.2.3). The software related section of the investigation was divided into four “stages”. Stages 1, 2 and 3, though providing interesting data on navigation through differing hypertext structures, serve mainly to trial the software and provide data sets to test out tracking and graphic display methods. Stage 4, which has the most complex hypertext structure will be analysed in greater detail and will be the source of data for comparisons with questionnaire data.

6.2 *Questionnaire Data*

This section will begin with an examination of descriptive statistics focusing on an item by item analysis of responses to each part of the questionnaire. This will then be followed by a statistical analysis of correlational relationships within the data (see Section 6.2.2).

6.2.1 *Descriptives*

6.2.1.1 *Background Details*

Frequency tables summarising the background details for all subjects in this study are given in [Main Study – Background Frequencies.htm](#). This sample of 40 overseas students has a high average age (mean = 27.08, Std Dev = 6.41, min = 20, max = 50), is mostly female (80%, n = 32) and is predominantly South-East and East Asian (77.5%, n = 31). Postgraduates (including MA/MSc, visiting, and Foundation Year students) make up the majority of subjects (82.5%, n = 33) accounting not only for the high average age but also the wide range of ages.

Notable features are, firstly, that every subject claims to have studied English for more than four years. This is to be expected from the educational level of the subjects, their age and the education systems they have come through. Secondly, the time the subjects have been in England is quite varied, but 55% (n = 22) have been in this country for less than a

year while 40% (n = 16) have been in England for between 1 and 3 years. Thirdly, 45% (n = 18) of the subjects state that their language education has been a mix of formal and functional methods while 37.5% (n = 15) of the subjects state that their language education has been predominantly formal.

Most notably, a high proportion of the subjects (75%, n = 30) state that their priority in learning English is functional. A cross-tabulation (see Figure 21) between this and student type¹² yields a significant chi-square ($\chi^2 = 10.667$, $df = 3$, $p = .014$). However, this is invalid as the expected cell count is very small (.25) and 75% of the cells have cell counts less than 5. The interesting point about this is that post-graduates overwhelmingly state (5 formal vs 25 functional) that their priority is functional. On the other hand, all 3 Foundation Year students, who are developing their English in advance of doing post-graduate degrees, state that their priority is formal. This will be discussed further in Chapter 7.2.1.1.

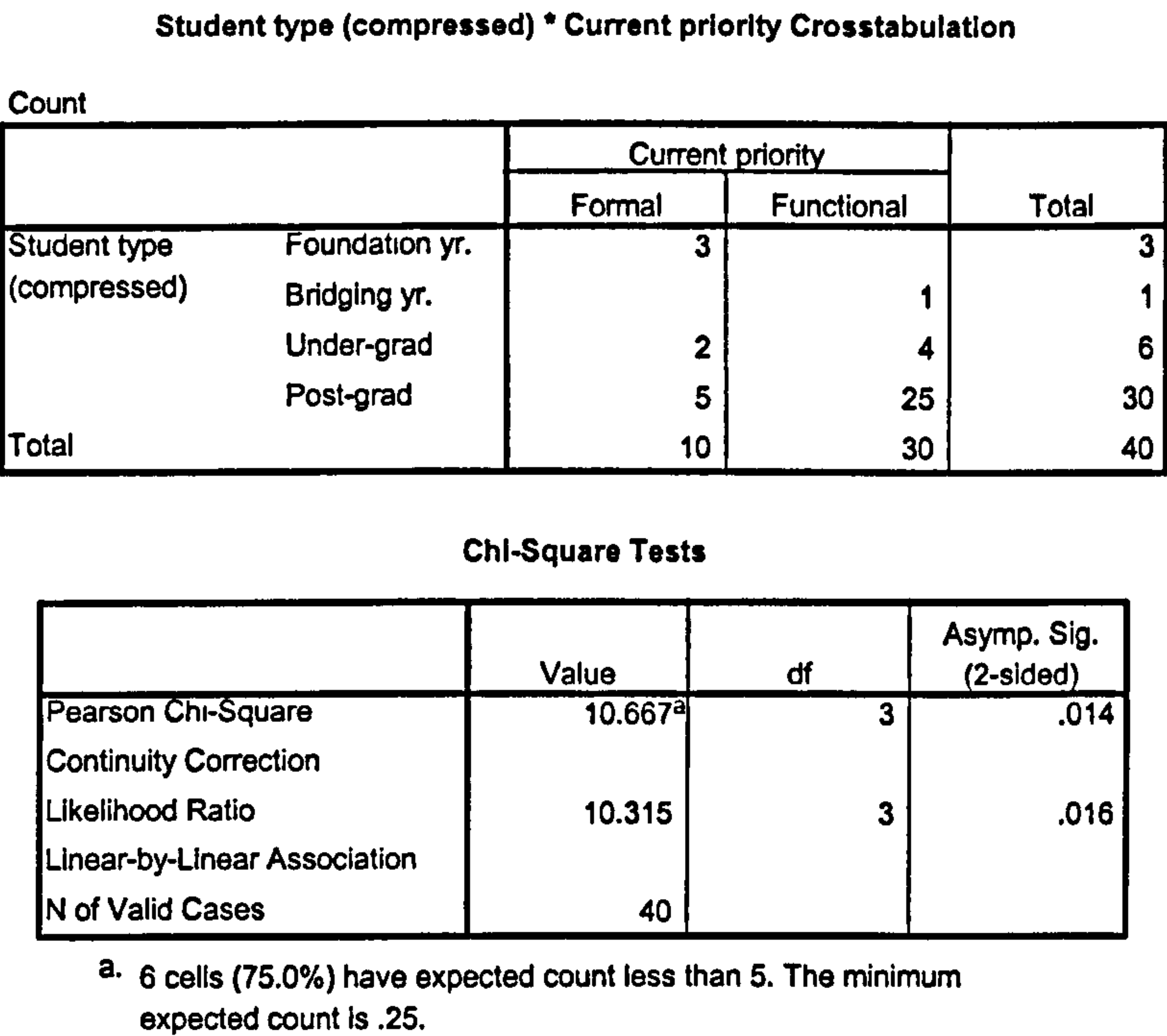


Figure 21: Cross-tabulation and chi-square between student type and learning priority.

Cross-tabulations (Main Study – Crosstabs between Background Vs and Part 2.htm, Main Study – Crosstabs between Background Vs and Part 3.htm, Main Study – Crosstabs between Background Vs and Part 4.htm) were calculated to look for possible interactions

¹² The post-grad category consisted of MA/MSc/PhD and Post Doc/Visiting staff categories compressed into a single category.

between background factors and variables in Parts 2, 3, and 4. To increase the likelihood of valid results, data from Parts 2 and 4 ([Main Study – Crosstabs between Background Vs and Part 2.htm](#), [Main Study – Crosstabs between Background Vs and Part 4.htm](#)) were collapsed from five to three categories using the same method as that used for the Questionnaire Pilot Study (see Chapter 5.1.1.1). The data selected from Part 3 was the subjects' definition of the tasks as either formal or functional based on the difference in their ratings of formality and functionality of the tasks. These cross-tabulations yielded some significant chi-squared results but all results were invalid due to a high proportion of cells with counts less than 5 and very low expected cell frequencies. Bearing in mind the lack of validity of the chi-squared statistics obtained, the results were examined with a view to identifying patterns which might suggest avenues for future research.

The only discernible patterns ([Main Study – Crosstabs between Background Vs and Part 2.htm](#)) were, firstly, that item 8 in Part 2, focusing on attempting to speak even if incorrect, had significant but invalid statistical relationships with age group ($\chi^2 = 15.128$, $df = 6$, $p = .019$), student type ($\chi^2 = 25.105$, $df = 10$, $p = .005$), time spent in English native speaking countries ($\chi^2 = 20.971$, $df = 8$, $p = .007$), and current learning priority ($\chi^2 = 6.559$, $df = 2$, $p = .038$). Secondly, current learning priority (either functional or formal), had significant but invalid statistical relationships with items 2 ($\chi^2 = 7.259$, $df = 2$, $p = .027$), 4 ($\chi^2 = 13.344$, $df = 2$, $p = .001$), 6 ($\chi^2 = 5.928$, $df = 2$, $p = .052$), 7 ($\chi^2 = 7.373$, $df = 2$, $p = .025$), and 9 ($\chi^2 = 10.092$, $df = 2$, $p = .006$) in Part 2.

There are no other significant statistical relationships between the data on background variables collected in Part 1 and Parts 3 and 4.

6.2.1.2 Part 2

Responses to this section of the questionnaire are tabulated in Table 26 and frequency tables for this data are given in [Main Study – Part 2 Frequencies.htm](#). As the pattern of response appeared very similar to the Questionnaire Pilot Study, a statistical comparison was performed for each item in this questionnaire and the corresponding item in the Questionnaire Pilot Study using the Mann-Whitney U-test ([Main Study Mann Whitney U tests Comparing Responses.htm](#)). This found significant differences between item 5 ($U = 330.000$, Questionnaire Pilot Study $n = 30$, Main Study $n = 40$, $p = .001$) and item 9 ($U = 455.000$, Questionnaire Pilot Study $n = 30$, Main Study $n = 40$, $p = .048$) of this

questionnaire and the corresponding items in the Questionnaire Pilot Study. As there were no significant differences for the other items, a full descriptive analysis will not be given here. The reader is referred to Chapter 5.1.1.2.1 for the descriptive analysis of Part 2 of the Questionnaire Pilot Study. Only items 5 and 9 will be discussed here.

	SA	A	NAND	D	SD
1. It is necessary to know English culture in order to speak English well.	10	19	5	5	1
2. It is better to learn English in an English speaking country.	19	17	2		2
3. Learning a foreign language is mostly a matter of learning many new vocabulary words.	2	11	13	13	1
4. Learning a foreign language is mostly a matter of learning many grammar rules.		8	15	17	
5. Learning English is different from learning other school subjects.	5	19	8	8	
6. Learning English is mostly a matter of translating from my own language.		4	10	18	8
7. It is important to repeat and practice often.	16	18	4		2
8. You should not say anything in English until you can say it correctly.	1	1	1	15	22
9. It is OK to guess if I do not know an English word.	13	21	3	1	2
10. If you are allowed to make mistakes in the beginning, it will be hard to get rid of them later on.	1	13	6	16	4

Table 26: Responses to Part 2 items.

6.2.1.2.1 Item 5

Although a majority (24 out of 40) agree that learning English is different from learning other school subjects, there is a wide range of opinion with 8 neutral and 8 disagree. This wider range of opinion with a significant minority (n = 16, 40%) either neutral or disagreeing is probably the source of the statistical difference with the Questionnaire Pilot Study. This will be discussed further below in relation to correlations found with items in Part 4 (see Section 6.2.2.2.1).

6.2.1.2.2 Item 9

Here again, there is a wider range of opinion than that found in the Questionnaire Pilot Study for this item on the appropriacy of guessing. However, the real difference between the two samples is probably the large proportion of respondents in this sample that strongly agree with guessing ($n = 13$, 32.5%). This will be discussed further in Chapter 7.2.1.2.

6.2.1.2.3 Summary of Questionnaire Response

Belief in the value of living in an English speaking country and having knowledge of English culture was very strong, while there was a high degree of neutrality on the importance of learning grammar and vocabulary. This neutrality was taken to mean that subjects felt unable to commit to either agreement or disagreement as there may be a role for formal learning in certain situations. Repetition and practice was regarded as very important by the great majority of subjects, while there was also strong agreement that it was OK to guess if you are not sure of being correct. This contrasted with a range of opinion on learning from mistakes.

6.2.1.3 Part 3

Descriptive statistics and frequency tables for responses to Part 3 of the Definition of Language Learning Tasks questionnaire are given in [Main Study – Part 3 Frequencies.htm](#). Table 27 summarises these statistics by giving the median values for formal and functional ratings of each of the 8 activities and the median values of the respondents' ratings of the effectiveness of these activities given in Part 4 of the questionnaire. If the activity is more formal than functional according to the median response, it is defined as formal and vice versa for functional. Item h had equal median responses on both scales and is classified as "equal". The use of an "equal" classification differs from the system applied in the Questionnaire Pilot Study (see Chapter 5.1.1.3.1) as items e to h were not piloted using verbal protocols and there was no expected subject definition for these items.

For activities *a* to *d*, the results of this part of the study are similar to the corresponding items in the Questionnaire Pilot Study in two ways. Firstly, for activities *a* to *d*, subject definitions are as expected and are the same as the Questionnaire Pilot Study. Secondly, although in seven out of the eight activities there is a clear belief that the activity is mostly formal or functional, no particular item is seen as serving only one purpose.

Regarding items *e* to *h*, these results show that this sample believes that doing multiple choice activities on a computer and reading a dictionary definition of a word are formal. Guessing the meaning of a word is seen as functional. Item *h* differed from the other activities in being defined as equally formal and functional with a relatively high rating of four on each scale.

Activities	Formal Median	Functional Median	Overall Definition	Median Effectiveness Rating
a) Repeating words after the teacher.	5	-3	Formal	3.00
b) Using new vocabulary in group discussion to express opinions/feelings	3	-4	Functional	4.00
c) Teacher translates all new words and explains what they mean in your own language.	4	-2	Formal	3.00
d) Games in which pairs and groups have to be creative with vocabulary and communicate in your target language	3	-5	Functional	4.00
e) Doing multiple choice exercises on a computer to practice the meaning of words and getting immediate information regarding whether you are right or wrong.	4	-2	Formal	3.50
f) Learning the meaning of a word by reading the English language definition (e.g. not a translation into your own language).	4	-3	Formal	4.00
g) Guessing the meaning of a word by reading sentences containing the word.	3	-4	Functional ¹³	4.00
h) Practicing writing sentences using a new word.	4	-4	Equal	4.00

Table 27: Medians of formal and functional components of all Part 3 activities and medians of their effectiveness in learning English.

6.2.1.4 Part 4

Frequency tables of the responses to Part 4 are given in [Main Study – Part 4 Frequencies.htm](#). As mentioned above (see Section 6.2.1.1), cross tabulations and chi-squared statistics show no valid significant interactions between background variables and ratings of effectiveness of the language learning activities described in Part 4.

Table 27 above shows the median effectiveness ratings the sample gave the activities listed. These ratings range from three to four with activities defined as functional having

¹³ If this is calculated from the median of the differences rather than by comparing the medians for formal and functional ratings, this activity is equally formal and functional.

higher median ratings than formal activities in all cases. Activity *h* (Sentence writing) had a median effectiveness rating of 4, but was also rated by the sample as being equally formal. This will be discussed further in Chapter 7.2.1.4.

A Mann-Whitney U-test was performed to look for any differences there may have been between the effectiveness ratings for the four items (*a* to *d*) in the Main Study questionnaire which were also included in the Questionnaire Pilot Study. No significant differences were found. The output for these results can be seen in [Main Study Mann Whitney U-tests Comparing Responses.htm](#).

A Wilcoxon Signed Ranks test (see Figure 22) was performed to see if the difference in median ratings was significant. To do this, respondents' median ratings for items *a*, *c*, *e*, and *f*, which were defined overall as formal were compared with their median ratings for items *b*, *d*, and *g*, which were defined overall as functional. The result shows that there is a very highly significant difference ($Z = - 4.183$, $N = 36$, $p = .000$) and that, in common with the Questionnaire Pilot Study, the observed preference for functional over formal activities is real.

Ranks		N	Mean Rank	Sum of Ranks
P4 Functional Median - P4 Formal Median	Negative Ranks	3 ^a	23.00	69.00
	Positive Ranks	33 ^b	18.09	597.00
	Ties	4 ^c		
	Total	40		

a. P4 Functional Median < P4 Formal Median
b. P4 Functional Median > P4 Formal Median
c. P4 Formal Median = P4 Functional Median

Test Statistics ^b	
	P4 Functional Median - P4 Formal Median
Z	-4.183 ^a
Asymp. Sig. (2-tailed)	.000

a. Based on negative ranks.
b. Wilcoxon Signed Ranks Test

Figure 22: Wilcoxon signed-ranks test on medians of scores for effectiveness of formal and functional activities.

6.2.1.5 Summary Of Parts 3 And 4 Descriptive Statistics

The descriptive statistics for Parts 3 and 4 of this study paint a picture of a group that is very similar in their beliefs about the purposes and effectiveness of the learning activities described to the sample surveyed in the Questionnaire Pilot Study despite the age and cultural differences between the groups. Activities *a* to *d* were defined overall in exactly the same way as either formal or functional and no statistically significant differences were found for the efficacy the two samples assigned these items. Activities *e* and *f*, which were not in the Questionnaire Pilot Study, were clearly defined while activity *h* (Sentence writing), also not in the Questionnaire Pilot Study, was rated equally formal and functional. For all items, overall median ratings indicate that respondents believe that the activities described serve both formal and functional purposes. Finally, as with the Questionnaire Pilot Study, functional activities were seen as slightly more effective than formal activities and this difference was statistically significant.

6.2.2 Analysis of Relationships within the Questionnaire

6.2.2.1 Analysis Structure

The method and structure of this analysis will follow that established in the Questionnaire Pilot Study (see Chapter 5.1.2). That is, in order to seek answers to research questions 1A and 1B, we shall look for significant correlations between Part 2 and Part 4 of the questionnaire. What significant correlations are found will be described according to the categories of questions within Part 2. To improve the readability of the analysis but avoid use of the whole activity description, short forms (see Table 28) will be given in brackets.

Activities	Short Form
a) Repeating words after the teacher.	Repeating words
b) Using new vocabulary in group discussion to express opinions/feelings	Vocab in group discussion
c) Teacher translates all new words and explains what they mean in your own language.	Teacher translates vocab
d) Games in which pairs and groups have to be creative with vocabulary and communicate in your target language	Vocab games
e) Doing multiple choice exercises on a computer to practice the meaning of words and getting immediate information regarding whether you are right or wrong.	Multiple choice on computer
f) Learning the meaning of a word by reading the English language definition (e.g. not a translation into your own language).	Learning from definition
g) Guessing the meaning of a word by reading sentences containing the word.	Inferencing
h) Practicing writing sentences using a new word.	Sentence writing

Table 28: Short forms of Main Study Parts 3 and 4 activity descriptions.

6.2.2.2 Analysis

Table 29 provides the results of a Spearman’s Rank correlation (one-tailed) performed on data from Parts 2 and 4. Please see [Main Study - Spearman’s Rank Correlations between Parts 2 and 4.htm](#) for complete tables of correlations. Significant results will be discussed below.

Part 2 Items	Part 4 Items:	a	b	c	d	e	f	g	h
1	Correlation Coeff.	.126	-.018	.093	-.078	.118	-.028	.115	-.054
	Sig. (1-tailed)	.220	.456	.284	.315	.235	.431	.240	.369
	N	40	40	40	40	40	40	40	40
2	Correlation Coeff.	.161	.079	-.057	-.044	.096	-.020	.005	.149
	Sig. (1-tailed)	.160	.314	.363	.394	.278	.451	.488	.180
	N	40	40	40	40	40	40	40	40
3	Correlation Coeff.	.230	-.282	.297	-.031	.054	-.037	.034	.025
	Sig. (1-tailed)	.077	.039	.032	.424	.371	.410	.417	.440
	N	40	40	40	40	40	40	40	40
4	Correlation Coeff.	.091	-.193	.269	.038	.088	-.017	-.075	.036
	Sig. (1-tailed)	.289	.116	.047	.407	.295	.458	.323	.413
	N	40	40	40	40	40	40	40	40
5	Correlation Coeff.	-.188	.444	-.121	.353	.058	.286	.339	.355
	Sig. (1-tailed)	.123	.002	.229	.013	.362	.037	.016	.012
	N	40	40	40	40	40	40	40	40
6	Correlation Coeff.	.011	-.155	.370	-.102	.093	-.172	-.001	-.137
	Sig. (1-tailed)	.474	.170	.009	.266	.285	.145	.497	.199
	N	40	40	40	40	40	40	40	40
7	Correlation Coeff.	-.006	.068	.099	.146	-.050	.157	.174	.118
	Sig. (1-tailed)	.485	.337	.272	.185	.379	.167	.141	.235
	N	40	40	40	40	40	40	40	40
8	Correlation Coeff.	.005	.257	.206	-.213	-.119	.018	.033	-.191
	Sig. (1-tailed)	.488	.055	.101	.093	.232	.457	.419	.119
	N	40	40	40	40	40	40	40	40
9	Correlation Coeff.	-.180	-.113	-.084	.270	.285	.149	.150	.377
	Sig. (1-tailed)	.133	.244	.302	.046	.038	.180	.177	.008
	N	40	40	40	40	40	40	40	40
10	Correlation Coeff.	.261	-.095	-.054	-.205	-.139	.173	-.086	-.067
	Sig. (1-tailed)	.052	.281	.371	.102	.196	.142	.300	.341
	N	40	40	40	40	40	40	40	40

Table 29: Spearman's Rank correlations between Part 2 and Part 4
Key: Significant results in bold.

6.2.2.2.1 Correlations With Nature of Language Learning

3. Learning a foreign language is mostly a matter of learning many new vocabulary words.

This item has the following significant correlations:

Activity b (Vocab in group discussion) (Functional): Strength of agreement with this item has a significant but weak negative correlation ($r = -.28, p = .039, n = 40$) with the rating of effectiveness of using new vocabulary communicatively.

Subjects who do not view learning English as a matter of learning lots of words tend to value practicing new vocabulary in discussions.

Activity c (Teacher translates vocab) (Formal): Agreement with the statement has a significant but weak positive correlation ($r = .30, p = .032, n = 40$) with the perceived value of teacher translation of new words.

4. Learning a foreign language is mostly a matter of learning many grammar rules.
This statement has a significant but weak positive correlation ($r = .27, p = .047, n = 40$) with activity c (Teacher translates vocab) (Formal). The majority of responses to the statement were either neutral ($n = 15$) or disagree ($n = 17$). This disagreement correlates with a lower valuing of teacher translation of new words.

5. Learning English is different from learning other school subjects.

This item has the following significant correlations:

Activity b (Vocab in group discussion) (Functional): Agreement with the statement has a weak but highly significant positive correlation ($r = .44, p = .002, n = 40$) with the rating of effectiveness of communicative practice of new vocabulary.

Activity d (Vocab games) (Functional): Higher perceived effectiveness of vocabulary learning games has a weak but significant positive correlation of ($r = .35, p = .013, n = 40$). The stronger this belief, the more learning vocabulary through games is valued.

Activity f (learning from definition) (Formal): Agreement with the statement has a weak but significant positive correlation ($r = .29, p = .037, n = 40$) with the value put on learning the meaning of a new word by reading a monolingual dictionary definition.

Activity g (Inferencing) (Functional): Agreement with the statement has a weak but significant positive correlation ($r = .34, p = .016, n = 40$) with higher valuing of learning new words by inferring meaning from context.

Activity h (Sentence writing) (Equal): Agreement with the statement has a weak but significant positive correlation of ($r = .35, p = .012, n = 40$) with the perceived value of writing sentences containing a new word.

6. Learning English is mostly a matter of translating from my own language.
- Responses to this statement have a weak but highly significant positive correlation of ($r = .37, p = .009, n = 40$) with activity *c* (Teacher translates vocab) (Formal). The majority of respondents were either neutral ($n = 10$), disagreed ($n = 18$), or strongly disagreed ($n = 8$) with the statement and the strength of this disagreement correlated a lower perceived value of teacher translation of new words. This statement does not correlate significantly with any other item from Part 4.

6.2.2.2.1.1 *Summary of Correlations With Nature of Language Learning*

The significant correlations found between statements 3 and 6 and activity *c* (Teacher translates vocab) support an affirmative answer to research question 1A. The significant correlations found between statement 3 and activity *b* (Vocab in group discussion), statement 4 and activity *c* (Teacher translates vocab), statement 5 and activities *b, d, f, g,* and *h* support an affirmative answer to research question 1B.

6.2.2.2.2 *Correlations With Learning Strategies*

The only statement in this category was item 7 “It is important to repeat and practice often”. It had no significant correlations with any of the items in Part 4.

6.2.2.2.3 *Correlations With Communication Strategies*

8. You should not say anything in English until you can say it correctly.
- Agreement with the statement, indicating an emphasis on the value of accuracy in speaking has a weak positive correlation approaching significance ($r = .26, p = .055, n = 40$) with activity *b* (Vocab in group discussion) (Functional). As almost all respondents disagreed with the statement, it would be truer to say that the stronger the disagreement that one should not speak unless able to speak correctly, the lower the perceived value of communicative practice of new vocabulary. This statement does not correlate significantly with any other item from Part 4.
9. It is OK to guess if you do not know an English word.
- This item has the following significant correlations:
- Activity *d* (Vocab games) (Functional): Agreement with the statement, indicating a belief that guessing (risk taking) is a valid communication strategy, has a weak

but significant positive correlation of ($r = .27, p = .046, n = 40$) with the perceived value of vocabulary learning games.

Activity *e* (multiple choice on computer) (Formal): Agreement with the statement has a weak but significant positive correlation ($r = .28, p = .038, n = 40$) with the perceived value of multiple choice questions with immediate feedback.

Activity *h* (Sentence writing) (Equal): Agreement with the statement has a weak but highly significant positive correlation of ($r = .37, p = .008, n = 40$) with the perceived value of writing sentences with new word.

10. If you are allowed to make mistakes in the beginning, it will be hard to get rid of them later on.

Agreement with the statement, indicating that the respondent believes in the value of correction, has a weak positive correlation approaching significance ($r = .26, p = .052, n = 40$) with activity *a* (Repeating words) (Formal). Those who believe in teacher correction also appear to perceive value in repeating after the teacher.

6.2.2.2.3.1 Summary of Correlations With Communication Strategies

The significant correlations between statement 9 and activity *e* (multiple choice on computer), and between statement 10 and activity *a* (Repeating words) support an affirmative answer to research question 1A. The significant correlations between statement 9 and activities *d* and *h* support an affirmative answer to research question 1B. No explanation can be found for the correlation between statement 8 and activity *b* (Vocab in group discussion).

6.2.2.3 Summary

Apart from the correlation between statement 8 and activity *b* (Vocab in group discussion), the significant correlations described above support affirmative answers to research questions 1A and 1B. This data therefore confirms Hypothesis 1 that definition of language learning as formal or functional relates to preferences for specific learning and practice activities; subjects whose responses suggest formal or functional bias in beliefs about language learning place a higher value on activities that correspond to these beliefs.

6.3 Logged Data

The main purpose of this section is, firstly, to give a general statistical description (see Section 6.3.1) of the decisions made by Stage 4 subjects as they worked through the

program. As stated above (see Section 6.1), attention will focus on Stage 4 as Stages 1, 2, and 3 serve primarily to debug the software. Likewise, discussion of this analysis in Chapter 7.2.4 will therefore focus on Stage 4 and also on what can be learned from the graphic display of initial choice of learning method, duration of study, path-length, navigation, and exploratory behaviour. Secondly, significant correlations between the questionnaire data and the data obtained from logging subject interactions with WordLearner will be described (see Section 6.3.2). Thirdly, a qualitative description of individual questionnaire responses and their behaviour in WordLearner will be given (see Section 6.3.2.4). Where relevant, reference will be made to this investigation's research questions and hypotheses.

6.3.1 Descriptive Statistics of Subject Interaction with WordLearner

Description of the subjects' use of WordLearner will take the form of descriptive statistics on:

- a) Distribution of mean levels of prior knowledge for Stage 4 subjects.
- b) Initial choice of learning method by level of prior knowledge of the vocabulary.
- c) Path-length, duration of study, and mean duration of study per screen by level of prior knowledge of the vocabulary.
- d) Patterns of navigation through WordLearner by level of prior knowledge of the vocabulary.
- e) Exploratory behaviour by level of prior knowledge of the vocabulary.

6.3.1.1 Distribution of Mean Levels of Prior Knowledge for Stage 4 Subjects

Figure 23 (p. 223) shows that the distribution of the subjects' means (mean = 3.02, Std. Dev. = .62, $n = 40$) of prior knowledge of the target vocabulary is slightly skewed towards the lower levels of prior knowledge. For Figure 23, these means have been grouped into categories with a width of .2 of a level of prior knowledge.

6.3.1.2 Initial choice of Learning Method by Level of Prior Knowledge of the Vocabulary

Stage 4 subjects' initial choice of learning method is shown in the user choice diagram (see Figure 24, p. 223). Thicker lines indicate more popular choices. We can see from this diagram, for example, that for subjects who stated that they had no prior knowledge

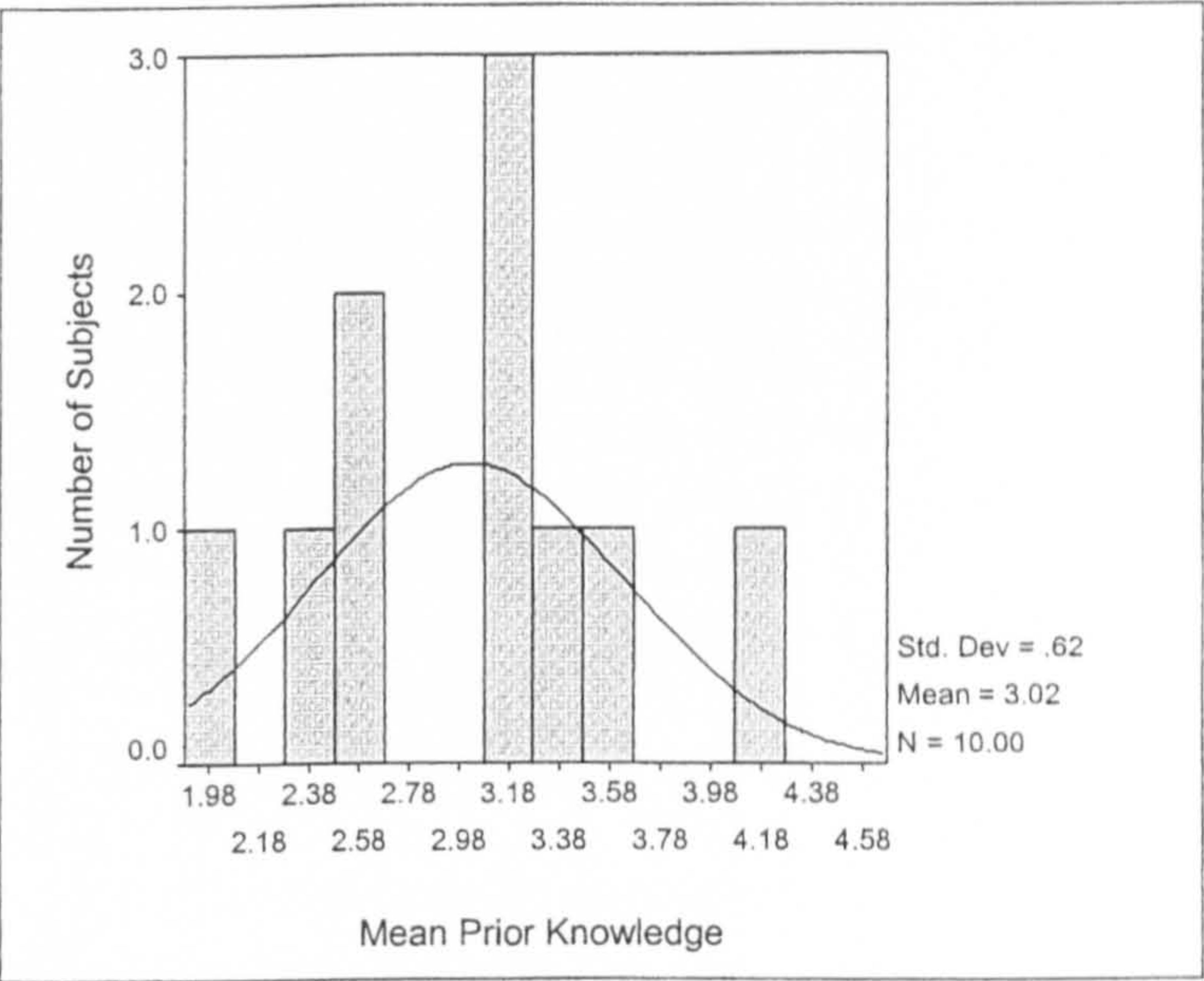


Figure 23: Histogram of Stage 4 subjects' mean prior knowledge of target vocabulary.

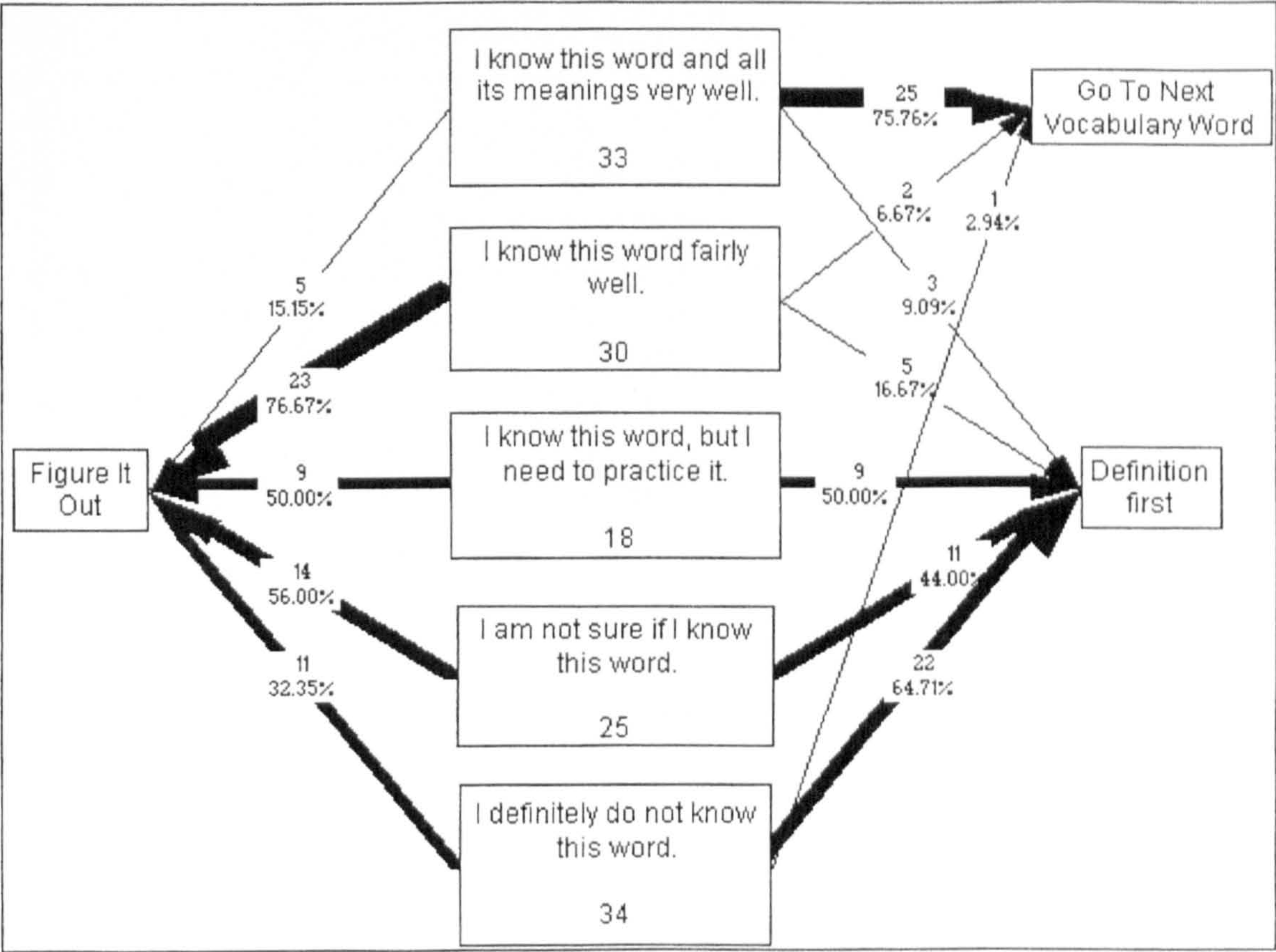


Figure 24: User choice of initial learning method by prior knowledge at Stage 4.

of the vocabulary (level 1 prior knowledge), *See the Definition* was chosen 22 times and *Figure it Out* was chosen 11 times. When students have no knowledge of the target word, they are most likely to choose a deductive method of learning. *See the Definition*, the deductive learning method, remains about as popular at levels 2 and 3 of prior knowledge while *Figure it Out*, the inductive learning method, becomes the overwhelming choice (76.67% of the choices made) at level 4.

6.3.1.3 Duration of Study and Path-Length by Level of Prior Knowledge of the Vocabulary

This description will include data from Stages 1, 2, and 3 as this helps to highlight salient features of Stage 4 subject's interaction with the materials. Before continuing, a caveat on interpretation of Figure 25 and Figure 26 should be mentioned. To some extent, a comparison of path-length between stages is invalid as the degree of choice in how many screens can be accessed is limited in Stages 1, 2, and 3. For example, once Stage 1 subjects decide to study, their path-length will be 3.0. This data is included however, as it provides a comparison with how the subjects make use of the increased flexibility at Stage 4.

From Figure 25 and Figure 26, we can see that although there is a general decrease in duration and path-length from unknown words to well-known words, this decrease is not steady. For Stages 1 and 2, path-length and duration are approximately level between levels 1 and 2 of prior knowledge. Stage 4, however, shows a more extreme pattern starting with the longest path-length (mean = 3.97), but the shortest duration (mean = 02:32) and then peaking very strongly at level 3 of prior knowledge for both duration (mean = 03:31) and path-length (mean = 4.40). The bell-shaped curves shown by Stage 4 subjects' path-lengths and durations, show that with increased flexibility, subjects access more screens and spend more time on target vocabulary which they have a medium prior knowledge of.

Figure 27 below shows that longer path-length or duration of study does not necessarily mean longer duration of study per screen; although Stage 4 students look at more screens, the average time they spend on each screen is less than all other stages for level 1 (mean = 00:38 secs.) and level 5 words (mean = 00:25 secs.). However, the bell shaped curve shown by path-length and duration is present in this graph also, and Stage 4 subjects spend more time than any others on level 3 target vocabulary (mean = 00:48 secs.).

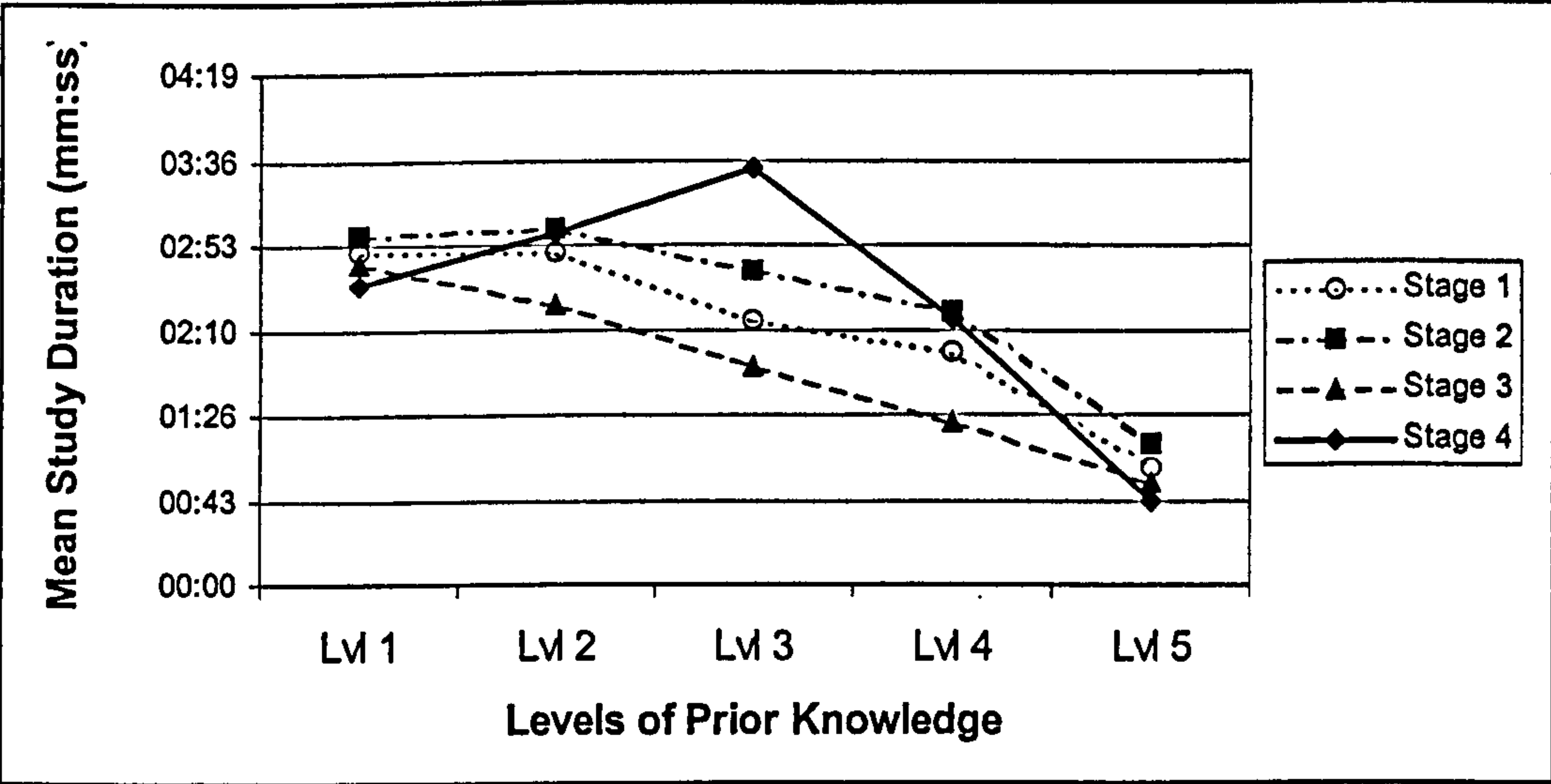


Figure 25: Mean duration of study by level of prior knowledge.

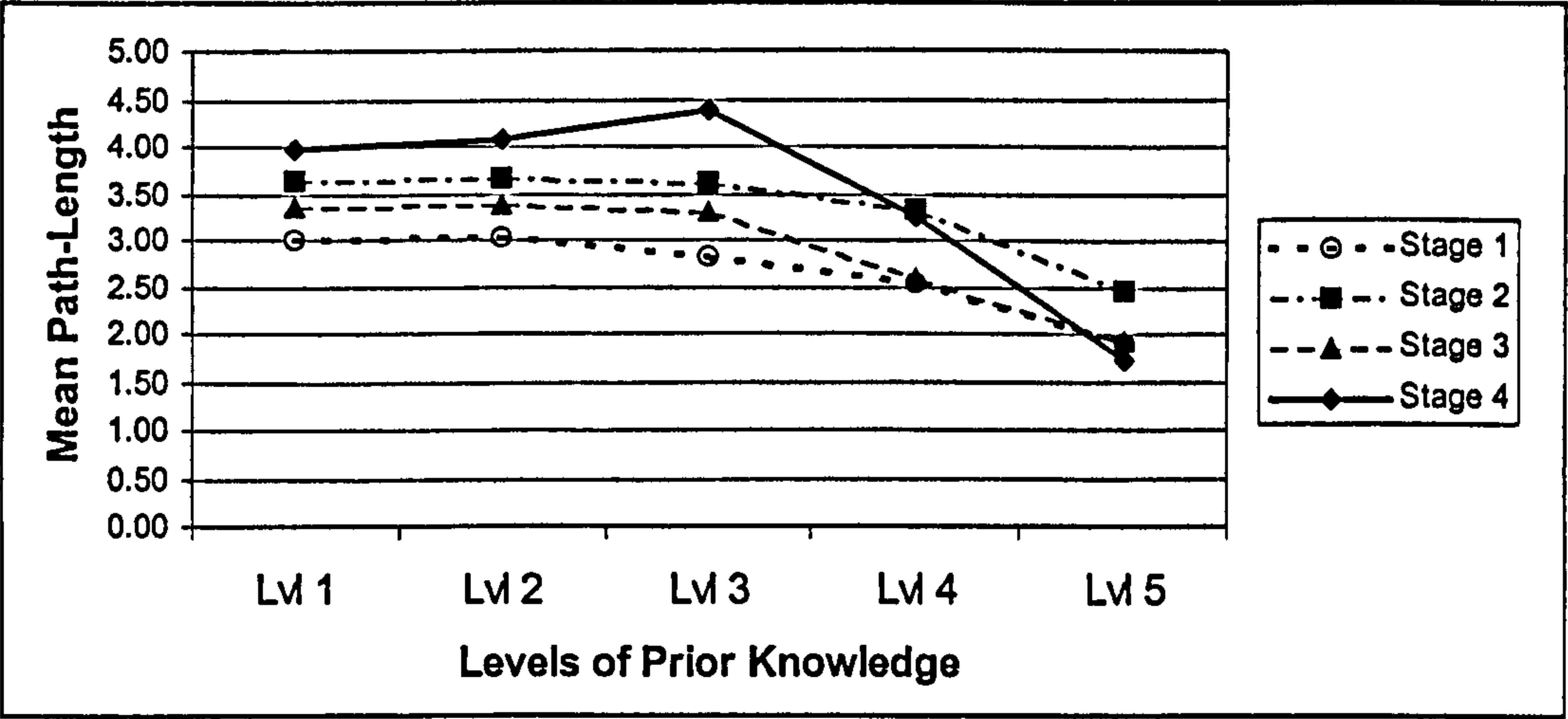


Figure 26: Mean path-length by level of prior knowledge.

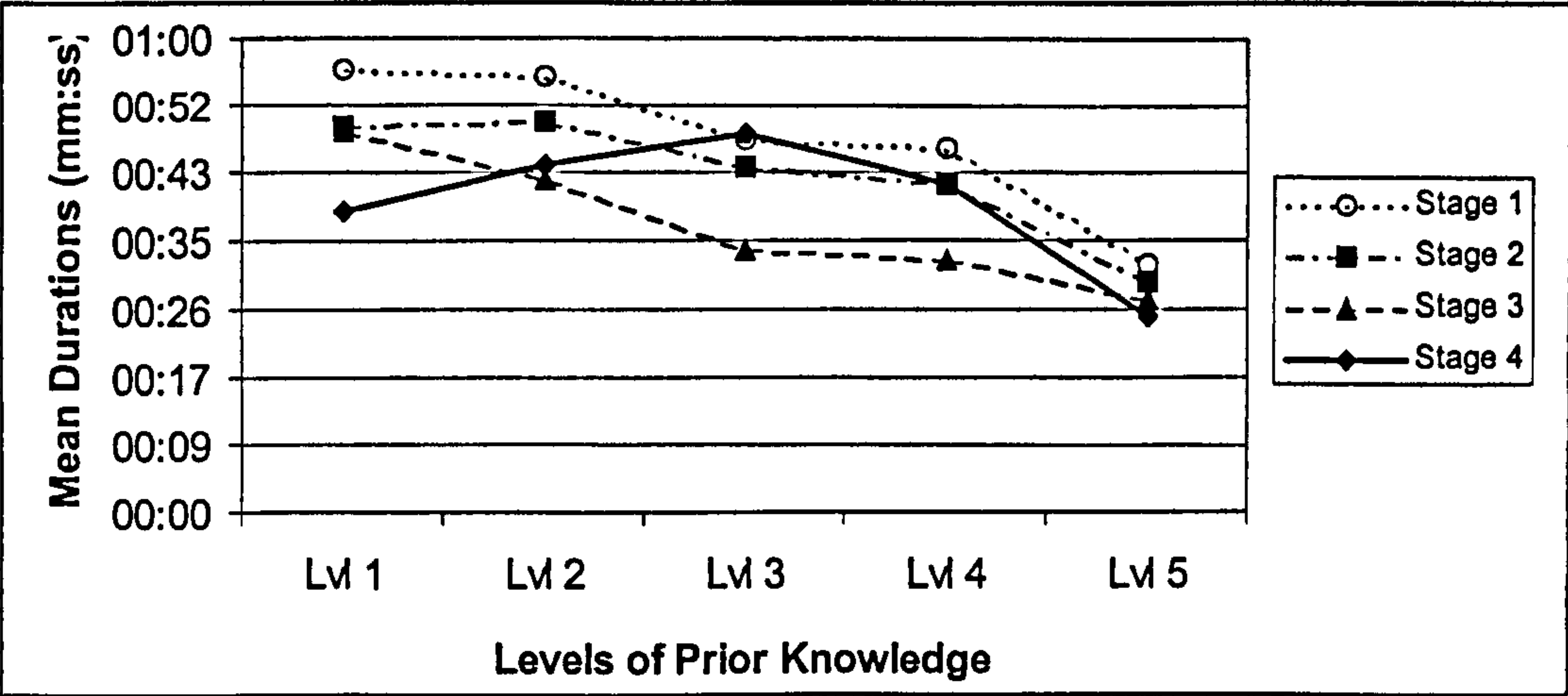


Figure 27: Mean duration of study per screen.

6.3.1.4 *Patterns of Navigation through WordLearner by Level of Prior Knowledge of the Vocabulary*

The changes in students' navigation patterns are most conveniently seen by looking at the Decision Flow Summary diagrams (see Figure 28 below) which indicate the most popular pathways by levels of prior knowledge. Complete decision flow diagrams showing all paths taken and volume of “traffic” along these paths by levels of prior knowledge are given in Appendix I. This diagram shows that:

- a) If prior knowledge is low, the preferred pattern is deductive-passive.
- b) At levels 2 and 3 there is a pronounced mix of preferences which may account for the slightly higher path-lengths and durations.
- c) At level 4, there is a preference for inductive learning followed by either productive or passive practice.
- d) At level 5, many students skip to the next vocabulary word but a large minority practice anyway. Anecdotal evidence suggests that students like to use these questions as a quick check of their knowledge.

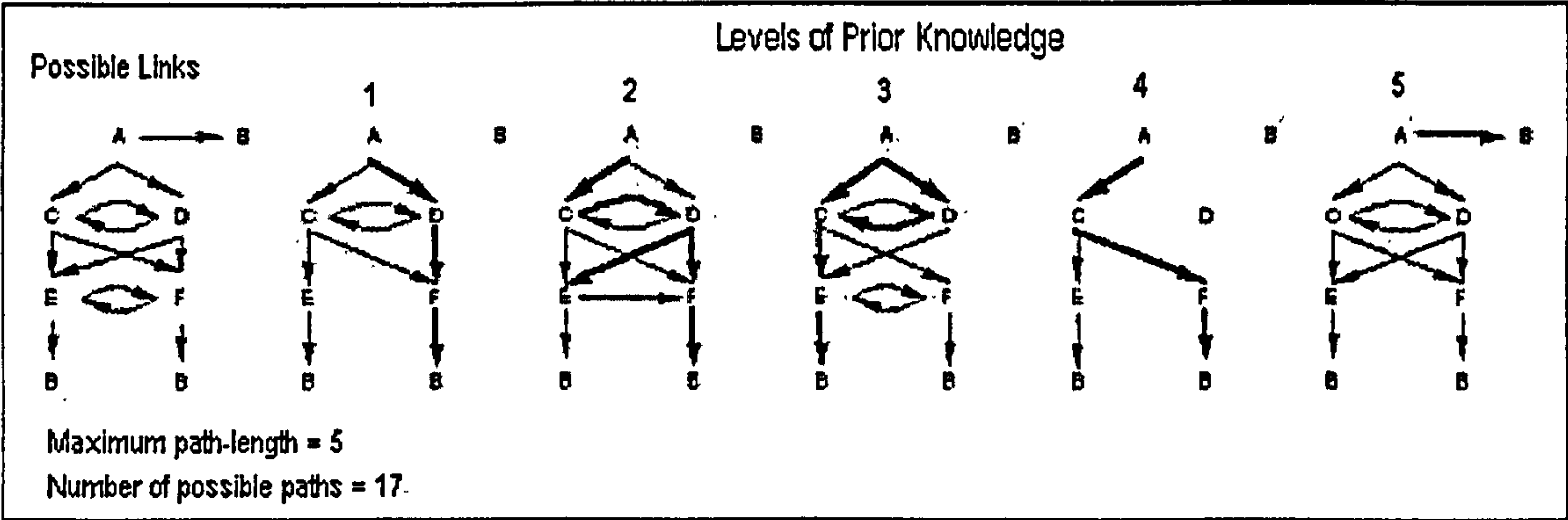


Figure 28: Stage 4 decision flow summary for stage 4 by levels of prior knowledge.

Key: A = Decision screen, B = Go to next word, C = Figure it Out (Inductive) screen, D = See the Definition (Deductive) screen, E = Guided Production (Productive), F = Multiple Choice (Passive). Thick lines indicate most popular links. Thin lines indicate links within 10% of most popular links.

6.3.1.5 *Exploratory Behaviour by Level of Prior Knowledge of the Vocabulary*

The cross-link diagrams (see Appendix J) show how initial choices of learning method change according to level of prior knowledge and from question to question. An index of exploration is calculated by dividing the number of changes in initial learning choices by the total number of links made at a given level. Therefore, if there were 2 changes out of

20 links, the index would be 0.10. These indices have been tabulated in Table 30. Figure 29 is a graph of this table.

Regarding changes according to level of prior knowledge, exploratory behaviour is most common in levels one and five. However, the figures for level 1 of Stage 4 are affected by two students who account for 8 out of 11 changes. From the cross-link diagram (see Appendix J), we can see that the highest number of changes is usually in the second question at any given level.

Level of Prior Knowledge					
1	2	3	4	5	Mean
0.32	0.04	0.17	0.17	0.21	0.19

Table 30: Stage 4 indices of exploratory behaviour by level.

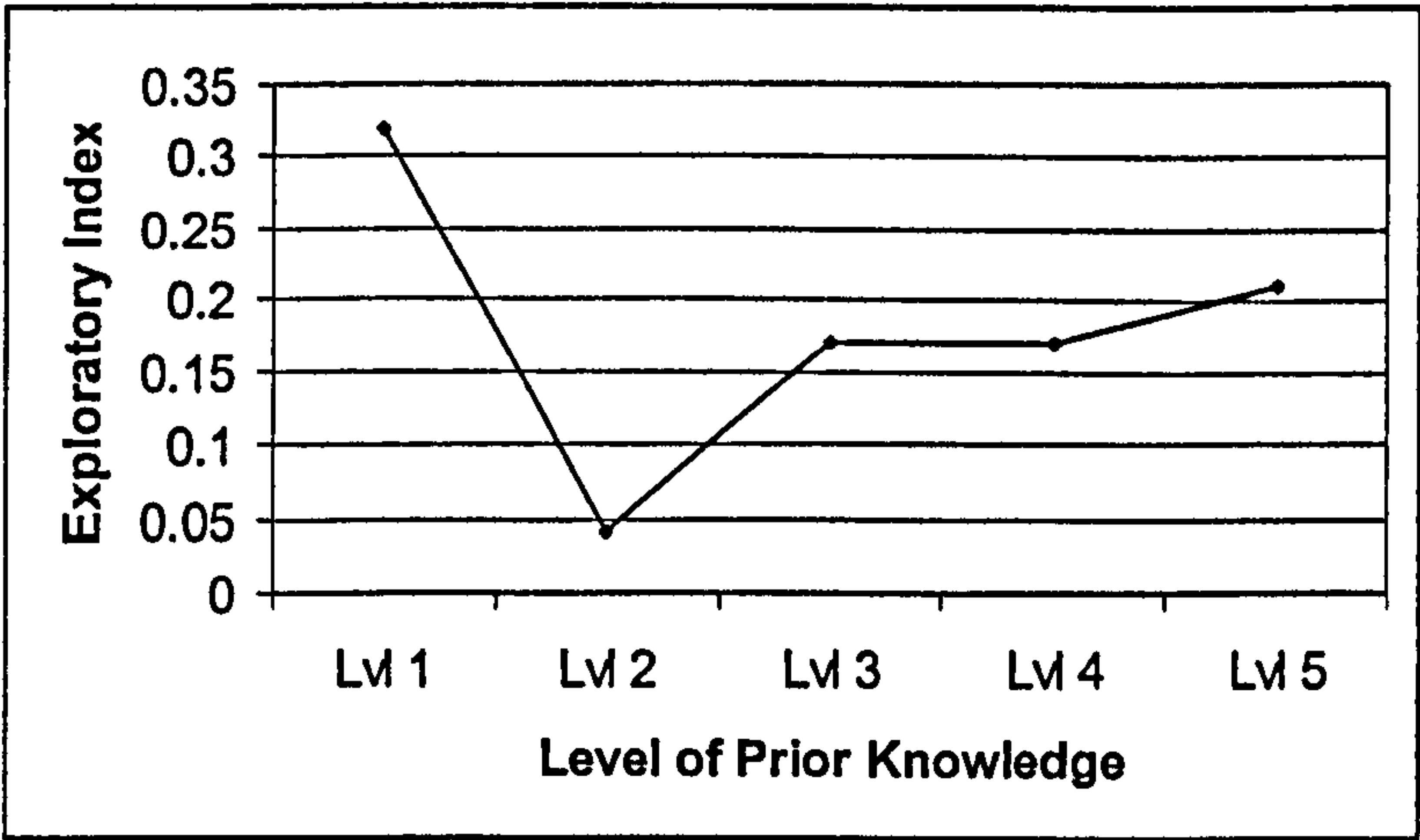


Figure 29: Stage 4 exploratory indices of initial preference for inductive or deductive learning methodology by level of prior knowledge.

6.3.2 Correlational Analysis of Relationships Between Questionnaire Data and Effort Invested in Study in WordLearner

This section, which is divided into analysis of correlations with Part 2 (see Section 6.3.2.1) and Part 4 (see Section 6.3.2.2) of the questionnaire, describes and analyses the correlational relationships, if any, between the data obtained on subjects’ beliefs and the effort invested in the learning task. Effort is measured by:

- a) The number of screens accessed (path length).
- b) Overall duration of study.
- c) Mean duration of study per screen.

The statistic used is Spearman's Rank and the data is categorised according to level of prior knowledge of the target vocabulary. For example, the median scores for item #1 are correlated with mean path lengths for each of the 5 levels of prior knowledge.

6.3.2.1 Part 2 Correlations with Path-Length, Durations of Study, and Mean Duration of Study per Screen

Each section of this part of the analysis will be divided into two parts which will consist of analysis and description of:

1. The relationships shown with those statements in Part 2 for which a direction of correlational relationship cannot be hypothesised; that is, we cannot find a logical basis to hypothesise that the relationship will be positive or negative and must therefore apply two-tailed tests of significance.
2. The relationships shown for which a direction can be hypothesised; that is, we do have a logical basis on which to hypothesise that the relationship will be positive or negative and may therefore apply one-tailed tests of significance.

The following significant results were found:

Correlations with Path Length

See [Main Study – Spearmans Rank Correlations – P-Length by PK for Part 2.htm](#) for complete output.

Non-Directional Correlations (see Table 31)

Item 6 with Prior Knowledge level 3: A significant strong negative correlation ($p = .01$, $r = -.83$, $n = 8$) was found. Strength of disagreement with the statement that language learning is mostly a matter of translation, suggesting a functional bias, correlates with longer path lengths when subjects have a medium knowledge of the target vocabulary.

Directional Correlations (see Table 32)

Item 8 with Prior Knowledge level 5: A significant medium negative correlation ($p = .028$, $r = -.65$, $n = 9$) was found. Strength of disagreement with the statement that one should not say anything unless one can say it correctly, correlates with longer path lengths when subjects state that they have a complete knowledge of the target vocabulary. A belief in

the value of trying to speak even though one might be incorrect, suggesting a functional bias, correlates with seeking more exposure to learning and practice activities in WordLearner.

		Part 2 #1	Part 2 #2	Part 2 #5	Part 2 #6	Part 2 #9
Mean level 1 path length	Correlation Coefficient	-.237	-.225	.388	.000	.229
	Sig. (2-tailed)	.539	.560	.302	1.000	.553
	N	9	9	9	9	9
Mean level 2 path length	Correlation Coefficient	-.147	-.263	.461	-.319	-.232
	Sig. (2-tailed)	.684	.462	.180	.369	.519
	N	10	10	10	10	10
Mean level 3 path length	Correlation Coefficient	.000	-.206	-.042	-.833	-.257
	Sig. (2-tailed)	1.000	.624	.922	.010	.540
	N	8	8	8	8	8
Mean level 4 path length	Correlation Coefficient	.065	.081	.240	-.044	-.313
	Sig. (2-tailed)	.869	.837	.535	.911	.412
	N	9	9	9	9	9
Mean level 5 path length	Correlation Coefficient	-.253	-.244	.417	-.044	.280
	Sig. (2-tailed)	.511	.527	.264	.910	.466
	N	9	9	9	9	9

Table 31: Spearman's Rank correlations (2-tailed) between median scores for Part 2 and mean path lengths by level of prior knowledge for items where direction of correlation can be assumed.

Key: Significant results in bold.

		Part 2 #3	Part 2 #4	Part 2 #7	Part 2 #8	Part 2 #10
Mean level 1 path length	Correlation Coefficient	-.344	-.043	.139	.000	-.400
	Sig. (1-tailed)	.183	.456	.361	.500	.143
	N	9	9	9	9	9
Mean level 2 path length	Correlation Coefficient	-.449	.142	.383	.193	-.252
	Sig. (1-tailed)	.097	.348	.137	.296	.241
	N	10	10	10	10	10
Mean level 3 path length	Correlation Coefficient	.233	.444	-.236	-.459	-.133
	Sig. (1-tailed)	.290	.135	.287	.126	.377
	N	8	8	8	8	8
Mean level 4 path length	Correlation Coefficient	.358	.175	.422	.092	.723
	Sig. (1-tailed)	.172	.327	.129	.407	.014
	N	9	9	9	9	9
Mean level 5 path length	Correlation Coefficient	.084	.531	-.247	-.653	-.052
	Sig. (1-tailed)	.415	.071	.261	.028	.447
	N	9	9	9	9	9

Table 32: Spearman's Rank correlations (1-tailed) between median scores for Part 2 and mean path lengths by level of prior knowledge for items where direction of correlation can be assumed.

Key: Significant results in bold.

Item 10 with Prior Knowledge level 4: A significant medium positive correlation ($p = .014$, $r = .72$, $n = 9$) was found. Agreement with the statement that if one is allowed to make mistakes at the beginning it will be hard to get rid of them later on correlates with longer path lengths when subjects state that they know the target vocabulary quite well. In this case, a formal bias, correlates with accessing more screens when knowledge of the target is already quite good.

Correlations with Duration of Study

For complete outputs see Main Study – Spearmans Rank Correlations – Duration by PK for Part 2.htm.

Non-Directional Correlations (see Table 33)

There are no significant two-tailed correlations.

		Part 2 #1	Part 2 #2	Part 2 #5	Part 2 #6	Part 2 #9
Mean level 1 duration	Correlation Coefficient	.315	-.518	.426	.000	-.091
	Sig. (2-tailed)	.409	.153	.253	1.000	.815
	N	9	9	9	9	9
Mean level 2 duration	Correlation Coefficient	.145	.000	.048	-.104	-.342
	Sig. (2-tailed)	.690	1.000	.895	.774	.334
	N	10	10	10	10	10
Mean level 3 duration	Correlation Coefficient	-.170	.514	-.191	-.327	-.504
	Sig. (2-tailed)	.688	.192	.651	.429	.203
	N	8	8	8	8	8
Mean level 4 duration	Correlation Coefficient	-.077	.251	.337	-.087	-.311
	Sig. (2-tailed)	.844	.515	.376	.825	.416
	N	9	9	9	9	9
Mean level 5 duration	Correlation Coefficient	-.333	-.120	.448	-.260	.274
	Sig. (2-tailed)	.381	.759	.226	.500	.476
	N	9	9	9	9	9

Table 33: Spearman's Rank correlations (2-tailed) between median scores for Part 2 and mean durations of study by level of prior knowledge for items where direction of correlation cannot be assumed.

Directional Correlations (see Table 34)

Item 7 with Prior Knowledge level 2: A significant medium positive correlation ($r = .62$, $p = .019$, $n = 10$) was found. Strength of agreement with the statement that it is important to repeat and practice often correlates with longer durations of study when subjects have a little knowledge of the target vocabulary. A strong belief in the value of repetition and

practice is likely to lead to subjects practicing for longer when prior knowledge of the target is low.

		Part 2 #3	Part 2 #4	Part 2 #7	Part 2 #8	Part 2 #10
Mean level 1 duration	Correlation Coefficient	.104	.087	.410	.000	-.568
	Sig. (1-tailed)	.395	.412	.137	.500	.055*
	N	9	9	9	9	9
Mean level 2 duration	Correlation Coefficient	-.271	-.453	.662	.798	.055
	Sig. (1-tailed)	.225	.095	.019	.003	.440
	N	10	10	10	10	10
Mean level 3 duration	Correlation Coefficient	.099	-.218	-.103	.282	.674
	Sig. (1-tailed)	.408	.302	.404	.250	.034
	N	8	8	8	8	8
Mean level 4 duration	Correlation Coefficient	.399	-.087	.365	.183	.837
	Sig. (1-tailed)	.144	.412	.167	.319	.002
	N	9	9	9	9	9
Mean level 5 duration	Correlation Coefficient	.182	.520	-.383	-.730	-.101
	Sig. (1-tailed)	.320	.076	.154	.013	.398
	N	9	9	9	9	9

Table 34: Spearman's Rank correlations (1-tailed) between median scores for Part 2 and mean durations of study by level of prior knowledge.

Key: Significant results in bold, * = approaching significance).

Item 8 with Prior Knowledge level 2: A highly significant strong positive correlation of ($r = .8, p = .003, n = 10$) was found. Strength of disagreement with the statement that one should not say anything unless one can say it correctly, correlates with shorter durations of study when subjects state that they have a little knowledge of the target vocabulary. A functional bias correlates with spending less time when prior knowledge is low.

Item 8 with Prior Knowledge level 5: A negative but significant ($r = -.73, p = .013, n = 9$) strong correlation was found. Strength of disagreement with the statement that one should not say anything unless one can say it correctly, correlates with longer durations of study when subjects state that they have a complete knowledge of the target vocabulary. In contrast to the correlation found at level 2, a functional bias appears to correlate with spending more time on learning and practice when knowledge of the target is very good.

Item 10 with Prior Knowledge level 1: A medium negative correlation approaching significance ($r = -.57, p = .055, n = 8$) was found. Agreement with the statement that if one is allowed to make mistakes at the beginning it will be hard to get rid of them later on, which suggests a formal bias, correlates with shorter durations of study when subjects state that they have no prior knowledge of the target vocabulary.

Item 10 with Prior Knowledge level 3: A significant medium positive correlation ($r = .67$, $p = .034$, $n = 8$) was found. Agreement with the statement that if one is allowed to make mistakes at the beginning it will be hard to get rid of them later on correlates with longer durations of study when subjects state that they have a medium knowledge of the target vocabulary. The formal bias suggested by agreement with the statement appears to be associated with spending more time on target words at this level of prior knowledge.

Item 10 with Prior Knowledge level 4: A highly significant strong positive correlation ($r = .84$, $p = .002$, $n = 9$) was found. Continuing the relationship suggested by the previous correlation, agreement with the statement that if one is allowed to make mistakes at the beginning it will be hard to get rid of them later on correlates with longer durations of study when subjects state that they know the target vocabulary quite well.

Correlations with Mean Duration of Study per Screen

For complete outputs see Main Study – Spearmans Rank Correlations – Duration per Screen by PK for Part 2.htm.

Non-Directional Correlations (see Table 35)

No significant correlations were found.

Directional Correlations (see Table 36)

Item 4 with prior knowledge level 2: A negative but significant medium correlation ($r = -.592$, $p = .036$, $n = 10$) was found with belief in the importance of grammar. The more subjects value grammar, the less time they spend per screen when prior knowledge is low.

Item 4 with prior knowledge level 5: A significant medium positive correlation ($r = .606$, $p = .042$, $n = 9$) was found with belief in the importance of grammar. The more subjects value grammar, the more time they spend per screen when prior knowledge is very high, or, as skipping to the next word is a common choice at this level, the more likely they are to practice.

Item 8 with prior knowledge level 2: A significant medium positive correlation ($r = .646$, $p = .022$, $n = 10$) was found with aversion to risk taking. Agreement with the statement is interpreted as aversion to risk, but as most subjects disagreed with the statement, we should say that in this case the weaker the aversion to risk, the less time subjects spend when prior knowledge is low.

Item 8 with prior knowledge level 3: A positive medium correlation approaching significance ($r = .620$, $p = .051$, $n = 8$) was found with aversion to risk taking. As with

the previous correlation, the weaker the aversion to risk, the less time subjects spend when prior knowledge is medium.

Item 8 with prior knowledge level 5: A negative but highly significant strong correlation ($r = -.822, p = .003, n = 9$) was found with aversion to risk taking. The weaker the aversion to risk, the more time they spent at level 5. Risk takers spend more time per screen at level 5 or, bearing in mind that skipping to the next word was common at this level, are more likely to practice at level 5.

Item 10 with prior knowledge level 3: A highly significant strong positive correlation ($r = .825, p = .006, n = 8$) was found. Agreement with this statement is interpreted as disapproval of learning from mistakes. Therefore, a wish to avoid mistakes correlates with spending more time per screen when prior knowledge is medium. To the extent that this shows a relationship with a wish to avoid mistakes, it is consistent with the correlation between statement 8 and level 3 mean duration per screen above.

Item 10 with prior knowledge level 4: A highly significant strong positive correlation ($r = .837, p = .002, n = 9$) was found. A wish to avoid mistakes correlates with spending more time per screen when prior knowledge is good. This is also consistent with the correlation between statement 8 and level 3 mean duration per screen above.

		Part 2 #1	Part 2 #2	Part 2 #5	Part 2 #6	Part 2 #9
Mean Level 1 duration per screen	Correlation Coefficient	.254	-.378	.426	.000	-.183
	Sig. (2-tailed)	.510	.315	.253	1.000	.638
	N	9	9	9	9	9
Mean Level 2 duration per screen	Correlation Coefficient	.050	.090	-.137	-.104	-.114
	Sig. (2-tailed)	.890	.805	.706	.774	.754
	N	10	10	10	10	10
Mean Level 3 duration per screen	Correlation Coefficient	.036	.546	-.218	.218	-.504
	Sig. (2-tailed)	.932	.162	.604	.604	.203
	N	8	8	8	8	8
Mean Level 4 duration per screen	Correlation Coefficient	-.034	.251	.248	-.173	-.414
	Sig. (2-tailed)	.930	.515	.521	.656	.268
	N	9	9	9	9	9
Mean Level 5 duration per screen	Correlation Coefficient	-.120	-.120	.369	-.346	.091
	Sig. (2-tailed)	.759	.759	.329	.361	.815
	N	9	9	9	9	9

Table 35: Spearman's Rank correlations (2-tailed) between median scores for Part 2 and mean durations of study per screen by level of prior knowledge for items where direction of correlation cannot be assumed.

		Part 2 #3	Part 2 #4	Part 2 #7	Part 2 #8	Part 2 #10
Mean Level 1 duration per screen	Correlation Coefficient	.208	.000	.285	.000	-.398
	Sig. (1-tailed)	.296	.500	.229	.500	.144
	N	9	9	9	9	9
Mean Level 2 duration per screen	Correlation Coefficient	-.245	-.592	.350	.646	.028
	Sig. (1-tailed)	.247	.036	.160	.022	.470
	N	10	10	10	10	10
Mean Level 3 duration per screen	Correlation Coefficient	.148	-.436	.206	.620	.825
	Sig. (1-tailed)	.363	.140	.312	.051	.006
	N	8	8	8	8	8
Mean Level 4 duration per screen	Correlation Coefficient	.442	-.087	.321	.183	.837
	Sig. (1-tailed)	.117	.412	.200	.319	.002
	N	9	9	9	9	9
Mean Level 5 duration per screen	Correlation Coefficient	.529	.606	-.456	-.822	-.240
	Sig. (1-tailed)	.072	.042	.108	.003	.267
	N	9	9	9	9	9

Table 36:Spearman's Rank correlations (1-tailed) between median scores for Part 2 and mean durations of study per screen by level of prior knowledge for items where direction of correlation can be assumed

Key: Significant results in bold.

6.3.2.1.1 Summary of Correlations between Part 2 and Path Lengths, Durations of Study, and Mean Durations of Study per Screen

Summarising these results is complicated by three factors. Firstly, the patterns of response to item 4 (5 neutral, 5 disagree), item 8 (7 strongly disagree, 3 disagree), and item 10 (6 disagree, 2 neutral, 2 agree) show a very strong functional bias. It is, therefore, not very meaningful to talk about strength of agreement, which suggests formal bias, being related to effort. The following analysis will therefore refer to functional bias. Secondly, directions of correlations change according to levels of prior knowledge. Thirdly, these correlations do not fall conveniently into formal or functional categories. The following analysis will therefore attempt to describe these contrasting relationships within a structure which allows clear conclusions regarding the research questions and hypotheses.

6.3.2.1.1.1 *Relevance to Research Questions*

A total of thirteen significant results were found, 3 for path length, 6 for duration of study, and 7 for mean duration per screen. The 3 correlations with path length show that either a formal or functional bias results in subjects accessing more screens. Although these correlations show that bias of either type is related to longer path-length, this is not

enough to show a trend and research question 4A must be answered negatively; this data does not show a relationship between formal or functional bias and path-length.

Regarding correlations with mean duration of study, the significant correlations found show the functional bias in the responses to items 8 and 10 is associated with shorter durations between prior knowledge levels 2 and 4. This is a little confusing as the correlations are all positive, which one might assume means longer duration, but as stated above (see Section 6.3.2.1.1 above) the functional bias is at the lower end of the scale on these particular questions. A positive correlation therefore suggests that functional bias is associated with spending less time. Directions of correlations reverse at the extremes of level of prior knowledge. The negative correlation for item 10 at level one suggests that greater functionality is associated with spending more time when prior knowledge is zero while the negative correlation for item 8 at level five of prior knowledge suggests that functionality is associated with spending more time when prior knowledge is very good. Agreement that repetition and practice are important, which does not necessarily indicate either a formal or functional bias, correlates with spending more time on target vocabulary at level 2. With the provisos that the evidence is very limited and that the nature of the relationship is more complex than the research question allows for, research question 4B can be answered positively; there may be a relationship between formal or functional bias and mean duration of study.

Regarding correlations with mean duration of study per screen, seven significant correlations were found all with statements focusing on formal beliefs. These correlations vary in direction suggesting that specific beliefs rather than general bias may be related to mean duration per screen. Correlations with items 8 and 10 suggest that functional bias is associated with spending less time per screen between levels 2 and 4. The strong negative correlation for item 8 at level five of prior knowledge suggests functional bias is associated with spending more time at this level.

The negative correlation with item 4 at level 2 of prior knowledge suggests that those who do not believe grammar is important and may therefore be said to have functional belief spend more time at this level. The same item has a positive correlation at level five which suggests subjects who value grammar (or in this case are neutral on its value) spend more time per screen when they already know a word very well. This item shows opposite trends in the relationship between functionality and effort to items 8 and 10. In addition,

this difference highlights the importance of the specific object of the belief rather than its relevance to function or form.

This data provides partial support for a positive answer to research question 4C; formal or functional bias may be related to the amount of time subjects spend per screen. However, this statement has to be qualified as item 4 correlations suggest that functionality is associated with longer duration per screen at a low level and shorter at a high level, while correlations for items 8 and 10 suggest the opposite.

Regarding research question 4, this data provides somewhat limited support for an affirmative answer; there may be a relationship between formal or functional bias and the amount of effort students invest in learning and practice.

6.3.2.1.1.2 Relevance to Hypotheses

The above description and analysis provides limited support for confirmation of hypothesis 4 that there is a relationship between formal and/or functional bias in general beliefs about language learning and the amount of effort subjects invest in learning and practice in WordLearner. This relationship, however, is unlikely to be a simple unidimensional one with effort varying along a continuum from formality to functionality mediated by a factor such as prior knowledge, but may be based on the nature of specific beliefs. This will be discussed further in Chapter 7.2.4.3.1.

6.3.2.2 Part 4 Correlations with Path-Length, Durations of Study and Mean Duration of Study per Screen

This section of the analysis will address the relationships, if any, between ratings for the effectiveness of the activities described in Part 4 of the questionnaire and the means of subjects' path lengths and durations of study within WordLearner. To remind the reader, the activities defined as formal were items *a*, *c*, *e* and *f*. Those defined as functional were items *b*, *d*, and *g*. Item *h* was defined as equally formal and functional by the sample and will receive separate mention in Section 6.3.2.2.1 below. The analysis first examines correlations for medians for each item in Part 4 (Section 6.3.2.2.1), then correlations for the medians of formal and functional scores (Section 6.3.2.2.3), and, finally, correlations for the medians of all scores (Section 6.3.2.2.5).

6.3.2.2.1 Correlations by Item

Spearman's Rank correlations were made between median scores for each item in Part 4 and path length (see Table 37, p. 238), duration of study (see Table 38, p. 238), and mean duration of study per screen (see Table 39, p. 239). The purpose of this was to see if there were any discernible patterns in interactions between positive attitudes to particular types of activity and putting more time and effort into the study of target vocabulary.

Correlations with Path Length

See [Main Study – Spearmans Rank Correlations – P-Length by PK for Part 4.htm](#) for complete output.

Item d with Prior Knowledge Level 2: A significant strong positive correlation ($r = .71$, $p = .022$, $n = 10$) was found between higher ratings for the effectiveness of vocabulary games and path length for words which the subjects stated they had a little prior knowledge of.

Item e with Prior Knowledge Level 1: A significant strong positive correlation ($r = .75$, $p = .02$, $n = 9$) was found between higher ratings for the effectiveness of multiple choice exercises and path length for words which the subjects stated they had no prior knowledge of.

Correlations with Duration of Study

See [Main Study – Spearmans Rank Correlations – Duration by PK for Part 4.htm](#) for complete output.

Item c with Prior Knowledge Level 4: A significant strong negative correlation ($r = -.73$, $p = .026$, $n = 9$) was found between ratings for teacher translation of new vocabulary and duration of study for words which the subjects stated they knew fairly well. The more subjects valued teacher translation, the less time they spent studying at this level of knowledge.

Item d with Prior Knowledge Level 3: A significant strong negative correlation ($r = -.72$, $p = .045$, $n = 8$) was found between ratings for vocabulary games and duration of study for words which the subjects stated they knew but needed to work on. The more subjects valued learning through vocabulary games, the less time they spent studying at this level of knowledge.

	Part 4 Items	a	b	c	d	e	f	g	h
Mean level 1 path length	Correlation	-.113	.321	.156	.596	.748	.299	-.086	-.036
	Coefficient								
	Sig. (2-tailed)	.772	.400	.689	.090	.020	.434	.825	.927
	N	9	9	9	9	9	9	9	9
Mean level 2 path length	Correlation	-.235	.464	.398	.707	.366	.478	-.051	-.026
	Coefficient								
	Sig. (2-tailed)	.514	.176	.254	.022	.298	.163	.889	.943
	N	10	10	10	10	10	10	10	10
Mean level 3 path length	Correlation	-.268	-.057	.229	.139	-.117	.073	-.075	-.289
	Coefficient								
	Sig. (2-tailed)	.522	.893	.585	.742	.783	.864	.859	.488
	N	8	8	8	8	8	8	8	8
Mean level 4 path length	Correlation	.061	-.276	-.376	-.169	-.283	-.094	-.385	-.413
	Coefficient								
	Sig. (2-tailed)	.876	.472	.319	.664	.460	.810	.306	.269
	N	9	9	9	9	9	9	9	9
Mean level 5 path length	Correlation	-.358	-.326	.249	.400	.583	-.221	-.389	-.205
	Coefficient								
	Sig. (2-tailed)	.344	.391	.518	.286	.099	.567	.300	.597
	N	9	9	9	9	9	9	9	9

Table 37: Spearman's Rank correlations between median scores for Part 4 and path length by level of prior knowledge

Key: Significant results shown in bold.

	Part 4 Items	a	b	c	d	e	f	g	h
Mean level 1 duration	Correlation	-.546	.091	.210	.639	.541	.671	.696	.312
	Coefficient								
	Sig. (2-tailed)	.128	.815	.588	.064	.133	.048	.037	.414
	N	9	9	9	9	9	9	9	9
Mean level 2 duration	Correlation	.449	.570	-.162	.049	-.203	.382	-.100	-.270
	Coefficient								
	Sig. (2-tailed)	.193	.086	.656	.894	.573	.276	.783	.451
	N	10	10	10	10	10	10	10	10
Mean level 3 duration	Correlation	.551	.169	-.476	-.717	-.792	-.222	-.272	-.063
	Coefficient								
	Sig. (2-tailed)	.157	.689	.234	.045	.019	.598	.515	.882
	N	8	8	8	8	8	8	8	8
Mean level 4 duration	Correlation	.138	-.091	-.727	-.484	-.457	.112	-.094	-.107
	Coefficient								
	Sig. (2-tailed)	.723	.815	.026	.186	.216	.775	.809	.784
	N	9	9	9	9	9	9	9	9
Mean level 5 duration	Correlation	-.402	-.274	.053	.242	.501	-.087	-.295	-.107
	Coefficient								
	Sig. (2-tailed)	.284	.476	.892	.530	.170	.825	.442	.784
	N	9	9	9	9	9	9	9	9

Table 38: Spearman's Rank correlations between median scores for Part 4 and duration of study by level of prior knowledge.

Key: Significant results shown in bold.

	Part 4 Items	a	b	c	d	e	f	g	h
Mean Lvl 1 duration per screen	Correlation	-.520	.091	-.009	.274	.266	.671	.893	.588
	Coefficient								
	Sig. (2-tailed)	.151	.815	.981	.476	.489	.048	.001	.096
	N	9	9	9	9	9	9	9	9
Mean Lvl 2 duration per screen	Correlation	.605	.570	-.278	-.187	-.203	.228	-.125	-.263
	Coefficient								
	Sig. (2-tailed)	.064	.086	.437	.604	.573	.527	.731	.462
	N	10	10	10	10	10	10	10	10
Mean Lvl 3 duration per screen	Correlation	.726	.056	-.651	-.822	-.805	-.300	-.235	-.063
	Coefficient								
	Sig. (2-tailed)	.041	.895	.081	.012	.016	.470	.576	.882
	N	8	8	8	8	8	8	8	8
Mean Lvl 4 duration per screen	Correlation	.190	-.091	-.727	-.559	-.553	.075	-.094	-.151
	Coefficient								
	Sig. (2-tailed)	.625	.815	.026	.118	.122	.849	.809	.697
	N	9	9	9	9	9	9	9	9
Mean Lvl 5 duration per screen	Correlation	-.556	-.456	-.115	.037	.343	.000	.061	.036
	Coefficient								
	Sig. (2-tailed)	.120	.217	.768	.924	.367	1.000	.877	.927
	N	9	9	9	9	9	9	9	9

Table 39: Spearman's Rank correlations between median scores for Part 4 and mean duration of study per screen by level of prior knowledge.

Key: Significant results shown in bold.

Item e with Prior Knowledge Level 3: A significant strong negative correlation ($r = -.79$, $p = .019$, $n = 8$) was found between ratings for multiple choice exercises and duration of study for words which the subjects stated they knew but needed to work on. The more subjects valued multiple choice exercises, the less time they spent studying at this level of knowledge.

Item f with Prior Knowledge Level 1: A significant medium positive correlation ($r = .67$, $p = .048$, $n = 9$) was found between higher ratings for learning by reading monolingual dictionary definitions and duration of study for words which the subjects stated they had no prior knowledge of.

Item g with Prior Knowledge Level 1: A significant medium positive correlation ($r = .70$, $p = .037$, $n = 9$) was found between higher ratings for learning by inferring from context and duration of study for words which the subjects stated they had no prior knowledge of.

Correlations with Mean Duration of Study per Screen

See Main Study – Spearmans Rank Correlations – Duration per Scr by PK for Part 4.htm for complete output.

Item a and prior knowledge level 3: A significant strong positive correlation ($r = .726, p = .041, n = 8$) was found. Belief in the efficacy of a highly formal activity correlates with spending more time per screen when prior knowledge is medium.

Item c and prior knowledge level 4: A negative but strong significant correlation ($r = -.727, p = .026, n = 9$) was found. As the median rating for this activity was quite low (median = 3.00) we may say that the more subjects dislike this activity, the more time they spend per screen when prior knowledge is good. This activity has negative but non-significant correlations for every level of prior knowledge.

Item d and prior knowledge level 3: A negative but significant strong correlation ($r = -.822, p = .012, n = 8$) was found. The stronger the belief in the efficacy of a meaning focused communicative activity, the less time was spent per screen when prior knowledge was medium.

Item e and prior knowledge level 3: A negative but significant strong correlation ($r = -.805, p = .016, n = 8$) was found. The stronger the belief in the efficacy of a formal activity, the less time was spent per screen when prior knowledge was medium.

Item f and prior knowledge level 1: A significant strong positive correlation ($r = .671, p = .048, n = 9$) was found. Belief in the efficacy of a formal activity correlates with spending more time per screen when prior knowledge is zero.

Item f and prior knowledge level 1: A highly significant strong positive correlation ($r = .893, p = .001, n = 9$) was found. Belief in the efficacy of a meaning-focused activity correlates with spending more time per screen when prior knowledge is zero.

6.3.2.2.2 Summary of Correlations by Item

6.3.2.2.2.1 Relevance to Research Questions

The two significant strong correlations with path-length at the lowest two levels of prior knowledge are not strong enough evidence to state that there is a relationship between attitudes to these activities; therefore, research question 5A is answered negatively.

Attitudes to these activities seem to interact more with the amount of time subjects spent on target vocabulary rather than the number of screens they accessed. Regarding levels of prior knowledge, the 3 significant correlations at the lowest level of knowledge are quite conspicuous. If we add to these the two correlations which come close to significance, it seems that having a positive attitude to these activities is probably important in deciding to invest more time in the study of unknown vocabulary. Therefore, research question 5B is answered affirmatively.

At level 3 of prior knowledge, we have 2 strong negative correlations with items 4 and 5 respectively for both duration and mean duration of study per screen. At level 1 of prior knowledge, however, item *e* has a strong positive correlation with path-length while there are also strong but non-significant positive correlations at level 1 for both these items with duration of study. We therefore have a situation in which the direction of the relationship changes when subjects have some knowledge of the target vocabulary.

Correlations with mean duration of study per screen lend limited support the interpretation that strong beliefs are a factor in duration of study at lower levels of prior knowledge.

Three correlations show a positive relationship (i.e. subjects spend more time per screen).

These are at level 1 (2 correlations) and level 3 (1 correlation). Three correlations show a negative relationship. These are at level 3 (2 correlations) and level 4 (one correlation).

Research question 5C is therefore answered affirmatively. However, beyond the slight balance towards spending more time per screen at lower levels of prior knowledge, analysis of these correlations sheds no light on the nature of the relationship between ratings for the efficacy of activities and the duration of study per screen. These issues will be discussed further in 6.2.4.2.3.

6.3.2.2.2.2 Relevance to Hypotheses

This data provides limited support for a confirmation of hypothesis 5 that there is a relationship between belief in the efficacy of formal and/or functional activities and the amount of effort subjects invest.

6.3.2.2.3 Correlations by Formal and Functional Median Scores

Spearman's Rank correlations were made between the medians of scores for activities defined by the subjects as formal and functional and path length (see Table 40, p. 231), duration of study (see Table 41, p. 231), and mean duration of study per screen (see Table 42, p. 231). The purpose of this was to see if there were any relationship between positive attitudes to formal or functional activities and time and effort spent on studying the target vocabulary. Significant results were as follows:

Correlations with Path Length

See Main Study – Spearmans Rank Correlations – P-Length by PK for Func-Form Medians.htm for complete output.

Formal median and Prior Knowledge Level 1: A significant medium positive correlation approaching significance ($r = .66, p = .052, n = 9$) was found between higher median scores for formal activities and words which the subjects stated they had no prior knowledge of.

Correlations with Duration of Study

See Main Study – Spearmans Rank Correlations – Duration by PK for Func-Form Medians.htm for complete output.

No significant correlations were found with duration of study.

Correlations with Mean Duration of Study per Screen

See Main Study – Spearmans Rank Correlations – Duration per Scr by PK for Func-Form.htm for complete output.

No significant correlations were found with mean duration of study per screen.

6.3.2.2.4 Summary of Correlations by Formal and Functional Median Scores

6.3.2.2.4.1 *Relevance to Research Questions*

At level 1 of prior knowledge, higher ratings for formal activities had a significant median positive correlation with path length very close to significance. It therefore seems that there may be a relationship between positive attitudes to formal activities and the effort, as measured by the number of screens looked at, put into studying target vocabulary which subjects have little or no prior knowledge of. This provides very limited support for a positive answer to research question 5A; there may be a relationship between

positive attitudes to formal activities and path-length. It must be stressed, however, that this support is very weak.

Regarding the complete absence of significant correlations with duration of study and mean duration of study, this data suggests negative answers to research questions 5B and 5C; there is no relationship between positive attitudes to formal and functional activities and the effort invested in the learning task as measured by duration of study and mean duration of study per screen.

		P4 Formal Median	P4 Functional Median
Mean level 1 path length	Correlation Coefficient Sig. (2-tailed) N	.662 .052* 9	.138 .724 9
Mean level 2 path length	Correlation Coefficient Sig. (2-tailed) N	.599 .067 10	.515 .127 10
Mean level 3 path length	Correlation Coefficient Sig. (2-tailed) N	.208 .622 8	.167 .693 8
Mean level 4 path length	Correlation Coefficient Sig. (2-tailed) N	-.406 .278 9	-.460 .212 9
Mean level 5 path length	Correlation Coefficient Sig. (2-tailed) N	.146 .708 9	.000 1.000 9

Table 40: Spearman's Rank correlations between medians of scores for formal and functional activities and path length by level of prior knowledge (results approaching significance shown by *).

Key: * = approaching significance.

		P4 Formal Median	P4 Functional Median
Mean level 1 duration	Correlation Coefficient Sig. (2-tailed) N	.448 .227 9	.411 .272 9
Mean level 2 duration	Correlation Coefficient Sig. (2-tailed) N	.331 .351 10	-.078 .831 10
Mean level 3 duration	Correlation Coefficient Sig. (2-tailed) N	-.457 .255 8	-.218 .604 8
Mean level 4 duration	Correlation Coefficient Sig. (2-tailed) N	-.537 .136 9	-.548 .127 9
Mean level 5 duration	Correlation Coefficient Sig. (2-tailed) N	.087 .825 9	-.091 .815 9

Table 41: Spearman's Rank correlations between medians of scores for formal and functional activities and duration of study by level of prior knowledge.

		P4 Formal Median	P4 Functional Median
Mean Lvl 1 duration per screen	Correlation Coefficient Sig. (2-tailed) N	.184 .635 9	.411 .272 9
Mean Lvl 2 duration per screen	Correlation Coefficient Sig. (2-tailed) N	.350 .322 10	-.234 .516 10
Mean Lvl 3 duration per screen	Correlation Coefficient Sig. (2-tailed) N	-.667 .071 8	-.436 .280 8
Mean Lvl 4 duration per screen	Correlation Coefficient Sig. (2-tailed) N	-.537 .136 9	-.548 .127 9
Mean Lvl 5 duration per screen	Correlation Coefficient Sig. (2-tailed) N	-.121 .756 9	-.183 .638 9

Table 42: Spearman's Rank correlations between medians of scores for formal and functional activities and mean duration of study per screen by level of prior knowledge.

6.3.2.2.4.2 *Relevance to Hypotheses*

This data supports a rejection of hypothesis 5 that there is a relationship between belief in the efficacy of formal and/or functional activities and the amount of effort subjects invest in WordLearner.

6.3.2.2.5 *Correlations by All Scores*

Spearman's Rank correlations (see [Main Study – Spearmans Rank Correlations by All Scores.htm](#) for complete output) were made between the median of all scores for Part 4 activities and path length (see Table 43, p. 233), duration of study (see Table 44, p. 233) and mean duration of study per screen (see Table 45, p. 233). The purpose for doing this was to see if positive attitudes to the learning activities described, be they formally or functionally defined, correlate with the time and effort spent on studying the target vocabulary; it is possible that simply being positive about practice may play a part in determining how much work a student does, rather than formal or functional bias.

Only 1 correlation was found approaching significance. This was a medium strength positive correlation ($r = .66, p = .053, n = 9$) with mean duration of study per screen at level 1 of prior knowledge. This provides very limited support for a positive answer to research question 5C; positive attitudes to learning activities may be related to deciding how much time subjects spend per screen when prior knowledge is zero. The absence of any significant results for path-length and duration of study suggests negative answers to research questions 5A and 5B; there is no relationship between positive attitudes to learning activities and the effort put into the learning task in terms of path-length or duration. This data therefore supports a rejection of the hypothesis that there is a relationship between belief in the efficacy of formal and/or functional activities and the amount of effort subjects invest in WordLearner.

6.3.2.3 *Summary of Correlations Between Part 4 and Path-Length, Duration of Study and Mean Duration of Study per Screen*

6.3.2.3.1 *Relevance to Research Questions*

The results of the analyses above in terms of answers to research questions are tabulated below (see Table 46). Only research question 5C has a majority of affirmative conclusions from the above analysis and is answered affirmatively overall, but even if research questions are answered affirmatively, this is generally with the proviso that support is very limited. Research questions 5A and 5B are answered negatively overall.

		P4 Median of All Scores
Mean level 1 path length	Correlation Coefficient Sig. (2-tailed) N	.111 .777 9
Mean level 2 path length	Correlation Coefficient Sig. (2-tailed) N	.381 .277 10
Mean level 3 path length	Correlation Coefficient Sig. (2-tailed) N	.082 .847 8
Mean level 4 path length	Correlation Coefficient Sig. (2-tailed) N	-.266 .489 9
Mean level 5 path length	Correlation Coefficient Sig. (2-tailed) N	-.216 .578 9

Table 43: Spearman's Rank correlations between the median for all scores in Part 4 and path length by level of prior knowledge.

		P4 Median of All Scores
Mean level 1 duration	Correlation Coefficient Sig. (2-tailed) N	.596 .090 9
Mean level 2 duration	Correlation Coefficient Sig. (2-tailed) N	.091 .802 10
Mean level 3 duration	Correlation Coefficient Sig. (2-tailed) N	-.284 .495 8
Mean level 4 duration	Correlation Coefficient Sig. (2-tailed) N	-.141 .718 9
Mean level 5 duration	Correlation Coefficient Sig. (2-tailed) N	-.202 .603 9

Table 44: Spearman's Rank correlations between the median for all scores in Part 4 and duration of study by level of prior knowledge.

		P4 Median of All Scores
Mean Lvl 1 duration per screen	Correlation Coefficient Sig. (2-tailed) N	.661 .053* 9
Mean Lvl 2 duration per screen	Correlation Coefficient Sig. (2-tailed) N	-.046 .901 10
Mean Lvl 3 duration per screen	Correlation Coefficient Sig. (2-tailed) N	-.408 .316 8
Mean Lvl 4 duration per screen	Correlation Coefficient Sig. (2-tailed) N	-.176 .651 9
Mean Lvl 5 duration per screen	Correlation Coefficient Sig. (2-tailed) N	-.165 .671 9

Table 45: Spearman's Rank correlations between the median for all scores in Part 4 and mean duration of study per screen by level of prior knowledge.

Key: * = approaching significance.

The most fruitful analyses in terms of the number of significant correlations is between individual items and duration and mean duration per screen. Analysis of the relationships with medians of formal and functional activities as groups and medians of all scores yield very few correlations. This suggests that research question 5 has to be answered negatively; this data does not show a relationship between preference for formal or functional learning and practice activities and the amount of effort students put into learning and practice in WordLearner.

Research Questions	Item Medians	Formal/Functional Medians	Medians of All Scores
5A	Negative	Affirmative	Negative
5B	Affirmative	Negative	Negative
5C	Affirmative	Negative	Affirmative

Table 46: Summary of answers to research questions.

6.3.2.3.2 Relevance to Hypotheses

The data on correlational relationships between preferences for formal and functional learning and practice activities and effort invested in the learning task in WordLearner suggests that hypothesis 5 must be rejected. Some relationships were found, but these are not enough to justify an acceptance of the hypothesis.

6.3.2.4 *Summary of Correlational Analyses*

The evidence presented above provides limited support for stating that general beliefs about language learning may be related to the effort invested in WordLearner. Research questions 4B and 4C are answered affirmatively while research question 4A is answered negatively. Research question 4 is answered affirmatively and hypothesis 4 is accepted. On the other hand, the evidence suggests that beliefs about the efficacy of specific formal and functional activities is not related to the effort invested in WordLearner. Research question 5C is answered affirmatively. Research questions 5A and 5B are answered negatively, as is research question 5, and hypothesis 5 is rejected.

6.3.3 Qualitative Description of User Behaviour in CALL

This section will consist of a subject by subject analysis and description of questionnaire data and behaviour in WordLearner. For each subject, there will be a summary outlining responses to Parts 2 (general beliefs about language learning) and 4 (beliefs about the

Subject	1. It is necessary to know English culture in order to speak English well.	2. It is better to learn English in an English speaking country	3. Learning English is mostly a matter of learning many new vocabulary words.	4. Learning English is mostly a matter of learning many grammar rules.	5. Learning English is different from learning other school subjects.	6. Learning English is mostly a matter of translating from my own language.	7. It is important to repeat and practice often.	8. You should not say anything in English until you can say it correctly.	9. It is OK to guess if you do not know an English word.	10. If you are allowed to make mistakes in the beginning, it will be hard to get rid of them later on.
1	A	A	NAND	D	NAND	NAND	A	SD	SA	A
2	NAND	SA	D	D	A	D	SA	D	A	A
3	A	SA	A	NAND	A	D	A	SD	A	D
4	D	SA	NAND	NAND	SA	NAND	A	SD	A	NAND
5	SD	SA	D	D	A	D	NAND	SD	SA	D
6	NAND	SA	D	NAND	A	NAND	A	SD	SA	D
7	A	SA	NAND	NAND	D	D	NAND	SD	A	D
8	A	A	SD	D	A	NAND	SA	D	A	D
9	SA	NAND	A	NAND	A	D	SA	SD	A	D
10	SA	SA	A	D	NAND	NAND	SA	D	A	NAND

Table 47: Individual responses to Part 2 of the questionnaire.

Key - SA = strongly agree, A = agree, NAND = neither agree nor disagree, D = disagree, SD = strongly disagree.

Subject	a) Repeating words after the teacher	b) Using new vocabulary in group discussion to express opinions/feelings	c) Teacher translates all new words and explains what they mean in your own language	d) Games in which pairs and groups have to be creative with vocabulary and communicate in	e) Doing multiple choice exercises on a computer to practice the meaning of words and getting immediate information regarding	f) Learning the meaning of a word by reading the English language definition (e.g. not a translation	g) Guessing the meaning of a word by reading sentences containing	h) Practising writing sentences using a new word.	Median of ratings of formal activities.	Median of ratings of functional activities.
1	4	4	3	4	3	3	4	4	3.00	4.00
2	4	5	2	4	2	4	3	4	3.00	4.00
3	1	4	2	4	3	4	5	5	2.50	4.00
4	2	4	2	4	4	3	3	5	2.50	4.00
5	3	5	2	4	4	4	4	5	3.50	4.00
6	2	4	3	5	5	3	2	4	3.00	4.00
7	3	4	3	4	3	2	2	3	3.00	4.00
8	3	5	4	5	4	4	5	5	4.00	5.00
9	2	4	3	5	4	4	4	3	3.50	4.00
10	5	4	1	2	2	3	3	3	2.50	3.00

Table 48: Individual responses to Part 4.

Key - 1 = not effective at all, 2 = not very effective, 3 = neither effective nor ineffective, 4 = effective, 5 = very effective. Shaded columns are items rated as formal. Item 8 is rated equally formal and functional.

efficacy of specific activities) of the questionnaire and how these responses match actual learning behaviour in WordLearner. Individual analyses will conclude with an examination of how, if at all, the behaviour in WordLearner indicated by the logged data answers this investigation’s research questions. This section will conclude by integrating how this data answers the research questions and how, taken as a whole, it confirms or rejects the research hypotheses.

6.3.3.1 Individual Profiles

The ten profiles (of the subjects in Stage 4 of the Main Study) of individual interaction with WordLearner that follow consist of 2 parts:

Background Details: This includes background data from the questionnaire and a table which shows the activities chosen by level of prior knowledge of the target vocabulary and how the subject navigated through the activities. Table 49 presents a key to the terms used.

Def	See the definition
FiO	Figure it out
MChoice	Multiple choice
GProd	Guided production
GoToNx	Go to the next word

Table 49: Key to terms used in the navigation table.

Using Table 50 as an example, target words are given by level of prior knowledge and then in the order in which they were done by the subject. For example, Subject 1 gave a prior knowledge level 1 to words 1 and 2. She gave a prior knowledge level 5 to word 3 and a prior knowledge level 2 to word 4. She then gave a prior knowledge level 1 to word 5.

To see how a subject approaches learning and practicing a word, read from left to right. For example, in Table 50, for word 1, Subject 1 visited the See the Definition screen first. Then, she went to Figure it Out for a context example and followed this by going to the Multiple Choice activity. She then opted to go to the next word. The final two columns give the mean path-length and mean duration for each level.

The reason for presenting the words in this way was that patterns, if any, in the way in which learners approached words of a particular prior knowledge level would become obvious. Even though words at a particular level are encountered irregularly (e.g. words 1, 2 , 5 for level 1 of prior knowledge in Table 50), we may be able to identify a pattern. For example, Subject 1 had exactly the same approach to doing all level 2 words even though they were not encountered one after the other.

Subject Summary: This integrates and discusses the data described under Background Details and relates this to the research questions.

6.3.3.1.1 Subject 1
Background Details

Age:	26	Has Studied English for:	More than 4 years
Gender:	Female	Total time spent in English speaking countries:	Four months or less
Nationality:	Taiwanese	Previous language learning methodology:	Formal
Student Type:	Post-Graduate (MA/MSc)	Current priority:	Functional

Table 50 shows that the main features of Subject 1’s work in WordLearner are, firstly, that she states she has no knowledge at all (level 1) or only poor knowledge (level 2) of 11 out of the 14 target words. Secondly, the subject’s pattern of decision making is not very stable when she has no knowledge of the target word, but for level 2 of prior knowledge there are no changes in the pattern of decision making. Thirdly, the subject’s preference in practice appears to be solely passive (Multiple Choice). There is no attempt at productive practice (Guided Production). Lastly, the amount of time and effort as measured by path-length and duration of study decreases slightly from level 1 to level 2 words.

At level 1 of prior knowledge, the subject shows 3 different patterns¹⁴. These 3 patterns are deductive-passive (4 out of 8 target words), deductive-inductive-passive (2 out of 8 target words), and inductive-deductive-passive (2 out of 8 target words). There is, therefore, a preference for deductive learning followed by passive practice.

¹⁴ This does not include one occasion on which the subject chose to go to the next word. This was almost certainly a mistake either in the rating of the word or in clicking and is discounted.

At level 2, the subject followed a deductive-passive navigation pattern. At level 5, the subject preferred skipping to the next word.

Prior Knowledge	Word #	⇔⇔⇔⇔⇔ Direction of Navigation ⇔⇔⇔⇔⇔				Mean Path-Length	Mean Duration (mm:ss)
		Learning Activities		Practice Activities			
1	1	Def	FiO	MChoice	GoToNx	3.25	1:47
	2	FiO	Def	MChoice	GoToNx		
	5	Def		MChoice	GoToNx		
	6				GoToNx		
	7	Def	FiO	MChoice	GoToNx		
	9	FiO	Def	MChoice	GoToNx		
	13	Def		MChoice	GoToNx		
	14	Def		MChoice	GoToNx		
2	4	Def		MChoice	GoToNx	3.00	1:19
	10	Def		MChoice	GoToNx		
	12	Def		MChoice	GoToNx		
5	3	FiO		MChoice	GoToNx	1.67	0:34
	8				GoToNx		
	11				GoToNx		

Table 50: Subject 1 - Activities chosen in WordLearner.

Regarding behaviour at the lowest level of prior knowledge, there are three points to note. First, the instability of navigational patterns is consistent with the general pattern shown by the cross-link diagram (see Figure 17). The changes in behaviour may be attempts to experiment in order to adapt to a difficult task or reflect recognition of a prefix or suffix that might help in guessing from context.

Level 2 patterns are notable for superficial attention to learning and practice. The subject did the bare minimum allowed by the program apart from skipping to the next word. It is possible that the subject was not trying very hard because this was not a real learning situation, but behaviour with level 1 words does not suggest this. Level 5 patterns show the typical efficiency with which subjects handled words they already knew.

6.3.3.1.1.1 Subject Summary

Data from Part 4 of the questionnaire does not provide a lot of information apart from the subject’s overall preference for functional activities. There is little else in terms of differentiation between activities. In addition, her behaviour in WordLearner does not closely reflect her questionnaire responses. Agreement that repetition and practice are important did not translate into practice in WordLearner apart from level 1 target words. The subject did not attempt sentence reconstruction (Guided Production), an activity

which one might expect a person who strongly approves of guessing and who has stated clearly that sentence writing is an effective method of learning vocabulary, even once. It is possible that the views expressed do not apply to study of vocabulary at low levels of prior knowledge. It may be that Guided Production was too difficult to attempt with any confidence of success; the subject’s negative views on learning from mistakes may have influenced her decisions while trying the multiple choice questions was enough practice. A possible trend to invest less effort with higher levels of prior knowledge was observed as path-length and duration of study were slightly less for level 2 (path-length = 3.00, mean duration = 1:19) than level 1 (path-length = 3.25, mean duration = 1:47) and were much shorter for level 5 (path-length = 1.67, mean duration = 0:34)

The interpretation of this data supports negative answers to research questions 1D, 1F, 2B and 2D; for this subject, functional preferences are not reflected in preferences for inductive learning or productive practice. With the reservation that this subject’s navigational patterns show more changes of pattern at level 1 and a preference for skipping to the next word at level 5, answers to research questions 3A and 3B are also negative as there are no obvious changes in learning and practice preferences according to level of prior knowledge. With regard to research question 3C, slightly less time and effort is expended with a higher level of prior knowledge.

6.3.3.1.2 Subject 2
Subject Background Details

Age:	23	Has Studied English for:	More than 4 years
Gender:	Female	Total time spent in English speaking countries:	Between 2 and 3 years
Nationality:	Spanish	Previous language learning methodology:	Formal
Student Type:	Post-Graduate (MA/MSc)	Current priority:	Functional

Table 51 shows, firstly, that there is a full range of prior knowledge levels with level 5 (5 target words) being the most common and level 4 (1 target word) being the least common. Secondly, navigation patterns are quite stable at levels 2 and 3 of prior knowledge with the preferred pattern being inductive-deductive, productive-passive. Thirdly, this subject shows a relatively thorough approach to practicing words at levels 2 and 3 of prior knowledge, doing all of the activities available for 4 out of 5 words at these levels. This is reflected in the steadily increasing duration of study from level 2 through to level 4. At level 1, however, each of the three target words produced not only relatively shorter

pathways through the hypertext, but also a different order of choices for each word. Lastly, this subject’s preference for target words at the highest level of prior knowledge is to skip to the next word.

Prior Knowledge	Word #	⇔⇔⇔⇔⇔ Direction of Navigation ⇔⇔⇔⇔⇔					Mean Path- Length	Mean Duration (mm:ss)
		Learning Activities		Practice Activities				
1	9	Def	FiO	MChoice	GoToNx		3.67	1:39
	13	Def	MChoice		GoToNx			
	14	Def	GProd	MChoice	GoToNx			
2	1	FiO	Def	GProd	MChoice	GoToNx	5.00	4:29
	7	FiO	Def	GProd	MChoice	GoToNx		
3	2	FiO	Def	GProd	MChoice	GoToNx	4.67	4:46
	5	FiO	Def	GProd	MChoice	GoToNx		
	10	Def	FiO	GProd	GoToNx			
4	4	FiO	Def	GProd	GoToNx		4.00	5:07
5	3	FiO	Def	MChoice	GoToNx		1.60	0:22
	6	GoToNx						
	8	GoToNx						
	11	GoToNx						
	12	GoToNx						

Table 51: Subject 2 - Activities chosen in WordLearner.

We therefore have a subject who attends diligently and consistently to words which she does not have an excellent knowledge of (in her own estimation), but does not waste time when she evaluates her knowledge of the target as complete. When the subject states she has no prior knowledge at all, however, there appears to be a much less consistent application of preferences.

6.3.3.1.2.1 Subject Summary

The eclectic preferences shown by the subject’s responses to Parts 2 and 4 (see Table 48) are, to some extent reflected in her tendency to do most of the available activities, but there are obvious inconsistencies. Her low rating for the efficacy of multiple choice activities may be echoed in her choice of always doing the multiple choice questions last, but she did not have to do them and there may be a more positive explanation for spending time on multiple choice. This subject also gave a low rating to guessing from context, but she accessed the inductive learning screen on 8 occasions and it was her first choice in 6 out of the 10 target words she chose to practice. This is consistent with her response to the item on the appropriacy of guessing in Part 2, but it may also be that taken as part of a set of activities, guessing from context has a lot more practical value for this

student. For example, the subject might perceive guessing to be valuable only when confirmation, in the form of a dictionary definition, is available.

The overall pattern of interaction with the program (inductive-deductive, productive-passive) is more consistent with the subject’s questionnaire data. It is also interesting that the pattern of guessing and confirming in the inductive-deductive combination is similar to the pattern of sentence reconstruction (Guided Production) followed by multiple choice in the productive-passive combination; both combinations involve higher risk and higher cognitive effort followed by lower risk, lower cognitive effort. The multiple choice questions also fulfil a confirming role as the first part of the multiple choice activity is a simple definition question, so there is also a parallel risk-taking, confirming pattern.

The mix of preferences shown by the questionnaire data seems to be reflected in the variety of ways in which the subject assembled activities. If a simple majority of choices made were taken as proof, the relevant research questions would have to be answered affirmatively as the majority of choices plainly reflect a functional bias. However, the pattern of interaction with the materials appears to be partly governed by level of prior knowledge rather than functional bias as level one choices are distinctly different. Research questions 1D, 1F, 2B and 2D are therefore answered negatively.

The data on path-length and duration of study for this subject shows that level of prior knowledge is probably a factor in determining the choice of learning and practice activities, so research questions 3A and 3B can be answered affirmatively. The way in which effort is related to prior knowledge (research question 3C) indicates that more effort is invested at the mid levels of prior knowledge than at the lowest level.

6.3.3.1.3 Subject 3
Subject Background Details

Age:	29	Has Studied English for:	More than 4 years
Gender:	Male	Total time spent in English speaking countries:	Between 1 and 2 years
Nationality:	Taiwanese	Previous language learning methodology:	Formal
Student Type:	Post-Graduate (MA/MSc)	Current priority:	Functional

The patterns of interaction with the CALL materials shown in Table 52 are characterised by consistency with an inductive-passive pattern being preferred at level 4. Level 1 and 2

patterns, however, show attempts to alter the approach. The post hoc interview (see Appendix K) provides evidence to explain this variation as he stated that he varied his approach as a result of time pressure and for the sake of interest. As time progressed and he felt he was spending more time than was necessary, he stopped varying the approach, opting automatically for the inductive-passive pattern. In addition, the subject's interview data suggests that the decision to follow the inductive-passive pattern was quite conscious and deliberate; he believed that learning from context was a feature of his learning environment and level of ability while the need to work quickly required the use of multiple choice questions. The interview data does contradict his actual behaviour as he stated in the interview that he used sentence making exclusively and that activities such as multiple choice were reserved only for words he did not know very well. It seems that needing to finish quickly over-rode his belief in the value of creating sentences.

Overall prior knowledge is very high with 9 of the 14 target words rated at level 4 or 5 of prior knowledge. At level 5, the subject does not practice at all, but at level 4, he follows the same pattern of guessing from context followed by multiple choice that he follows at level 2 of prior knowledge. Despite this similarity in pattern, however, the subject spent longer studying the level 4 words than the level 2 words. The interview data suggested that he was spending longer on better known words because:

- a) The words may have been more interesting or useful to him.
- b) He was looking for alternative uses and collocations of the word and increasing his knowledge of the range of meanings of the target vocabulary. He stated that at higher levels of prior knowledge he interested in the range of meanings for vocabulary.

We can see that although the subject was consciously taking a shorter, faster route through the materials, he still spent longer studying words at a higher level of prior knowledge. As this extra time did not result from accessing more screens, the conclusion that he was engaged in a deeper analysis of the materials is reasonable. In common with the other post hoc interview (see 6.3.3.1.8 below), learning behaviour seems to be related to long established patterns of decision making; the subject is imposing these on the materials and features of the software such as evaluation of word knowledge have not influenced his decisions. These decisions appear to be based on interest and time limitations.

Prior Knowledge	Word #	⇔⇔⇔⇔⇔ Direction of Navigation ⇔⇔⇔⇔⇔			Mean Path-Length	Mean Duration (mm:ss)
		Learning Activities	Practice Activities			
1	2	FIO	GProd	GoToNx	3.00	3:22
	4	FiO	MChoice	GoToNx		
	5	FiO	GProd	GoToNx		
2	7	FiO	Def	MChoice	3.50	1:31
	14	FiO	MChoice	GoToNx		
4	1	FiO	MChoice	GoToNx	3.00	1:56
	9	FiO	MChoice	GoToNx		
	10	FiO	MChoice	GoToNx		
	13	FiO	MChoice	GoToNx		
5	3			GoToNx	1.00	0:21
	6			GoToNx		
	8			GoToNx		
	11			GoToNx		
	12			GoToNx		

Table 52: Subject 3 - Activities chosen in WordLearner.

6.3.3.1.3.1 Subject Summary

Taken as a whole, this subject’s questionnaire data, interview data and learning preferences in WordLearner present a picture of a language learner with strong functional biases in beliefs about language learning whose perceptions of the efficacy of activities and actual learning behaviours reflect these beliefs. The navigational patterns and interview data show an efficiency of approach combined with an enthusiasm for vocabulary that led to time being spent on more detailed analysis of language at higher levels of prior knowledge.

This data provides a clear basis for affirmative answers to research questions 1D and 2B. On the other hand, apart from 2 exceptions at level 1 of prior knowledge, which were explained by the interview data, the data also suggests negative answers for research questions 1F and 2D. Therefore, functional beliefs and preferences for functional activities are reflected in choice of learning but not in choice of practice. As there are almost no changes navigation patterns according to level of prior knowledge, research questions 3A and 3B have to be answered negatively. As to the degree to which effort expended on target words relates to level of prior knowledge (research question 3C), less time is spent on level 2 words than either level 1 or level 4; however, the interview data suggests that interest in the words and their perceived utility are also factors in how much effort the subject puts into the task.

6.3.3.1.4 Subject 4

Subject Background Details

Age:	22	Has Studied English for:	More than 4 years
Gender:	Female	Total time spent in English speaking countries:	Four months or less
Nationality:	French	Previous language learning methodology:	Formal
Student Type:	Undergraduate	Current priority:	Formal

Patterns of navigation shown in Table 53 appear to indicate a subject with a propensity to change approach very frequently; repetition of a navigation pattern within a level of prior knowledge is the exception rather than the rule. The only discernible pattern variations by level of prior knowledge are:

1. Deductive learning is always accessed first at level 1 of prior knowledge. At higher levels, the subject chose inductive learning on 3 out of the 8 occasions she decided to practice the target words, but deductive learning remained the most common choice (5 out of 8 words practiced).
2. At level 4 of prior knowledge, guided production is always chosen for practice with multiple choice being skipped.
3. In 2 out of 4 cases at level 5 of prior knowledge, the subject follows a Definition, Figure it Out, Multiple Choice pattern. As the subject has stated that she knows the word extremely well, this could be considered a waste of time and effort, but other explanations are possible.
4. In 8 out of the 12 target words the subject chose to study, the initial practice choice was Multiple Choice.

Prior Knowledge	Word #	⇔⇔⇔⇔⇔ Direction of Navigation ⇔⇔⇔⇔⇔					Mean Path- Length	Mean Duration (mm:ss)
		Learning Activities		Practice Activities				
1	5	Def	FiO	MChoice	GProd	GoToNx	3.75	2:09
	7	Def		MChoice		GoToNx		
	9	Def		MChoice		GoToNx		
	14	Def	FiO	MChoice		GoToNx		
2	2	FiO	Def	MChoice		GoToNx	4.00	1:51
3	4	FiO	Def	GProd		GoToNx	4.50	4:15
	12	Def	FiO	MChoice	GProd	GoToNx		
4	1	Def		GProd		GoToNx	3.67	3:54
	3	FiO	Def	GProd		GoToNx		
	10	Def	FiO	GProd		GoToNx		
5	6	Def	FiO	MChoice		GoToNx	2.50	1:19
	8					GoToNx		
	11					GoToNx		
	13	Def	FiO	MChoice		GoToNx		

Table 53: Subject 4 - Activities chosen in WordLearner.

6.3.3.1.4.1 Subject Summary

The obvious preference for deductive learning, though weaker at levels 2, 3 and 4 of prior knowledge, is consistent with the general formal bias suggested by the subject's responses to Part 2, in particular her response to learning from mistakes. Reading a definition first would reduce mistakes and increase confidence in following activities. It is not, however, consistent with her stated approval of guessing strategy.

The subject's preference for multiple choice is also suggestive of someone who would like to stay on firm ground. The preference for Guided Production at level 4 of prior knowledge and the more frequent initial choice of inductive learning at levels 2, 3, and 4, however, is interesting in that it suggests risk-taking when the chance of success is relatively good and a corresponding need for security. It may be that the subject differentiates between guessing in communication and learning situations or guesses only when likely to be correct. The subject seeks the security of knowing the meaning of a word before looking at context examples and prefers low risk activities with low threat to self-esteem. The overall pattern of choices shows some relationship to level of prior knowledge, but this is not as clear-cut as it is with some other subjects. Preference for deductive learning at level 1 gives way to a mix of deductive and inductive from level 2 onwards while preference for passive practice at levels 1 and 2 changes to productive practice in levels 3 and 4.

As responses to Part 2 show a formal bias and responses to Part 4 show a functional bias, the relevant research questions are 1C, 1F, 2B and 2D. The subject's exclusive initial preference at level 1 of prior knowledge is deductive, but this is not the case at levels 2, 3, and 4 as inductive learning is the initial preference in 50% (3 out of 6) of the cases at these levels. Therefore, research questions 1C and 2B must be answered negatively. Likewise, the subject's initial practice preference was exclusively passive at levels 1 and 2 of prior knowledge, but at levels 3 and 4, the subject initially chose productive learning in 80% (4 out of the 5) of the cases at these levels. Research questions 1E and 2F are therefore answered negatively.

The type of learning and practice activities preferred appear to change according to level of prior knowledge. Therefore, research questions 3A and 3B are answered affirmatively.

Regarding research question 3C, this subject spends more time and effort at levels 3 and 4 than at levels 1 and 2.

6.3.3.1.5 Subject 5

Subject Background Details

Age:	25	Has Studied English for:	More than four years
Gender:	Male	Total time spent in English speaking countries:	Four months or less
Nationality:	Hong Kong	Previous language learning methodology:	Functional
Student Type:	Post-Graduate (MA/MSc)	Current priority:	Functional

Table 54 shows that only 5 of the target words fell into levels 1, 2 and 3 of prior knowledge, but also that the full range of prior knowledge is shown. The most obvious features of the navigation patterns shown are that:

1. At levels 1, 2, and 3 of prior knowledge, there is a definite preference for a deductive-inductive, passive-productive pattern, with the subject accessing every possible screen on 3 out of the 5 occasions that he practiced target words at this level.
2. At level 4 of prior knowledge, there is abrupt switch in approach, with inductive learning becoming the initial choice for every level 4 target word practiced. The subject does not spend more time than necessary at this level, accessing only one learning screen and one practice screen before going to the next word. On the first 2 encounters with level 4 words, the subject chose to do Guided Production, but then switched to Multiple Choice.

Prior Knowledge	Word #	⇔⇔⇔⇔⇔ Direction of Navigation ⇔⇔⇔⇔⇔					Mean Path-Length	Mean Duration (mm:ss)
		Learning Activities		Practice Activities				
1	5	Def	FiO	MChoice	GProd	GoToNx	5.00	2:56
2	2	Def		MChoice		GoToNx	4.00	3:40
	4	Def	FiO	MChoice	GProd	GoToNx		
3	7	Def	FiO	GProd		GoToNx	4.50	3:11
	9	Def	FiO	MChoice	GProd	GoToNx		
4	1	FiO		GProd		GoToNx	2.67	1:07
	10	FiO		GProd		GoToNx		
	11	FiO		MChoice		GoToNx		
	12	FiO		MChoice		GoToNx		
	13	FiO		MChoice		GoToNx		
	14					GoToNx		
5	3	FiO		MChoice		GoToNx	1.67	0:41
	6					GoToNx		
	8					GoToNx		

Table 54: Subject 5 - Activities chosen in WordLearner.

6.3.3.1.5.1 Subject Summary

There appears to be some tension between this subject's stated beliefs in Part 2 on the one hand and his preferences for specific activities and actual behaviour on the other. There is a bad fit between the subject's strong functional bias and his deductive-inductive, passive-productive navigation pattern at levels 1, 2, and 3. It appears that in this case, level of prior knowledge may have a stronger influence on how the subject combines the available activities than the subject's underlying beliefs. The subject may be biased towards meaning-focused communicative activities and also towards corresponding learning strategies, but the subject's task knowledge may determine that the appropriate course of action at this level of prior knowledge is more formal.

It is not surprising that the subject preferred formal methods at level 1 of prior knowledge, but the persistence of the pattern up to level 3 and the abrupt change to a more functional approach at level 4 is. It may be that this is an example of risk taking only when the chance of success is very good, but the subject's frequent accessing of the Figure it Out and the Guided Production activities at low levels undermines this proposition. The difference might be not only the type of activity preferred but the amount of work the subject is prepared to put into words he already knows very well. At lower levels, the subject's work ethic determines a formal, diligent approach, but when prior knowledge is good, the subject applies a more meaning-focused but less thorough approach.

As the subject's general beliefs (Part 2) and specific preferences (Part 4) are functionally biased, the relevant research questions are 1D, 1F, 2B and 2D. At levels 1, 2, and 3, the subject shows a preference for deductive learning while at levels 4 and 5, the subject changes his preference to inductive learning. As initial practice preference is not consistent with stated beliefs across levels, research questions 1D and 2B are answered negatively. Practice preferences are not consistent with a functional bias; therefore, research questions 1F and 2D are answered negatively.

For this subject, learning and practice choices seem to be closely related to level of prior knowledge. Therefore, research questions 3A and 3B are answered affirmatively. To answer research question 3C on the relationship between prior knowledge and effort, the amount of effort invested in target words is greater at levels 2 and 3 than at level 1.

Further to this, although it must be pointed out that there is only one word at level 1, the subject accessed all four screens for this and still had a shorter duration of study.

6.3.3.1.6 Subject 6
Subject Background Details

Age:	27	Has Studied English for:	More than 4 years
Gender:	Male	Total time spent in English speaking countries:	Between 4 months and 1 year
Nationality:	Spanish	Previous language learning methodology:	Formal
Student Type:	Post-Graduate (MA/MSc)	Current priority:	Functional

Prior Knowledge	Word #	⇔⇔⇔⇔⇔ Direction of Navigation ⇔⇔⇔⇔⇔					Mean Path- Length	Mean Duration (mm:ss)
		Learning Activities		Practice Activities				
1	7	Def	FiO	GProd	MChoice	GoToNx	4.50	2:13
	14	FiO	Def	MChoice		GoToNx		
2	2	Def		GProd	MChoice	GoToNx	4.50	2:39
	5	Def	FiO	MChoice	GProd	GoToNx		
3	1	FiO		MChoice	GProd	GoToNx	4.00	2:08
	4	Def		GProd		GoToNx		
	10	Def	FiO	MChoice		GoToNx		
	13	Def	FiO	MChoice	GProd	GoToNx		
4	3	FiO		MChoice		GoToNx	3.25	1:01
	6	FiO		MChoice		GoToNx		
	9	Def		MChoice		GoToNx		
	11	Def		MChoice		GoToNx		
5	8					GoToNx	2.00	0:40
	12	FiO		GProd		GoToNx		

Table 55: Subject 6 - Activities chosen in WordLearner.

Table 55 shows a complete range of prior knowledge and a tendency towards a formal approach to learning and practicing words at levels 1, 2, and 3. A total of 8 target words were practiced at levels 1, 2, and 3 of prior knowledge and the subject chose to practice 5 out of 6 target words at levels 4 and 5 of prior knowledge. Discernible patterns appear to be:

1. At levels 1, 2, and 3, there is a tendency to a formal approach with a deductive-inductive or deductive only pattern. The subject’s initial choice is deductive learning for 6 out of the 8 words at these levels. For 4 of these 6 words, the next choice is inductive learning.
2. At levels 1, 2, and 3, practice patterns are a mix of approaches, but for 5 out of the 8 words, Multiple Choice is the first preference.

3. At level 4, where 4 words were practiced, there was an equal mix of deductive (2 out of 4) and inductive (2 out of 4) initial choices with the subject moving immediately to Multiple Choice on each occasion.
4. There was a marked decrease in the number of screens accessed at levels 4 and 5. The subject never accessed more than 2 activity screens at these levels of prior knowledge.

6.3.3.1.6.1 Subject Summary

For this subject, responses to the questionnaire suggest a mix of formal and functional beliefs and preferences and this mix is reflected in his approach to working through WordLearner. Measured by a simple majority of choices, there is a preference for deductive learning at lower levels with some inductive learning at level 4 and 5 as the subject tries an inductive initial choice for 60% (3 out of 5) of the words practiced at these levels; therefore, the subject's preferred navigation patterns could be summarised as deductive passive at levels 1 to 3 changing to a mix of inductive-passive and deductive-passive for levels 4 and 5.

Part 2 and 4 responses are reasonably consistent with the subject's navigation patterns at levels 4 and 5 as his accessing of screens for guessing from context (Figure it Out) and reconstructing sentences (Guided Production) fit well with stated beliefs about attempting to speak even if he might be incorrect, guessing if necessary, and learning from mistakes. Part 4 responses on the value of communicative practice of vocabulary, multiple choice exercises and writing sentences with new vocabulary also fit well with the subject's actual behaviour in WordLearner. The subject's relatively low opinion of using monolingual dictionary definitions, however, does not fit with the deductive preferences shown for levels 1 to 3.

As the subject's responses to Part 2 and Part 4 suggest a functional bias, the relevant research questions are 1D, 1F, 2B and 2D. Research questions 1D and 2B are answered negatively at levels 1 to 3 of prior knowledge. The small majority of inductive learning choices at levels 4 and 5 do not warrant an affirmative answer at these levels. Research questions 1F and 2D are answered negatively for all levels as the subject, with only four exceptions, clearly prefers passive practice activities.

Regarding a possible relationship between level of prior knowledge and navigation patterns, for research question 3A, there does appear to be some influence of level of prior knowledge on learning choices. This question is, therefore, answered affirmatively. Research question 3B is answered negatively as there are no changes in practice preferences with increase in prior knowledge. For research question 3C, the relationship between level of prior knowledge and effort appears to be an increase in duration of study from level 1 to level 2 followed by a steady decrease.

6.3.3.1.7 Subject 7

Subject Background Details

Age:	27	Has Studied English for:	More than 4 years
Gender:	Female	Total time spent in English speaking countries:	Four months or less
Nationality:	Hong Kong	Previous language learning methodology:	Formal
Student Type:	Post-Graduate (MA/MSc)	Current priority:	Functional

At levels 1 and 2 of prior knowledge, this subject has a mix of deductive-passive (37.5%, 3 out of 8 target words practiced at these levels), deductive-inductive-passive (37.5%, and inductive-deductive-passive (25%, 2 out of 8 target words practiced at these levels) patterns (see Table 56). At level 4, there is an abrupt change to an inductive-passive pattern.

Prior Knowledge	Word #	⇔⇔⇔⇔⇔ Direction of Navigation ⇔⇔⇔⇔⇔					Mean Path- Length	Mean Duration (mm:ss)
		Learning Activities		Practice Activities				
1	5	Def	FiO	MChoice		GoToNx	3.60	1:32
	7	Def	FiO	MChoice		GoToNx		
	9	Def		MChoice		GoToNx		
	13	FiO	Def	MChoice		GoToNx		
	14	Def		MChoice		GoToNx		
2	2	Def		MChoice	GProd	GoToNx	4.00	2:22
	4	Def	FiO	MChoice		GoToNx		
	12	FiO	Def	MChoice		GoToNx		
3	1	Def	FiO	GProd	MChoice	GoToNx	5.00	4:30
4	3	FiO		MChoice		GoToNx	3.00	0:58
	6	FiO		MChoice		GoToNx		
	8	FiO		MChoice		GoToNx		
	10	FiO		MChoice		GoToNx		
	11	FiO		MChoice		GoToNx		

Table 56: Subject 7 - Activities chosen in WordLearner.

6.3.3.1.7.1 *Subject Summary*

As with subject 5, the navigation patterns shown by this subject strongly suggest that prior knowledge, or more accurately, task knowledge, of the target word has more influence on learning decisions than stated beliefs or preferences. This subject is also similar to subject 5 in the abrupt change of navigation pattern at level 4 to one which is more meaning-focused and more consistent with stated views.

As this subject has a bias towards functional beliefs and opinions on the efficacy of specific activities, the relevant research questions are 1D, 1F, 2B and 2D. The subject’s learning choices from levels 1 to 3 show a marked tendency for a deductive initial choice in learning activity (77.7%, 7 out of 9 words practiced at these levels), but at level 4, there is an exclusively inductive preference. Research questions 1D and 2 B are therefore answered negatively. For research questions 1F and 2D, we find negative answers for all levels of prior knowledge as the almost exclusive choice of passive practice (92.8%, 13 out of 14 target words) does not match the functional bias in the subject’s questionnaire data. Regarding 2D, it must be pointed out that if we look at the item score for sentence writing in Part 4 of the questionnaire, there is a consistency in the relationship between the score and the actual behaviour as the subject was unenthusiastic about the activity described.

Regarding research question 3A, choice of learning activity does change according to level of prior knowledge; therefore, the answer to this question is affirmative. Research question 3B has to be answered negatively as practice choice clearly does not change according to level. To answer research question 3C, regarding the relationship between effort and level of prior knowledge, the duration of study increases from level 1 through to level 3, and then decreases for level 4.

6.3.3.1.8 Subject 8

Subject Background Details

Age:	30	Has Studied English for:	More than 4 years
Gender:	Male	Total time spent in English speaking countries:	Between 4 months and 1 year
Nationality:	Indonesian	Previous language learning methodology:	Formal/Functional
Student Type:	Post-Graduate (MA/MSc)	Current priority:	Functional

Table 57 shows that 11 out of the 14 target words were at levels 1, 2, and 3 of prior knowledge. As with subject 3, this subject exhibits a very consistent navigation pattern that does not change according to level of prior knowledge. This pattern, inductive-productive-passive with occasional accessing of the deductive screen does not change until levels 4 and 5 where the subject either skipped to the next word or followed a deductive-inductive-passive pattern. Interview data indicated that at level 4, the subject switched to this pattern looking for possible other meanings of a word he already knew quite well. Interview data also suggested that at lower levels, the accessing of the deductive screen reflects a lack of confidence in his inference. The subject also stated that learning through the inductive-deductive pattern would help him remember the word better.

Interview data (see Appendix L) indicated that the inductive-productive-passive was followed for 2 reasons. Firstly, in the subject’s own words doing Guided Production first followed by Multiple Choice was “more interesting”. Secondly, the subject believed that the two activities were different but complementary; doing the Guided Production activity was “really thinking”, while success in the Multiple Choice activity relied on his “ability to see tricky things”, hinting at a fun element in the activity.

Prior Knowledge	Word #	⇔⇔⇔⇔⇔ Direction of Navigation ⇔⇔⇔⇔⇔					Mean Path- Length	Mean Duration (mm:ss)
		Learning Activities		Practice Activities				
1	5	FiO	Def	GProd	MChoice	GoToNx	4.00	3:32
	14	FiO		GProd	MChoice	GoToNx		
2	2	FiO	Def	GProd	MChoice	GoToNx	4.67	3:55
	4	FiO	Def	GProd	MChoice	GoToNx		
	7	FiO		GProd	MChoice	GoToNx		
	9	FiO	Def	GProd	MChoice	GoToNx		
	12	FiO	Def	GProd	MChoice	GoToNx		
	13	FiO	Def	GProd		GoToNx		
3	1	FiO		GProd	MChoice	GoToNx	4.00	3:00
	10	FiO		GProd	MChoice	GoToNx		
	11	FiO		GProd	MChoice	GoToNx		
4	3					GoToNx	2.50	0:40
	8	Def	FiO	MChoice		GoToNx		
5	6					GoToNx	1.00	0:13

Table 57: Subject 8 - Activities chosen in WordLearner.

The temptation to generalise from this evidence has to be tempered by further comments made by the subject. Two statements, “If I had to do this every week, I would be more selective”, and “In the real world, I have to work much faster”, suggest that the subject would not access as many screens as he did if WordLearner were used on a more regular

basis. On the other hand, these comments also point to the subject as a highly focused learner. Lastly, although the subject commented that he found the scale of prior knowledge confusing and that the program would be better off without it, there is no sign that evaluation of word knowledge influenced decision making.

6.3.3.1.8.1 *Subject Summary*

The subject’s navigation patterns stand out for 2 reasons. Firstly, they are very consistent and secondly, the inductive-productive-passive pattern is unusual at lower levels with other subjects. This concords quite closely with the functional bias suggested by the subject’s questionnaire data. Interview data suggests that this subject is consciously applying a learning strategy aimed at deeper processing and longer retention.

As the subject’s questionnaire data shows a functional bias, the relevant research questions are 1D, 1F, 2B, and 2D. As the subject’s learning preferences were inductive, research questions 1D and 2B are answered affirmatively. Likewise, as the subject’s initial practice preference was almost exclusively productive, research questions 1F and 2D are also answered affirmatively.

Regarding research question 3A, learning choices do change with increasing prior knowledge of the target vocabulary. The nature of this change is a greater recourse to deductive learning at lower levels. Practice patterns do not change with level of prior knowledge, however, so research question 3B is answered negatively. Regarding research question 3C, duration of study peaks at level 2 of prior knowledge; again, effort, as measured by mean time spent on target words is greater when the subject has some prior knowledge.

6.3.3.1.9 **Subject 9**
Subject Background Details

Age:	24	Has Studied English for:	More than 4 years
Gender:	Female	Total time spent in English speaking countries:	Four months or less
Nationality:	Japanese	Previous language learning methodology:	Formal/Functional
Student Type:	Foundation year	Current priority:	Formal

For this subject, 9 out of the 14 target words were at levels 1, 2, and 3 of prior knowledge (see Table 58) with 6 of these words at level 1. The most common navigation pattern at

levels 1, 2, and 3 was deductive-inductive, passive-productive (7 out of 9 target words practiced at these levels) with a change at level 4 to an inductive-productive pattern (3 out of 5 words practiced at levels 4 and 5). Thus, this subject’s pattern of decision making is marked at lower levels by dependence on direct learning of vocabulary (deductive), diligence (all screens are accessed), and minimising risk (deductive before inductive, passive before productive). At higher levels, the subject becomes more adventurous but expends less effort.

Prior Knowledge	Word #	⇔⇔⇔⇔⇔ Direction of Navigation ⇔⇔⇔⇔⇔					Mean Path- Length	Mean Duration (mm:ss)
		Learning Activities		Practice Activities				
1	2	FiO	Def	MChoice	GProd	GoToNx	5.00	3:42
	4	Def	FiO	MChoice	GProd	GoToNx		
	5	Def	FiO	MChoice	GProd	GoToNx		
	7	Def	FiO	MChoice	GProd	GoToNx		
	9	FiO	Def	MChoice	GProd	GoToNx		
	14	Def	FiO	MChoice	GProd	GoToNx		
2	1	Def	FiO	MChoice	GProd	GoToNx	5.00	3:54
	12	Def	FiO	MChoice	GProd	GoToNx		
3	10	Def	FiO	MChoice	GProd	GoToNx	5.00	2:15
4	3	FiO		GProd		GoToNx	3.67	2:31
	11	FiO		GProd		GoToNx		
	13	FiO	Def	MChoice	GProd	GoToNx		
5	6	Def		GProd		GoToNx	3.00	2:00
	8	FiO		GProd		GoToNx		

Table 58: Subject 9 - Activities chosen in WordLearner.

6.3.3.1.9.1 Subject Summary

This subject’s responses to Parts 2 and 4 are consistent in so far as her stated beliefs about speaking even if incorrect, guessing, and learning from mistakes are matched by high scores for the efficacy of activities (e.g. communicative use of new vocabulary or vocabulary games) supported by such beliefs. Likewise, her stated beliefs about the importance of vocabulary and repetition and practice are matched by high scores for monolingual dictionary use and multiple choice activities. Low scores for repetition after the teacher, which involves no direct or immediate communicative element, and teacher translation are also consistent with stated beliefs.

There is also a high degree of consistency between the questionnaire data and the subject’s decision making within WordLearner if levels of prior knowledge are taken into account. That is, formal preferences are matched at lower levels and functional preferences come into play at higher levels. The cut-off point at level 4, at which the subject changes from a formal to a functional approach, is also found in other subjects’

patterns (e.g. subjects 5, 7, and possibly 6). This may be the point at which students feel confident enough to undertake learning activities involving risk.

On balance, this subject’s responses to Part 2 suggest a functional bias. The relevant questions are therefore 1D and 1F. As her behaviour appears to be governed in part by level of prior knowledge and is not consistent across levels, both of these questions must be answered negatively.

As this subject gives a higher median score in Part 4 for functional activities the relevant research questions are 2B and 2D. These questions are answered negatively as the deductive learning preference and passive practice preference at levels 1 to 3 does not match the overall functional bias in the subject’s Part 4 data.

Research questions 3A and 3B are answered affirmatively as level of prior knowledge does appear to be a factor in choice of learning and practice activities. To answer research question 3C, while the subject’s path-length is consistently high at levels 1 to 3 (mean path-length = 5.0) dropping drastically at levels 4 (mean path-length = 3.67) and 5 (mean path-length = 3.00), duration of study is somewhat uneven. The drop in path-length is not paralleled by a drop in duration of study which peaks at level 2 and then drops. Therefore, in terms of duration, the effort this subject invests by level of prior knowledge peaks slightly at level 2 followed by a decrease through levels 3, 4 and 5.

6.3.3.1.10 Subject 10
Subject Background Details

Age:	Not given	Has Studied English for:	More than 4 years
Gender:	Female	Total time spent in English speaking countries:	Between 1 and 2 years
Nationality:	Taiwanese	Previous language learning methodology:	Functional
Student Type:	Post-Graduate (MA/MSc)	Current priority:	Functional

Table 59 gives us a picture of a student with a relatively good prior knowledge of the target words. There are no completely unknown words (level 1), 6 out of the 14 target words fall into levels 2, 3, and 4, while the subject states she has complete knowledge (level 5) of 8 of the target words. There are two very clear navigation patterns. These are, firstly, inductive-productive at levels 2, 3, and 4 and secondly, going directly to the next word at level 5.

Prior Knowledge	Word #	⇔⇔⇔⇔⇔ Direction of Navigation ⇔⇔⇔⇔⇔			Mean Path- Length	Mean Duration (mm:ss)
		Learning Activities	Practice Activities			
2	5	FiO	GProd	GoToNx	3.00	4:10
	9	FiO	GProd	GoToNx		
3	2	FiO	GProd	GoToNx	3.00	4:05
	4	FiO	GProd	GoToNx		
4	7	FiO	GProd	GoToNx	3.50	3:03
	14	FiO Def	GProd	GoToNx		
5	1			GoToNx	1.00	0:19
	3			GoToNx		
	6			GoToNx		
	8			GoToNx		
	10			GoToNx		
	11			GoToNx		
	12			GoToNx		
	13			GoToNx		

Table 59: Subject 10 - Activities chosen in WordLearner.

6.3.3.1.10.1 Subject Summary

The subject’s questionnaire data and behaviour in WordLearner are problematic. The general beliefs shown in Part 2 provides a picture of a student with a mix of formal and functional beliefs, but Part 4 responses seem to indicate a lack of enthusiasm for classroom learning. One might interpret the navigation patterns as reflecting the subjects abilities in English and her skills as a language student, which were very good. However, anecdotal evidence obtained in conversation with the subject suggests that she is a very advanced learner who is disenchanted with classroom learning and who wants to emphasise learning from real world communication. The investigator would, therefore, argue that the subject’s interaction pattern is that of a very advanced learner disillusioned with the organised learning of English.

As both the subject’s general beliefs and beliefs about specific activities appear to have a slight functional bias, the relevant research questions are 1D, 1F, 2B and 2D. All of these research questions are answered affirmatively as there is an almost exclusive inductive-productive navigation pattern. However, this is stated with the proviso that the functional bias is marginal and interest in the CALL materials may have been low.

Research questions 3A and 3B are answered negatively as there appears to be no change in preferences by level of prior knowledge. As for research question 3C, there is a slight

decrease in duration of study from level 2 to level 3 with a faster drop to level 4. The number of screens that the subject looks at does not change.

6.3.3.2 Summary of Individual Profiles

This section seeks to integrate the qualitative analysis of each subject’s data into a “bigger picture” so that we can see how the data answers the relevant research questions. The method of integrating the data is to tabulate and total affirmative and negative answers. Table 60 presents this data and the totals for affirmative and negative answers.

Research Q's	1								2								3			
Sub-Questions	C		D		E		F		A		B		C		D		I		II	
Subjects	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
1.				*				*				*				*		*		*
2.				*				*				*				*	*		*	
3.			*					*			*					*		*		*
4.		*				*						*				*	*		*	
5.				*				*				*				*	*		*	
6.				*				*				*				*	*			*
7.				*				*				*				*	*			*
8.			*				*				*				*		*			*
9.				*				*				*				*	*		*	
10.			*				*				*				*			*		*
Totals		1	3	6		1	2	7			3	7			2	8	7	3	4	6

Table 60: Results of qualitative analysis - answers to research questions.

Key: + = affirmative answer to research question.
 - = negative answer to research question.
 Shaded = research question relevant to formal preferences
 Un-shaded = research question relevant to functional preferences

6.3.3.2.1 Relevance to Research Questions

Regarding research sub-questions 1C and 1E, although a sizeable minority showed some relevance, only one subject (#4) showed questionnaire responses directly relevant to these questions. Although, this subject’s data suggested negative answers to these questions, the lack of evidence does not allow for a general answer to these research questions.

Research questions 2A and 2C cannot be answered as no subject showed formal preferences in learning activities. Data was much more plentiful for research questions 1D, 1F, 2B and 2D. The analysis (1D: 3 affirmative vs 6 negative, 1F: 2 affirmative vs 7 negative) suggests that functional bias in general beliefs about language learning was not reflected in either learning or practice preferences in WordLearner. This data supports

negative answers to research questions 1D and 1F. The analysis (2B: 3 affirmative vs 7 negative, 2D: 2 affirmative vs 8 negative) shows that functional bias in preference for activities cannot be said to be related to actual learning behaviour in WordLearner. Although a sizeable minority of subjects do show some relevance, analysis of this data suggests that hypothesis 2 must be rejected.

Answers to research questions 3A and 3B are less ambiguous. The data from this sample shows that preference for initial learning activity is clearly related to the level of prior knowledge. A strong majority (7 vs 3) of cases show subjects varying learning preference according to level of prior knowledge. On the other hand, a majority of subjects (6 vs 4) do not change practice preferences according to level of prior knowledge. Therefore, research question 3A is answered affirmatively while 3B is answered negatively.

6.3.3.2.2 Relevance to Hypotheses

This analysis shows no clear relationship between questionnaire responses on general beliefs about language learning and beliefs about the efficacy of specific activities and actual preferences in WordLearner. Therefore, hypotheses 1 and 2 are rejected.

Hypothesis 3 that subjects consciously take advantage of the flexibility of choice in the program can be accepted. A majority of subjects did not change their practice preferences according to level of prior knowledge, thus weakening the case in favour of complete acceptance of the hypothesis. However, enough subjects adapted their preferences in such a way as to indicate conscious deliberation that the investigator considered the case for acceptance strong enough.

6.4 Conclusion

Analysis of this study falls naturally into two sections, descriptive and correlational analysis of the questionnaire survey and descriptive and correlational analysis of the subjects' recorded behaviour in WordLearner. Analysis of the questionnaire survey found much the same results as the pilot study despite the different backgrounds of this sample. Regarding Part 3, in which subjects rated the formality or functionality of language learning activities, these activities were, on the whole, defined as expected as either formal or functional in nature. As with the Questionnaire Pilot Study, functionally defined activities were given significantly higher scores for efficacy.

Correlations between the general beliefs recorded in Part 2 and scores for efficacy in Part 4, though differing from those found in the pilot study, were in the expected directions. Functional beliefs correlated positively with the perceived efficacy of functional activities and likewise for formal beliefs and formal activities. This data supports a confirmation of hypothesis 1.

Preferences recorded in WordLearner do not match the data obtained from the questionnaire. It appears that correlations between general statements about beliefs and the perceived efficacy of language learning activities are as predicted, but in a real language learning situation, learning decisions are based not only on beliefs but also by other factors. In this case, prior knowledge of the target vocabulary appears to be an influential factor in learners' decisions. This data supports a rejection of hypothesis 2 and qualified acceptance of hypothesis 3.

Regarding the amount effort invested in the learning task, it was found that there was a relationship between formal-functional bias in general beliefs about language learning and effort invested. However, there did not appear to be a relationship between beliefs about the efficacy of formal or functional activities and effort. Hypothesis 4 was accepted while hypothesis 5 was rejected.

Apart from accepting or rejecting hypotheses, issues have arisen in the analysis of this data regarding the nature of the relationships between learners' beliefs and their actual behaviour and also regarding autonomous learning. These issues will be discussed in the next chapter.

Chapter 7 Discussion

This chapter is structured according to the two studies which make up this research. Within each main section, there will be a general introduction consisting of a brief discussion of characteristics of the sample that may have affected the results and a “background picture” based on the descriptive statistics followed by a detailed discussion of the results. This detailed discussion will firstly address in what ways, if any, the data supports the research hypotheses. Secondly, it will discuss the extent to which this data supports and contributes to current thinking on metacognition in second language learning.

7.1 *Questionnaire Pilot Study*

7.1.1 Questionnaire Pilot Study Introduction

Following the description of the sample, this section will begin with a general introduction based on the descriptive statistics for each part of the questionnaire. The discussion of the results will be structured according to the four themes in Part 2 of the questionnaire and will integrate both descriptive and correlational statistics. Following this, a short section will be devoted to a discussion of how these results can be viewed in the light of previous theory and research on metacognitive knowledge and what, if anything, the investigation described here can add to this body of knowledge.

7.1.1.1 *Background Data*

The main characteristics of the sample as a whole were that they were close together in age and were evenly divided in gender. As a group, they are quite experienced in language learning and have been exposed to a variety of teaching methodologies. A fairly large proportion (9 out of 30) are East Asian. Possible relationships between cultural background and questionnaire responses will be discussed below.

Cross tabulations indicated that the background variables measured did not appear to have any valid significant statistical relationship with items in Parts 2, 3 and 4 as cell counts and expected minimum frequencies were too low to accept the chi squared statistic.

However, although invalid, the cross tabulations yielded significant results for the nature of previous classroom learning and the perceived efficacy of all 4 grammar activities in Part 4. It is difficult to ignore these results as the style of classroom learning seems to be

so closely linked to the perceived value of grammar learning activities and unrelated in any systematic way to any of the other activities.

The best description for this relationship between the perceived nature of previous classroom learning and the perceived efficacy of grammar learning activities might be “the grass is always greener on the other side of the fence”. Those who state that their previous classroom learning was mostly formal rate functional activities more highly while those who state that it was mostly functional rate formal activities more highly. Those who state that their previous learning was a mix of both appear likely to value both types of activity.

The investigator is aware of only one research report that may be relevant. Elbaum et al (1993, 329-330) found that students’ prior experience of a traditional approach led to subjects defining language learning as declarative while experience of immersion and living in the foreign language culture led to subjects defining language learning as procedural. This is somewhat different to the finding here, but Elbaum et al (1993, p. 330) also propose that purpose and environment also influence task definition and learning strategies. The need to develop a balance of skills to function during the year abroad and to function in a job requiring the target L2 may also have influenced these respondents.

The lack of validity of the cross-tabulation provides a poor basis for interpretation, so this discussion is particularly speculative and therefore restricted. It is quite possible that the wording of the question on previous classroom learning influenced the result; grammar was a key part of the description of formal and mixed learning and it was also part of the definition of *correctness* in Part 3. Grammar was, therefore, quite possibly at the forefront of the respondents’ minds. However, it is equally possible that the role attention to grammar has played in respondents’ overall experience of classroom learning may be a key component of their beliefs about the way grammar should be learned. Exactly how experience affects beliefs and how these beliefs affect teaching and learning is a matter for future research.

While re-emphasising the weakness of the evidence, the data suggests that exposing language learners to a balanced variety of activity types may be beneficial. Such exposure may develop a positive attitude to both formal and functional activity types and

the flexible approach that seems to be characteristic of good language learners (Gremmo & Riley, 1995, p. 158)¹⁵.

Regarding cross tabulations between cultural background (variable: nationality) and responses to Parts 3 and 4 of the questionnaire, a significant but invalid cross tabulation was found with formal-functional definition of teacher translation of vocabulary (activity c) in Part 3. Teacher translation of vocabulary was defined by most (89%) of the East Asian respondents as formal, while most (62%) of the Europeans defined it as functional. The surprising thing about this is that the East Asians, who are studying an L3 in an L2 medium, see this activity as traditional and teacher centred, while the Europeans, who are studying an L3 in an L1 or at least a cognate language, see it as meaning focused, communicative, and relevant to performance of language skills. This is counter to the stereotype of East Asian students and perhaps supports Littlewood's (1999, p. 73) contention that the stereotype does not exist.

In Part 4, significant but invalid results were found with translation related and games and reading for fun activities. In all cases, East Asian students tend to give lower values for the efficacy of translation related activities. Again, this is opposite to the East Asian stereotype. On the other hand, East Asian students tend to give lower ratings for the efficacy of vocabulary and grammar games and reading for fun, which is what one expects according to the stereotype of East Asians as formally biased language learners.

What might explain these results? The answers may lie in the East Asian respondents' perception of the learning context and its requirements and a possible bias towards a need for teacher correction. For the East Asian respondents, the context is somewhat different from the European respondents as they are learning an L3 in an L2 medium classroom environment. Thinking and working in the L3 might be easier for them than continually looking for translations in a classroom in which students have 2 or more mother tongues. These students have already had to do something which the majority of the European students have not; that is, they have had to adapt to immersion in an English language environment. This might give them a more positive opinion on immersion in another language environment. Regarding games and reading for fun, these activities emphasise communication at the expense of accuracy while the teacher's involvement is necessarily limited. Although this investigation found no relationship between cultural background

¹⁵ See Chapter 8.2.1.1, #1 for research conclusions and Chapter 8.3.2, #1 for pedagogical implications.

and general beliefs in Part 2, previous research (Cortazzi & Jin, 1996; McCargar, 1993) has suggested that East Asian students value teacher correction and support and the development of accuracy more than teachers do.

Again, the weakness of this evidence has to be emphasised as these results are statistically invalid. The interpretation given here, however, lends some support to the point made above regarding the influence of previous experience on beliefs. In this case, the East Asian students might be expressing beliefs based on their experience of learning English. In addition, the perceived context may be different because of this. Further research is warranted on the relationship between context, culture and beliefs.¹⁶

7.1.1.2 General Beliefs About Language Learning

With the exception of a few items in which a large proportion of responses were neutral, the overall pattern of responses to Part 2 of the questionnaire on general beliefs about language learning shows that the respondents tended to have definite and, to a certain extent, consistent views on the statements provided. Findings for Part 2 will be discussed in detail below (see Chapter 7.1.2 to 7.1.6).

The overall picture is one of a group that is generally biased towards language learning as a task that requires focus on meaning and communicative practice. There is general agreement that knowledge of the target language culture, living in the target language country, practice, guessing and learning from mistakes are all important to language learning. Strong opinions on these general issues contrast with neutrality on more specific issues such as the importance of vocabulary, grammar and translation. This differs from Horwitz' (1988) study of freshmen (supposedly beginning level) students and Yang's (1993) study of Chinese university English majors (with six or more years of English study) who valued these highly. Graham's (1997, p. 79) finding that A level learners combined beliefs in the value of knowledge of the L2 country and living there with an emphasis on grammar and vocabulary also differs from the present study. The difference between her findings and the present study may be due to the students being at a higher educational level and not having to pass an A level type examination.

¹⁶ See Chapter 8.2.1.1 and Chapter 8.2.1.5 for research conclusions based on this.

There is also a strong feeling that one should try to speak even if one makes mistakes and that guessing is a good strategy, but the respondents are divided on the issue of teacher correction, which perhaps reflects differences in attitudes to developing communicative ability. Some of these students, like some teachers, may believe that good communicative ability is founded on an insistence on accuracy in the beginning stages of learning while others may believe that establishing fluency is more important. This may also reflect a conflict between the need to learn to communicate and the need to pass examinations which may lead to some students valuing both communicative and highly formal methods. Yang (1993, p. 3) argued that this conflict explained a similar pattern of opinions in her study.

Horwitz' (1988, p. 292) conclusions about her subjects' bias towards valuing of formal methods are challenged by the present study. She argued that such "erroneous beliefs should be confronted with new information" (p. 292) if the students are to develop further, but her questionnaire, on which Part 2 is based, does not take account of how beliefs may change over time with, for example, developing proficiency or changes in learning context. While it should be made clear that these subjects are quite different from the mostly inexperienced learners surveyed by Horwitz, the subjects' neutrality in the present study suggests that language learners' beliefs may change as they develop their abilities.¹⁷

Regarding motivations, majority agreement with items 16 and 18 showed that both instrumental and integrative orientations are expressed by most of the subjects in this sample. Yang (1993, p. 3) found that instrumental motivation was much higher than integrative motivation and suggested this was due to studying the L2 (English) in the L1 country (Taiwan). The subjects in the present study are in a similar situation. The difference is, however, that spending a year in the target L2 country is a part of their course. Getting to know L2 native speakers is therefore a realistic probability. Responses regarding item 17 on the perceived status of knowing the target language showed interesting differences between languages. Students of Japanese perceived their target language as having a high status, but students of Chinese and Korean were not so uniformly positive. This may reflect a perception of Japan as a powerful trading and exporting nation and that being able to speak Japanese is therefore valuable. China and Korea may not yet be seen in the same positive light.

¹⁷ See Chapter 8.2.1.5 #8 for research conclusions.

7.1.1.3 *Formal-Functional Definitions of Language Learning Activities*

Responses to Part 3, which asked respondents to evaluate the formal and functional components of specific activities, showed, firstly, that language students are capable of making such judgements if the criteria are explained clearly to them. Secondly, in making these judgements, they perceive that no activity is purely functional or formal in nature. This echoes Bialystok's (1981, p. 25) recognition that form and function are not mutually exclusive and that one cannot be studied in the absence of the other. It could be argued that the questionnaire imposed these categories on the respondents, but against this it could also be argued that they did not have to evaluate the two components in the way that they did. They could, for example, have rated the formal component at the lowest point on the scale on activities which they perceived to be functional, but they did not do this.

7.1.1.4 *Efficacy of Language Learning Activities*

Responses to Part 4, which asked respondents to evaluate the efficacy of the tasks described in Part 3, showed that there is a significant difference for the group as a whole in the perceived efficacy of activities which they see as formal or functional. It may be that Bialystok's (1981, pp. 32-33) finding that functional practice leads to greater achievement is matched by a perception among students that such practice is more effective. This difference will be discussed further below (see Section 7.1.6).

7.1.2 *Nature of Language Learning*

Responses to items 1 through 7 of Part 2 revealed that knowledge of the target language culture and living in the target language country are quite highly valued, there is a strong feeling that language learning is different, and that many respondents are neutral regarding the importance of vocabulary, grammar and translation. We shall discuss each of these in turn together with the implications of any correlations which these items had with Part 4.

Data from items 2 and 3 of Part 2 concerning the importance of cultural knowledge and of living in the L2 culture suggests that both of these are highly valued. In addition, these beliefs also have a relatively high number (5 for item 2 and 10 for item 3) of significant or near significant correlations with beliefs about the efficacy of both formal and functional learning activities. The directions of these correlations, positive for functional activities

and negative for formal, provide support for hypotheses 1. They also show that general beliefs about the value of cultural knowledge or learning environment, factors which facilitate learning rather than directly bring it about, correlate with very specific beliefs about classroom learning activities.

An example of the strength of this relationship is that item 3 on the importance of living in the target language country has a significant negative correlation with the perceived efficacy of the formal activity of memorising dialogues. This activity is often justified on the grounds that memorising a dialogue, say, to buy a train ticket, can help perform the task in real life (i.e. when living in the native speaking country); however, these respondents rated it as 5 for formality, 2 for functionality, and only 3 for efficacy, showing that they believed memorisation of dialogues was not particularly relevant to performance and not very effective for learning. With this sample, therefore, even a formal activity with an arguably practical benefit was seen as ineffective by those who believed in the importance of living in the target language environment.

As correlational relationships do not show direction of relationship, it is not possible to say with assurance that beliefs about factors that facilitate the learning of a foreign language *lead to* stronger belief in the efficacy of performance oriented activities that focus on meaning. However, such beliefs in the importance of facilitative factors could be seen in a similar light to those found by Benson and Lor (1999, 467-470) who concluded that the students most likely to progress to an advanced level in English at university level were those who viewed language learning qualitatively rather than quantitatively; those who viewed language as an environment rather than a set of discrete facts such as words or rules were more likely to progress. It might, therefore, be argued that the relationships found here are reflective of experienced and relatively successful language learners.¹⁸

Two possible interpretations of the responses to items 4, 5, and 7 (focusing on vocabulary, grammar and translation respectively) will be considered here. To recap, these items all had a high proportion of neutral responses and very few correlations with perceptions of the efficacy of specific activities. The high proportion of neutral responses probably militates against achieving statistically significant correlations. The question is, therefore, why are there so many neutral responses. Firstly, the items might not have been worded

¹⁸ See Chapter 8.2.1.2, #1 for research conclusions and Chapter 8.3.2, #3 for pedagogical implications.

clearly enough. Against this, it has to be said that it is fairly clear that these statements are generalisations about learning the target language and these items have elicited a much wider range of responses in previous surveys (e.g. Horwitz 1988). An alternative approach to this interpretation would be that the questions were understood, but language learning and language learners might have been viewed by the respondents as so varied that they could neither agree nor disagree; these items might therefore be described as not specific enough for this sample.

Secondly, we could take the responses at face value, accept that neutrality on these issues is a characteristic of the sample rather than a result of poorly chosen wording, and try to see how this neutrality fits into the bigger picture. As mentioned already, items 2 and 3 focus on factors that facilitate language learning and agreement with them may indicate a qualitative view of language learning; on the other hand, items 4 (vocabulary) and 5 (grammar) focus on knowledge domains and item 7 (translation) focuses on a method of learning that could be applied in a variety of situations. If we compare the response patterns, we can see that the sample is heavily biased towards agreement with items 2 and 3 and towards neutrality with items 4, 5, and 7. If we also bear in mind the high level of language learning experience among this sample and research which suggests that more successful learners are likely to apply a wide range of strategies (Gremmo & Riley, 1995, p. 158), a picture emerges of a group of language learners who are relatively successful, take a qualitative view of language learning and will not commit one way or the other on the importance of vocabulary, grammar or translation possibly because they recognise that for them this depends on the learning task and its context.¹⁹

7.1.3 Learning Strategies

The two items in this section focus, firstly, on a very general belief in the importance of repetition and practice (item 8) and, secondly, on the importance of studying in the Open Access Centre (item 9). Item 8 refers to both “repetition” and “practice”. This could be regarded as vague and confusing. During the development of the BALLI, Horwitz asked students to describe their beliefs and these descriptions then became items in the questionnaire. Horwitz (1988, p. 284), following pilot testing of the questionnaire, deliberately kept the wording used by students as this would more accurately reflect the terms in which language learners think about the task of language learning.

¹⁹ See Chapter 8.2.1.1, #1 for research conclusions.

There are a total of 5 correlations between item 8 and the activities described in Part 4. Two of these correlations, which are both with video activities for listening, are relatively strong ($r = .50, p = .002$ and $r = .54, p = .001$ respectively). Overall, the pattern of responses suggests that valuing repetition and practice does not necessarily mean valuing repetitive formal activities; those who agree with the statement appear to believe that performance oriented, meaning focused activities are effective learning methods even for something inherently formal like grammar.

Item 9 is superficially specific to students in the Language Centre at Newcastle University, but it is taken here to indicate the importance put on self-directed study. There are three correlations, all of which are weak, and one of which is only approaching significance. Although this evidence is very limited, the directions of two of these correlations (positive with Activity *h*, communicative practice to improve grammar skills, and negative with Activity *x*, dictation to practice listening skills) appear to support the view that those who value self-directed learning may also value student-centred communicative activities and place a low value on teacher-led activities like dictation. The positive correlation with sentence level practice of writing skills, a formal activity, is not so easy to interpret. It may be just a chance relationship or it may reflect the type of activity Oriental languages students do in the OAC. Students of these languages have to work very hard on orthographic and sentence level skills that they might breeze through (or not have to learn at all in the case of ideograms) if they were learning a European language and the OAC is a good place to do this.

7.1.4 Communication Strategies

The six items comprising this section of Part 2 address the beliefs respondents have concerning the importance of accent (item 10) and accuracy (item 11), taking opportunities to practice with native speakers (item 12), guessing (item 13), feelings of embarrassment (item 14), and correction (item 15). The lack of any correlations between item 10 and activities in Part 4 is interesting in that one might expect this to have some relationship to activities involving repetition or speaking. One might speculate that the respondents perceive the activities described as having no effect on accent and that factors in the learning environment other than these are more important; for example, native speaker teachers and spending time in the target language country may be perceived as relevant but were not included in Part 4.

Item 11, focusing on accuracy in speaking, elicited a strong response in favour of speaking regardless of mistakes and had a relatively high number of correlations with activities in Part 4, all of which were in the expected directions: functional belief correlated positively with functional activities and negatively with formal activities. Since these respondents appear to be veteran language learners, this may be the voice of experience. It may also be a result of having teachers who emphasise speaking or going through a school system that uses communicative methods.

Item 12 on seeking practice opportunities with native speakers showed up an interesting difference in beliefs between genders and a possible relationship with beliefs about the value of translation. There may also be indirect implications for dependence on authority. Those who were neutral or stated that they would not initiate a conversation with a native speaker were predominantly female. Even though the item did not mention the gender of the native speaker, the safety issue and the natural reluctance of females to start conversations with unknown males was quite possibly a factor in the response. This item had two significant negative correlations with the efficacy of teacher translation for learning vocabulary and developing reading skills, both of which are quite closely related. A reluctance to engage in conversation with native speakers correlates with a higher perceived value of teacher translation. This may reflect either an underlying disinclination to take risks expressed in a dependence on the authority of the teacher, a factor identified by both Cotterall (1995, p. 197) and Mori (1999b, p. 396), or a possible relationship between gender and formal preferences, which has been suggested by research conducted by Oxford and Nyikos (1989, p. 296) and Wen and Johnson (1997, p. 34).

Item 13 on belief in the value of guessing has two correlations, one negative with focus on sentence level skills in writing practice and another positive (approaching significance) with written vocabulary exercises, which are typically multiple choice or gap-filling, following reading. The negative correlation with working on sentence level skills is in the expected direction as this is a formal activity emphasising the mechanical aspects of writing rather than communication of meaning and with little need to experiment or explore. The correlation with written vocabulary exercises will be discussed further below.

Item 14 regarding self-consciousness while speaking the language in front of others has two correlations, one positive with written vocabulary exercises following reading, which will be discussed below, and another negative with group discussion to develop speaking skills. The negative correlation with group discussion activities is not surprising; students have to overcome a lot of embarrassment to take part in such activities.

Item 15 regarding correction has two correlations, one positive with the perceived value of real written communication without teacher correction and another negative with the perceived value of leisure reading. The positive correlation with writing without correction cannot be explained by this investigator. The second correlation with the value of leisure reading is in the expected direction. Leisure reading in a second language must entail a high tolerance of ambiguity, which may not concord with a strong belief that being allowed to make mistakes is bad.

Three correlations with formal activities need further explanation. Firstly, a negative correlation between item 11 focusing on accuracy in speaking and activity *k*, multiple choice grammar exercises to develop writing skills had a negative rather than the positive correlation which one might expect; that is, agreement with the statement suggests a formal belief, so it should correlate positively with a formal activity. The explanation for this may lie in the respondents' beliefs regarding multiple choice activities as they might perceive that they combine risk-taking with a low threat to self-esteem; they are slightly risky but most of all safe. Strength of disagreement with item 11 suggests a stronger belief in risk taking, so a corresponding higher valuing of multiple choice activities is not surprising.

Secondly, the positive correlation between item 13 focusing on guessing and written vocabulary exercises following reading may have a similar explanation to the correlation between item 11 and activity *k*. That is, guessing is risk-taking and the vocabulary exercises are also perceived as risk-taking. Thirdly, the correlation between item 14 regarding self-consciousness and written vocabulary exercises following reading may have a similar explanation. The respondents' familiarity with the activity type is likely to decrease anxiety and the perceived threat to self-esteem (Ausubel, Novak, & Hanesian, 1978, p. 443).

7.1.5 Motivations

This section of Part 2 consisted of three items focusing on instrumental motivation (item 16), perceived status of speaking the target language (item 17), and integrative motivation (item 18). Regarding correlations between these items and activities in Part 4, only instrumental motivation, producing seven significant (including one approaching significant) positive correlations, showed much of a relationship to perceived efficacy. Two questions arise in attempting to interpret this. Firstly, although instrumental motivation may be associated with formal learning (Gardner and Lambert, 1972), all of the correlations are with the perceived efficacy of functional activities, which is the opposite of what would be expected. Secondly, if this type of motivation could yield so many correlations, why is it that integrative motivation, which yielded only a single negative correlation approaching significance, did not?

One possible explanation for both of these problems might be that the respondents hope to get a job in which they can apply their language skills and they see clear connections between the practice activities and tasks they would need to perform in the work-place. There are, therefore, more correlations.²⁰ These correlations are with functional activities because the respondents may be more concerned with being able to function in a job than with the means of getting one (i.e. passing exams and getting a degree); therefore, the formal methods which aid in passing exams are not important to them. Conversely, because the aims of integrative motivation might not be as clear cut as those of instrumental motivation and the skills needed to achieve integration might not be as easily identifiable, there would be fewer correlations.

7.1.6 Relevance to Previous Theory and Research on Metacognition

This section will consist of a synthesis of the above discussion focusing on how the data can be interpreted according to the conclusions reached by previous theory and research in the field of metacognitive knowledge. As such, it is an attempt to fuse the various arguments and explanations put forward above into a coherent picture with a view to examining possible pedagogical implications. This discussion will focus, firstly, on the relevance of the research results to Flavell's model of metacognitive monitoring (Flavell, 1979), and, secondly, on how these research results could be interpreted from a multidimensional view of personal epistemology.

²⁰ See Chapter 8.2.1.1, #4 for research conclusions.

Regarding Flavell's model, the respondents' ability to evaluate formal-functional components of language learning activities (Definition of Language Learning Tasks Questionnaire, Part 3) and to differentiate between activities on the basis of their effectiveness for the skill being practiced (Definition of Language Learning Tasks Questionnaire, Part 4) suggests a well-developed knowledge of the nature of language learning tasks. That this ability to conceive of activities in this way is present supports Flavell's (1979, p. 907) model of metacognitive monitoring, at least in so far as task and strategic knowledge are concerned as respondents show a clear conscious knowledge of language learning tasks and methods.

The general pedagogical implication here is that experienced language learners like those in this sample may be able to make considered decisions on how to learn and that this ability could be harnessed. Listening to students' opinions on activities and methods and making this interaction part of both classroom practice and awareness training might lead to more effective teaching and learning, at least for experienced language learners.²¹

The results of this study can also be interpreted in terms of multidimensional views of personal beliefs about language learning. Cotterall's 1995 study found (p. 197) that dependence on the teacher both as an authority and a source of feedback were very strong components in her subjects' beliefs, while a follow-up study (Cotterall, 1999, p. 505) found that subjects also believed that making mistakes (with the implied need to take risks) was part of learning. The results from Part 2 of the Definition of Language Learning Tasks Questionnaire are consistent with this; a sizable minority, 11 out of 30, wants correction, but almost all are risk takers (24 out of 30).

If we examine the correlations between Part 2 and Part 4, certain apparent inconsistencies emerge within the data itself and also between previous research and this study. Firstly, a majority of the subjects do not believe translation is an important part of language learning. The sample gave a median value of 3 for the efficacy of translation in the reading class, which is consistent with their response in Part 2; however, the sample also gave translation in vocabulary learning a median of 4 for efficacy. If we were to use the terms adopted by Schommer (1990) and Mori (1999a; 1999b), we would say that the subjects display some dependence on authority in vocabulary learning but not as much in reading. This would be questionable as dependence on authority was viewed by both

²¹ See Chapter 8.3.2, #2 for pedagogical implications.

Schommer (1990) and Mori (1999a; 1999b) as a core dimension of belief which should be consistent across skill areas and not subject to influence by other comprehension or learning variables. It may be that dependence on authority is a dimension of these students' beliefs, but recognition of the nature of specific tasks over-rides it; the subjects possibly believe that the teacher is an authority on vocabulary and that translation is an efficient method of learning in a knowledge domain where efficiency might be an issue; a lot of vocabulary has to be learned in a short time and what the student learns can easily be quantified.²²

On the other hand, the task of developing reading skill is fundamentally communicative. The focus is on meaning and the acquisition of procedural knowledge (Bialystok, 1981, 1988), and it is not easy to quantify the degree of reading ability. If communicative ability has to be seen in qualitative not quantitative terms, the efficiency provided by teacher translation in terms of the speed at which a reading passage can be completed may not be as likely to be viewed as relevant.

The argument put forward here combines Benson and Lor's (1999, 467-470) conclusions on a quantitative-qualitative distinction in learners' beliefs and research findings suggesting that good language learners take a flexible approach (Gremmo & Riley, 1995, p. 158); although learners may need to have an over-all qualitative view of language learning for long term improvement, experienced learners are willing take a quantitative (e.g. maximise the number of words that can be learned in a given time) approach when the task demands it. Purely speculatively, it may be that good language learners are able to apply a range of different learning strategies because their underlying beliefs about language learning (or learning in general) incorporate a dimension of inflexibility-flexibility; good language learners accept the need to adapt.²³

Next, we shall discuss a possible explanation for the high number of correlations found between general beliefs and specific activities and the low number of correlations between the more specific beliefs such as those referring to the importance of vocabulary, grammar and translation and specific activities. This contrasts with Mori's findings that general beliefs had few correlations with beliefs about learning Japanese. However, the research

²² See Chapter 8.2.1.5, #3 and #7 for research conclusions.

²³ See Chapter 8.2.1.2, #4 for research conclusions.

reported here focuses on the next level of relationships between general beliefs about language learning and specific tasks.

It may be that general beliefs about the importance of culture and practice or about principles such as learning from mistakes that are not related to specific skill areas form the core of a language learner's personal epistemology; beliefs about more specific considerations such as the importance of vocabulary and grammar would then overlay these. If this is the case, there is a strong implication for language awareness training. That is, unless such general beliefs are directly addressed, trying to change a student's opinion about, say, an obsession with grammar is likely to fail. Moreover, it emphasises the value of culturally oriented activities such as the study of French Cinema on a French degree course or social programmes in language schools.²⁴

7.1.7 Summary

The general pattern of response indicates that:

1. Subjects with a functional bias in general beliefs as measured by Part 2 of the Definition of Language Learning Tasks Questionnaire also have a functional bias in preferences for specific activity types. Likewise, those with a formal bias are more likely to value formal activities. Bearing in mind the weakness of the correlations and the paucity of correlations between more specific beliefs and preferences for specific activities, the significant correlations found within the data support affirmative answers to research questions 1A and 1B and acceptance of hypothesis 1.
2. These language learners may have a metacognitive knowledge that is not only well-developed but also stateable (i.e. it is consciously held). The responses to Part 2 generally suggest that the respondents do have fairly clearly established beliefs and opinions. However, a high proportion of neutrality was found in responses to several items.

General principles such as value of cultural knowledge, environment, importance of practice and trying to speak even though one might be wrong have a relatively high number of correlations with Part 4. In contrast, more specific beliefs regarding, say, the

²⁴ See Chapter 8.3.2, #3 for pedagogical implications.

importance of translation or vocabulary, show a high proportion of neutrality and do not yield many correlations. Respondents possibly found it hard to agree or disagree with the statements on translation or vocabulary because the task of language learning and the needs of learners at different levels are so varied that they have to say “it depends”; it is possible that these respondents possess a core belief in the need for flexibility in approach to learning and believe that formal activities such as translation, memorisation of vocabulary, and learning grammar rules are sometimes appropriate. Further research would be required to identify the conditions under which language learners believe that formal activities are necessary.

Lastly, this data may point the way to further investigations of the possibility that there is a hierarchy of beliefs in terms of some beliefs being more important than others in determining learning preferences. Research on the effects of language awareness training focusing on various levels within this hierarchy, if it exists, may have pedagogical implications especially in the area of awareness of task requirements.²⁵

7.2 *Main Study*

Discussion of the results of this study will be divided into two main sections. Firstly, we will discuss the analysis of the questionnaire results. Secondly, the results of the analysis of subjects’ interactions with the computer environment used in this investigation and correlations between the two.

7.2.1 Questionnaire Introduction

The structure of this part of the discussion will mirror that of the Questionnaire Pilot Study (see section 7.1.1 above). It will begin with a general introduction based on the descriptive statistics for each part of the questionnaire followed by a discussion of the results structured according to the themes in Part 2 of the questionnaire (Nature of Language Learning, Learning Strategies, and Communication Strategies) integrating both descriptive and correlational statistics. Following this, there will be a discussion of how these results may be relevant to previous theory and research on metacognitive knowledge and what this particular research might add to our knowledge of metacognition in language learners.

²⁵ See Chapter 8.4.1 for suggestions for future research.

7.2.1.1 Background Data

This sample differed from that of the Questionnaire Pilot Study in several respects. The subjects, all of whom were from overseas and mostly from East or South-East Asia, were older, mostly female post-graduate students highly experienced in studying English. Some 82.5% of the sample stated that their prior learning had been either formal (37.5%) or a mix of formal and functional (45%), which is not surprising bearing in mind the highly traditional nature of education in Asian countries. However, 75% of the subjects stated that their priority in learning methodology was functional. The chi-squared statistic showed a significant but invalid relationship between priority and student type probably due to the high proportion of post-graduates who stated that their priority was functional and the Foundation Year students who stated their priority was formal. Bearing in mind the invalidity of the statistic, it is highly speculative to discuss this. However, it is interesting in that two groups of students who have the similar academic objectives have such different priorities. The difference may be in immediate needs as students take the Foundation Year because they do not reach the required scores in TOEFL or IELTS and study English almost full-time with the aim of achieving these scores. The post-graduate subjects do not have to take IELTS and are more concerned with communicating ideas either in speaking or writing.

While noting that there were only 3 Foundation Year students in the current study, this data is consistent with Cotterall (1999, p. 508), who argued that the EAP students in her research study put a high value on formal aspects of language because of the need to develop accuracy. On the one hand, the post-graduates, provide a contrast; test scores are not relevant to them and it may be that Cotterall's conclusions did not take full account of her subjects' need to get a high enough score to gain admission to their courses. On the other, these results may provide an illustration of Elbaum et al's (1993, p. 330) findings on the importance of purpose to task definition and learning strategies.

7.2.1.2 General Beliefs About Language Learning

The samples for the Questionnaire Pilot Study and this study were quite different as the former were a combination of British and overseas students studying Oriental languages in England while the latter were all overseas students studying English in England. However, despite these important differences, the analysis found only 2 significant differences in their general beliefs concerning belief that language learning is different and belief that it is OK to guess. Overall, the sample is biased towards a functional view

of language learning and, as with the Questionnaire Pilot Study, contrasts with Horwitz' (1988) results.

Within the sample, general agreement on the importance of knowledge of culture, learning English while living in an English speaking country, practice, and guessing contrasted with a spread of opinion and a high proportion of neutrality on the importance of grammar, vocabulary and translation. This neutrality suggests an "it depends" attitude to the statement which in turn suggests that the subjects are quite capable of distinguishing the requirements of learning tasks. Again (see above), these results differ from those of Horwitz (1988), and Yang (1993; 1999).

It also seems that a high proportion of subjects in this sample combine a belief in the value of living in England and knowledge of English culture with an unwillingness to state that grammar and vocabulary are not a major part of learning an L2. If we interpret this reluctance as an acceptance that grammar and vocabulary may sometimes be important, this is consistent with Graham (1997, p. 79). Moreover, although we do not have evidence to claim that these subjects are good language learners, in the sense that they are very successful, they are at least very experienced. This provides some support for the argument made above (see Section 7.1.1.2) that neutrality is evidence of awareness of variation in task requirements and indirectly supports evidence that good language learners are adaptable (Gremmo & Riley, 1995, p. 158).²⁶

Item 5 should be mentioned here as the Main Study response was significantly different from the Questionnaire Pilot Study. Some 40% of the sample are either neutral or disagree that language learning is different from learning other subjects. This may have implications for the type of learning strategies these subjects apply to learning English and the positive correlations found with functional activities (see Section 7.2.2.1), which are inherently more meaning focused, may suggest that perceiving a difference is related to a more communicative approach to language learning.

Apart from item 9 on guessing, responses to items on communication strategies also show a strong similarity to the Questionnaire Pilot Study. The subjects' overall agreement on the importance of speaking even if incorrect and their strong agreement with guessing if a word is not known contrasts with a dichotomy of opinion on learning from mistakes. As

²⁶ See Chapter 8.2.1.5, #1 for research conclusions.

we have seen from the description of the responses in the Questionnaire Pilot Study (see 5.1.1.2.3), what we may be observing here is that a small majority of students are probably prepared to trade accuracy for fluency and believe that inaccuracies in the L2 can be ironed out later.

Regarding item 9, the significant difference with the Questionnaire Pilot Study response is probably due to the much stronger agreement with guessing as a communication strategy. This evidence provides support for those who argue that the Asian student is not the shrinking violet that accepted wisdom would have us believe.

In section 7.1.1.2 above, it was argued that a conflict between the need to communicate and the need to pass examinations produced these responses to the item on learning from mistakes and that this was consistent with previous research (Yang, 1993). However, although many subjects in this sample would have had to take subject examinations, few of them (3 Foundation Year and 1 Bridging Year out of 40 subjects) had the same concern for IELTS examination scores. It seems that while a large majority of subjects state that their learning priority is functional and therefore value communicative methods, a large minority (14 out of 40) probably see no problem with teacher correction. The investigator's intuitive, highly speculative argument, is that it may be that these responses simply reflect one or more of the following:

1. The need for accuracy in EAP.
2. Different approaches to language learning that were formed earlier in the subjects' development when examinations were important.
3. Looking at this data from a Vygotskian socio-cultural perspective (Frawley & Lantolf, 1985), subjects perceive a need for support from others (e.g. a teacher) in the development process whether or not they have to take an examination. This support could take the form of assessment or correction.

7.2.1.3 Formal/Functional Definitions of Language Learning Activities

This sample's responses to Part 3 of the questionnaire were also similar in many respects to those of the Questionnaire Pilot Study. All activities were perceived as having both formal and functional components. The eight activities described in this part of the questionnaire all focused on learning vocabulary. The first four activities, which were also included in the previous study, were defined as either formal or functional in the

same way that the Questionnaire Pilot Study sample had defined them. Activities *e*, *f*, and *g*, which were introduced in this study, were also defined as expected. For a discussion of this, the reader is referred to Section 7.1.1.3 above as interpretation of this data is the same as for the Questionnaire Pilot Study.

Activity *h* (writing sentences to practice new vocabulary), which was also new in this study, was rated as equally formal and functional according to median values by the sample as a whole. This was unexpected as the investigator had designed it to be defined as functional. The investigator's interpretation of this is that the subjects probably viewed this as primarily a meaning focused activity that required strong formal skills such as knowledge of vocabulary and sentence structure to complete. It may therefore be that this is simply an example of practice of meaning being highly dependant on form (Bialystok, 1981, p. 25), at least in the subject's view.

From the investigator's point of view as a teacher, the subjects' perception of practicing new vocabulary by writing sentences containing them as equally formal and functional is surprising. It is easy to assume that such an activity is highly meaning focused and is perceived in the same way by students, but this may not be the case. It appears that their task knowledge (Flavell, 1977, p. 907; Wenden, 1998, p. 518) takes into account not only the communicative aspect of the activity, but also the formal skills required to produce a meaningful sentence. It may be that the formal component of this activity is easy to underestimate from the teacher's point of view; for a native speaker, the problem solving procedures involved in producing a sentence are usually sub-conscious as they would be been proceduralized (Anderson, 2000b, p. 241). Whereas a native speaker can produce a sentence without being consciously aware of these skills, a non-native is likely to be acutely aware of them and consequently perceives the activity rather differently from a native speaker teacher.

7.2.1.4 Efficacy of Language Learning Activities

Subjects' evaluation of the efficacy of these activities was also similar to the evaluations given in the Questionnaire Pilot Study. Activities defined as functional were given higher median scores than those defined as formal and, supporting the Questionnaire Pilot Study

analysis, this difference was found to be significant; meaning-focused, communicative activities are perceived to be more effective by this sample.²⁷

7.2.2 Discussion of Correlational Analysis

This section of the discussion will focus on the implications of the correlational relationships found between general beliefs about language learning (Part 2) and beliefs about the efficacy of specific activities (Part 4) defined by the subjects as either formal or functional in nature. We will conclude with a discussion of the relevance of the findings from the current study to previous theory and research.

Before we begin, it should be pointed out that despite the similarity between the Questionnaire Pilot Study and this study in responses to Parts 2, 3, and 4 of the questionnaire, there is little similarity in the results of the correlational analysis. It seems that although the two samples were similar in general beliefs and perceptions of formality and functionality of specific activities, the concrete expression of these beliefs in terms of how effective they believe these activities to be is different. This will be discussed further below (see Section 7.2.2.4).

7.2.2.1 *Nature of Language Learning*

Statements 1 and 2 on the importance of knowledge of culture and living in an English speaking country, had no correlations at all. This contrasts with the Questionnaire Pilot Study as the high number of correlations found suggested these beliefs were quite important to the efficacy subjects assigned to activities in Part 4. Moreover, it is quite surprising that overseas students do not show any relationship between these beliefs and the value they put on activities as they are actually living in the target language environment.

Purely speculatively, there may be two reasons for this difference between the samples. Firstly, while both samples agreed strongly that knowledge of culture and living in an English speaking country were important, it may be that although they placed high values on the activities described, there may have been other types of activities not described with which the subjects in this study would have related more strongly. Secondly, the two samples differ in the purpose for language learning. For the Questionnaire Pilot Study

²⁷ See Chapter 8.2.1.3, #1 for research conclusions.

sample, language learning was an end in itself, but for the Main Study sample, English was a tool for studying another subject. This is likely to influence the strategies students apply in studying English (Elbaum et al., 1993, p. 188; Wenden, 1995, p. 188).

Statement 3 on the importance of vocabulary in language learning yielded two significant correlations. While it is surprising that a belief about vocabulary does not have more correlations with the perceived value of vocabulary learning activities, the Questionnaire Pilot Study, in contrast, only yielded a single correlation approaching significance with a communicative speaking activity. The general beliefs indicated by this sample of overseas students therefore show relationships to the perceived efficacy vocabulary learning activities which the sample of mainly English students in the Questionnaire Pilot Study did not show. These correlations showed two contrasting learning preferences. Firstly, the weak negative correlation with activity *b* (practicing new vocabulary in group discussions) showed that those who do not value vocabulary may have a slight tendency to prefer learning vocabulary in communicative situations. Secondly, the weak positive correlation with valuing teacher translation of new words suggests that those who believe vocabulary is a major part of learning a language also have a slight tendency to prefer teachers to by-pass L2 explanations and provide L1 translations.

These relationships between belief in the importance of vocabulary and teacher translation are consistent with the weak positive correlation between belief in the importance of grammar (statement 4) and teacher translation of vocabulary. As most subjects were neutral or disagreed with the importance of grammar, this relationship suggests that as with belief in the importance of vocabulary, those whose beliefs are less formal are more likely either to prefer methods which do not isolate particular language skills (e.g. group discussion) or to ascribe lower efficacy to activities that do isolate them (e.g. teacher translation).²⁸

Perhaps the most interesting aspect of the significant correlations found was the relatively high number of correlations found between belief that learning English is different from learning other subjects (Statement 5) and belief in the efficacy of specific activities. This is especially interesting as there was also a significant difference between the two studies in response to this statement. Whereas in the Questionnaire Pilot Study only 2 significant results were found for this item out of a possible 24, in this study, 5 significant results

²⁸ See Chapter 8.2.1.3, #3 for research conclusions.

were found out of a possible 8. Of these 5 significant correlations, all 5 are positive and 4 out of the 5 are with functional activities (including activity *h*, which is equally formal and functional). The one formal activity was looking up words in a monolingual dictionary, which, it could be argued, has a functional aspect as the dictionary content is totally in English.

Agreement with the statement that learning a foreign language is different from learning other subjects is taken to mean that learning a foreign language involves taking on something of the foreign language culture (Gardner & Lambert, 1972, p. 3; Tse, 2000, p. 70) and it may be that the differences between the samples are coming to the fore here; these subjects are all overseas students studying in the UK and studying English is secondary to the study of another subject. While belief that language learning was different did not appear to be of great importance in terms of the activities subjects valued in the Questionnaire Pilot Study, it was certainly important in this study. Moreover, within the sample, these correlations contrast with the complete lack of significant correlations for statements 1 and 2 which were more obviously concerned with culture.

To speculate on the implications of the relevance of this belief to the value put on activities, it may be that the strategies applied in the study of English compared to those applied in the subjects' fields of study have as much to do with this belief as culture does. Whereas the subject matter of Chemistry or Physics is independent of culture, language is not and strategies involving interaction and communication with others become very important. As these subjects are using English to learn another subject and gain degrees in an English medium, they may be much more acutely aware of the differences than the subjects in the Questionnaire Pilot Study. Therefore, learning context, which in this case is learning the target language in an English university to gain a degree using English, may add a certain "flavour" to the metacognitive knowledge of language study which language specialists such as those in the Questionnaire Pilot Study do not experience.

The dimension of belief that underlies this variable, appears to be closely related to the efficacy subjects assign to meaning focused activities. As the Questionnaire Pilot Study sample did not yield anything like as many correlations, it seems that the nature of this sample and/or the learning context make an important difference to how this belief influences the perceived efficacy of learning activities. There is broad agreement that culture and environment are important, but there are no correlations with these factors.

Why? In the investigator's opinion, this statement might be "touching a nerve". The "difference" perceived may be that communication in English is fundamental to academic success, so the subjects would be likely to be keenly aware of the different requirements of studying English and their level of achievement in it compared to achievement in their own fields of study. It may be that strength of feeling about these aspects of English study relates to how subjects evaluate the efficacy of communicative activities.²⁹

Statement 6 on the importance of translation in language learning correlated significantly only with the efficacy of teacher translation of vocabulary. As most of the subjects did not believe translation in general was important and most of them also did not value teacher translation very highly, the implication is that translation as a learning method is held in generally low regard.

7.2.2.2 *Learning Strategies*

The complete lack of correlations between the statement that practice and repetition are important and activities in Part 4 is consistent with the relationships found in the Questionnaire Pilot Study. The two correlations found in the Questionnaire Pilot Study were both with video activities to practice listening comprehension and no such activities were described in this study. The conclusion reached above was that repetition and practice may be highly valued, but subjects are likely to discriminate between types of practice. If this is the case with this sample, then none of the activities described are relevant enough to this belief to show a related preference.

7.2.2.3 *Communication Strategies*

Statement 8 had one positive correlation approaching significance. The interpretation of the correlation between statement 8 on the appropriacy of speaking even if incorrect (communication vs accuracy) and activity *b*, communicative practice of new vocabulary, is that those who value communication over accuracy put a lower value on practicing vocabulary in group discussion. This does not appear to be a logical relationship and cannot be explained.

Statement 9 on the appropriacy of guessing when a word is not known had three significant correlations. Two of these were positive correlations with the efficacy of

²⁹ See Chapter 8.2.1.1, #4 for research conclusions.

vocabulary games and writing sentences to practice new vocabulary. These relationships are as expected as both involve risk taking and have a strong meaning focused component. The remaining correlation was with multiple choice activities, which although defined as formal, also have a risk taking component.

Discussion of statement nine's correlations in the Questionnaire Pilot Study (see Section 7.1.4 above) suggested that the relationship shown with the perceived efficacy of meaning-focused activities was the voice of experience and possibly the result of having experienced an education system emphasising communicative methods. While it may be true that experience has something to do with the response in this study, the subjects' beliefs are either based on recent experience or a reaction to the methods used in their own education systems as such a large proportion of them stated that their previous learning had been formal (37.5%) or a mix of formal and functional (45%). If we also consider that 3 correlations out of a possible 8 is proportionately much more than the results found in the Questionnaire Pilot Study (2 significant correlations out of a possible 24), it would appear that a belief among this sample that guessing is appropriate has a lot to do with the activities preferred. That the Questionnaire Pilot Study elicited a similar pattern of agreement on this item but fewer correlations suggests the strength of this belief among this current sample is more important to how effective they believe risk-oriented, meaning-focused activities are. This may be due to the variation in learning context.³⁰

Statement 10 on being allowed to make mistakes has a single correlation approaching significance with activity *a*, repeating after the teacher. This correlation is as expected as agreement with the statement indicates that subjects value correction and developing accuracy over fluency, which fits well with such a safe, highly structured, teacher-centred activity.

7.2.2.4 Relevance to Previous Theory and Research on Metacognition

Discussion so far has focused mainly on individual items and their correlations together with relevant research findings and the investigator's own interpretations. This section will focus specifically on the relevance of the data to theory and research on metacognition. There appears to be little difference in response to the questionnaire between the Questionnaire Pilot Study and the Main Study supporting Horwitz' (1999)

³⁰ See Chapter 8.2.1.1, #1 for research conclusions.

findings and her assertion (p. 575) that there may be a “world culture” in language learning that encourages similarity in beliefs between students and teachers from different cultures.³¹

The differences found between the samples were in the results of the correlational analysis. Differences were found in correlations between all three themes in Part 2 and perceived efficacy of activities in Part 4. Items and their correlations have been discussed above individually. Here we shall group them together to focus on a common theme distinguished in the analysis and discussion above: the influence of context on task and strategic knowledge.

The easiest assumption to make regarding the correlations found is that culture accounts for the differences between the Questionnaire Pilot Study and the Main Study. It is argued here that this is not the case. Firstly, Horwitz (1999, p. 575) comments that although culture appears to be a factor in differences between groups sampled using the BALLI (the source of the items in Part 2 of the Definition of Language Learning Tasks Questionnaire), with-in group differences such as age, stage of learning, learning context, and instructional practices account for as much variation in metacognitive knowledge as cultural differences. Secondly, as 75% of the subjects were from East or South East Asia, one might assume that strong cultural influences related to Confucianist beliefs about education were present. This assumption, or more accurately the stereotype Westerners have of Asian students, has been challenged as ill-informed, inaccurate and imperialist (Atkinson, 1999, p. 640; Kubota, 1999, pp. 11-12; Littlewood, 1999, p. 72). Thirdly, culture is not a common factor among the sample; while 75% of the subjects are from East or South East Asia, there are cultural differences within this group and with the other 25% of the subjects.

In the above discussion (see Section 7.2.2), correlations were explained in terms of the influence of learning context on metacognitive knowledge. It is argued here that although the two samples so far surveyed appear superficially similar in general beliefs about language learning, difference in learning context produces variation in specific task and strategic knowledge. Following, is a discussion of how theory and research on metacognition accounts for the influence of context.

³¹ See Chapter 8.2.1.5, #9 for research conclusions.

Items on the importance of knowledge of culture and living in an English native speaking country, had no correlations with activities described in Part 4. While this contrasts with the results of the Questionnaire Pilot Study in which these very general beliefs have more correlations, five correlations between item 5 (language learning is different from learning other subjects) and Part 4 indicated that a very general belief still elicits the most correlations in this study (see Section 7.1.6 above for a discussion of the implications of this regarding the possibility of a hierarchy of beliefs). It was argued above (see Section 7.2.2.1) that this item had more correlations in this study than in the Questionnaire Pilot Study because unlike the subjects in the Questionnaire Pilot Study, they were not language specialists; they were studying in the target language country using English as a tool to study something else. Learning context is likely to be a factor in forming their metacognitive knowledge as the strategies and methodologies needed to achieve ability in English may contrast with those needed in the study of their subject.

Metacognitive knowledge of the task (Flavell, 1977, p. 907; Wenden, 1998, p. 518) is composed of knowledge of task purpose, outcomes and demands. Each of these is so closely related to the context they cannot be separated from it. In fact, Wenden (1995, p. 188) argues that a student's knowledge of these aspects of the task is, in itself, a context. Context is defined here in a wider sense to include the environment in which study takes place and the other subjects which a student may be studying.³²

Previous research (Cotterall, 1999, p. 508; Elbaum et al., 1993, p. 330) has concluded that knowledge of task purpose was a factor in determining learning strategies. Regarding demands of the task, Poullisse and Schils (1995, p. 298) found that task demands were more influential than proficiency in determining how students applied compensatory strategies in solving lexical problems in conversation. If understanding the nature of a task is also taken to mean understanding the task's requirements, then Gu's (1994, p. 17) conclusion on the importance of understanding the dynamic nature of vocabulary is relevant here.

The three correlations found with Statement 9 (the appropriacy of guessing) suggest that knowledge of task demands and desired outcomes may influence the strategies students apply as the background data indicates that the majority come from a formal or formal/functional oriented language learning system. As this group is mainly Asian, its

³² See Chapter 8.2.1.1, #2 and #3 for research conclusions.

functional bias in response to statement 9 combined with positive correlations with meaning-focused, risk oriented activities tends to confirm Gu and Johnson's (1996, pp. 654-655) research finding, contradicting stereotypes of Chinese students, that rote memorisation of vocabulary was not a strategy used by good students. It also supports the arguments made by Littlewood (1999, p. 72) and Atkinson (1999, p. 640) that Asian students are not necessarily the authority-dependant, rote-memorising, risk-avoiding beings they are often assumed to be. Students may vary in degree of adaptability to new task demands, but culture may not be a deciding factor in this.

7.2.3 Summary

Despite there being little similarity in the correlations found within the questionnaire, response was very similar to that found in the Questionnaire Pilot Study. The conclusions reached are therefore the same regarding confirmation of research questions 1A and 1B and hypothesis 1. For a more detailed summary of this, please refer to Section 7.1.7 above. Although the correlations found were rather different, it was again found that a very general belief with only an indirect relationship to language study had the most correlations (item 5: language learning is different from studying other subjects). The conclusion that there may be a hierarchy of beliefs as they relate to preference for specific activity types is therefore the same as that reached above (see Section 7.1.7 above).³³

It was concluded that correlations between Part 2 and Part 4 were not the same because the context in which the subjects were studying was different. Cultural background was disregarded as a factor in producing the different correlations. It is argued that because these subjects were not language specialists, as the subjects in the Questionnaire Pilot Study were, their metacognitive task knowledge, which includes what they know of the purpose, demands and outcomes of the task, differed from the Questionnaire Pilot Study subjects. Therefore, while stated beliefs about language learning in general were very similar, beliefs about specific tasks were not.³⁴

7.2.4 Subject Interaction With WordLearner

This section will have two main emphases. Each of the following sections will begin with a discussion of how the data has answered the research questions and implications of the

³³ See Chapter 8.2.1.2, #1 for research conclusions.

³⁴ See Chapter 8.2.1.1, #2 and #3 for research conclusions.

findings arising from this. The first of the following sections will be a discussion of the qualitative analysis of how questionnaire data on formal-function preferences relates to actual preferences in WordLearner (see Section 7.2.4.1). This will be followed by a discussion of the findings on how the overall patterns of interaction (see Section 7.2.4.2) changed according to levels of prior knowledge. Following this, the correlational analysis of relationships between the questionnaire data and choices made in the program will be discussed (see Section 7.2.4.3). We shall then examine what the evidence suggests regarding autonomous learning behaviour (see Section 7.2.4.4) and finally, we will discuss the relevance of the evidence to current theory and research on metacognition (see Section 7.2.4.5).

7.2.4.1 *Qualitative Analysis*

This section of the analysis focused on answering research questions 1, 2 and 3 and the corresponding hypotheses 1, 2, and 3. Aspects of subject interaction with WordLearner which are better dealt with from a quantitative standpoint with qualitative support are dealt with below in Sections 7.2.4.2 and 7.2.4.2.4. The aspects of the interaction which, because of sample size, are best approached qualitatively are discussed here. Issues raised by the analysis were the seeming lack of relationship between questionnaire data on formal-functional bias and the associated issue of measurement, risk-taking behaviour, and analysis of language. Each of these will be taken in turn.

7.2.4.1.1 Research Questions and Hypotheses

The findings suggested negative answers to research questions 1 and 2 on the relationship between formal-functional bias and preferences in WordLearner, although it must be said that it was not possible to state categorically that there was or was not a relationship between questionnaire responses and actual behaviour. Research question 3A regarding changes in learning preference according to levels of prior knowledge was answered affirmatively, while research question 3B regarding changes in practice preference according to level of prior knowledge was answered negatively. Again, the latter finding has to be qualified as a large minority of subjects (4 out of 10) did appear to change their practice preference. Hypothesis 3 was accepted with the proviso that although a majority of subjects did not change practice preferences, a substantial minority did. It is, perhaps, the most striking feature of the qualitative analysis that in most cases learning preferences changed so obviously and so suddenly. This is discussed in Section 7.2.4.2.1 below.

7.2.4.1.2 Relationship between Formal-Functional Bias and Behaviour

With negative answers to research questions 1 and 2, we have to ask if this means there really is no relationship between formal-functional bias and learning and practice preferences or if the method of measurement of formal-functional beliefs was at fault. The research questions were answered negatively because the changes in learning preferences with increasing levels of prior knowledge made it impossible to say if there was a real preference. Practice preferences also changed somewhat with increasing prior knowledge, but in cases where they did not, patterns of preference were so unstable that, again, an affirmative answer could not be given.

It is argued here that the lack of agreement between questionnaire data and actual behaviour does not mean that there is no relationship between subjects' beliefs and what they actually do; neither does it mean the method of measurement is at fault. The interpretation given here is that there are statistically real relationships between formal-functional bias in general beliefs and stated preferences for learning and practice activities within the questionnaire data (see Sections 7.1.7 and 7.2.3 above). However, the questionnaire does not ask the respondents what they would do if their prior knowledge was low or high or if the task were difficult or easy; it just asks what they believe on a very general level. What the data from interaction with WordLearner shows is that at the task level, as Wenden (1995, pp. 185-187) argued, decisions are made taking specific task and strategic knowledge into account. Beliefs will still be there in the background, but they do not appear to be decisive at the task level.

7.2.4.1.3 Method of Measurement

At this point, it may be helpful to recall Greenwald's (1989, pp. 4-7) discussion of the difficulty of relating attitudes to behaviour. One of the difficulties of attitude research is that attitudes are not necessarily expressed in behaviour towards the attitudinal object. The problem is to find how the attitude is expressed. In this case, while we cannot claim to see how formal-functional bias is expressed, it seems it is not manifested in a blanket preference for formal or functional learning and practice. Some subjects (e.g. subjects 3, 8 and 10) do show a strong preference for one type of learning and practice and do not vary it with increasing level of prior knowledge. However, these are not enough to prove anything and there are no subjects with formal bias showing a consistent formal

preference in learning and practice. To a limited extent, this is supported by Greenwald's (1989, pp. 4-7) discussion; the questionnaire measures beliefs at a general level, but the behaviour is observed at the more specific task level, while the object of the belief and the object of the actual behaviour are attitudinally quite complex. As the relationship to level of prior knowledge shows, there is at least one other factor at work in determining subject behaviour.

7.2.4.1.4 Risk-Taking Behaviour

With the exceptions of subjects 3, 8, and 10, subjects who agreed that it was OK to guess if you do not know a word, suggesting that risk-taking was a strong element in their beliefs about language learning, almost never made risk-taking choices such as inductive learning or guided production at lower levels of prior knowledge. Subject 1, for example, stated that sentence writing was a good way to practice new vocabulary, but did not attempt Guided Production even once. Risk-taking preferences only became apparent at higher levels of prior knowledge (e.g. see subjects 4 and 5), indicating that they took chances on being wrong only when the chance of being wrong was low.³⁵

It may be that the general statement about guessing in the questionnaire lacked precision. For example, we could have stated a more specific situation in which the guessing would take place, making it clear that the context is a conversation or a printed vocabulary exercise. However, subjects showed strong opinions on this issue, indicating that there was little perceived ambiguity in the question, and they did access the risk-oriented activities available in WordLearner, showing that there is a correlation under certain circumstances.

At lower levels, multiple-choice was the most common preference. Although multiple-choice has a risk-taking element, it involves no productive effort, it is quick, and the penalty for a mistake is very mild in terms of threat to self-esteem. We therefore see a pattern of low effort, low risk-low penalty activity at low levels of prior knowledge leading into higher effort, high risk-high penalty activity at higher levels of prior knowledge. How could this be explained? The key may be anxiety about negative learning outcomes leading to subjects lowering their expectations about what they can achieve as suggested by Cheng et al (1999, p. 437), who also links prior knowledge to

³⁵ See Chapter 8.2.1.4, #2 for research conclusions.

self-confidence, and MacIntyre et al (1997, p. 269). Subjects want to take risks but avoid failure and corresponding anxiety about negative outcomes by only taking risks when there is a low threat to self-esteem and a strong chance of reinforcing self-confidence through success.

The advantages of this pattern of risk-taking are possibly that persistence with the task and long-term success is likely to be enhanced (Cheng et al., 1999, p. 437; MacIntyre et al., 1997, p. 269), cognitive resources are not taken up by anxiety (MacIntyre et al., 1997, p. 269), and use of metacognitive strategies may be encouraged (Oxford & Ehrman, 1995, p. 377). Therefore, a moderate amount of state anxiety may facilitate achievement (Graham, 1997, p. 93). The disadvantage is that use of cognitive strategies may decrease (Oxford & Ehrman, 1995, p. 377). Looking at the situation as a whole, the investigator's conclusion is that subjects are doing the right thing. While they may tend to under-achieve by avoiding tasks that stretch their abilities, reinforcement of self-confidence and self-esteem may lead to higher achievement in the long run.³⁶

7.2.4.1.5 Analysis of Language

The post-hoc interview with subject 3 suggested that there may be a relationship between high prior knowledge and formal bias in the form of interest in analysis of the language content. While the concept of analysis of language is a component of the definition of a formal approach to learning, it is difficult to disentangle analysis from a functional approach (Bialystok, 1981, p. 25). Inferencing meaning, for example, cannot be achieved without analysis of context. It is acknowledged here that analysis can easily be seen as inferencing; however, the following brief discussion is made from the standpoint that it is a formal bias.

It may be that analysis is a factor in subjects' decisions to invest the greater amount of effort at the mid levels of prior knowledge shown by the bell-shaped curve in mean duration and mean duration per screen (see Figure 25 and Figure 27). If it is the case that analysis, based on interest in language content, leads to more effort and attention, this supports research in CAI (Lawless & Kulikowich, 1998, p. 66) showing that interest is related to moderate levels of prior knowledge which, in turn, is related to effort. It may also be partly responsible for subjects deciding to study target vocabulary which they

³⁶ See Chapter 8.2.1.4, #3 for research conclusions.

have stated they know very well already. Subject 3, for example, stated that his interest in the vocabulary and accompanying content, analysing the content and looking for new ways to use the word, determined whether or not he would study target vocabulary that he already knew.³⁷

7.2.4.1.6 Summary of qualitative analysis

The qualitative analysis of subject interaction with WordLearner appears to show that beliefs about language learning are not as decisive at the task level as correlations within the questionnaire itself suggested. However, it was argued that other factors, in this case, prior knowledge, obscure the effect of beliefs; they are likely to play an important role, but this cannot be seen through this method of analysis.

Two issues raised by the qualitative analysis were risk-taking and analysis of language. It appears that even though subjects state that one should speak even if incorrect, which involves risk-taking, they do not actually take risks until they have a very good chance of being correct.³⁸ It was concluded that subjects' instincts for risk avoidance at lower levels might be well-founded as self-confidence is more important to achievement in the long run.³⁹

A tendency to analyse linguistic content was also found as data from one of the post-hoc interviews suggested that interest in anything else that could be learned was a factor in deciding to study target vocabulary. Previous research (Lawless and Kulikowich, 1998) supports the conclusion that interest in the linguistic content encouraged increased effort at the mid to high levels of prior knowledge.⁴⁰

7.2.4.2 *Discussion of Overall Patterns of Interaction*

7.2.4.2.1 Navigation Patterns

It is clear from the user choice (see Figure 24) and decision flow summary diagrams (see Figure 28) and from the qualitative analysis of subject interaction with the program that learning preferences change according to level. Research question 3A was therefore answered affirmatively. The change in navigation patterns from a predominantly deductive-passive pattern at level 1 of prior knowledge to inductive-active as level of

³⁷ See Chapter 8.2.1.6, #2 and #3 for research conclusions.

³⁸ See Chapter 8.2.1.4, #2 for research conclusions.

³⁹ See Chapter 8.2.1.4, #3 for research conclusions.

⁴⁰ See Chapter 8.2.1.6, #1 for research conclusions.

prior knowledge increases confirms Manning's (1996, p. 28) finding that students seek refuge in structure when the target is difficult.⁴¹

The qualitative analysis of subject interaction with the program showed an interesting contrast in patterns of change between learning and practice choices. In a majority of cases, learning preferences changed (7 vs 3), but practice preferences did not (6 vs 4). Research question 3B was therefore answered negatively. In some cases, learning preferences changed quite suddenly as though there is a threshold at which the subject believes different methods should be applied. The level at which this threshold is reached varies from subject to subject. Subjects 2 and 4 changed from a deductive to an inductive preference at level 2 while subjects 4, 7 and 9 did not change until level 4. In cases where practice preferences did change, they did not show the same clear threshold as practice preferences lacked the same degree of stability as learning preferences; subjects were much more likely to change practice preferences within the same level of prior knowledge.⁴²

Lawless and Kulikowich (1998, p. 66), working in CAI, found that high domain knowledge was closely related to navigation patterns. The Lawless and Kulikowich (1998) study differed from the current investigation in that their subjects were measured once only for prior knowledge of the whole program content; in the current investigation, prior knowledge was measured for each subject for each target word, so changes in individual behaviour from one word to the next could be observed. This makes for an interesting comparison.

In the Lawless and Kulikowich (1998, p. 66) study, subjects with high prior knowledge were most likely to have low interest and adopt a linear navigation pattern through a hypertext, rarely deviating from the established path. This was found to be typical of "apathetic users" identified in earlier research (Lawless & Brown, 1997, p. 125; Lawless & Kulikowich, 1996, p. 395). Although the shortness of the navigation patterns found at levels 4 and 5 of prior knowledge in this study could be said to represent apathy, a lot of deviation was found (please see 7.2.4.2.2 below for a more detailed discussion of this). Lawless and Kulikowich (1998, p. 66) also found that those with a moderate amount of knowledge were likely to visit the most screens. This is confirmed by this study and will

⁴¹ See Chapter 8.3.1.1, #3 for pedagogical implications and Chapter 8.4.2, #1 for suggestions for future research.

⁴² See Chapter 8.4.2, #1 and #2 for suggestions for future research.

be discussed in more detail in Section 7.2.4.2.3 below. Those with the lowest prior knowledge in the Lawless and Kulikowich (1998, p. 66) study were unable to make decisions regarding navigation that appeared appropriate to their learning needs (in the eyes of the researchers) and tended to be distracted by focus on finding out the structure of the program and the multimedia features available. This is not confirmed by this study and will be discussed in more detail in Section 7.2.4.2.3 below.

While it is true that general navigation patterns were discernible, it is also true that no subject was exactly the same and there was a lot of variety. We may say, therefore, that subjects were able to apply their individual preferences as they wished within the constraints of the hypertext structure (i.e. no reverse movement). The identification of learning styles was not part of this research, but the fact that subjects appeared able to establish stable navigation patterns and vary these according to changing conditions (in this case, levels of prior knowledge) provides partial confirmation of previous research conclusions that hypertext allows students to apply preferred learning styles (Liu & Reed, 1994, p. 429). It also supports the theoretical arguments regarding the accommodation of individual learning styles put forward by Oxford et al (1998). Finally, we should consider the arguments put forward by Stanton (1994, p. 284) that learning styles are not necessarily a constant for the individual but may in fact be artefacts of the system; that is, an individual establishes a pattern of use that is unique to the hypertext and the movement allowed within it. While the investigator does not hold this view, if this were the case in this investigation, then it would still be true to say that the subjects showed a capacity to adapt to the possibilities and limitations of this particular hypertext and subject behaviour was autonomous.⁴³

7.2.4.2.2 Exploratory Behaviour

For Stage 4 students, exploratory behaviour (trying another method from the one usually used) is most common at level one and level five of prior knowledge. As 8 of the 11 changes from the usual initial learning choice are accounted for by just 2 students we have to discount this. In addition, much of the level 4 and 5 exploratory behaviour stems simply from having more choices available as going to the next word is a viable alternative. However, it would appear that exploratory behaviour increases according to level of prior knowledge at least from level 2 to level 3.

⁴³ See Chapter 8.2.2.1, #2 for research conclusions.

Two possible explanations are discussed here. Firstly, it may be due to subjects having more confidence to change as higher prior knowledge may reduce anxiety and therefore increase the likelihood of risk-taking behaviour (Ausubel et al., 1978, p. 443). Secondly, from a cognitive perspective, it may also be due to higher prior knowledge and lower anxiety freeing-up cognitive capacity making subjects more able to make learning decisions (MacIntyre et al., 1997, p. 269). Oxford and Ehrman (1995, p. 377) found that self-confidence was positively correlated with metacognitive strategies suggesting that subjects are more likely to make the kind of executive decision necessary to changing a pattern of behaviour. Higher prior knowledge might also allow more cognitive connections to be made with existing schemata (Anderson, 2000a, p. 154) and subjects may actively seek opportunities for this by accessing more content. Although some CAI research (Schank & Rowe, 1993, p. 317) has found that prior knowledge was not related to how students navigate a hypertext, the balance of research findings seems to indicate that it most likely is.

Lawless and Kulikowich (1998, p. 66) found that subjects with low prior knowledge were more likely to focus on finding out the structure of the program rather than on its content. This may explain the behaviour of the two subjects who account for most of the exploration at level 1. They also found that those with a moderate level of knowledge, who they described as “knowledge seekers”, were most likely to seek out useful content. This may be consistent with the increase in exploration observed at levels 2 and 3 of prior knowledge; subjects may have been looking for the best way to learn at these levels and finding what they were most comfortable with.

The highest number of changes were usually found on the second word at any given level of prior knowledge. In other words, the subjects started with one learning activity and the next time they found a word at the same level of prior knowledge, they might change. It was quite common for subjects to make a change and then change back to the original learning method for the next word. This pattern is interpreted as experimenting with another way of learning, finding that the other method is not as good for them, at least as the initial choice, and going back to the established pattern. It may be that having made an initial decision, possibly based on established beliefs about language learning, change in approach is unlikely even though learners experiment with alternatives. The

investigator is not aware of previous research describing or explaining this pattern of experimentation.⁴⁴

7.2.4.2.3 Path-Length, Duration and Mean Duration Per Screen

The patterns of path-length, duration and mean duration per screen were quite surprising, but are not unique to this study. To recap, path-length was steady from level 1 to level 3 of prior knowledge and then dropped quickly to level 4 and 5, so the amount of content accessed did not decrease steadily, as one might have expected from level 1 to level 5. Duration of study and mean duration of study both had pronounced bell-shaped curves peaking at level 3, so more attention was given to target words which subjects had some prior knowledge of than words which they had no or little knowledge of.

Lawless and Kulikowich (1998, p. 66) also found a bell-shaped curve; subjects who had moderate prior knowledge had greater interest in the task and accessed more content than either low or high prior knowledge subjects. For this investigation, how can this pattern of time and effort invested be accounted for? It is suggested here that they may have been “skimming” low level words, exposing themselves to the content, but not attempting to process it. The less they know about a word, the less likely they are to be able to make connections with existing schemata and the less able they are to process the word at anything more than a superficial level. At medium levels of prior knowledge, they may have been more interested and motivated because they already knew the word somewhat; also, because of their higher prior knowledge, the subjects may have been able to attempt more processing of content and make more connections to existing schemata⁴⁵.

Following level 3, effort invested dropped off quickly as the words were already well known, and as Lawless and Kulikowich (1998, p. 66) found, higher prior knowledge is related to lower interest and less effort.

The pedagogical implications of these findings are simply that they confirm what experienced teachers already know; students are more likely to engage with material that is not totally new and full of difficult vocabulary, but at the same time is not too easy and familiar. For self-access, these findings highlight the importance of having a variety of material at the right level available for students and guiding them to it.⁴⁶

⁴⁴ See Chapter 8.2.2.1, #3 for research conclusions.

⁴⁵ See Chapter 8.2.2.18.2.1.6, #1, #2 and #3 for research conclusions.

⁴⁶ See Chapter 8.2.1.68.3.1.1, #1, #2 and #3 for pedagogical implications.

7.2.4.2.4 Summary of Interaction Patterns

Learning preferences showed marked changes between low and high levels from an deductive to inductive. Patterns of learning preferences differed from practice preferences in that learning preferences seemed much more stable. However, in a large minority of cases, there did appear to be a trend from passive at lower levels to productive at higher levels. The highly individualised patterns of interaction supports the theoretical position (Oxford et al, 1998) that hypertext accommodates individual learning styles.⁴⁷

Exploratory behaviour was less easy to analyse and discuss, but it seems that there was an increase in exploration between levels 2 and 3. This may have been because of greater self-confidence or because higher prior knowledge freed up cognitive resources.

Data on three measures of effort invested in the learning task, path-length, duration and mean duration of study, were also discussed. Differences between path-length, which was steady at lower levels and then dropped off at higher levels, and mean duration per screen, which showed a bell-shaped curve, showed that at lower levels of prior knowledge, subjects accessed material but did not give it as much attention as at mid levels. This pattern of greater attention at mid levels of prior knowledge than at lower or higher levels was also found by Lawless and Kulikowich (1998, p. 66).⁴⁸

7.2.4.3 *Correlations*

This section of the discussion focuses on how significant correlational relationships provided answers to research questions 4 and 5 and the corresponding hypotheses 4 and 5. Discussion of the research questions will address 2 issues raised by the significant correlations found. These are the nature of the relationship between formal or functional bias and effort invested in the learning task, and the apparent importance of strength of belief.

7.2.4.3.1 Correlations with General Beliefs

Research question 4 focussed on the relationship between formal or functional bias in general beliefs about language learning and the effort invested in the learning task and it was hypothesised that there was a relationship between bias and effort. This question was

⁴⁷ See Chapter 8.2.2.1, #2 for research conclusions.

⁴⁸ See Chapter 8.3.1.1 for pedagogical implications.

answered affirmatively and hypothesis 4 was confirmed; it was found that both formal or functional bias in general beliefs may be related to the effort invested in learning with this software. Research question 5 focussed on the relationship between formal and functional bias in beliefs about the efficacy of specific activities and the effort invested in the learning task and it was hypothesised that there was a relationship between bias and effort. This question was answered negatively and hypothesis 5 was rejected; beliefs about the efficacy of specific activities defined as formal or functional by the subjects do not appear to be related to the effort invested in the learning task.

However, these findings are far from clear-cut and the significant correlations found suggested unexpected relationships between bias and effort. Looking at general beliefs (Research Question 4), significant correlations with mean duration of study per screen show specific formal beliefs with relationships in opposite directions. Item 8, concerning the importance of accuracy, has a significant positive correlation with mean duration per screen at levels 2 and 3 of prior knowledge, but a significant negative correlation at level 5. Interpretation of this is complicated by the lop-sided spread of response to item 8 (3 disagree and 7 strongly disagree). Functional belief is a defining feature of this response, so it may be more valid to say that spending more time on target words at low to mid levels of prior knowledge is related to weakness in the belief that one *should* speak even if incorrect; the more meaning-focused the belief the less time is spent at these levels. The negative correlation at level 5, suggests that strength of belief that one should speak even if incorrect results in subjects spending more time on target words when prior knowledge is stated to be complete.⁴⁹

Item 10, concerning learning from mistakes, has a similar response pattern to item 8 and, as stated above, this item is discussed in functional rather than formal terms.

Disagreement with item 10, suggesting the functional belief that one learns from mistakes, also correlates with spending less time per screen at levels 3 and 4 of prior knowledge. This is consistent with correlations found at the same levels with duration of study; however, this item has a negative correlation approaching significance with level 1 of prior knowledge suggesting that an over-concern with making mistakes may result in lower effort being invested in target vocabulary for which subjects have no prior

⁴⁹ See Chapter 8.2.1.4, #4 for research conclusions.

knowledge at all, or, to put it another way, more functional belief is associated with more effort invested when prior knowledge is zero.⁵⁰

On the other hand, disagreement with the importance of grammar (item 4), a functional belief, shows subjects spending more time at lower levels and less at higher levels of prior knowledge. If one wants to analyse language, one has to understand it first. Therefore, a belief in the importance of grammar appears to lead to investing more effort when prior knowledge is very good, but less when prior knowledge is poor.⁵¹

This contrast in relationships shows that formality and functionality cannot be viewed in terms of a single dimension of belief at least in relation to effort invested in language learning. Belief that it does not help to be allowed to make mistakes with a probable associated need for teacher correction appears to be important in deciding to invest less effort when prior knowledge is zero but more effort at the mid-levels of prior knowledge. Likewise, those who are not as enthusiastic about speaking even if incorrect and are possibly more likely to be worried about making mistakes also appear to be influenced by this belief to invest more effort at the low to mid-levels of prior knowledge. The opposite is true for beliefs about the value of grammar; subjects who were neutral on the value of grammar spent less time at level 2 of prior knowledge and more time at level five.

Anxiety about making mistakes may lead to greater effort at lower levels while belief in the value of analysis of grammatical structure, which requires some comprehension of the language, leads to less effort at lower levels of prior knowledge.

To discuss the pedagogical implications, we shall examine the aspects of these findings that appear to highlight anxiety about learning and focus on form. A low level of state anxiety may be beneficial (Graham, 1997, p. 93; Oxford & Ehrman, 1995, p. 379) and, as we see from these results, subjects who may have been anxious about accuracy increased their effort at low to mid levels of prior knowledge. Too much anxiety would be detrimental.⁵²

Regarding focus on form, if a language learner focuses on grammar to the exclusion of other aspects of language, this is likely to be detrimental to learning as the learner would misdirect effort to learning tasks for which he or she has a high enough level of prior

⁵⁰ See Chapter 8.2.1.4, #5 for research conclusions.

⁵¹ See Chapter 8.2.1.5, #6 for research conclusions.

⁵² See Chapter 8.3.1, #1 for pedagogical implications.

knowledge to analyse structure and not spend enough time on tasks for which he or she has lower prior knowledge. The idea that a formal approach to language learning may not be as effective as a functional approach is not new. For example, Bialystok (1981, pp. 32-33) found that the application of what she termed “functional strategies” was most responsible for achievement. However, the learning of vocabulary may be a process of revisiting during which words which are at first only recognised gradually become more familiar (Nagy & Herman, 1987, p. 25); therefore, something which encourages the process of revisiting at higher levels of prior knowledge may lead to better vocabulary acquisition. The implication is, therefore, that the combination of a low level of anxiety with some focus on form might not be a bad thing.⁵³

7.2.4.3.2 Correlations with Beliefs About the Efficacy of Activities

Regarding beliefs about the efficacy of activities which subjects have defined as formal or functional (Research Question 5), it may be that strength of belief is more important than what you believe and that this is most important at the lowest level of prior knowledge. When activities are grouped together, allowing an examination of the relationships with more general formal-functional bias, significant correlations appear only at level 1 of prior knowledge. Formal preferences correlate significantly with path-length suggesting that subjects with this bias are willing to at least skim the available material. Attitudes to all activities grouped together correlate significantly with mean duration per screen suggesting that positive attitudes to activities are a factor in the attention given to the material when knowledge of the vocabulary is zero.

As significant correlations are only found at the lowest level of prior knowledge when activities are grouped together, it may be worth considering the roles of cognitive effort, risk and confidence in the activity. It is argued here that the importance of confidence should be extended from the language learners’ confidence in themselves to confidence in the activity itself; the language learner has to believe that the activity is effective. Strength of belief seems to become important when subjects have to invest the most effort and the corresponding risk of failure is greatest; subjects may have been asking themselves “I have little chance of success in learning this word. Is it worth the trouble?” The answer to this question is more likely to be “yes” if:

⁵³ See Chapter 8.3.1, #1 for pedagogical implications.

- a) The subject has confidence in themselves, which, it has been argued, is another way to say they perceive a good likelihood of success (McClelland, 1987, pp. 506-507).
- b) The threat to self-esteem is minimised (Ausubel et al., 1978, p. 442).
- c) The subject has confidence in the activity.

The pedagogical implications of this may be that materials designers and teachers should be aware of the confidence students have in activities and that this is most important when they are learning something new. They are less likely to invest effort if they expect failure and the accompanying threat to self-esteem (McClelland, 1987, pp. 506-507). It is possible that the formal learning and practice preferences found at lower levels, the refuge in structure described by Manning (1996, p. 28), are popular simply because they are safe. If activities are preferred for this reason, then more meaning focused activities could be used when prior knowledge is low, as long as there is a good possibility of success for the student and the threat to self-esteem is low. Moreover, privacy, which it has been suggested is a possible reason for lower anxiety levels found in reading in the L2, is also a feature of individual language work in a computer environment; this element may serve to encourage language learners to increase attention to tasks at low levels of prior knowledge.⁵⁴

7.2.4.3.3 Summary of Discussion of Correlations

This section has discussed significant correlations found between items in Parts 2 and 4 and effort invested in the learning task as measured by path-length, mean duration of study and mean duration of study per screen. Part 2 correlations suggested quite unexpected relationships between bias and effort with functional beliefs associated with increased effort at both the lowest and highest levels of prior knowledge and less effort at mid levels.⁵⁵ These correlations also highlighted the fact that formality or functionality cannot logically be viewed as homogenous in the sense that all beliefs falling into these categories influence effort invested in the task in the same direction. Levels of anxiety, suggested by similarities in correlations for belief in the value of accuracy and learning from mistakes, as well as focus on form or function may also play a role in the learner's decision to invest effort in the task.

⁵⁴ See Chapter 8.3.1, #2 for pedagogical implications.

⁵⁵ See Chapter 8.2.1.4, #4 and #5 and Chapter 8.2.1.5, #6 for research conclusions.

Part 4 correlations suggest that strength of belief may be as important as what one believes. Grouped correlations were only significant at the lowest level of prior knowledge suggesting that what one believes is more critical when the task is most difficult. This discussion also raised the issues of the learner's confidence not only in himself or herself, but also in the efficacy of the activity. Learners may be less likely to try harder if the likelihood of failure is too high.

Implications for teachers using language learning software or for designers of such software are that the private nature of work in a computer environment and learners' belief in its efficacy should be taken into account in addition to functional or formal emphasis on language activities.⁵⁶ It was speculated that if more meaning-focus could be combined with structured formal activities (and the low threat to self-esteem associated with these), more effective work might be accomplished at very low levels of prior knowledge.⁵⁷

7.2.4.4 *Autonomy*

What does the analysis of the data on subject interaction with the program say about their ability to work autonomously? Changes in navigation patterns by level of prior knowledge suggest that subjects were able to vary preferences according to changing conditions.⁵⁸ It is possible that subjects were not consciously deciding what to do as responses to task demands, which can be classed as problem solving procedures, can be so automatic that the subject is unaware of them (Anderson, 2000b, p. 241). However, in this case, there is a strong suggestion of deliberation in the decision-making process as subjects varied their approach consistently despite target words of the same level of prior knowledge being separated from each other by words at other levels. The data shows that in most cases, each subject's pattern of interaction was quite stable.

Can we say that the subjects in this study were acting autonomously? To answer this, we can compare what the subjects did with Littlewood's (1996, p. 429) analysis of the concept of autonomy in which he identifies two levels of autonomy, general and task specific. As this investigation focuses on what subjects are doing with a particular task, we are concerned here with task-specific autonomy involving low-level decisions related

⁵⁶ See Chapter 8.3.1, #2 for pedagogical implications.

⁵⁷ See Chapter 8.3.1.1, #3 for pedagogical implications.

⁵⁸ See Chapter 8.2.2.1, #2 for research conclusions.

to immediate or short-term needs. If we take the four components of autonomy in Little's (1991, p. 4) definition of it, detachment, critical reflection, decision-making, and independent action, we could argue that each of these is evident in subjects' interaction with the program. Detachment and independent action are evident in the subjects' ability to consistently access or ignore certain screens at specific levels of prior knowledge. They did not slavishly access every screen. Critical reflection and decision making are suggested by the changes in navigation patterns according to prior knowledge and exploratory behaviour shown by the subjects. It is proposed here that subjects may have assessed their knowledge and decided what to do based on this assessment. If they had not done something like this, they are unlikely to have shown such consistency in navigation patterns and the changes in these. It is therefore argued that at least according to Little's (1991, p. 4) definition, the subjects were behaving autonomously in WordLearner.

Can theories on autonomy explain anything about the ways in which subjects interacted with the materials? How might theory and research contribute to understanding the subjects' ability to change patterns of navigation and the pattern of increased effort at the middle ranges of prior knowledge? To answer these questions, we shall look to theory on autonomy's role in motivation. It has been argued that autonomy is a basic need that contributes to intrinsic motivation (van Lier, 1996, p. 103) and that perception of control is central to students being able to attribute success to their own effort which has been associated with increased effort and persistence (Child, 1997, p. 70). Research has found that language learners generally want autonomy (Graham, 1997, p. 122) and that CALL materials may promote it (Pawling, 1999, p. 170). It could be argued that as the flexibility of choice built into the hypertext was exploited by the subjects and that learner behaviour was adapted to changing conditions, these materials also promoted autonomy and perception of control. The increased effort at mid levels of prior knowledge may be evidence of this as subjects were able to decide what and how much to practice.

It is argued here, therefore, that the freedom to choose provided in the program was exploited in a considered manner by the subjects of this study. The subjects' autonomous behaviour was evident not only in the activities chosen but also in the pattern of attention

to the program content. This conclusion is also supported by intrinsic-extrinsic motivation theory and attribution theory.⁵⁹

The pedagogical implications are related to materials design and self-access learning. For materials design, the implication may be that while hypertext research reviews (Dillon & Gabbard, 1998; Higginbotham-Wheat, 1990; Niemec, Sikorski, & Walberg, 1996; Schnackenberg & Sullivan, 1997) appear to show that the jury is still out on whether learner control really is beneficial in terms of learning results, this study suggests that effort is invested where students have some prior knowledge and that the learner control provided in this program was likely to be beneficial. It is argued here that increased effort in terms of time spent on the target is likely to result in better learning. Therefore, design features such as advance organisers, which seek to activate prior knowledge, may serve to encourage students to spend more time and effort at lower levels.⁶⁰

For self-access, the implications are, firstly, that this investigation suggests language learners are certainly capable of making learning decisions based on context. Secondly, the decisions they make may not always be what teachers would like. In some cases, the student might have a better idea of what they need than the teacher; however, the evidence showing that subjects put less effort into words of lower prior knowledge suggests that self-access learning of new vocabulary requires strong support not only in terms of design features such as advance organisers but also in terms of guidance such as learner training.⁶¹

7.2.4.5 Relevance to Previous Theory and Research on Metacognition

The discussion so far (Sections 7.2.4.1 to 7.2.4.4) has explored the issues of analysis of language, the multidimensional nature of subjects' beliefs, anxiety in language learning and subjects' confidence in activities, the relationship between belief and effort invested in the learning task, and finally autonomy. This section will discuss how the arguments put forward above, and the evidence that supports them, concord with current theory and research on metacognitive knowledge about language learning.

⁵⁹ See Chapter 8.2.2.1, #1 for research conclusions.

⁶⁰ See Chapter 8.3.1.1, #4 for pedagogical implications.

⁶¹ See Chapter 8.3.1.1, #2 for pedagogical implications.

Taking analysis of content first (see Section 7.2.4.1.5), although it does not have a place in Flavell's (1979) model of metacognitive monitoring, comments made by subject 3 suggest that his behaviour was based on a conception of language and language learning that is a basis for belief and learning behaviour. Benson and Lor (1999, p. 459-460) argue that conceptions underlie beliefs which then become manifest in an approach to learning. Subject 3's statements that interest in the vocabulary and the context in which it was presented determined whether or not to study the word suggested that there was an underlying conception of vocabulary as something dynamic, something that is a part of an environment rather than a collection of discrete items. It was argued above (see Section 7.2.4.2.1) that the bell-shaped pattern of effort invested in learning the target vocabulary may partly be accounted for by interest. In Benson and Lor's (1999, p. 468) terms, a conception of vocabulary as "interesting" would also be qualitative and deep as opposed to quantitative and superficial. These statements combined with the subject's actual behaviour also suggested an approach which accepted that there was much more to be learned from the material than a mere word; there were new meanings and new uses for the word in addition to new meanings and new uses for words and phrases in the context. If subject 3's comments were to be generalised to the whole sample, the belief that lexical items are interesting might be seen as a component of individual conceptions of language learning which may partly account for the bell-shaped pattern of effort invested in learning the target vocabulary.

Regarding the multidimensional nature of beliefs about language learning (see Section 7.2.4.3.3), the evidence discussed above strongly supports Mori's (1999b, p. 405) argument that we should examine individual constructs that underlie language learning behaviour rather than simply dichotomise good and bad language learners. It is tempting to label learners as highly formal, assign a negative label to all of their learning behaviour and assume that they are poor language learners. To label learners as highly communicative (functional) and expect all of their learning behaviours to be beneficial to language learning would be to make the same mistake.

Anxiety and confidence in activities (see Section 7.2.4.2.4) are indirectly related to metacognitive knowledge of language learning as they may result from negative metacognitive experience. In Flavell's (1979) model of metacognitive monitoring, the learner's experiences of confusion, embarrassment, or success help to form the learner's person, task and strategic knowledge. It could be argued that the anxiety a student feels is

related to person knowledge that says “You’re not very good at this. You might get it wrong. Remember what happened the last time you tried this” or to task knowledge that says “Danger. This kind of activity isn’t very good. You might be sticking your neck out for no good reason”. Taking this view of anxiety and beliefs about the efficacy of activities, the correlations discussed above suggest that person and task knowledge may have a strong influence on choice of activity and the effort invested in learning.

The preceding paragraphs have to some extent covered the proposed relationship between beliefs and the effort invested in learning. However, there remains the issue of strength of belief (see Section 7.2.4.3.2). It was found that there was a significant positive correlation between strength of formal beliefs and path-length and strength of all beliefs grouped together and mean duration of study per screen at level one of prior knowledge. No other significant correlations were found. The implication is that strength of belief is most influential at the lowest level of prior knowledge and that strength of belief may be more important than what you believe. The investigator is not aware of any metacognitive research that might explain this. Purely speculatively, it could be argued that beliefs become crucial in decision making when cognitive resources are minimal.

Lastly, it was argued above (see Section 7.2.4.4) that the subjects had behaved autonomously in the program. This being the case, they were able to apply person, task and strategic knowledge in a considered manner. The relationship to metacognition is also that the evidence shows the subjects were able to make considered decisions and adapt to variations in context without the influence of a teacher or other students. It is very possible that common metacognitive experience (Flavell, 1979, p. 907) of classroom language learning among the subjects led to a fairly consistent pattern of navigation. It is also possible that given the relatively simple and repetitious nature of the program (14 target words all with the same choices of learning and practice activities) the subjects quickly established task knowledge which Wenden (1995, pp. 188-190) argues is key to autonomous learning. It is proposed here that it is most likely a bit of both as subjects tended to stick with the navigation pattern chosen at the first encounter with a word at a given level of prior knowledge and the activities, though presented in a software context, were similar to text book exercises.

7.3 Conclusion

Questionnaire data suggests that there is a relationship between beliefs about language learning and belief in the efficacy of specific activities for vocabulary learning. While general beliefs were very similar between both the Questionnaire Pilot Study and the main study samples, the correlational relationships found with belief in the efficacy of specific activities were different. This may have been because the samples, their target languages, and their learning contexts were different and they therefore had different needs. Analysis of the questionnaire data also led to the suggestion that there might be a hierarchy of beliefs in the sense that belief in the value of knowledge of culture, for example, may be more important in determining learning behaviours than specific beliefs about, say, the value of grammar.

Analysis of subject interaction with WordLearner was both qualitative and quantitative. Qualitative analysis could not identify specific relationships between questionnaire data and subject behaviour. The most striking feature of the subjects' patterns of interaction was the consistent trend to "play it safe" at lower levels of prior knowledge and follow a deductive-passive pattern of learning and practice while changing quite abruptly to a more inductive-productive pattern around the mid levels of prior knowledge. The bell shaped curve of mean duration of study per screen by level of prior knowledge was also quite surprising as the investigator had expected a steady drop in attention to task with increasing prior knowledge.

Beliefs in the value of risk taking and actual risk taking behaviour were discussed as it appeared that risk-taking behaviour only took place at higher levels of prior knowledge when the chance of being successful was higher. This may have been beneficial as self-confidence may lead to greater achievement in the long run. The role of interest in linguistic content in effort invested was also discussed. Research from outside the field of language acquisition (Lawless & Kulikowich, 1998) supports this and it was concluded that interest and analysis of linguistic content may be a reason for subjects spending more time at mid to high levels of prior knowledge than is warranted by their level of prior knowledge of the target.

Quantitative analysis of the relationships between beliefs and behaviour was exclusively correlational. Unexpected correlations were found between formal-functional bias and effort invested in the learning task. These correlations showed that we cannot generalise

about the advantages or disadvantages of formal or functional bias and that anxiety about language learning may play a role in the learner's decision to invest effort. Correlations with Part 4 of the questionnaire suggested little except that beliefs may be more important when the task is most difficult and that strength of belief may be more important than what you believe.

Regarding the relationship of this data to autonomy and metacognition, it was found that the subjects had used WordLearner autonomously. Analysis of this data also supports a multidimensional view of language learners' beliefs. In addition, it supports Mori's (1999b, p. 405) contention that we should not dichotomise good and bad learners by showing that formal and functional beliefs cannot be simply labelled as good or bad; some beliefs that learners have are likely to help and others are likely to hinder.

Discussion of the analysis and description of the data obtained in this investigation is now concluded. We shall now move on to conclusions based on this discussion.

Chapter 8 Conclusions

This chapter will address the main conclusions reached based on the discussion of the analysis and description of the data obtained from the two studies which composed this investigation. This chapter will be divided into four main sections, a recap of the acceptance or rejection of hypotheses and research questions, research conclusions, pedagogical implications stemming from the research, and finally suggestions for further research.

8.1 *Hypotheses and Research Questions*

For the sake of clarity, the research questions and hypotheses will be restated before conclusions are given. With the exception of research question 1, only main research questions rather than sub-questions will be addressed. It is felt that the discussion of the data in Chapter 7 adequately summarizes the sub-questions.

Research Question 1

Does definition of language learning in general as formal or functional relate to preferences for specific learning and practice activities? If so, how?

Sub-Questions

- 1 G: Do subjects whose beliefs about the nature of language learning are more formal value formal learning activities more than functional learning activities?
- 1 H: Do subjects whose beliefs about the nature of language learning are more functional value functional learning activities more than formal learning activities?
- 1 I: Does definition of language learning in general as formal lead to a preference for deductive learning activities?
- 1 J: Does definition of language learning in general as functional lead to a preference for inductive learning activities?
- 1 K: Does definition of language learning in general as formal lead to a preference for passive practice activities?
- 1 L: Does definition of language learning in general as functional lead to a preference for productive practice activities?

Hypothesis 1

Definition of language learning in general as formal or functional relates to preferences for specific learning and practice activities.

Hypothesis 1 Conclusions

Hypothesis 1 is accepted. Definition of language learning in general as formal or functional does appear to relate to preferences for specific learning and practice activities which subjects have defined as formal or functional in nature. Research questions 1A and 1B are both answered affirmatively as correlations within the questionnaire show significant positive relationships between formal-functional beliefs and beliefs about the efficacy of formally or functionally defined activities. Research questions 1C and 1E could not be conclusively answered due to a lack of clear evidence (see 6.3.3.2.1 above). Research questions were 1D and 1F were answered negatively.

Research Question 2

Does definition of specific language learning tasks as formal or functional relate to preferences for specific learning and practice activities? If so, how?

Sub-Questions

- 2 E: Does valuing formal learning tasks lead to a preference for deductive learning activities?
- 2 F: Does valuing functional learning tasks lead to a preference for inductive learning activities?
- 2 G: Does valuing formal learning tasks lead to a preference for passive practice activities?
- 2 H: Does valuing functional learning tasks lead to a preference for productive practice activities?

Hypothesis 2

There is a relationship between belief in the efficacy of formal and/or functional activities and preferences for specific learning and practice activities.

Hypothesis 2 Conclusions

Hypothesis 2 was rejected as no relationship was observed between belief in the efficacy of formally or functionally defined activities and preferences for specific learning or practice activities. Likewise, research question 2 was answered negatively.

Research Question 3

Does prior knowledge of the specific language item being studied relate to preferences for specific learning and practice activities? If so, how?

Sub-Questions

3A iv: Is level of prior knowledge of the target language item a factor in determining the type of learning activities preferred?

3A v: Is level of prior knowledge of the target language item a factor in determining the type of practice activities preferred?

3A vi: How does the level of prior knowledge of the target language item relate to the amount of effort expended on the target language item?

Hypothesis 3

Subjects vary their learning preferences in the program according to their prior knowledge.

Hypothesis 3 Conclusions

Hypothesis 3 is accepted with qualifications and research question 3 is answered affirmatively. Firstly, target vocabulary for which students have a low or high prior knowledge receives less attention to task than target vocabulary for which students have a medium prior knowledge. Secondly, subjects do vary their learning preferences according to their prior knowledge of the target vocabulary with deductive learning being the initial preference at the lowest levels and inductive learning taking over as the most common initial choice at medium to higher levels. Practice preferences on the other hand are not so easy to interpret. While a majority of subjects did not change practice preferences in any obvious way, a large minority of subjects did. There is, therefore, an indication that level of prior knowledge is an influential factor for some students under certain conditions.

Research Question 4

Is there a relationship between learners' formal or functional bias in beliefs about language learning and the amount of effort subjects invest in learning and practice in the computer environment created for this investigation?

Sub-Questions

- 4 D: Is formal or functional bias in general beliefs about language learning related to path-length?
- 4 E: Is formal or functional bias in general beliefs about language learning related to duration of study?
- 4 F: Is formal or functional bias in general beliefs about language learning related to the amount of time subjects spend on each screen?⁶²

Hypothesis 4

There is a relationship between formal and/or functional bias in general beliefs about language learning and the amount of effort subjects invest in learning and practice in the computer environment created for this investigation.

Hypothesis 4 Conclusions

Hypothesis 4 is accepted and research question 4 is answered affirmatively. There is a relationship between formal-functional bias in general beliefs about language learning and the amount of effort subjects invest in learning and practice in WordLearner. The relationship is, however, related to specific beliefs, not categories of beliefs.

Research Question 5

Does preference for formal or functional learning and practice activities relate to the amount of effort students put into learning and practice in the computer environment created for this investigation? If so, how?

Sub-Questions

- 5 D: Is belief in the efficacy of formal or functional activities related to path-length?
- 5 E: Is belief in the efficacy of formal or functional activities related to duration of study?

⁶² See Section 4.4.2 for a description of how path-length, duration of study, and mean duration of study per screen are calculated.

5 F: Is belief in the efficacy of formal or functional activities related to the amount of time subjects spend on each screen?

Hypothesis 5

There is a relationship between belief in the efficacy of formal and/or functional activities and the amount of effort subjects invest in the computer environment created for this investigation.

Hypothesis 5 Conclusions

Hypothesis 5 is rejected and research question 5 is answered negatively. This data does not support the statement that there is a relationship between belief in the efficacy of formal and/or functional activities and the amount of effort subjects invest in this language learning software. Despite this, however, one conclusion is worth mentioning with regard to the relationship between beliefs about the efficacy of activities and effort invested in the learning task. That is that a positive attitude to activities appears to be important when prior knowledge is stated to be zero. This conclusion will be expanded on below (see Section 8.2.1.3).

8.2 Conclusions

First, conclusions related to metacognition will be given. Second, conclusions related to autonomous learning behaviour in the computer environment will be given.

8.2.1 Metacognition

The conclusions reached are given under 5 categories. These are the importance of task context and purpose, dimensions of belief, risk-taking, the pedagogical validity of the terms formal and functional, and linguistic analysis. Following each section, the relevant conclusions are listed by number. Although this involves some repetition, it is felt that the benefits of clarity and easy reference outweigh this disadvantage.

8.2.1.1 *The Importance of Task Context and Purpose*

The strong tendency to neutrality shown by both samples on the importance of vocabulary, grammar and translation in language learning leads to the conclusion that the language learners observed in these studies took some account of the context and purpose of the task. This neutrality was not found in previous BALLI studies. It is argued here that the subjects were probably saying *it depends*; other factors such as context and purpose

determine the importance of vocabulary, grammar and translation, so a bald statement such as *language learning is mostly a matter of learning vocabulary* will not elicit much agreement or disagreement from experienced language learners.

It is also concluded that variation in task context is related to a variation in specific task and strategic knowledge. This is suggested, firstly, by the finding of significant differences between the two samples in their belief that guessing is appropriate and, secondly, by the differences in the correlations found in the Pilot and Main Studies. Thirdly, the significant difference found for belief that learning a language is different from learning other subjects and the higher number of correlations found for this belief in the Main Study suggest that seeing a difference in the task of language learning is important in the types of activities preferred.

Taking the significant differences in beliefs first, it appears that the context may be the primary determinant of these beliefs. Other factors such as the Main Study sample's greater mean age and more formal language learning experience suggest that there would be a difference in the opposite direction; that is, the Main Study sample would be less likely to favour guessing as a communication strategy. However, the opposite is true. The Main Study subjects find themselves in a situation in which this strategy is necessary and therefore adapt. At this point, we might also mention the differences found between East Asian and European students in the Questionnaire Pilot Study (see Chapter 7.1.1.1). In this case, the East Asian students placed a lower value on the efficacy of translation related activities than European students and also defined teacher translation of vocabulary as formal while the Europeans defined it as functional. This runs counter to the stereotype of East Asian learners and may be due to the perceived context being different; they were studying an L3 in an L2 context while the Europeans were studying an L2 or L3 in an L1 context.

Regarding differences in correlations, whereas the Pilot Study sample were studying an Oriental language in the UK, the Main Study sample were studying EFL in the UK. Again, differences in age or culture may have influenced this, but context is more likely to be relevant as age and culture would probably have produced correlations in different directions. Therefore, although their beliefs as a whole were very similar, the activities with which these beliefs correlated were quite different.

Regarding the belief that language learning is different from learning other subjects, it may be that for the Main Study sample, studying English for the sake of pursuing the study of an academic subject obviates the differences between the two. Therefore, the context of this juxtaposition of language learning and subject learning is associated with a change in belief and learning preferences.

The conclusion that knowledge of task purpose is related to preferences for particular activity types is supported by the Pilot Study finding that instrumentally motivated subjects valued meaning-focused activities. It is argued that these subjects could see a clear connection between the skills being developed and the skills needed to perform future work-related tasks. At the same time, the Main Study sample showed relationships between beliefs and activities which were more likely to support their immediate academic aims.

These conclusions are summarised as follows:

1. Students' beliefs about the importance of vocabulary, grammar and translation take the nature of the task and task context into account.
2. Students' beliefs about task purpose are a basis for activity preference.
3. Differences in learning context produce variation in specific task and strategic knowledge.
4. Instrumentally motivated students will value meaning-focused language learning activities if they can see a clear connection between the skill being developed and the skills needed to perform job-related tasks.

8.2.1.2 Dimensions of Belief

Previous research (Mori, 1999; Schommer, 1990) suggests that personal epistemologies should be seen as multidimensional rather than unidimensional. This research supports this view. There are four key conclusions with regard to this:

1. Positive general beliefs which are facilitative in nature rather than directly related to particular skills are likely to be reflected in preferences for meaning-focused activities even for inherently formal skills such as the learning of vocabulary or grammar. For example, in the Questionnaire Pilot Study, belief in the value of knowledge of the target language culture elicited many more correlations with beliefs about the efficacy of specific activities than beliefs about the importance of vocabulary or grammar did.

2. This data confirms a multidimensional view of language learning beliefs, but also suggests that there may be a hierarchy of beliefs. That is, that some beliefs might be more important than others or may have a more significant effect on language learning. For example, if conclusion 1, above, is valid, then we might say that facilitative beliefs are more fundamental to language learning behaviour than those beliefs which relate to specific skills.
3. Formality and functionality should not be viewed as a single dimension of belief.
4. Flexibility-inflexibility may be a core dimension of language learning belief. This may underlie the frequent finding that good language learners do whatever is needed to complete language learning tasks and are not tied to formal or functional methods.

8.2.1.3 *Beliefs About the Efficacy of Activities*

Evidence from both of the studies carried out in this investigation leads to the conclusion that learners believe that meaning-focused communicative activities are more effective than form-focused activities. First, functionally-defined activities are significantly more highly rated than formally-defined activities. Second, correlations between belief in the importance of repetition and practice and functional activities support the conclusion that communicative meaning-focused activities are preferred over form-focused activities even for inherently formal skills such as grammar. Third, this can further be interpreted according to the holistic nature of communicative activities as one could say that functionally biased subjects appear to prefer activities which do not isolate a target skill.

Further to this, data from the Main Study supports a conclusion that a positive attitude to activities, whether functional or formal, may be important to investing effort at the lowest level of prior knowledge. This may be associated with the greater cognitive load encountered by learners when handling something completely new and a suggestion regarding this is made for future research below (see Section 8.4.1).

These conclusions are summarised as follows:

1. Students believe that meaning-focused tasks are more effective than form-focused tasks.
2. Performance-oriented, meaning focused activities are viewed as effective repetition and practice even for inherently formal skills.

3. Students whose beliefs are more functionally oriented are likely to prefer activities such as group discussion which do not isolate skills and to see activities which do isolate skills as less effective.

8.2.1.4 Risk-Taking

Conclusions related to beliefs about risk-taking centre on the role of person and task knowledge (Flavell, 1977) related to self-confidence and anxiety and on the relationship of risk taking beliefs to learning preferences. Firstly, although subjects generally agree that it is appropriate to take risks, data from WordLearner shows that there is no correlation between stated risk-taking belief and doing activities which involve risk-taking until level four of prior knowledge; the subjects do not take risks until they have a very good chance of success. It is concluded here that in doing this, they avoid threats to self-esteem and reinforce confidence through success. This leads to the next conclusion that this pattern of behaviour may lead to higher achievement in the long run because of the positive effects on self-confidence.

Secondly, belief in the value of accuracy (or avoidance of risk) and belief in the value of learning from mistakes are related to greater effort at lower levels. It seems that both beliefs are related to a wish to be thorough in language practice. These conclusions are expanded below in Sections 8.2.1.5 and 8.2.1.6.

These conclusions are summarised as follows:

1. Risk-taking beliefs among overseas students studying English are closely related to preferences for risk-oriented, meaning-focused activities.
2. Subjects agree that it is appropriate to take risks, but rarely take risks unless they are confident of success, thereby avoiding threats to self-esteem and reinforcing self-confidence through success.
3. Avoidance of failure may lead to higher achievement in the long run through reinforcement of self-confidence.
4. Belief in the value of avoidance of risk taking suggested by the stated belief that one not speak if possibly incorrect is related to spending more time at low to mid levels of prior knowledge and less time at higher levels.
5. Belief in the value of learning from mistakes is related to investing more effort when prior knowledge is stated to be zero and less time at medium to high levels of prior knowledge.

8.2.1.5 *Can We Label Learners as Formal or Functional*

There is an assumption inherent in the stereotypes that tend to be applied to students from certain cultures that they are to some degree either formal or functional in their approach to language learning and that a formal approach is not as effective. The conclusions regarding this issue reached in this investigation suggest that this assumption is not well founded. First, it was concluded from the data from both studies that these subjects were clearly aware of the formal or functional nature of activities. This provides a sound basis for the following conclusions.

Second, it was concluded from the Questionnaire Pilot Study data (see Chapter 7.1.1.1) that, with regard to grammar, if a student has experienced a highly communicative methodology, he or she might want to redress the balance by focusing more on form and vice versa for students who have experienced a highly formal methodology. In addition, the East Asian students in the sample (see Chapter 7.1.1.1) defined teacher translation of vocabulary as formal while most European students defined it as functional. East Asian students also tended to give lower values for the efficacy of translation related activities. They may have been influenced in this by their experience of immersion in an English speaking environment. This suggests that there are no grounds for labelling a student based on the educational component of cultural background.

Third, the biases shown by the data regarding beliefs in the importance of grammar, emphasis on accuracy and learning from mistakes (see Chapter 7.2.4.3.1 above for discussion of the relevant correlations) indicate that what may be regarded as formal bias is not uniformly detrimental or beneficial to language learning. It is concluded here that belief in the importance of grammar is related to less effort invested at lower levels and more at higher levels of prior knowledge. This is detrimental at lower levels but at least encourages the revisiting of linguistic content which is already familiar and, perhaps, the development of a deeper understanding. The conclusions regarding emphasis on accuracy and belief that one learns from mistakes discussed above (see Section 8.2.1.4) are also relevant here. Both of these are related to subjects investing greater effort at lower levels, which is probably beneficial, but belief that one learns from mistakes is related to spending less time at medium to high levels, which is probably detrimental. Therefore, it is concluded here that formal bias with regard to these beliefs can be helpful while functional bias is not necessarily beneficial.

Fourth, based on the neutrality shown by both the Questionnaire Pilot Study and Main Study samples, which were composed of very experienced language learners, compared to the wider range of responses found by previous surveys using the same or similar questionnaire items with inexperienced learners, it is concluded that language learners may change their beliefs as they develop. If an individual's beliefs are likely to be changing in response to the learning context, the tasks he or she is presented with and the level that he or she is currently at, it does not make sense to fix a label on that individual, especially when they are possibly coming around (all be it slowly) to the teacher's way of looking at things.

Fifth, it is concluded that dependence on authority, a dimension of belief discussed by both Schommer (1990) and Mori (1999b), is related to the particular skill being practiced and was not consistent across skills. For example, when the students are focusing on vocabulary, which has a strong quantitative aspect, teacher translations may be seen as more efficient. Dependence on the authority of the teacher is seen as a formal attribute associated with East Asian cultures. The conclusion that dependence on authority varies with the skill being practiced undermines this stereotype and is further support for not labelling students because of their culture or because of some bias perceived by the teacher.

Lastly, and perhaps most importantly, based on the similarity in general beliefs found between the Questionnaire Pilot Study and Main Study samples, it is concluded that different cultural groups are likely to have a great deal in common in their beliefs about language learning. This concurs with Horwitz's (1999) position that there may be a "world culture" in language learning. This being the case, it may not be particularly valid to have expectations about the formality of language learners from different cultures and further undermines the label.

These conclusions are summarised as follows:

1. Students are conscious of the formal or functional nature of language learning tasks and believe that no task is purely one or the other.
2. Students whose previous learning experience is mainly formal are likely to believe that meaning-focused grammar activities are more effective, while those whose previous learning experience was mainly functional are likely to believe that formal

grammar activities are more effective. Students whose previous experience is a mix of formal and functional methods value both.

3. Students' beliefs about the importance of vocabulary, grammar and translation take the nature of the task and task context into account.
4. Students who value self-directed learning value student-centred communicative practice and place a low value on teacher-led activities such as dictation.
5. Students whose beliefs are more functionally oriented are likely to prefer activities such as group discussion which do not isolate skills and to see activities which do isolate skills as less effective.
6. Belief in the importance of grammar to learning English is related to spending less effort at low levels of prior knowledge and more at higher levels; analysis of structure depends very much on the ability to understand linguistic content.
7. Dependence on the authority of the teacher is not consistent across skill areas and may be related to the nature of the linguistic skill being practiced.
8. Learners' beliefs change as they develop as language learners.
9. Language learners from different cultures are likely to have a great deal in common in terms of their general beliefs about language learning.

8.2.1.6 The Bell-Shaped Curve in Attention to Task and Linguistic Analysis

In this section, we shall address conclusions relating to patterns of attention to task and the possible role of analysis of linguistic content. Firstly, in the discussion of the bell-shaped pattern of effort invested in the task (see Chapter 7.2.4.2.3), it was suggested that at lower levels, subjects may have been "skimming" the content but not processing it deeply while at mid-levels of prior knowledge, they focused more attention because they could make more connections to existing schemata and process the vocabulary more deeply. It is therefore concluded that in autonomous learning of vocabulary, language learners may seek only exposure to content when prior knowledge is low. It is further concluded that when language learners have some prior knowledge of vocabulary they are likely to focus more attention on the task. In so far as subject behaviour appears to reflect an incremental approach to vocabulary acquisition, these conclusions concord with the view of vocabulary learning put forward by Nagy and Herman (1987, pp. 25-26).

Secondly, with regard to this investigation, linguistic analysis could be categorised in two ways:

- a) Analysis of structure
- b) Analysis of linguistic content

Conclusions on the relationship between belief in the importance of analysis of structure (belief in the importance of grammar) and effort invested in the task are covered in Section 8.2.1.6. Here, we shall focus on analysis of linguistic content and its relationship to conceptions of learning vocabulary. A conclusion on the relationship to effort invested in learning will also be covered. Interview data suggested that one reason for accessing material at medium and high levels of prior knowledge was that there might be linguistic content other than the target vocabulary which might be interesting to the subject either because it was unknown or because new uses for it might be found. A conception of vocabulary as “interesting” would be qualitative and deep as opposed to quantitative and superficial. It is therefore concluded that an interest in language for its own sake indicates a qualitative conception of language learning which it has been argued is a basis for progress to a high level of proficiency (Benson & Lor, 1999, p. 470). Interest in linguistic content is related to greater effort at medium and high levels of prior knowledge as evidenced by the bell-shaped curve in mean duration per screen. This is also supported by previous research (Lawless and Kulikowich, 1998). Learners are, therefore, likely to achieve greater proficiency if their interest motivates them to attend to linguistic content and develop a deeper understanding of it.

These conclusions are summarised as follows:

1. In autonomous learning mode at low levels of prior knowledge, language learners seek exposure to target vocabulary but do not attempt deeper processing.
2. In autonomous learning mode at medium levels of prior knowledge, language learners are likely to focus more attention on target vocabulary and process this more deeply.
3. Learners who are interested in language for its own sake are likely to focus greater attention on the linguistic content of language learning activities and develop a higher level of proficiency.

8.2.2 Autonomy

There is one conclusion related to autonomous learning behaviour in WordLearner. This is that the subjects exploited their freedom to choose which activities to do in a conscious and deliberate manner. Evidence suggested that this autonomous behaviour was related to

the subject's prior knowledge of the target vocabulary and that this was reflected not only in the patterns of activities chosen but also in the patterns of attention to the learning task.

This conclusion is summarised as follows:

1. The language learners in this study made conscious and deliberate learning decisions which were related to their prior knowledge of the target vocabulary.

8.2.2.1 Autonomy in Language Learning Computer Environments

A fundamental feature of the structure and content of WordLearner was the idea, based on Cognitive Flexibility Theory, that subjects could choose different ways to study the same target. This contrasts with the more typical type of autonomy provided in language learning software that allows learners to move at their own pace, choosing what or how much they wish to study. A key conclusion of this investigation with regard to language learning software is that the behaviour observed in WordLearner suggested that this type of structure was taken advantage of by the subjects. They were able to vary, not only the amount of material accessed and the time they spent on the learning target, but also the type of material accessed. We may therefore conclude that the flexibility provided by the hypertext allowed students to apply their preferred learning styles. Although this investigation did not evaluate learning effects, this type of structure certainly adds to the kind of qualitative difference in learning which Oxford et al (1998, pp. 8-9) argue allows language learners to apply preferred learning styles.

However, there do appear to be limits to the autonomy shown by these subjects. A further conclusion in this respect is that once students made an initial decision as to their learning preferences at a given level of prior knowledge, they did not change this very much. Practice preferences were less stable, but still quite predictable in a large minority of cases. Therefore, there appears to be some inertia in patterns of use of the software. Perhaps, with a larger, more varied program, subjects may have exploited a wider variety of learning patterns.

These conclusions are summarised as follows:

1. This program's hypertext structure, which provided different ways to learn and practice the same learning target, was exploited by the language learners in this study and facilitate language learning autonomy.

2. The flexibility provided by this hypertext allows students to apply their preferred learning styles within the constraints of the hypertext.
3. After making an initial decision on how to approach the learning task, students are unlikely to make permanent changes in their approach.

8.3 *Pedagogical Implications*

The pedagogical implications of this research relate to anxiety and confidence, materials design and provision, and how the teacher might use knowledge of students' beliefs to advantage in classroom teaching and language awareness training.

8.3.1 Language Learning Anxiety and Confidence

Although teachers may strive to create a low stress environment in the classroom, it may be that a low level of state anxiety in the language learner is not only unavoidable but possibly beneficial when tasks are familiar and non-threatening (Ausubel, Novak, & Hanesian, 1978, p. 443). The data obtained from this study:

- a) suggesting learner anxiety about making mistakes and
- b) the statistical relationship found between effort invested in learning and focus on form

suggests that a combination of these two is related to greater effort at low levels of prior knowledge and the revisiting of material at higher levels of prior knowledge. It is not suggested that the teacher actually encourage either anxiety or focus on form, but that when students do show such tendencies, to understand why they are anxious and that because of this, they want to focus on form. Furthermore, satisfying such needs and developing student confidence and self-esteem may be a basis for the introduction of more meaning-focused methodology in the medium to long term.

This investigation collected data on language learners' beliefs about the efficacy of language learning activities. Another way to put this would be to say that we asked language learners how much confidence they have in certain activities. Put like this, it could be argued that language learners not only have to have confidence in themselves, but also confidence in the activities. Anxiety may be related to this as learners are less likely to invest effort if they expect that they are not going to improve even if successful

in the task itself. Materials designers and teachers may therefore benefit from knowledge of how students feel about the activities they are given.

The implication is that materials designers and teachers should be aware of the confidence students have in activities as they are less likely to invest effort if they expect failure.

8.3.1.1 *Materials Design and Provision*

The logged data suggests that deductive learning and activities such as multiple choice questions that do not involve language production appear to take up less time. As these are the preferred learning and practice modes at the lowest level of prior knowledge, it is suggested that for self-access learning as much material as possible with as much variety as possible in terms of different methods of focusing on the same target should be provided for language learners at this level of prior knowledge. Moreover, students should be encouraged to take advantage of this variety. At the same time, if language learners give less attention at low levels of prior knowledge, guidance, either through the design of self-access material or from the teacher, should encourage greater attention to task.

If it is true that language learners prefer structured activities at lower levels of prior knowledge, then this investigation has two further recommendations for materials design at low levels of prior knowledge. Firstly, designing more meaning-focus into structured activities while maintaining a low threat to learners' self-esteem may increase attention to task. The investigator acknowledges that this may be very difficult to do. Secondly, features such as advance organizers may have the effect of activating prior knowledge to a level at which learners are confident enough to try less structured or more production-oriented activities.

These implications are summarized as follows:

1. These findings highlight the importance of having material at the right level for students and guiding them through it, especially when prior knowledge is low.
2. Students working in self-access mode need more help and guidance to encourage greater attention at these levels.
3. As much variety as possible in terms of different ways of practicing the same target should be provided.
4. Investing structured tasks with more meaning-focus may increase attention to task.

5. Attention to task increases at medium levels of prior knowledge, so design features such as advance organisers may lead to increased attention to task.

8.3.2 Using Students' Beliefs in Classroom Teaching and Language Awareness Training

The first suggestion under this heading is that exposing language learners to a variety of formal and functional activity types may help them to develop a positive attitude to both so that they can take a flexible approach when necessary. This leads on to the second suggestion, which is also based on the conclusion that experienced learners can make considered decisions about language learning, that teachers should listen more to students. This could be done on an individual level in language awareness training or at a class level when discussing materials, methods, or objectives. Lastly, as general beliefs such as those about the value of culture appear to be closely related to preferences for specific activities, it may be that fostering such general beliefs may possibly be rewarding in terms of developing positive attitudes to meaning focused activities.

These implications are summarized as follows:

1. Exposing language learners to a balanced variety of formal and functional activity types may help develop positive attitudes to both, and a flexible approach.
2. Experienced learners can make considered decisions and teachers should listen more to students.
3. General beliefs such as those about the value of culture should be addressed if the teacher seeks to develop positive attitudes to communicative activities.

8.4 *Suggestions for Further Research*

This research has created at least as many questions as it sought to answer. The following suggestions for further research refer to issues related to metacognition, attention to form and use of hypertext materials.

8.4.1 Metacognition

Analysis of the data suggests that students' experience affects their beliefs about learning. This is not surprising, but more research should be carried out to identify how experience influences beliefs, especially where the introduction of new methods such as CALL are introduced. This research supports a multidimensional view of personal beliefs, but there

are suggestions in the data of a hierarchy of beliefs: that some beliefs are more important than others in determining learning preferences. Further research on the relative influence of particular beliefs or types of belief is warranted. Lastly, the data suggests that beliefs might become decisive in learning preference when prior knowledge of the target is least. More research is needed to clarify if this is the case and, if so, why this might be.

These suggestions are summarised as follows:

1. How does experience affect beliefs and how do these beliefs affect teaching and learning?
2. Research is needed to identify if there is a hierarchy of beliefs.
3. More research is needed to clarify if beliefs become crucial when prior knowledge is very low.

8.4.2 Attention to Form

Data from this investigation showing that subjects preferred deductive learning, which is inherently formal, at lower levels, suggests that more research should be done to identify the conditions under which learners believe formal methods are necessary. Further to this, data from subject behaviour in WordLearner suggested that there was a threshold point at which subjects changed from formal to functional learning preferences. Further research on this issue is needed to see if this threshold is present in other contexts and, if so, to look for reasons for its existence and individual differences in when it is reached.

These suggestions are summarised as follows:

1. Under what conditions do language learners believe formal methods are necessary?
2. More research on the threshold at which learners change from formal to functional learning preferences is warranted.

8.4.3 Language Learners' Use of Hypertext

This research looked at the influence of prior knowledge without looking at how proficiency interacted with this. However, it would be useful to compare how low and high proficiency language learners deal with tasks for which they have low or high prior knowledge. Such research would have important implications for materials design for learners of different proficiencies. Regarding learning and practice preferences, the

subjects' learning preferences were much more consistent than their practice preferences. Further research is needed to identify if this happens in other contexts and, if so, why.

These suggestions are summarised as follows:

1. Low prior knowledge is not the same as low proficiency; more research is warranted on how learners of different proficiency levels work in hypertext.
2. Why is it that learners are quite consistent in learning preferences, but not so consistent in practice preferences?

8.5 Conclusion

It is clear from the questionnaire data that general beliefs about language learning are related to the values subjects put on the efficacy of specific language learning activities. However, this only supports the very general proposition that formal-functional bias is related to preferences for formal or functional methods. In contrast to this, it has not been possible to show such a clear relationship between what subjects believe and what they actually do; the investigation has failed to establish a relationship in a general sense between formal-functional bias in beliefs about language learning and actual language learning preferences in a computer environment as level of prior knowledge seems to be a greater influence on decision making than personal beliefs.

The interaction patterns that were found suggest that language learners are strongly influenced by task difficulty as measured by prior knowledge of the target vocabulary and take this into account in deciding which activities to do. The amount of effort subjects are prepared to invest shows a bell-shaped curve when measured against level of prior knowledge. Effort increases from the lowest level of prior knowledge up to level three and then decreases very quickly to the highest level of prior knowledge. When learning and practice preferences are overlaid with this curve, we see that lower attention to task at level one of prior knowledge is associated with formal preferences while increasing attention to task is associated with a mix of formal and functional preferences. The decrease in effort from medium to high levels of prior knowledge is associated with functional preferences and, in the case of level five, formal preferences, possibly because subjects were checking inferences.

At the same time, particular formal or functional beliefs associated with increased or decreased effort, seem to push subjects in opposite directions. It seems, therefore, that labelling students as formal or functional has little pedagogical value.

Having described this investigation's conclusions, it is natural to ask what they add up to. Ultimately, this investigation is about how language learners' make decisions, or, to put it in a single word, autonomy. It is argued here that the language learners who were the subjects of this investigation demonstrated quite clearly that they were able to evaluate the formal-functional components of language learning tasks and were clearly working autonomously within the program. While no comparison with proficiency or learning effects was made, it is argued that the observation and recording of autonomous learning behaviour is worthwhile in that the development of the ability to learn autonomously is an accepted pedagogical aim supported by a large body of theory and research. The evidence presented here shows that language learners can be highly aware of the nature of language learning tasks, that they can have clear opinions as to the efficacy of these tasks, and that they change their preferences according to the context and their knowledge of the task. Language learners' task knowledge may be a hugely underestimated resource. To sum up, if there is a single lesson to be learned from this investigation, it is that language learners know a lot more about language learning than some language teachers might give them credit for and that in underestimating them, language teachers fail to exploit the learners' own resources.

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Appendix A An Early Example of a BALLI

Beliefs About Language Learning Inventory: ESL Student Version (from Horwitz (1987))

Below are beliefs that some people have about learning foreign languages.

Read each statement and then decide if you:

(1) strongly agree, (2) agree, (3) neither agree nor disagree, (4) disagree, (5) strongly disagree.

There are no right or wrong answers. We are simply interested in your opinions. Mark each answer on the special answer sheet. Questions 4 and 15 are slight different and you should mark them as indicated.

REMEMBER

(1) strongly agree, (2) agree, (3) neither agree nor disagree, (4) disagree, (5) strongly disagree.

- 1. It is easier for children than adults to learn a foreign language.
- 2. Some people have a special ability for learning foreign languages.
- 3. Some languages are easier to learn than others.

English is:	(a) a very difficult language
	(b) a difficult language
	(c) a language of medium difficulty
	(d) an easy language
	(e) a very easy language

- 4. I believe that I will learn to speak English very well.
- 5. People from my country are good at learning foreign languages.
- 6. It is important to speak English with an excellent pronunciation.
- 7. It is necessary to know about English-speaking cultures in order to speak English.
- 8. You shouldn't say anything in English until you can say it correctly.
- 9. It is easier to for someone who already speaks a foreign language to learn another one.
- 10. People who are good at mathematics or science are not good at learning foreign languages.
- 11. It is best to learn English in an English-speaking country.
- 12. I enjoy practicing English with the Americans I meet.
- 13. It's OK to guess if you don't know a word in English.
- 14. If someone spent one hour a day learning a language, how long would it take them to speak the language very well:
 - (a) less than one year
 - (b) 1-2 years
 - (c) 3-5 years
 - (d) 5-10 years
 - (e) You can't learn a language in 1 hour a day.
- 15. I have a special ability for learning foreign languages.
- 16. The most important part of learning a foreign language is learning vocabulary words.
- 17. It is important to repeat and practice a lot.
- 18. Women are better than men at learning foreign languages.
- 19. People in my country feel that it is important to speak English.

20. I feel timid speaking English in front of other people.
21. If beginning students are permitted to make errors in English, it will be difficult for them to speak correctly later on.
22. The most important part of learning a foreign language is learning the grammar.
23. I would like to learn English so that I can get to know Americans better.
24. It is easier to speak than understand a foreign language.
25. It is important to practice with cassettes or tapes.
26. Learning a foreign language is different than learning other academic subjects.
27. The most important part of learning English is learning how to translate from my native language.
28. If I learn English very well, I will have better opportunities for a good job.
29. People who speak more than one language are very intelligent.
30. I want to learn to speak English well.
31. I would like to have American friends.
32. Everyone can learn to speak a foreign language.
33. It is easier to read and write English than to speak and understand it.

Appendix B List of Learning Strategies

Metacognitive	Cognitive/Compensation/Memory	Affective
<p><u>Centring your learning.</u></p> <p>Overviewing and linking with already known material.</p> <p>Paying attention.</p> <p>Delaying speech production to focus on listening.</p> <p><u>Arranging and planning your learning.</u></p> <p>Finding out about language learning.</p> <p>Organising.</p> <p>Setting goals and objectives.</p> <p>Identifying the purpose of a language task. (purposeful listening/reading/speaking/writing)</p> <p>Planning for a language task.</p> <p>Seeking practice opportunities.</p> <p><u>Evaluating your learning.</u></p> <p>Self-monitoring.</p> <p>Self-evaluating.</p>	<p><u>Cognitive Strategies</u></p> <p><u>Practising:</u></p> <p>Repeating</p> <p>Formally practising with sounds and writing systems</p> <p>Recognising and using formulas and patterns</p> <p>Recombining</p> <p>Practising naturalistically</p> <p><u>Receiving and sending messages:</u></p> <p>Getting the idea quickly</p> <p>Using resources for receiving and sending messages</p> <p><u>Analysing and reasoning</u></p> <p>Reasoning deductively</p> <p>Analysing expressions</p> <p>Analysing contrastively (across languages)</p> <p>Translating</p> <p>Transferring</p> <p><u>Creating structure for input and output:</u></p> <p>Taking notes</p> <p>Summarising</p> <p>Highlighting</p>	<p><u>Lowering your anxiety:</u></p> <p>Using progressive relaxation.</p> <p>Using music</p> <p>Using laughter</p> <p><u>Encouraging yourself:</u></p> <p>Making positive statements</p> <p>Taking risks wisely</p> <p>Rewarding yourself</p> <p><u>Taking your emotional temperature:</u></p> <p>Listening to your body</p> <p>Using a checklist</p> <p>Writing a language learning diary</p> <p>Discussing your feelings with someone else</p>
	<p><u>Compensation strategies</u></p> <p>Guessing intelligently:</p> <p>Using linguistic clues</p> <p>Using other clues</p> <p><u>Overcoming limitation in speaking and writing:</u></p> <p>Switching to mother tongue</p> <p>Getting help</p> <p>Using mime or gesture</p> <p>Avoiding communication partially or totally</p> <p>Selecting the topic</p> <p>Adjusting or approximating the message</p> <p>Coining words</p> <p>Using a circumlocution or synonym</p> <p><u>Memory strategies</u></p> <p><u>Creating mental linkages:</u></p> <p>Grouping</p> <p>Associating/elaborating</p> <p>Placing new words into context</p> <p><u>Applying images and sounds:</u></p> <p>Using imagery</p> <p>Semantic mapping</p> <p>Using keywords</p> <p>Representing sounds in memory</p> <p><u>Reviewing well:</u></p> <p>Structured reviewing</p> <p><u>Employing action:</u></p> <p>Using physical response or sensation</p> <p>Using mechanical techniques</p>	

Appendix C Questionnaire Pilot Study Survey

Definition of Language Learning

Questionnaire

Part 1

The following questionnaire looks at the way people who study languages define the task of learning a language.

To begin, please answer the following questions. All data will be held in the strictest confidence.

1. Name:_____2. Age:_____3. Gender (please circle): M F
4. What language are you studying now (your target language)? If you are _____ studying more than one, please give the one you feel is most difficult.
5. How long have you been studying your target language. Please include lengths of time which you may regard as useless (e.g. time spent studying in high school)?

a) Less than one year
b) Between one and two years
c) Between two and three years
d) Between three and four years
e) More than four years
6. Year in college/university (Please circle):

1 2 3 4
7. Do you speak/study or have you ever studied any other languages apart from your native language(s) and the language you are studying now?

Yes No
8. If the answer to question 7 is “yes”, please list the languages (please circle the level achieved).

Level

1. _____ High Int. Low
2. _____ High Int. Low
3. _____ High Int. Low
4. _____ High Int. Low
9. Are you living or have you ever lived in the country of your current target language? (please circle):

Yes No
- 10.If “yes”, for how long?

a) Less than one month
b) Between one month and one year
c) Between one and two years
d) Between two and three years
e) More than three years
- 11.My classroom language learning so far has been characterised mainly by:

a) strong emphasis on memorisation, grammar and passing exams
b) a 50/50 emphasis on memorisation, grammar and passing exams and practicing communication for real life tasks
c) strong emphasis on practicing communication for real life tasks

Part 2: What Do You Believe About Learning A Language?
Instructions

Please read each statement and indicate:

- A. Strongly agree.
- B. Agree.
- C. Neither agree nor disagree.
- D. Disagree.
- E. Strongly disagree.

Well....maybe there are more women studying languages, but I don't really believe they are naturally better.

Example:

Women are better than men at learning foreign languages.

A. B. C. **D.** E.

Questionnaire

Please circle the appropriate letter.

- | | | | | | |
|--|----|----|----|----|----|
| 1. My target language is structured in the same way as my own language. | A. | B. | C. | D. | E. |
| 2. It is necessary to know the target language culture in order to speak that language well. | A. | B. | C. | D. | E. |
| 3. It is better to learn my target language in a country that speaks that language | A. | B. | C. | D. | E. |
| 4. Learning a foreign language is mostly a matter of learning many new vocabulary words. | A. | B. | C. | D. | E. |
| 5. Learning a foreign language is mostly a matter of learning many grammar rules. | A. | B. | C. | D. | E. |
| 6. Learning my target language is different from learning other school subjects. | A. | B. | C. | D. | E. |
| 7. Learning my target language is mostly a matter of translating from my own language. | A. | B. | C. | D. | E. |
| 8. It is important to repeat and practice often. | A. | B. | C. | D. | E. |
| 9. It is important to practice in the Open Access Centre. | A. | B. | C. | D. | E. |
| 10. It is important to speak my target language with an excellent accent. | A. | B. | C. | D. | E. |
| 11. I should not say anything in my target language until I can say it correctly. | A. | B. | C. | D. | E. |

- | | | | | | |
|---|----|----|----|----|----|
| 12. If I heard someone speaking my target language, I would go up to them so that I could practice speaking the language. | A. | B. | C. | D. | E. |
| 13. It is OK for me to guess if I do not know a word in my target language. | A. | B. | C. | D. | E. |
| 14. I feel self-conscious speaking my target language in front of other people. | A. | B. | C. | D. | E. |
| 15. If you are allowed to make mistakes in the beginning, it will be hard to get rid of them later on. | A. | B. | C. | D. | E. |
| 16. If I learn to speak my target language, it will help me to get a good job. | A. | B. | C. | D. | E. |
| 17. People in my country think it is important to speak my target language. | A. | B. | C. | D. | E. |
| 18. I would like to learn my target language so that I can get to know people better in the country where my target language is spoken. | A. | B. | C. | D. | E. |

Part 3: Language Learning Activities - Why Do We Do Them?

Instructions

Situation: Imagine you are in a language learning class in which everyone speaks the same language as you. The teacher can also speak that language if he or she needs to.

Let's say that in this class, you can do activities that help you learn to:

- A. be correct. For example, you learn grammar rules, but you don't worry very much about practising for real life communication. The teacher may be very active and you are quite passive. This is good for passing exams. Here, we call this "Correctness".
- B. communicate or perform tasks in real life. For example, you learn how to tell someone your opinion. You don't worry about small mistakes and you practice with other students. This is good for real life. Here, we call this "Performance".

The questions below ask you how much you think certain activities are about correctness or performance. Please mark on the scales your opinion on how weakly or how strongly they relate to correctness or performance. Please remember to mark both scales (see the examples).

- Scale:
- 1. Very little or not at all
 - 2. A little
 - 3. Neither a little nor a lot
 - 4. A lot
 - 5. Very much

Example 1:

Doing role plays: Correctness: 1. 2. 3. 4. 5.
 Performance: 1. 2. 3. 4. 5.

Hmmm...? When I do role-plays, do I have to worry about speaking very correctly? Probably a little.

Hmmm...? Do role plays help me with real life communication? Probably very much.

If you checked the above item like this, it would suggest that you think role-plays have very much to do with real life communication and that making a few mistakes is something you worry about just a little in role-plays.

Example 2:

Memorising dialogues: Correctness: 1. 2. 3. 4. 5.
 Performance: 1. 2. 3. 4. 5.

Hmmm...? Is memorising dialogues about learning to speak very correctly? Well....yes, they are strongly about correctness.

Hmmm...? Do I memorise these dialogues for real life performance or just for tests? Well....mostly they are just for tests.

If you checked the above item like this, it would suggest that you think memorising dialogues is quite a lot to do with being correct and sometimes similar to real life.

Questionnaire

Please circle the appropriate number.

Activity	Very little or not at all → → → → Very much					
Learning Vocabulary						
a) Repeating words after the teacher	Correctness:	1.	2.	3.	4.	5.
	Performance:	1.	2.	3.	4.	5.
b) Using new vocabulary in group discussion to express opinions/feelings	Correctness:	1.	2.	3.	4.	5.
	Performance:	1.	2.	3.	4.	5.
c) Teacher translates all new words and explains what they mean in your own language	Correctness:	1.	2.	3.	4.	5.
	Performance:	1.	2.	3.	4.	5.
d) Games in which pairs and groups have to be creative with vocabulary and communicate in your target language	Correctness:	1.	2.	3.	4.	5.
	Performance:	1.	2.	3.	4.	5.

Learning Grammar						
e) Games in which pairs and groups have to be creative with grammar and communicate in your target language	Correctness:	1.	2.	3.	4.	5.
	Performance:	1.	2.	3.	4.	5.
f) Repeating correct sentences after the teacher	Correctness:	1.	2.	3.	4.	5.
	Performance:	1.	2.	3.	4.	5.
g) Teacher teaches the grammar rules in your own language.	Correctness:	1.	2.	3.	4.	5.
	Performance:	1.	2.	3.	4.	5.
h) Using new grammar in conversation activities to express feelings/opinions or describe events	Correctness:	1.	2.	3.	4.	5.
	Performance:	1.	2.	3.	4.	5.

Learning General Writing (not academic or business)						
i) Focus on correct grammar in phrases and simple sentences, but no paragraph writing	Correctness:	1.	2.	3.	4.	5.
	Performance:	1.	2.	3.	4.	5.
j) Students use class time to write letters to pen friends; the teacher does not correct the letters	Correctness:	1.	2.	3.	4.	5.
	Performance:	1.	2.	3.	4.	5.
k) Multiple choice grammar exercises such as those focusing on using the right verb	Correctness:	1.	2.	3.	4.	5.
	Performance:	1.	2.	3.	4.	5.
l) Writing activities in class where communicating meaning is more important than grammar	Correctness:	1.	2.	3.	4.	5.
	Performance:	1.	2.	3.	4.	5.

Activity	Very little or not at all →→→→ Very much					
Learning Reading						
m) Teacher translates all new words and explains what they mean in your own language	Correctness:	1.	2.	3.	4.	5.
	Performance:	1.	2.	3.	4.	5.
n) Students do written vocabulary exercises after reading a short article.	Correctness:	1.	2.	3.	4.	5.
	Performance:	1.	2.	3.	4.	5.
o) Reading for fun	Correctness:	1.	2.	3.	4.	5.
	Performance:	1.	2.	3.	4.	5.
p) Students read stories and then tell them to other students who have not read the stories. Then they ask the other students questions about the stories.	Correctness:	1.	2.	3.	4.	5.
	Performance:	1.	2.	3.	4.	5.

Learning Speaking						
q) Games in which pairs and groups have to be creative and communicate in your target language	Correctness:	1.	2.	3.	4.	5.
	Performance:	1.	2.	3.	4.	5.
r) Students memorise dialogues which they have to write down for tests.	Correctness:	1.	2.	3.	4.	5.
	Performance:	1.	2.	3.	4.	5.
s) Whole class repeating dialogues after the teacher	Correctness:	1.	2.	3.	4.	5.
	Performance:	1.	2.	3.	4.	5.
t) Group discussion of topics	Correctness:	1.	2.	3.	4.	5.
	Performance:	1.	2.	3.	4.	5.

Learning Listening						
u) Students listen and fill in missing words in the script (missing words are random, not key words)	Correctness:	1.	2.	3.	4.	5.
	Performance:	1.	2.	3.	4.	5.
v) Watching a TV commercial and describing it to a student who cannot see it. The other student has to guess what the product is	Correctness:	1.	2.	3.	4.	5.
	Performance:	1.	2.	3.	4.	5.
w) Watching a short section of a film and discussing what happens next in the story	Correctness:	1.	2.	3.	4.	5.
	Performance:	1.	2.	3.	4.	5.
x) Teacher reads a paragraph and the students write it down. Teacher collects the students work, corrects it, and returns it after a week	Correctness:	1.	2.	3.	4.	5.
	Performance:	1.	2.	3.	4.	5.

Part 4: Effectiveness of Learning Methods Questionnaire

Instructions

Situation: You are going to start a language learning class. Before the class, the teacher gives you the a list of the kind of activities that could be done in the class and asks you to score the activities according to how effective you think they (and activities like them) are for learning.

- Scale:
- 1. Not effective at all
 - 2. Not very effective
 - 3. Neither effective nor ineffective
 - 4. Effective
 - 5. Very Effective

Example 1:

For learning vocabulary:

Activities like.....

Repeating words after the teacher: 1. ② 3. 4. 5.

Is repeating words after the teacher an effective way to learn vocabulary?
No, I don't think it's very effective.

If you circled the above item like this, it would suggest that you think repeating words after the teacher is not an effective way to learn vocabulary.

Example 2:

For learning reading:

Activities like....

Reading for fun: 1. 2. 3. 4. ⑤

Does reading for fun help me to improve my reading?
Yes, I think it does help a lot.

If you circled the above item like this, it would suggest that you think reading for fun is an effective way to learn reading.

Effectiveness of Learning Methods Questionnaire

Activities like.....	Not effective at all →→→→ Very effective				
Vocabulary					
a) Repeating words after the teacher	1.	2.	3.	4.	5.
b) Using new vocabulary in group discussion to express opinions/feelings	1.	2.	3.	4.	5.
c) Teacher translates all new words and explains what they mean in your own language	1.	2.	3.	4.	5.
d) Games in which pairs and groups have to be creative with vocabulary and communicate in your target language	1.	2.	3.	4.	5.

Grammar						
e)	Games in which pairs and groups have to be creative with grammar and communicate in your target language	1.	2.	3.	4.	5.
f)	Repeating correct sentences after the teacher	1.	2.	3.	4.	5.
g)	Teacher teaches the grammar rules in your own language.	1.	2.	3.	4.	5.
h)	Using new grammar in conversation activities to express feelings/opinions or describe events	1.	2.	3.	4.	5.

General Writing (not academic or business)						
i)	Focus on correct grammar in phrases and simple sentences, but no paragraph writing	1.	2.	3.	4.	5.
j)	Students use class time to write letters to pen friends; the teacher does not correct the letters	1.	2.	3.	4.	5.
k)	Multiple choice grammar exercises such as those focusing on using the right verb	1.	2.	3.	4.	5.
l)	Writing activities in class where communicating meaning is more important than grammar	1.	2.	3.	4.	5.

Activities like.....	Not effective at all →→→→ Very effective				
Reading					
m) Teacher translates all new words and explains what they mean in your own language	1.	2.	3.	4.	5.
n) Students do written vocabulary exercises after reading a short article.	1.	2.	3.	4.	5.
o) Reading for fun	1.	2.	3.	4.	5.
p) Students read stories and then tell them to other students who have not read the stories. Then they ask the other students questions.	1.	2.	3.	4.	5.

Speaking						
q)	Games in which pairs and groups have to be creative and communicate in your target language	1.	2.	3.	4.	5.
r)	Students memorise dialogues which they have to write down for tests.	1.	2.	3.	4.	5.
s)	Whole class repeating dialogues after the teacher	1.	2.	3.	4.	5.
t)	Group discussion of topics	1.	2.	3.	4.	5.

Listening						
u)	Students listen and fill in missing words in the script (missing words are random, not key words)	1.	2.	3.	4.	5.
v)	Watching a TV commercial and describing it to a student who cannot see it. The other student has to guess what the product is	1.	2.	3.	4.	5.
w)	Watching a short section of a film and discussing what happens next in the story	1.	2.	3.	4.	5.
x)	Teacher reads a paragraph and the students write it down. Teacher collects the students work, corrects it, and returns it after a week	1.	2.	3.	4.	5.

Appendix D Main Study Questionnaire Survey Form

Definition of Language Learning Questionnaire (Version 2E)

Part 1

The following questionnaire looks at the way people who study languages define the task of learning a language.

To begin, please answer the following questions. All data will be held in the strictest confidence.

1. Computer Login Name: N_____
2. Age:_____
3. Gender (please circle): M F
4. I am:
 - a) a Foundation year student
 - b) a Bridging year student
 - c) an undergraduate student
 - d) an MA/MSc student
 - e) a PhD student
 - f) a visiting student/visiting staff (e.g. post-Doctoral researcher)
5. How long have you been studying English. Please include lengths of time which you may regard as useless (e.g. time spent studying in high school)?
 - a) Less than one year
 - b) Between one and two years
 - c) Between two and three years
 - d) Between three and four years
 - e) More than four years
6. What is the total time you have spent living in English native speaking countries (e.g. UK, Australia, America)?
 - a) Four months or less
 - b) Between four months and one year
 - c) Between one and two years
 - d) Between two and three years
 - e) More than three years
7. My language learning so far has been characterised mainly by:
 - a) strong emphasis on memorisation, grammar and passing exams
 - b) a 50/50 emphasis on memorisation, grammar and passing exams and practising communication for real life tasks
 - c) strong emphasis on practising communication for real life tasks
8. At the moment, I believe the most important thing I need to do to develop my English is:
 - a) memorise new words and grammar, and improve my reading and listening
 - b) take part in real life communication and/or classroom activities that prepare me for that.

Part 2: What Do You Believe About Learning A Language?
Instructions

Please read each statement and indicate:

- A. Strongly agree.
- B. Agree.
- C. Neither agree nor disagree.
- D. Disagree.
- E. Strongly disagree.

Well....maybe there are more women studying languages, but I don't really believe they are naturally better.

Example:

Women are better than men at learning foreign languages.

- A. B. C. **D.** E.

Questionnaire

Please circle the appropriate letter.

- | | | | | | |
|--|----|----|----|----|----|
| 1. It is necessary to know English culture in order to speak English well. | A. | B. | C. | D. | E. |
| 2. It is better to learn English in an English speaking country | A. | B. | C. | D. | E. |
| 3. Learning a foreign language is mostly a matter of learning many new vocabulary words. | A. | B. | C. | D. | E. |
| 4. Learning a foreign language is mostly a matter of learning many grammar rules. | A. | B. | C. | D. | E. |
| 5. Learning English is different from learning other school subjects. | A. | B. | C. | D. | E. |
| 6. Learning English is mostly a matter of translating from my own language. | A. | B. | C. | D. | E. |
| 7. It is important to repeat and practice often. | A. | B. | C. | D. | E. |
| 8. You should not say anything in English until you can say it correctly. | A. | B. | C. | D. | E. |
| 9. It is OK to guess if you do not know an English word. | A. | B. | C. | D. | E. |
| 10. If you are allowed to make mistakes in the beginning, it will be hard to get rid of them later on. | A. | B. | C. | D. | E. |

Part 3: Language Learning Activities - Why Do We Do Them?

Instructions

Situation: Imagine you are in a language learning class in which everyone speaks the same language as you. The teacher can also speak that language if he or she needs to.

Let's say that in this class, you can do activities that help you learn to:

- A. be correct. For example, you learn grammar rules, but you don't worry very much about practising for real life communication. The teacher may be very active and you are quite passive. This is good for passing exams. Here, we call this "Correctness".
- B. communicate or perform tasks in real life. For example, you learn how to tell someone your opinion. You don't worry about small mistakes and you practice with other students. This is good for real life. Here, we call this "Performance".

The questions below ask you how much you think certain activities are about correctness or performance. Please mark on the scales your opinion on how weakly or how strongly they relate to correctness or performance. Please remember to mark both scales (see the examples).

- Scale:
- 1. Very little or not at all
 - 2. A little
 - 3. Neither a little nor a lot
 - 4. A lot
 - 5. Very much

Example 1:

Doing role plays: Correctness: 1. 2. 3. 4. 5.
 Performance: 1. 2. 3. 4. 5.

Hmmm...? When I do role-plays, do I have to worry about speaking very correctly?
Probably a little.

Hmmm...? Do role plays help me with real life communication?
Probably very much.

If you checked the above item like this, it would suggest that you think role-plays have very much to do with real life communication and that making a few mistakes is something you worry about just a little in role-plays.

Example 2:

Memorising dialogues: Correctness: 1. 2. 3. 4. 5.
 Performance: 1. 2. 3. 4. 5.

Hmmm...? Is memorising dialogues about learning very correct English?
Well...yes, they are strongly about correctness.

Hmmm...? Do I memorise these dialogues for real life performance or just for tests?
Well...mostly they are just for tests.

If you checked the above item like this, it would suggest that you think memorising dialogues is quite a lot to do with being correct and sometimes useful for real life language use.

Questionnaire

Please circle the appropriate number.

Activity	Very little or not at all →→→→ Very much					
Learning Vocabulary						
a) Repeating words after the teacher	Correctness:	1.	2.	3.	4.	5.
	Performance:	1.	2.	3.	4.	5.
b) Using new vocabulary in group discussion to express opinions/feelings	Correctness:	1.	2.	3.	4.	5.
	Performance:	1.	2.	3.	4.	5.
c) Teacher translates all new words and explains what they mean in your own language	Correctness:	1.	2.	3.	4.	5.
	Performance:	1.	2.	3.	4.	5.
d) Games in which pairs and groups have to be creative with vocabulary and communicate in English	Correctness:	1.	2.	3.	4.	5.
	Performance:	1.	2.	3.	4.	5.
e) Doing multiple choice exercises on a computer to practice the meaning of words and getting immediate information regarding whether you are right or wrong	Correctness:	1.	2.	3.	4.	5.
	Performance:	1.	2.	3.	4.	5.
f) Learning the meaning of a word by reading the English language definition (e.g. not a translation into your own language)	Correctness:	1.	2.	3.	4.	5.
	Performance:	1.	2.	3.	4.	5.
g) Guessing the meaning of a word by reading sentences containing the word.	Correctness:	1.	2.	3.	4.	5.
	Performance:	1.	2.	3.	4.	5.
h) Practising writing sentences using a new word.	Correctness:	1.	2.	3.	4.	5.
	Performance:	1.	2.	3.	4.	5.

Part 4: Effectiveness of Learning Methods Questionnaire
Instructions

Situation: You are going to start a language learning class. Before the class, the teacher gives you the a list of the kind of activities that could be done in the class and asks you to score the activities according to how effective you think they (and activities like them) are for learning.

- Scale:
- 1. Not effective at all
 - 2. Not very effective
 - 3. Neither effective nor ineffective
 - 4. Effective
 - 5. Very Effective

Example 1:

For learning vocabulary:

Activities like.....

Repeating words after the teacher: 1. ② 3. 4. 5.

Is repeating words after the teacher an effective way to learn vocabulary?
No, I don't think it's very effective.

If you circled the above item like this, it would suggest that you think repeating words after the teacher is not an effective way to learn vocabulary.

Example 2:

For learning reading:

Activities like....

Reading for fun: 1. 2. 3. 4. ⑤

Does reading for fun help me to improve my reading?
Yes, I think it does help a lot.

If you circled the above item like this, it would suggest that you think reading for fun is an effective way to learn reading.

Effectiveness of Learning Methods Questionnaire

Activities like.....	Not effective at all →→→→ Very effective				
For Learning Vocabulary					
a) Repeating words after the teacher	1.	2.	3.	4.	5.
b) Using new vocabulary in group discussion to express opinions/feelings	1.	2.	3.	4.	5.
c) Teacher translates all new words and explains what they mean in your own language	1.	2.	3.	4.	5.
d) Games in which pairs and groups have to be creative with vocabulary and communicate in English	1.	2.	3.	4.	5.
e) Doing multiple choice exercises on a computer to practice the meaning of words and getting immediate information regarding whether you are right or wrong	1.	2.	3.	4.	5.
f) Learning the meaning of a word by reading the English language definition (e.g. not a translation into your own language)	1.	2.	3.	4.	5.
g) Guessing the meaning of a word by reading sentences containing the word.	1.	2.	3.	4.	5.
h) Practising writing sentences using a new word.	1.	2.	3.	4.	5.

This is the end of the questionnaire.

Appendix E Examples of Verbal Protocols

Introduction

This appendix contains samples of verbal protocols performed in the development of the questionnaire used in the Questionnaire Pilot Study. Where necessary, supporting material such as summaries of the verbal protocols and copies of the scripts filled out by the verbal protocol subjects are provided. Where possible, the subjects were allowed to speak without interruption. However, a strict verbal protocol procedure was not followed as the investigator interrupted subjects to get further information about their choices.

Please note that to preserve the anonymity of the subjects, only their initials are given.

Analysis of BALLI Questionnaire Questions

This analysis of BALLI consists of a general summary of information gained from the 6 protocols run on a complete BALLI (taken from Yang, 1993) and an example transcript of one of these protocols.

General Points Arising from the Analysis of BALLI

“Learning English”

Terms such as “learning” can mean different things to different people. For example, to Taiwanese students studying English in Taiwan, “learning English” could mean studying English for exams or to get a degree whereas an in-sessional student in this university may see learning English as a tool for functioning in the university. That means the students in Taiwan could easily view learning English as an easy task if it is just a matter of learning vocabulary and passing tests while students here might be faced with a lot more problems with actually using English.

Context of learning

Some questions are ambiguous because of variation in learning context. For example, location (e.g. learnt English in Taiwan) and learning purpose (working here, not studying here) influence how subjects interpret and answer questions.

Generalising

Students sometimes answer for what they think is true generally not just their own case.

Verbal Protocol on BALLI - Subject 2 – CL – Recorded on 5/11/97

Subject: I am female. My native language is Chinese. I have studied English for more than 5 years. I am more than.... thirty or more years old. Do you want me to read this? It is easier for children than adults to learn a foreign language. Strongly agree. Some people are born with a special ability that helps them to learn a foreign language. Agree. Some languages are easier to learn than others. Agree. Learning English is ... medium difficulty. English is structured in the same way as my own language. I don't know. What is that? Strongly disagree. I believe that in the end I will learn to speak English very well. Agree. It is important to speak English with an

excellent accent. Disagree. It is necessary to know English culture in order to speak English well. Agree. You should not say anything in English until you can say it correctly. Disagree. It is easier for someone who already speaks a foreign language to learn another one. Disagree. It is better to learn English in an English speaking country. Strongly agree. If I heard someone speaking English, I would go up to them so that I could practice speaking the language. Agree. No, no. Disagree. Ah! Disagree. It is OK to guess if you do not know an English word. Agree. If someone spent one hour a day learning English, how long would it take him or her to become fluent? I don't know. Uh... one or two years. I am good at learning foreign languages. Disagree. Learning a foreign language is mostly a matter of learning many new vocabulary words. Disagree. It is important to repeat and practice often. Strongly agree. I feel self-conscious speaking English in front of other people. What's self-conscious? Means nervous?

Investigator: It's like embarrassed.

Subject: No, so disagree.

Investigator: Tell me, when you said it's important to repeat and practice often what does that mean to you?

Subject: Well, you have to read a book, repeat reading, listen to the tapes. When you have a chance to use it, you use it. But, I don't really agree, you just see a foreigner, you just go there and say hello and duh duh duh just in order to practice because you will give the other person a very uncomfortable feeling.

Investigator: But when it says practice and repeat, don't you think that means just doing exercises and homework and reading books.

Subject: Oh, you have to a lot, yes.

Investigator: And repeating, what does that mean to you?

Subject: Read. Just read things until you can say it fluently. Like repeating like reading. You know what I mean? If you are allowed to make mistakes in the beginning, it will be harder to get rid of them later on. No. I don't agree that. Learning a foreign language is mostly a matter of learning many grammar rules. No, disagree. It is important to practice in the Open Access Centre. Strongly agree. Women are better than men at learning foreign languages. I don't know. Neither agree nor disagree. If I speak this language very well, I will have many opportunities to use it. I don't understand. What does that mean? If I live in Taiwan, doesn't necessarily mean I will have many opportunities to use it.

Investigator: But, if you're living here? Is it unclear what that means?

Subject: Yes, very unclear. If I speak this language very well, I will... you should be... that means I will had many opportunities to use it. I think that this is ... not will.. If I speak, that means not the past tense, it means I already speak very good English. So, that means I had many opportunities to use it properly, but not I will have. So, I think this one is not very clear. All right? I don't know the answer. It is easier to speak than to understand English. Disagree. What does that mean? It is easier to speak than to understand. Oh, to listen.... Yes. Neither... I don't know. Just depends on people. You know a lot of Chinese students their listening is very good.

Investigator: Don't talk about Chinese students. Talk about yourself.

Subject: Oh, all right. I mean the listening can be quite good, but the speaking might not. You don't know how to put words together.

Investigator: Is that what you feel?

Subject: It is easier to speak than to ... not here. Not here. It's quite difficult to understand here.

Investigator: What is that? In Newcastle?

Subject: Yes. People's accent. I find it very hard to understand. Learning English is different from learning other school subjects. Yes. I agree. It's different. Learning English is mostly a matter of translating from my own language. No. Disagree. If I learn to speak English, it will help me to get a good job. Yes. I agree. It is easier to read and write English than to speak and understand it. Disagree.

Investigator: Is that [unintelligible]?

Subject: You mean to write? You mean to write an essay, to write an essay. Sometimes it's easier to speak, right, to just talk to people rather than put it in writing. But, depends write English, if it's very simple, no grammar. Of course, it's easier. So, I think you should really emphasise writing English what. Writing English letter, English essay.

Investigator: Are you talking about for yourself?

Subject: Yes. Talking about for myself. If you want me to write English essay...

Investigator: What about reading?

Subject: Reading.

Investigator: It says read and write.

Subject: It is easier to read and write

Investigator: than to speak and understand.

Subject: Yes, reading is... of course, it's easier.

Investigator: But when you read that question, did you just automatically just focus on write?

Subject: Yes.

Investigator: and forget about read?

Subject: Right. Yes.

Investigator: OK. Carry on.

Subject: People who are good at math and science are not good at learning foreign languages. Disagree. People in my country think it is important to speak English. Yes. Agree. I would like to learn English so that I can get to know English people better. Disagree. That's not the purpose I learn English. People who speak more than one language very well are very intelligent. Well, I can't Neither agree nor disagree. People in my country are good at learning foreign languages. I don't know. I mean....

Investigator: OK. Stop there. In your country, people speak several languages like Taiwanese, Hakka, Mandarin. Are they foreign languages?

Subject: No.

Investigator: Are they other languages?

Subject: They are other languages, but they grow up with that. They don't learn in schools. They just grow up. They learn it from parents and other relatives. In Taiwan, they only teach us... oh... OK.... Chinese and English, not.... There's no other foreign languages until you get into university you can choose. I don't know this one. Everyone can learn to speak English. Yes. I agree.

End of Protocol

Definition of Language Learning Questionnaire (DLL)

This formed Part 3 of the Pilot Study questionnaire and, in an abbreviated form, the Main Study questionnaire. Protocols were done only on Part 3 as the aim of doing the protocols was to refine the activities described so that respondents would understand them and the items were repeated in Part 4.

*Verbal Protocol on DLL Version 5: Subject 2 - MC – Recorded
on 18/12/97*

Investigator: OK, MC.

Subject: *Subject reads instructions up to part A of explanation of terms.*

Investigator: OK, so what does formal mean?

Subject: You mean formal?

Investigator: Yes, in this case, what does it mean?

Subject: I think it means the way you use the words and grammar. It tends to be in a formal way formal way, for example.

Investigator: In A what does it say? Focus on....

Subject: Focus on knowledge about language?

Investigator: OK. Continue.

Subject: *Subject reads activity description up to end of part B of explanation of terms.*

Investigator: OK, so what does functional mean?

Subject: *Subject reads activity description concerning functional.*

Investigator: OK. Good. So do you see the difference? What's the difference between formal and functional?

Subject: Form focus on knowledge about language but function focus on expression or understanding idea in a real life situation.

Investigator: OK. Now read the scale.

Subject: Subject reads scale.

Investigator: OK, now read the example.

Subject: Subject reads example.

Investigator: OK, and read the explanation.

Subject: Subject reads the explanation.

Investigator: So, look at the questionnaire now. If you're studying vocabulary what would you say? Read that.

Subject: *Subject reads the activity description.*

Investigator: So, what do you think that is? Do you think it's very formal, strongly formal, very strongly or not at all?

Subject: Yes, it's formal.

Investigator: So, please check. What do you think it is?

Subject: It's 4.

Investigator: And, is it to any degree functional?

Subject: It might be. Depends on the context.

Investigator: This is vocabulary.

Subject: No, no, 2, not really.

Investigator: OK, B.

Subject: *Subject reads activity description B.* It's quite functional, so

Investigator: And is it formal at all.

Subject: It's OK, but I wouldn't give the high mark. Formal.

Investigator: OK, C.

Subject: *Subject reads activity description C.* I think this one is very strong formal.

Investigator: It's your decision. And functional. Is it functional to any degree?

Subject: *Subject reads activity description D.* It's functional.

Investigator: Absolutely functional....? Now, if you're learning grammar....

Subject: *Subject reads activity description E.* It's functional. *Subject reads activity description F.* Formal. *Subject reads activity description G.* Formal. *Subject reads activity description H.* Functional. General writing?

Investigator: Yes, general writing. That's not business writing or academic writing.

Subject: *Subject reads activity description I.* Formal.

Investigator: Did you mark the functional?

Subject: Yes.

Investigator: OK.

Subject: *Subject reads activity description J.* Functional. *Subject reads activity description K.* *Subject reads activity description L.* Functional. Reading. *Subject reads activity description M.* Formal. *Subject reads activity description N.* Functional. *Subject reads activity description O.* Functional. *Subject reads activity description P.* Formal. Speaking. *Subject reads activity description Q.* Functional. *Subject reads activity description R.* Functional.

Investigator: Now what would you say? Is that very functional or very formal?

Subject: Oh.... It's formal.

Investigator: Now, tell me something. You looked a little bit confused there. Do you think it would be easy to be confused with this?

Subject: Yes.

Investigator: Any reason why?

Because uh... Because uh... You mean the reason to confuse me?

Investigator: Yes. Why does it confuse you? Other people get confused, too. I'm just interested to know why. Do you think they are very similar? The words are similar.

Subject: No, because in this questionnaire the question are similar to each other and repeat repeat each section. In the beginning it's OK, but when you repeat uh...

Investigator: Do you think it's..... Is it easy to loose concentration?

Subject: Yes. Very easy.

Investigator: Because it's just repeat repeat.

Subject: Yes.

Investigator: It's just a lot of questions isn't it?

Subject: Yes, but the repeat the question but it's in different part. For example, speaking vocabulary. But you loose your... you need to think..... stimulate. You loose the power to stimulate. So, I think it's easy to

Investigator: I think that's a very good way to say that. OK, continue.

Subject: *Subject reads activity description S.* Formal. *Subject reads activity description T.* Functional. *Subject reads activity description U.* Formal. *Subject reads activity description V.* Formal.

Investigator: Why did you say V was formal?

Subject: Because I think that this question is based on the student have to discuss one movie and to understand the content of that movie, so it's not casual talk. So, I think it's formal. But, it could be functional, so it's easy to confuse.

Investigator: So, to what degree do you think it's functional?

Subject: 4

Investigator: And to what degree is it formal?

Subject: 2

Investigator: OK. Carry on.

Subject: *Subject reads activity description W.* Formal. *Subject reads activity description X.* I don't understand what does it mean – 100% understanding of individual vocabulary words but without much attention to meaning.

Investigator: Yes. That's a problem question. It means that you translate every single word into your own language, say, so you know what each word means, but you're not thinking about the overall meaning.

Subject: But I think

Investigator: It's the same thing, isn't it.

Subject: But here, is it focused on the sentence or vocabulary words?

Investigator: It's focused on the words. Listening to the words. Individual words. Listening to the words, but not the individual sentences.

Subject: Oh... formal. Maybe. Finished?

Investigator: Just one more question. Do you think there are too many questions?

Subject: Yes.

Investigator: Why?

Subject: The question is too much. When you did it, in the end it's not easy to keep patience to do this questionnaire.

End of Protocol

Copy of MC's Questionnaire Script

Questionnaire

Definition of Activities as Formal vs. Functional

For each of the following activities, please indicate in your opinion to what degree do they usually do the following:

- A. Focus on knowledge about language (e.g. concentration on knowledge of words and grammar without concern for real life use). Here, this is termed "formal".
- B. Focus on expressing or understanding ideas in real life situations (e.g. not much concern for errors that do not interfere with communicating meaning). Here, this is termed "functional".

- Scale:
1. Very Weakly or not at all
 2. Weakly
 3. Neither weakly nor strongly
 4. Strongly
 5. Very Strongly

For example:

Doing role plays: Formal: 1. ☐ 2. ☒ 3. ☐ 4. ☐ 5. ☐
 Functional: 1. ☐ 2. ☐ 3. ☐ 4. ☐ 5. ☒

If you checked the above item like this, it would suggest that you think role plays are usually very functional in nature and not usually very formal.

Skill	Activity	Very Weakly	Very Strongly
Vocabulary	a) Repeating after the teacher	Formal: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/> Functional: 1. <input type="checkbox"/> 2. <input checked="" type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/>	
	b) Using new vocabulary in group discussion to express opinions/feelings	Formal: 1. <input type="checkbox"/> 2. <input checked="" type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> Functional: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/>	
	c) Translating all new words instead of explaining them to students (not as part of another activity)	Formal: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input checked="" type="checkbox"/> Functional: 1. <input type="checkbox"/> 2. <input checked="" type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/>	
	d) Games in which pairs and groups have to be creative with vocabulary and communicate in English	Formal: 1. <input checked="" type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> Functional: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/>	
Grammar	e) Games in which pairs and groups have to be creative with grammar and communicate in English	Formal: 1. <input checked="" type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> Functional: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/>	
	f) Repeating after the teacher	Formal: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/> Functional: 1. <input checked="" type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/>	
	g) Direct translation of grammar rules that students don't understand	Formal: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input checked="" type="checkbox"/> Functional: 1. <input type="checkbox"/> 2. <input checked="" type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/>	
	h) Using new grammar in conversation to describe events or express opinions/feelings	Formal: 1. <input checked="" type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> Functional: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input checked="" type="checkbox"/>	
General Writing	i) Focus on correct grammar in phrases and simple sentences	Formal: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input checked="" type="checkbox"/> Functional: 1. <input type="checkbox"/> 2. <input checked="" type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/>	

(not academic or business)	j) Students use class time to write to pen friends; the teacher is available to help with communicating meaning, but doesn't correct <u>grammar</u>	Formal: 1. <input checked="" type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> Functional: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input checked="" type="checkbox"/>
	k) Multiple choice grammar exercises such as those focusing on using the right pronoun	Formal: 1. <input type="checkbox"/> 2. <input checked="" type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input checked="" type="checkbox"/> Functional: 1. <input checked="" type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/>
	l) Activities in class where communicating meaning is more important than grammar	Formal: 1. <input checked="" type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> Functional: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input checked="" type="checkbox"/>
Reading	m) Teacher translates all new words and grammar that students don't understand (not as part of another activity)	Formal: 1. <input type="checkbox"/> 2. <input checked="" type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input checked="" type="checkbox"/> Functional: 1. <input checked="" type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/>
	n) Students do grammar exercises loosely based on the reading	Formal: 1. <input type="checkbox"/> 2. <input checked="" type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> Functional: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/>
	o) Reading for fun	Formal: 1. <input type="checkbox"/> 2. <input checked="" type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> Functional: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input checked="" type="checkbox"/>
	p) Students use English to summarise stories they have read and ask each other questions about them	Formal: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/> Functional: 1. <input checked="" type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/>
Speaking	q) Games in which pairs and groups have to be creative and communicate in English	Formal: 1. <input checked="" type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> Functional: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/>
	r) Translating all new words and grammar that students don't understand (not as part of another activity)	Formal: 1. <input checked="" type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/> Functional: 1. <input type="checkbox"/> 2. <input checked="" type="checkbox"/> 3. <input type="checkbox"/> 4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/>
	s) Whole class repeating after the teacher	Formal: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/> Functional: 1. <input checked="" type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/>
	t) Group discussion of topics	Formal: 1. <input checked="" type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> Functional: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/>
Listening	u) Translating all new words and grammar that students don't understand (not as part of another activity)	Formal: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/> Functional: 1. <input checked="" type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/>
	v) Watching sections of movies on video tape (no subtitles or script) and discussing them in groups both before and after	Formal: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/> Functional: 1. <input checked="" type="checkbox"/> 2. <input checked="" type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/>
	w) Watching/listening to broadcast TV/Radio programs such as the news or weather forecast (not recorded on video tape).	Formal: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/> Functional: 1. <input checked="" type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/>
	x) Listening to audio tapes for 100% understanding of individual vocabulary words but without much attention to meaning.	Formal: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input checked="" type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> Functional: 1. <input checked="" type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/>

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Sum as
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composed

Composed?

didn't understand the q.

Verbal Protocol on DLL Version 6: Subject 9 - JL – Recorded on 12/1/98

Investigator: Please begin by reading the instructions.

Subject: Read the instructions?

Investigator: Yes.

Subject: *Subject reads the instructions.*

Investigator: OK. Can you tell me please what are the two kinds of activities?

Subject: Um...

Investigator: What does being correct mean?

Subject: I'm not sure.

Investigator: If you do an activity in class and the aim of the activity is to be correct...

Subject: You mean when spell a wrong vocabulary and you will be corrected?

Investigator: Yes, or you just learn vocabulary or you make a mistake and you're corrected immediately or you're learning grammar rules... That's like learning to be correct.

Subject: You mean formal way?

Investigator: Yes, exactly.

Subject: Or when you learn language in an active way, for example from games or activities...?

Investigator: Yes, that's what we call communicating. One is formal, one is active. OK, continue.

Subject: Subject reads instructions, scale, and example. Being correct scale 2, communicating scale 5. I think doing role plays doing this activities for being correct, the scale is 2, for communicating the scale is 5.

Investigator: That's an example of [*unintelligible*]. That's not what you have to do.

Subject: In formal way, we seldom do role plays in the class.

Investigator: I just put the two scales there because there may in your opinion be an element of correctness in doing a role play. For you, you might mark 1. Other people might mark 2 or 3.

Subject: So the chance we do role plays in correct way....

Investigator: It's what you think. Don't ask me what I think.

Subject: Alright, it's my thinking.

Investigator: What do you consider in doing a role play? Do you consider doing role plays is very good for learning grammar, or is it just used to communicate, learning to communicate and not very good for learning grammar?

Subject: So, I just want to know. In a language class, you will teach language both in a correct or in a communicating way?

Investigator: Well, it depends on the situation, but you may see learning activities as containing a proportion of both, some only one.

Subject: So, maybe you will mix vocabulary or grammar in a communicating way to teach students or they just use incorrect or they just use correcting way.

Investigator: Some teachers are like that, but a teacher who likes to teach a lot of grammar probably wouldn't do much role play.

Subject: But being correct. You mean this is proportion?

Investigator: Yes, but this is just an example of somebody's opinion. What would you say?

Subject: Maybe being correct scale 1, communicating scale 5.

Investigator: OK. There's no correct, no right or wrong. It's just opinion.

Subject: So just read?

Investigator: Yes.

Subject: *Subject reads instructions.*

Investigator: Continue

Subject: Vocabulary. *Subject reads activity description A.* Being correct 5, communicating 1. Do I have to explain?

Investigator: Just say what you're thinking as you go along.

Subject: When you're repeating vocabulary you just like a machine. You just repeat and no chance to communicate. But according to this question, I think whole class repeating after the teacher.... If the teacher can explain how we use, what situation we use the vocabulary, we just have communicate, but when you just repeat you don't have chance to communicate. B.

Investigator: You don't have to say your opinion about the actual activity. We're only checking the questionnaire. Like, do you understand the question?

Subject: *Subject reads activity description B.* Being correct. Using new vocabulary – is it related to what you do in class?

Investigator: It's up to you.

Subject: Being correct 4. Communicating 1. *Subject reads activity description C.* Being correct 4. Communicating 2. *Subject reads activity description D.* Being correct 4. Communicating 5. Grammar. *Subject reads activity description E.* Being correct 3. Communicating 5. *Subject reads activity description F.* Being correct 3. Communicating 1. *Subject reads activity description G.* Being correct 3. Communicating 4. *Subject reads activity description H.* Being correct 4. Communicating 5. General writing.

Investigator: Just a minute. Can I ask you.... For H you wrote 4 for being correct and 5 for communicating. Why did you give such a high score for being correct?

Subject: Doing conversation activities which using certain grammar is natural. I mean you just use because teacher just can teach a certain grammar in one class, but if you just use the grammar that the teacher taught you to communicate, and you practice and you practice all the time and you will be correct all the time, you will make them all right. So, I gave it high score. And communicating, they have conversation so I gave it a high score 5.

Investigator: If we go back to D. You gave it.... What was it? Being correct 4. Communicating 1.

Subject: Because it didn't say the teacher will give the student a game to practice, so I don't think they have [*unintelligible*] to communicate to each other.

Investigator: Good.

Subject: *Subject reads activity description I.* Being correct 4. Communicating 4. *Subject reads activity description J.* Being correct 2. Communicating 5. *Subject reads activity description K.* Being correct 5. Communicating 1. *Subject reads activity description L.* Being correct 3. Communicating 5. Reading. *Subject reads activity description M.* Being correct 2. Communicating 1. *Subject reads activity description N.* You mean because based on the reading, they didn't do a lot of reading so their grammar is not good?

Investigator: No, it means ... have you ever used a reading book where they have a short story and afterwards they have some exercises and they have some vocabulary exercises, like a grammar exercise, something like that. It's kind of based on the reading but not much. Have you ever seen an exercise in a book like that?

Subject: Yes.

Investigator: That kind of thing.

Subject: I don't understand "students do grammar exercises loosely".

Investigator: Oh.... Loosely based means there is a weak connection between the exercise....

Subject: I mean because this is reading section...

Investigator: How would you find that in a reading book? Some reading books have these exercises and sometimes they have nothing to do with ...

Subject: I want to know when you do reading section, you want to focus on reading or you want to focus on grammar?

Investigator: Well, reading is communicative in a way because someone is trying to tell you something, but is that exercise helping your ability to communicate or is it helping your ability to be correct? Is it helping your reading?

Subject: Yes, because you read..... Being correct 4. Communicating 5. You want to ask me why?

Investigator: Yes, why?

Subject: Because I think it is a textbook, right, when you do reading. But I think everywhere is grammar ... everything in the textbook, they are all correct, so I think they can learn correct grammar or sentence. So, they can be corrected.... because that is formal way. *Subject reads activity description O.* Being correct 3.

Communicating 5. *Subject reads activity description P.* Being correct 4.

Communicating 5.

Investigator: Why did you give it 4 for being correct?

Subject: Students use English to summarise stories. I don't know. In my opinion, when I summarise stories to my friends in English, they usually will correct me. They will find your fault and correct you because they have read the story. Speaking.

Subject reads activity description Q. Being correct 3. Communicating 5. *Subject reads activity description R.* This question repeat?

Investigator: Yes, because it's a different skill.

Subject: *Subject reads activity description R.* Speaking. Without giving students a chance... You mean students can't ask question?

Investigator: No, say, it means whenever there is a new word, I would just say the word in Chinese.... I don't want to explain it.... I don't want to ask the students if they know what it means.

Subject: You just say it...

Investigator: I just say it and carry on with the class.

Subject: So, being correct 2. Communicating 2. *Subject reads activity description S.*

Being correct 5. Communicating 2. *Subject reads activity description T.* Being correct 4. Communicating 5.

Investigator: Why did you give it 4?

Subject: Group discussion of topics. I mean, when you want to practice speaking, you want to express your opinion and you also want to practice your pronunciation, so you use group discussion everyone have a chance to tell their opinion and they have chance to pronounce. So, I give it 4.

Investigator: Tell me something. If I called it formal instead of being correct....

Subject: Formal?

Investigator: If I called it formal...

Subject: It is a verb, formal?

Investigator: Instead of being correct, if I had said this is a formal way to learn, for communicating, active, would you have changed the score?

Subject: Yes, because not every formal way is not good. Some formal way is good for learning language. *Subject reads activity description U.* Being correct 2.

Communicating 2. *Subject reads activity description V.* Being correct 5.

Communicating 5.

Investigator: Why do you say 5 for being correct?

Subject: Watching short story. Although it said watching, in fact you are listening, right?

Investigator: Yes.

Subject: You listening and then you discuss. When you discuss, you can find out what listen is correct or wrong. So, I gave them high score. *Subject reads activity description W.* Being correct 3. Communicating 5. *Subject reads activity description X.* What is dictates?

Investigator: *Translates dictate to Chinese.*

Subject: Being correct 5. Communicating 5.

Investigator: Why do you think that's good for communicating?

Subject: When I learned English, my teacher also will give me dictating and after dictating, we will discuss and I know what mistakes I made, so I give them high score.

End of Protocol

Copy of JL's Questionnaire Script

JUP#9

V.6

12/1/98

TEST 6.5 Questionnaire

Situation: Imagine you are in a language learning class in which everyone speaks the same language as you. The teacher can also speak that language if he or she needs to.

Let's say that in this class, you can do activities that help you learn to:

- A. be exactly right. For example, you learn grammar and vocabulary in the classroom, but you don't worry very much about how you use this to communicate. These activities are good for passing exams. Here, we call this "Being correct".
- B. communicate. For example, you learn how to buy a bus ticket or tell someone your opinion, but you don't worry very much about small mistakes. These activities are good for learning to use the language in real life. Here, we call this "Communicating".

The questions below ask you how much you think certain activities help you to be correct or to communicate. Please mark on the scales how much you think the activities help you to be correct or to communicate. Please remember to mark both scales.

- Scale:
- 1. Very Weakly or not at all
 - 2. Weakly
 - 3. Neither weakly nor strongly
 - 4. Strongly
 - 5. Very Strongly

For example:

Doing role plays: Being correct: 1. ☐ 2. ☒ 3. ☐ 4. ☐ 5. ☐
 Communicating: 1. ☐ 2. ☐ 3. ☐ 4. ☐ 5. ☒

If you checked the above item like this, it would suggest that you think role plays are usually very good for learning to communicate and not usually very good for being correct.

Skill	Activity	What does it help you to do?				
		Very Weakly -----> Very Strongly				
Vocabulary	a) Whole class repeating after the teacher	Being Correct:	1. <input type="checkbox"/>	2. <input type="checkbox"/>	3. <input type="checkbox"/>	4. <input type="checkbox"/> 5. <input checked="" type="checkbox"/>
		Communicating:	1. <input checked="" type="checkbox"/>	2. <input type="checkbox"/>	3. <input type="checkbox"/>	4. <input type="checkbox"/> 5. <input type="checkbox"/>
	b) Using new vocabulary in group discussion to express opinions/feelings	Being correct:	1. <input type="checkbox"/>	2. <input type="checkbox"/>	3. <input type="checkbox"/>	4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/>
		Communicating:	1. <input checked="" type="checkbox"/>	2. <input type="checkbox"/>	3. <input type="checkbox"/>	4. <input type="checkbox"/> 5. <input type="checkbox"/>
	c) Translating all new words without giving students a chance to figure out the meaning.	Being correct:	1. <input type="checkbox"/>	2. <input type="checkbox"/>	3. <input type="checkbox"/>	4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/>
		Communicating:	1. <input type="checkbox"/>	2. <input checked="" type="checkbox"/>	3. <input type="checkbox"/>	4. <input type="checkbox"/> 5. <input type="checkbox"/>
	d) Games in which pairs and groups have to be creative with vocabulary and communicate in English	Being correct:	1. <input type="checkbox"/>	2. <input type="checkbox"/>	3. <input type="checkbox"/>	4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/>
		Communicating:	1. <input type="checkbox"/>	2. <input type="checkbox"/>	3. <input type="checkbox"/>	4. <input type="checkbox"/> 5. <input checked="" type="checkbox"/>
Grammar	e) Games in which pairs and groups have to be creative with grammar and communicate in English	Being correct:	1. <input type="checkbox"/>	2. <input type="checkbox"/>	3. <input checked="" type="checkbox"/>	4. <input type="checkbox"/> 5. <input type="checkbox"/>
		Communicating:	1. <input type="checkbox"/>	2. <input type="checkbox"/>	3. <input type="checkbox"/>	4. <input type="checkbox"/> 5. <input checked="" type="checkbox"/>
	f) Whole class repeating after the teacher	Being correct:	1. <input type="checkbox"/>	2. <input type="checkbox"/>	3. <input checked="" type="checkbox"/>	4. <input type="checkbox"/> 5. <input type="checkbox"/>
		Communicating:	1. <input checked="" type="checkbox"/>	2. <input type="checkbox"/>	3. <input type="checkbox"/>	4. <input type="checkbox"/> 5. <input type="checkbox"/>

	g) Teaching English grammar rules using your own language.	Being correct: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input checked="" type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> Communicating: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/>
	h) Doing conversation activities in which using certain grammar is natural.	Being correct: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/> Communicating: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input checked="" type="checkbox"/>
General Writing (not academic or business)	i) Focus on correct grammar in phrases and simple sentences, but not writing paragraphs	Being correct: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/> Communicating: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/>
	j) Students use class time to write to pen friends; the teacher is available to help with problems, but doesn't correct the letters	Being correct: 1. <input type="checkbox"/> 2. <input checked="" type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> Communicating: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input checked="" type="checkbox"/>
	k) Multiple choice grammar exercises such as those focusing on using the right pronoun	Being correct: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input checked="" type="checkbox"/> Communicating: 1. <input checked="" type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/>
	l) Writing activities in class where communicating meaning is more important than grammar	Being correct: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input checked="" type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> Communicating: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input checked="" type="checkbox"/>
Reading	m) Translating all new words without giving students a chance to figure out the meaning.	Being correct: 1. <input type="checkbox"/> 2. <input checked="" type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> Communicating: 1. <input checked="" type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/>
	n) Students do grammar exercises loosely based on the reading	Being correct: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/> Communicating: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input checked="" type="checkbox"/>
	o) Reading for fun	Being correct: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input checked="" type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> Communicating: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input checked="" type="checkbox"/>
	p) Students use English to summarise stories they have read and ask each other questions about them	Being correct: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/> Communicating: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input checked="" type="checkbox"/>
Speaking	q) Games in which pairs and groups have to be creative and communicate in English	Being correct: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input checked="" type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> Communicating: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input checked="" type="checkbox"/>
	r) Translating all new words without giving students a chance to figure out the meaning.	Being correct: 1. <input type="checkbox"/> 2. <input checked="" type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> Communicating: 1. <input type="checkbox"/> 2. <input checked="" type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/>
	s) Whole class repeating after the teacher	Being correct: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input checked="" type="checkbox"/> Communicating: 1. <input type="checkbox"/> 2. <input checked="" type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/>
	t) Group discussion of topics	Being correct: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/> Communicating: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input checked="" type="checkbox"/>
Listening	u) Translating all new words without giving students a chance to figure out the meaning.	Being correct: 1. <input type="checkbox"/> 2. <input checked="" type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> Communicating: 1. <input type="checkbox"/> 2. <input checked="" type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/>
	v) Watching short sections of movies on video tape (no subtitles or script) and discussing them in groups after	Being correct: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input checked="" type="checkbox"/> Communicating: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input checked="" type="checkbox"/>
	w) Watching/listening to broadcast TV/Radio programs for fun.	Being correct: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input checked="" type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> Communicating: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input checked="" type="checkbox"/>
	x) Teacher dictates a paragraph and corrects all the mistakes after.	Being correct: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input checked="" type="checkbox"/> Communicating: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input checked="" type="checkbox"/>

Verbal Protocol on DLL Version 7: Subject 19 - E – Recorded on 19/1/98

Subject: OK... Situation. *Subject reads instructions up to end of description of situation.*

Interviewer: OK. Can you tell me what is correctness according to this definition?

Subject: Well... correctness can I revise Correctness should be something related to the rules to be followed, like you've got some regulations or some steps to follow and you follow those steps... perhaps that's correctness.

Interviewer: Ok and what about performance?

Subject: Performance is the way you follow the steps. How you perform in doing those steps. The first step should be something and how you do that is going to be your performance.

Interviewer: OK. Continue.

Subject: *Subject continues reading instructions, scale, example.*

Interviewer: OK. Please read the questions.

Subject: There is a table.... something like that. Skill Vocabulary. *Subject reads activity description A.* Correctness. Performance. What does it help you to do? Very weakly to very strongly. From very weakly to very strongly actually. That is what the table suggests. Uh... B.

Interviewer: No...

Subject: Oh.... I should say something. Try.... *Subject reads activity description again.* Correctness 4. Performance 4 as well or 3. I might have ticked the wrong box.

Interviewer: [unintelligible]

Subject: uh... OK. *Subject reads activity description B.* Correctness ... uh....

yes.....4 as well and performance 3 maybe. *Subject reads activity description C.* 4 and performance 4. *Subject reads activity description D.* Correctness 3 ... that needs to be so precise and performance 3 or 4. Grammar.

Interviewer: Did you give it 4 or 3?

Subject: 3, 3. Grammar. *Subject reads activity description E.* Correctness 4.

Performance 4 as well. *Subject reads activity description F.* Correctness 4.

Performance 4. *Subject reads activity description G.* Correctness ... 3 and performance 3.

Investigator: If there is anything else that you're thinking, just say it.

Subject: Oh... [laughs] all right... *Subject reads activity description H.*

Correctness Very very important in my opinion.... 4 and performance will be 3

[unintelligible] I mean the important thing in my opinion is to transmit what you want.

General writing (not academic or business). *Subject reads activity description I.* 4

and performance 4 as well. *Subject reads activity description J.* Correctness 3.

Performance 3. *Subject reads activity description K.*

Investigator: Pronoun means I, you....

Subject: I, you, he, she.... OK. *Subject reads activity description K.* Correctness is very important [unintelligible] laughs..... and performance 3. *Subject reads activity description L.* Correctness not very important in that way is it? Performance 3, all right. *Subject reads activity description M.*

Investigator: What score did you give it?

Subject: 4.

Investigator: OK. Going back to L, you made a comment that's not very important. What did you mean?

Subject: *Subject reads activity description L.* Well, for example if somebody is trying to write small comments about something or like say simple message to somebody else in the classroom Uh... the correctness is not very important in that way because the main point here is transmitting or communicating the meaning.

Investigator: OK. So the score for correctness was..

Subject: 3

Investigator: and performance...

Subject: 3

Investigator: Yes. OK.... So, why did you give them an equal score?

Subject: Well, because performance doesn't matter very much, in my opinion, as well, because the main point is communicating. Sometimes you take longer... write longer statement or longer phrase. Your performance could be not very good, but if you are transmitting what you want... You know what I mean. That's the main point, regarding letter L, isn't it? *Subject reads activity description L.*

Investigator: OK. So, tell me something. Do you think performance is different from communicating?

Subject: Uh... maybe... somehow... maybe...

Investigator: OK. Carry on.

Subject: Performance, in my opinion, I should express my feeling. Performance is the way you do. For example, you can [unintelligible] in such a way.

Investigator: OK. You see performance as a process.

Subject: A process... a process.... Performance is a process. The way you do something or you express something more precisely or less precisely. That counts for me as a performance. For example, a football player plays better. His performance is a process. He use it to play football and his performance was better or bad in such a way. You know what I mean?

Investigator: OK. Carry on.

Subject: So, N. *Subject reads activity description N.* Correctness 4. Performance 4. *Subject reads activity description O.* 3..... 3..... *Subject reads activity description P.* Correctness.... You should tell me what you would expect from the correctness ... from the teller, you know...

Investigator: [unintelligible]

Subject: OK. Could be 3, 3 as well. *Subject reads activity description Q.* Yes... 3, 3 as well. *Subject reads activity description R.* That's 4, 4.

Investigator: Do you like that?

Subject: Yes. I mean memorise dialogs is not perhaps it's not learning. Memorising is a different thing. After memorising something, you write something and a few minutes afterwards, you've forgotten everything. So, but for tests, what counts here is the last word... It's for tests and you need to be good in your tests. In that way, correctness and performance should be good as well.

Investigator: And, you think that memorising dialogs is good for actually learning to speak English?

Subject: Not for learning actually, but the main point here is for the test that you are about to do.

Investigator: OK.

Subject: So, well, if you bear in mind that if you want to learn, that's a different thing actually. But, what suggests here for the reader is the last word... to write down for tests, sometimes you don't have time to learn properly and you don't have time to learn many things in order to do your tests, but what happens in that situation is that you read it quickly for example and [unintelligible] putting what I've read quickly

into the test. Just a situation, you know. *Subject reads activity description S.* Correctness maybe 3 and performance 3 as well... perhaps 2. *Subject reads activity description T.* Correctness and performance 3, 3.

Investigator: So, you don't think group discussion is good for learning to speak?

Subject: I think so.

Investigator: But you only gave it a 3.

Subject: Yes, but I, you know... I mean such kind of evaluation...uh subject to you know... You cannot say it's very important or less important, much important or less important. You know. But, on average, you know. On average. In such a way.

Investigator: OK. Carry on.

Subject: Listening. *Subject reads activity description U.* Correctness... maybe 4. Performance should be 4 as well. *Subject reads activity description V.* Correctness 4 and performance 4. *Subject reads activity description W.* Well.... Not very important is it? This one I can discuss with you. *Subject reads activity description X.*

Correctness 4. Performance should be 4 as well. OK?

Investigator: OK. Now, tell me something. You tend not to differentiate very much between correctness and performance. You know, you often give them both 3 or something.

Subject: Yes.

Investigator: Why do you tend to give equal scores?

Subject: Well, if you're correctness is good, that means your performance is good as well. Know what I mean? If your performance is good, sometimes your correctness is not. It doesn't work in both directions sometimes.

End of Protocol

Copy of E's Questionnaire Script

UP # 19

162 TS 6.0 3 yrs ago,

Jan 19, '78

E

Questionnaire
but now much better than

Situation: Imagine you are in a language learning class in which everyone speaks the same language as you. The teacher can also speak that language if he or she needs to.

Let's say that in this class, you can do activities that help you learn to:

- A. be correct. For example, you learn grammar rules, but you don't worry very much about practicing for real life communication and there may be little interaction with other students. The teacher may be very active and you are quite passive. These activities are good for passing exams. Here, we call this "Correctness".
- B. communicate or perform tasks in real life. For example, you learn how to tell someone your opinion or buy a bus ticket. You don't worry very much about small mistakes and you practice with other students. These activities are good for learning to use the language in real life. Here, we call this "Performance".

The questions below ask you how much you think certain activities help you to be correct or to communicate/perform. Please mark on the scales how much you think the activities help you to be correct or to communicate. Please remember to mark both scales (see the example):

- Scale:
- 1. Very Weakly or not at all
 - 2. Weakly
 - 3. Neither weakly nor strongly
 - 4. Strongly
 - 5. Very Strongly

For example:

Doing role plays: Correctness: 1. ☐ 2. ☒ 3. ☐ 4. ☐ 5. ☐
 Performance: 1. ☐ 2. ☐ 3. ☐ 4. ☐ 5. ☒

If you checked the above item like this, it would suggest that you think role plays are usually very good for learning to communicate or perform tasks and not usually very good for being correct.

Skill	Activity	What does it help you to do?									
		Very Weakly					Very Strongly				
Vocabulary	a) Repeating after the teacher	Correctness: 1. <input type="checkbox"/>	2. <input type="checkbox"/>	3. <input checked="" type="checkbox"/>	4. <input type="checkbox"/>	5. <input type="checkbox"/>	Performance: 1. <input type="checkbox"/>	2. <input type="checkbox"/>	3. <input checked="" type="checkbox"/>	4. <input type="checkbox"/>	5. <input type="checkbox"/>
	b) Using new vocabulary in group discussion to express opinions/feelings	Correctness: 1. <input type="checkbox"/>	2. <input type="checkbox"/>	3. <input type="checkbox"/>	4. <input checked="" type="checkbox"/>	5. <input type="checkbox"/>	Performance: 1. <input type="checkbox"/>	2. <input type="checkbox"/>	3. <input checked="" type="checkbox"/>	4. <input type="checkbox"/>	5. <input type="checkbox"/>
	c) Teacher translates all new words and explains what they mean in your own language	Correctness: 1. <input type="checkbox"/>	2. <input type="checkbox"/>	3. <input type="checkbox"/>	4. <input checked="" type="checkbox"/>	5. <input type="checkbox"/>	Performance: 1. <input type="checkbox"/>	2. <input type="checkbox"/>	3. <input type="checkbox"/>	4. <input checked="" type="checkbox"/>	5. <input type="checkbox"/>
	d) Games in which pairs and groups have to be creative with vocabulary and communicate in English	Correctness: 1. <input type="checkbox"/>	2. <input type="checkbox"/>	3. <input checked="" type="checkbox"/>	4. <input type="checkbox"/>	5. <input type="checkbox"/>	Performance: 1. <input type="checkbox"/>	2. <input type="checkbox"/>	3. <input checked="" type="checkbox"/>	4. <input type="checkbox"/>	5. <input type="checkbox"/>
Grammar	e) Games in which pairs and groups have to be creative with grammar and communicate in English	Correctness: 1. <input type="checkbox"/>	2. <input type="checkbox"/>	3. <input type="checkbox"/>	4. <input checked="" type="checkbox"/>	5. <input type="checkbox"/>	Performance: 1. <input type="checkbox"/>	2. <input type="checkbox"/>	3. <input type="checkbox"/>	4. <input checked="" type="checkbox"/>	5. <input type="checkbox"/>
	f) Repeating after the teacher	Correctness: 1. <input type="checkbox"/>	2. <input type="checkbox"/>	3. <input type="checkbox"/>	4. <input checked="" type="checkbox"/>	5. <input type="checkbox"/>	Performance: 1. <input type="checkbox"/>	2. <input type="checkbox"/>	3. <input type="checkbox"/>	4. <input checked="" type="checkbox"/>	5. <input type="checkbox"/>
	g) Teacher teaches the grammar rules in your own language.	Correctness: 1. <input type="checkbox"/>	2. <input type="checkbox"/>	3. <input checked="" type="checkbox"/>	4. <input type="checkbox"/>	5. <input type="checkbox"/>	Performance: 1. <input type="checkbox"/>	2. <input type="checkbox"/>	3. <input checked="" type="checkbox"/>	4. <input type="checkbox"/>	5. <input type="checkbox"/>

	h) Using new grammar in conversation activities to express feelings/opinions or describe events	Correctness: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/> Performance: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input checked="" type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/>
General Writing (not academic or business)	i) Focus on correct grammar in phrases and simple sentences, but no paragraph writing	Correctness: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/> Performance: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/>
	j) Students use class time to write letters to pen friends; the teacher does not correct the letters	Correctness: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input checked="" type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> Performance: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input checked="" type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/>
	k) Multiple choice grammar exercises such as those focusing on using the right pronoun	Correctness: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/> Performance: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input checked="" type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/>
	l) Writing activities in class where communicating meaning is more important than grammar	Correctness: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input checked="" type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> Performance: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input checked="" type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/>
Reading	m) Teacher translates all new words and explains what they mean in your own language	Correctness: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/> Performance: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/>
	n) Students do written vocabulary exercises after reading a short article.	Correctness: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/> Performance: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/>
	o) Reading for fun	Correctness: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input checked="" type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> Performance: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input checked="" type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/>
	p) Students read stories and then tell them to other students who have not read the stories. Then they ask the other students questions.	Correctness: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input checked="" type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> Performance: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input checked="" type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/>
Speaking	q) Games in which pairs and groups have to be creative and communicate in English	Correctness: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input checked="" type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> Performance: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input checked="" type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/>
	r) Students memorise dialogues which they have to write down for tests.	Correctness: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/> Performance: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/>
	s) Whole class repeating after the teacher	Correctness: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input checked="" type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> Performance: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input checked="" type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/>
	t) Group discussion of topics	Correctness: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input checked="" type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> Performance: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input checked="" type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/>
Listening	u) Students listen and fill in missing words in the script (missing words are random, not key words)	Correctness: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/> Performance: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/>
	v) Watching a TV commercial and describing it to a student who cannot see it. The other student has to guess what the product is	Correctness: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/> Performance: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/>
	w) Watching a short section of a film and discussing what happens next in the story	Correctness: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input checked="" type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> Performance: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input checked="" type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/>
	x) Teacher reads a paragraph and the students write it down. Teacher collects the students work, corrects it, and returns it after a week.	Correctness: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/> Performance: 1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input checked="" type="checkbox"/> 5. <input type="checkbox"/>

Appendix F Main Study Software Content

Target Word	Screen	Content
Cynical	See The Definition	Adj. - Describes a person who believes that others only do things for selfish reasons.
	Figure It Out	There's no point trying to apologise. He's so cynical about your motives that he just won't believe you're really sorry.
	Multiple Choice 1	Cynical is an adjective that describes a person: a) who is very pessimistic b) who does things only for selfish reasons c) who believes that others only do things for selfish reasons
	Multiple Choice 2	A) "Sure I believe you", the police detective laughed cynically. "Just like I believe in Santa Claus and the Tooth Fairy." B) You couldn't blame Peter for being cynical. He'd been working in advertising for so many years and had seen how the public could be tricked. C) I always knew my parents would believe me because they were so cynical.
	Guided Production	The TV reporter took a cynical view of politics. TV, reporter, took, view, politics
Talk down to	See The Definition	V. - A phrasal verb that describes talking to somebody as if they were less clever, less important, etc. than you.
	Figure It Out	Nobody likes being talked down to. It shows that you think they are stupid or that they have a lower status than you.
	Multiple Choice 1	Talk down to is a phrasal verb that describes talking to somebody: a) as if they were less clever or important than you b) as if you were taller than they were c) as if they were very depressed

belt and braces	Multiple Choice 2	<p>A) As a school teacher, Sam had become too used to talking down to everyone.</p> <p>B) If you find yourself talking down, you'd better sign up for some English classes to prevent further harm to your speaking ability.</p> <p>C) As soon as I noticed that I was being talked down to by the salesman, I walked out of the shop.</p>
	Guided Production	Professor Higgins had a reputation for talking down to undergraduate students. professor, Higgins, had, reputation, undergraduate, students
	See The Definition	Adj. - Idiom - Describes a stereotypical working class person who would wear his belt and braces to hold up his trousers.
	Figure It Out	The market for the Daily Sport newspaper is definitely the belt and braces type who want an easy read on the bus going to their job at the factory.
	Multiple Choice 1	<p>Belt and braces is an idiom that describes:</p> <p>a) a stock market investor</p> <p>b) a working class person</p> <p>c) a high school teacher</p>
	Multiple Choice 2	<p>A) My family background is definitely belt and braces, but my parents managed to send me to an expensive private school.</p> <p>B) The TV commercial was aimed at people who were belt and braces and the words they chose to use in the dialogue showed this clearly.</p> <p>C) I went to the dentist yesterday to have a belt and braces fitted.</p>
	Guided Production	She did her best to hide her belt and braces background with an aristocratic accent. she, did, her, best, hide, her, background, aristocratic, accent
	See The Definition	N. - A particular way of saying something. The type of language used to communicate.
turn of phrase	Figure It Out	The wording for that advertisement has to be just right. The wrong turn of phrase would upset the people we are selling to.
	Multiple Choice 1	<p>Turn of phrase is a noun that means:</p> <p>a) somebody said something wrong</p> <p>b) a way of turning a phrase left instead of right</p> <p>c) a particular way of saying something</p>

Crass	Multiple Choice 2	A) I failed my driving test because I was not confident enough in doing turns of phrase. B) If you know that your market is middle to low income families, you make sure to use the right turn of phrase in advertisements. C) Although she was only sixteen years old, her writing had such an adult turn of phrase that her teacher entered her short story in a competition.
	Guided Production	Raymond Chandler's unique turn of phrase made his stories different from other detective novels. Raymond Chandler's, unique, made, his, stories, different, other, detective, novels
	See The Definition	Adj. - 1. Stupid and lacking in taste or sensitivity. Used particularly to describe things that people say.
	Figure It Out	It was a crass comment to make about marriage. He knows how upset she is about her divorce.
	Multiple Choice 1	Crass is an adjective that describes: a) a comment that is appropriate for the situation b) something that is stupid and which shows you don't understand something c) a negative comment.
Sentiment	Multiple Choice 2	A) Such crass comments on the political situation had to be expected from such a low class newspaper. B) Joe was so crass in his conversation that I was glad I had invited him to the party. C) The crass emotional content of the story was typical of that kind of low-budget movie.
	Guided Production	The crass insensitivity of your conversation makes you an unpopular person. insensitivity, your, conversation, makes, you, unpopular, person
	See The Definition	N. - 1. An attitude or opinion that is often caused or influenced by emotion. 2. Gentle feelings such as love, sympathy, happy memories that influence action or behaviour (sometimes in situations where this is not suitable).
	Figure It Out	That politician seems to know exactly how the ordinary people like us feel. His speech expressed my sentiments exactly.
	Multiple Choice 1	Sentiment is a noun that refers to: a) an attitude or opinion that is often caused or influenced by emotion b) the material that is deposited at the bottom of a river c) an opinion that is nothing to do with reality

Hype	Multiple Choice 2	A) There's no room for sentiment in business. B) Clinton's appeal to popular sentiments about the privacy of the family persuaded Americans to give him another chance. C) The criminal's sentimental feelings for his grandmother made it easier for him to rob the nice old lady.
	Guided Production	The recent attacks on Sudan and Afghanistan have caused strong anti-American sentiment in Arab countries. recent, attacks, Sudan, Afghanistan, have caused, strong, anti-American, Arab, countries
	See The Definition	N. - (An abbreviation of hyperbole often used in marketing and advertising) A style of speech and writing which uses exaggeration in order to achieve a particular effect (e.g. for the purpose of persuading people to buy something). V. To hype something up is to make exaggerated claims about it (usually in order to sell it).
	Figure It Out	You didn't believe all that marketing hype about Windows 95, did you? They really hyped it up so that people would get excited and buy it.
	Multiple Choice 1	Hype is a noun that means: a) a kind of needle that is used by doctors b) overstatement and exaggeration for the purpose of selling c) a very fast sports car.
Technique	Multiple Choice 2	A) They really hyped up that movie, Independence Day, but it was really disappointing when I finally went to see it. B) You can learn a language in a month if you hype up the vocabulary. C) There is so much marketing hype surrounding Christmas now. It's really ruining the Christmas feeling.
	Guided Production	I never believe marketing hype about software because I've been disappointed before. I, never, believe, marketing, software, I've, been, disappointed, before
	See The Definition	N. - 1. A particular way of doing something. 2. Practical ability in something.
	Figure It Out	Our school uses new language teaching techniques to speed up language learning.
	Multiple Choice 1	Technique is a noun that means: a) a technical trick used by engineers b) how a teacher feels about something c) a particular way of doing something

	Multiple Choice 2	A) He lost his job as a result of using techniques and other drugs while he was working. B) The wrestler's excellent technique enabled him to win despite being smaller and lighter than his opponent. C) New medical techniques for doing surgery are making it possible to do operations without leaving large scars.
	Guided Production	Her excellent technique was due to having a good teacher and dedication. her, excellent, was, due, having, good, teacher, dedication
	See The Definition	N. - 1. A hollow place in a wall, often with a shelf. 2. A job, position, etc. that is suitable for you.
Niche	Figure It Out	Our company has been successful because we identified our niche market as 15 and 16 year old females and designed our products to suit them exactly.
	Multiple Choice 1	Niche is a noun that describes: a) a job or position that suits you b) a small hole in the back of your head c) a type of snow that falls during the summer
	Multiple Choice 2	A) When he took up teaching, he found his niche in life. B) The particular niche that I have in my garden grows only in the remote mountains of Central Asia. C) I found a small niche in the wall and hid my money there.
The bottom line	Guided Production	She placed the stolen ring in a tiny niche in the garden wall. she, placed, stolen, ring, tiny, niche, garden, wall
	See The Definition	N. - Idiom - the most important thing to consider.
	Figure It Out	The bottom line is how much money you make for the company. They don't really care about anything else.
	Multiple Choice 1	The bottom line is an idiom that means: a) an irrelevant detail that no one notices b) a factor which is important but not the most important c) the most important thing to consider

	Multiple Choice 2	<p>A) Before you sign anything, read the bottom line.</p> <p>B) The bottom line is how much benefit do I get from this deal.</p> <p>C) For a language school the bottom line is how many students they can get and for how long.</p>
	Guided Production	In business, the bottom line is how much money you can make. business, is, how much, money, you, can, make
Megabucks	See The Definition	N. - Idiom - An extremely large amount of money.
	Figure It Out	My salary is unbelievably high. It's megabucks!
	Multiple Choice 1	<p>Megabucks is an idiom that means:</p> <p>a) a small amount of money</p> <p>b) a large amount of money</p> <p>c) units of currency in Megaland, a small country in Africa</p>
	Multiple Choice 2	<p>A) The contract that I got for supplying IBM with keyboards is worth megabucks.</p> <p>B) You have to be a big company to advertise on TV as it costs megabucks.</p> <p>C) I spent 5000 megabucks on my car and it still broke down.</p>
	Guided Production	Famous movie stars are usually paid megabucks even for small parts in movies. famous, movie, stars, are, usually, paid, even, small, parts, movies
Perceive	See The Definition	V. - 1. To notice or realise something. 2. To see or think of something in a particular way.
	Figure It Out	I perceived his comments as negative criticism.
	Multiple Choice 1	Perceive is a verb that means:
		<p>a) to give something away</p> <p>b) to receive something really good</p> <p>c) to see or think of something in a particular way</p>

Portray	Multiple Choice 2	<p>A) People perceive regional accents to be more honest.</p> <p>B) Your perception of how others feel about you is not always how they really feel about you.</p> <p>C) As soon as he perceived the word, he regretted it. He knew he should always think before perceiving.</p>
	Guided Production	The new product should be perceived as modern and friendly to the environment. new, product, should be perceived, modern, friendly, environment
	See The Definition	V. - 1. To show something or someone by artistic means (e.g. in a book or film). 2. To give a particular impression of someone or something by emphasising some of their features (e.g. in advertising).
	Figure It Out	Advertising tends to portray women as being very traditional; for example, the housewife who only thinks about clean white shirts for her husband and children.
	Multiple Choice 1	<p>Portray is a verb that means:</p> <p>a) to show something in an artistic way or give an impression of something by emphasising some of its features.</p> <p>b) to help another country in a war against your own country</p> <p>c) to carry something on a tray.</p>
Lure	Multiple Choice 2	<p>A) Many writers have tried to portray London as a mysterious and foggy city.</p> <p>B) In advertising, minor problems such as what you want to eat for dinner are often portrayed as major issues.</p> <p>C) I couldn't portray my house as I wanted to because I didn't have enough glue.</p>
	Guided Production	The new washing powder should be portrayed as strong but also gentle and economical. new, washing powder, should, be, strong, also, gentle, economical
	See The Definition	V. - 1. To attract someone and cause them to go to a particular place or do something that they should not do. (e.g. buy something). 2. N. An attractive quality that something has or something that you find attractive.
	Figure It Out	The low rents in Neasden lure many students to live in that neighbourhood, but the transportation costs are high and there is a high crime rate.

	Multiple Choice 1	Lure is a verb that means: a) to attract people to do something that maybe they shouldn't do b) to attract people to do something that they should do c) to stop people from doing what they should do
	Multiple Choice 2	A) The low prices and 1 year guarantee lure potential buyers to the showroom and then the salesmen can do their work. B) Keep me away from drink and the lure of the casino. C) The lure that other women have for me makes my wife feel very secure.
	Guided Production	The lure of easy money and excitement attracts millions of people to the city. Lure, easy, money, excitement, attracts, millions, people, city.

Appendix G Screen Shots

Screenshots Of WordLearner

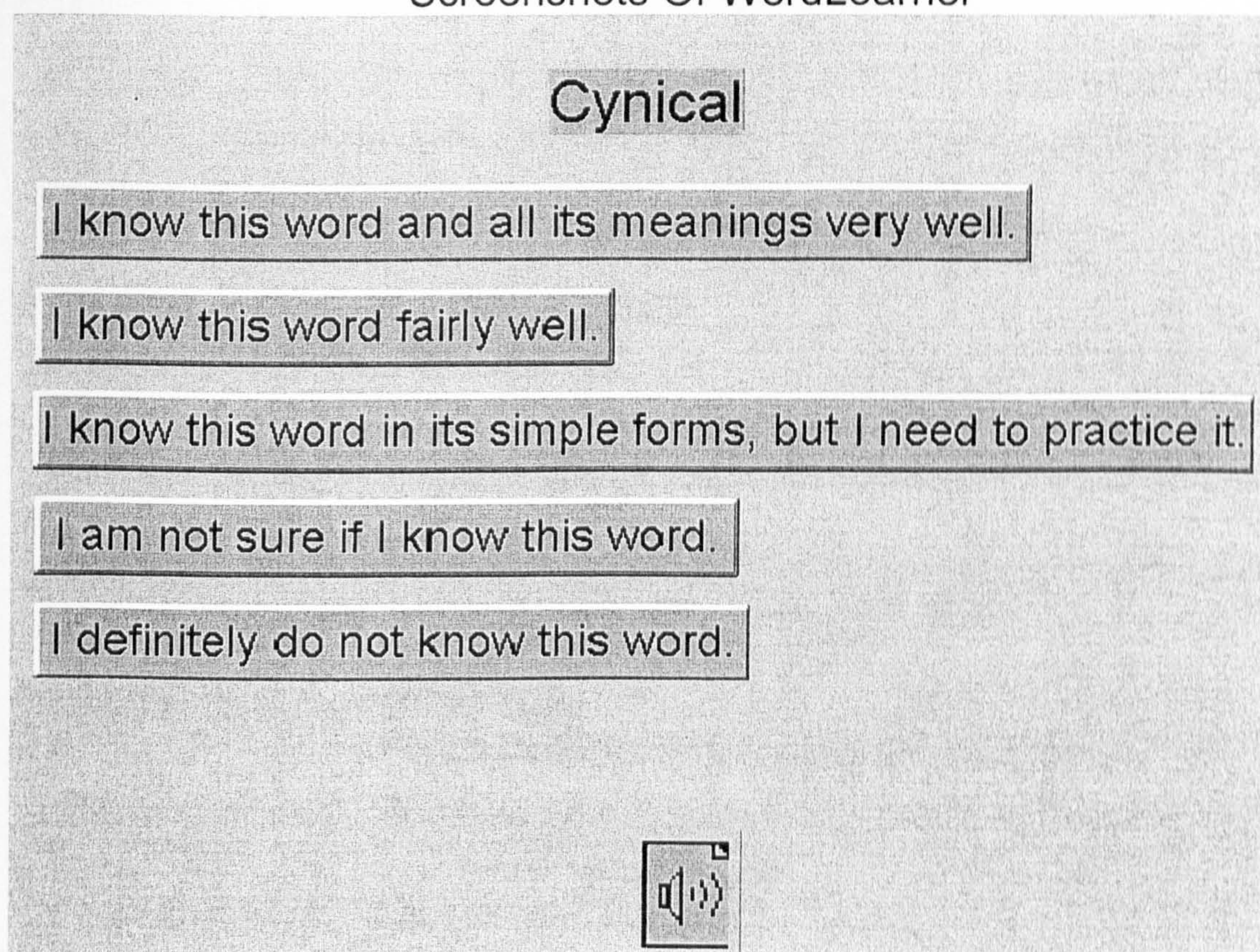


Figure 30: Prior knowledge screen.

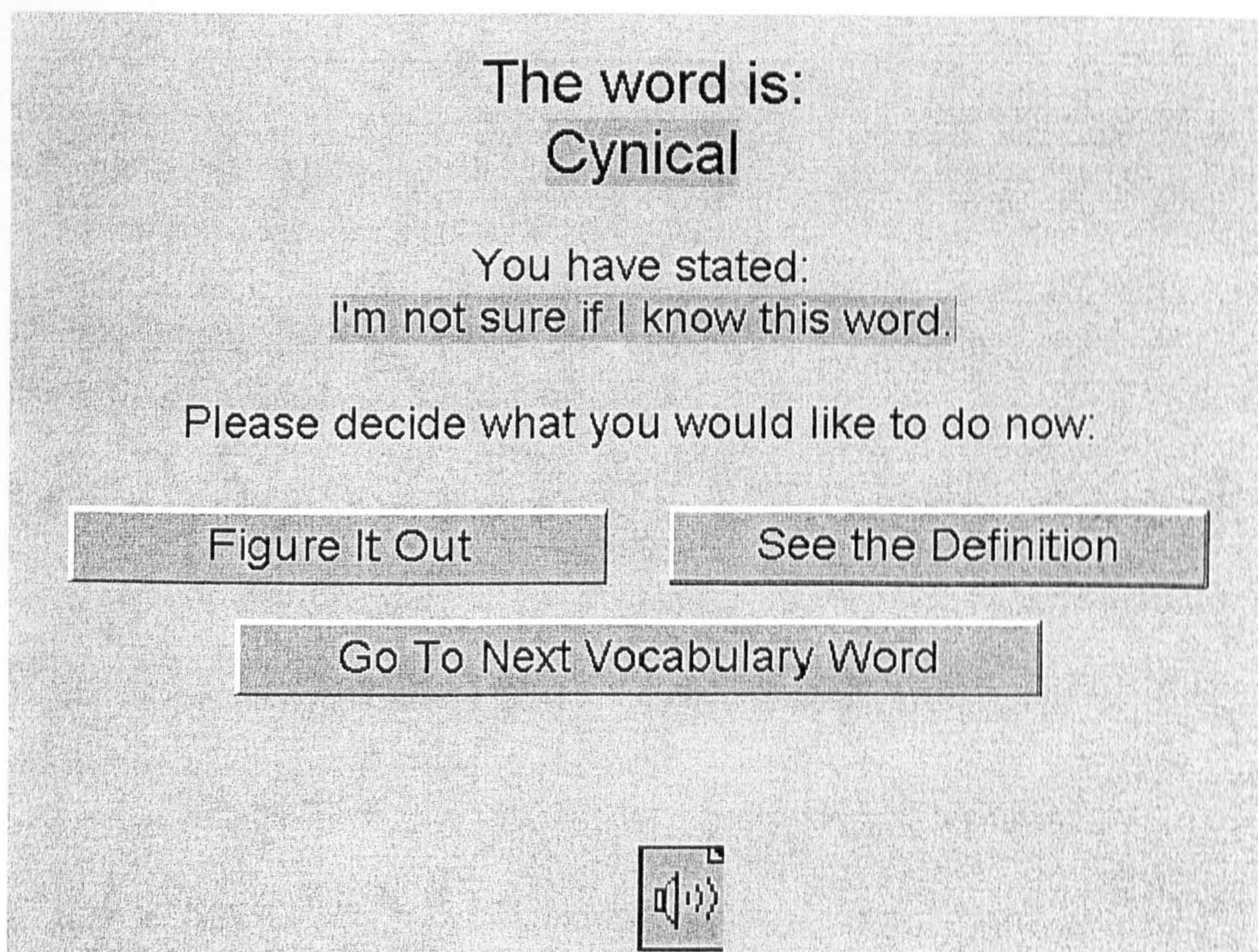


Figure 31: Decision screen.

Figure It Out

The word is: cynical

Below is an example of a sentence using this word. Try to figure out what the word means from the context.

Don't be so cynical! He did it to help us, not for the money.

When you are ready to continue, make a choice below.

Go To
See The Definition

Go To
Guided Production

Go To
Multiple Choice

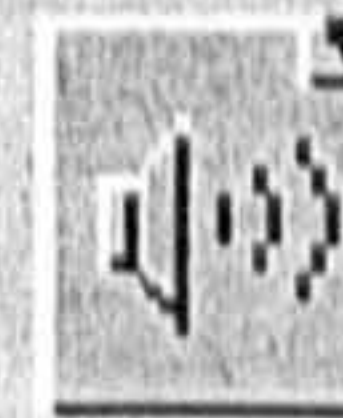


Figure 32: Inductive learning screen.

See The Definition

The word is: cynical

Read the following definition carefully and try to remember it.

Adj. - Describes a person who believes that others only do things for selfish reasons.

When you are ready, make your choice below.

Go To
Figure It Out

Go To
Guided Production

Go To
Multiple Choice



Figure 33: Deductive learning screen.

Multiple Choice Questions 1

The word is: cynical

Please choose which of the following is most likely to be correct.

Cynical is an adjective that describes a person:

- a. who believes that others only do things for selfish reasons
- b. who is very pessimistic
- c. who does things only for selfish reasons



Figure 34: First multiple choice screen.

Multiple Choice Questions 2

The word is: cynical

Please choose which of the following is most likely to be incorrect.

- A) "Sure I believe you", the police detective laughed cynically. "Just like I believe in Santa Claus and the Tooth Fairy."
- B) I always knew my parents would believe me because they were so cynical.
- C) You couldn't blame Peter for being cynical. He'd been working in advertising for so many years and had seen how the public could be tricked.

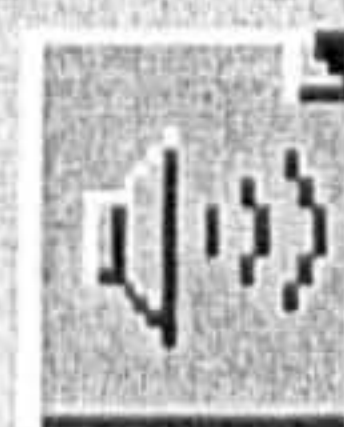


Figure 35: Second multiple choice screen.

Guided Production

[Click here to listen](#)

Use the following words to make a sentence with the vocabulary word you are practising now. Remember that you can listen to the word, but you cannot see it. The words are in the same order as they are in the sentence.

TV, reporter, took, view, politics

Don't forget that you also have to use the right grammar words and prepositions and that the vocabulary word might have a different form (e.g. it might have "ed" or be a plural).

[Click here to answer](#)

Your answer is: The TV reporter took cynical view to politics.

Our suggested answer is: The TV reporter took a cynical view of politics.

[Go To
Multiple Choice](#)

[Go To
Next Vocabulary Word](#)

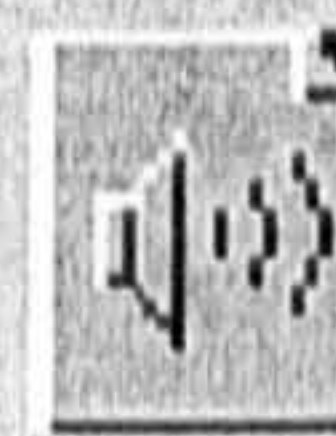


Figure 36: Guided production screen with completed answer.

Instructions

You will see a sentence like the one below with a gap and a list of words. Click on the word that you think is the most likely to be correct. If you don't know, choose "don't know".

NB: In this question, you will get feedback to help show you how to choose the correct answer, but you will not get feedback later.

Example question:

I save money on buying Christmas presents by getting them in the summer _____.

- a. *shopping*
- b. *sales*
- c. *weather*
- d. *tree*
- e. *trip*
- f. *don't know*

Continue

Figure 37: Tutorial screen for quiz.

Appendix H

Post Test Guided Interview Form

Post Test Guided Interview

1. Name:_____
2. Stage:_____
3. For each of the following levels of word knowledge, what was the most likely choice to make? Were you consistent in this? If not, why not?

Word Knowledge	See the Definition	Figure it Out	Both	Go to Next Word	Why?
I know this word and all its meanings very well.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
I know this word fairly well.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
I know this word in its simple forms but I need to practice it.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
I'm not sure if I know this word.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
I definitely do not know this word.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

4. For each of the following levels of word knowledge, what was the most likely choice to make? Why?

Word Knowledge	Multiple-Choice	Guided Production	Both	Sometimes one or the other	Why?
I know this word and all its meanings very well.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
I know this word fairly well.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
I know this word in its simple forms but I need to practice it.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
I'm not sure if I know this word.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
I definitely do not know this word.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

5. More time and effort is put into certain words. Can you explain why this is so?

6. Was there enough practice material? Y N

7. Are there any exercise types that you think should have been included? Why?

8. When did you make your decisions about the activities you wanted to do? (Right at the beginning or on the fly? Why?

9. Any comments on the scale for prior knowledge? Was it confusing at all? If you hadn't been asked, would you have thought about it anyway? Would the activities be different without it?

10. How would you describe yourself as a language learner? (E.G. Do you like to practice grammar and memorise vocabulary? Do you think you learn more from real life communication?)

Appendix I Decision Flow Diagrams by Level of Prior Knowledge

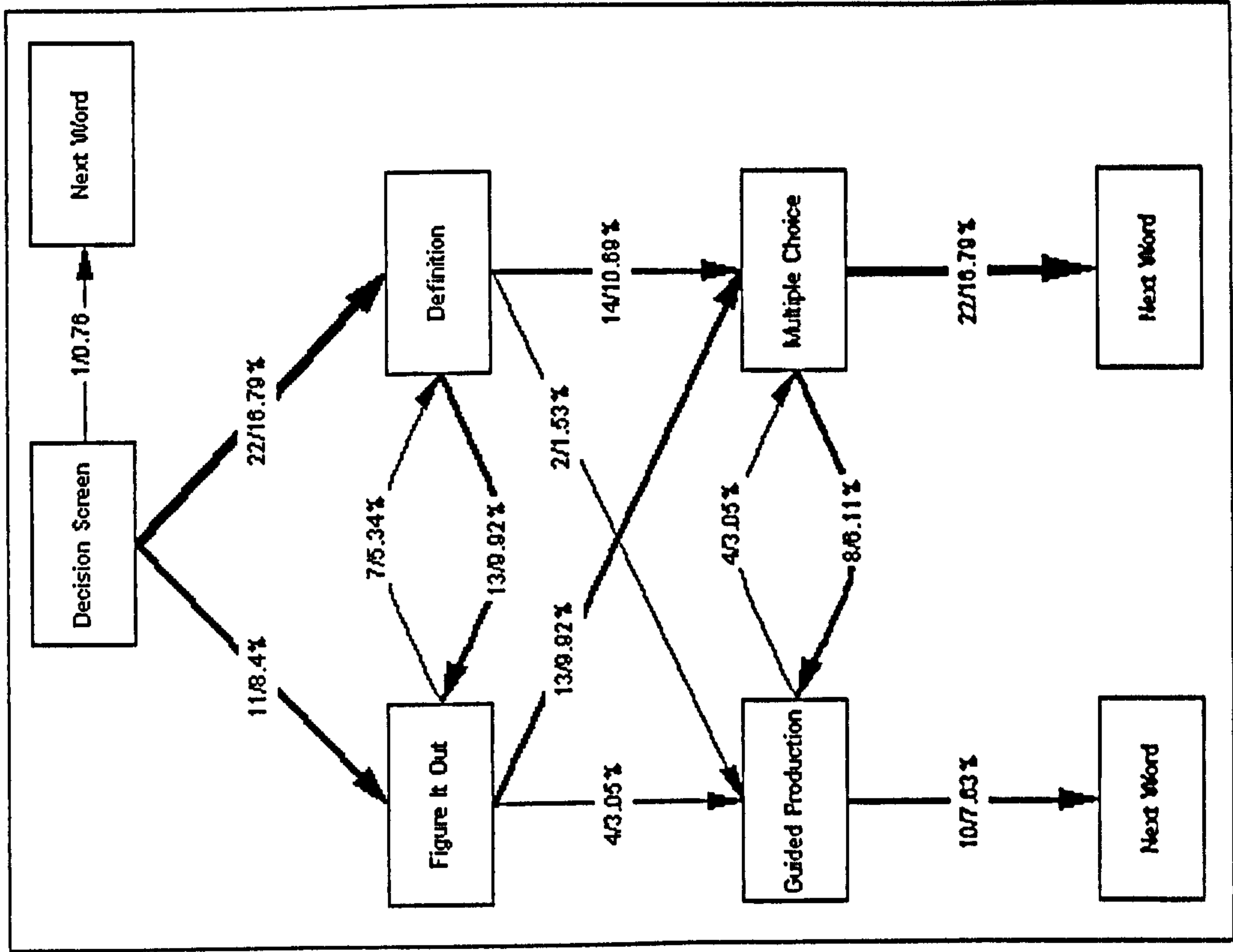


Figure 38: Level 1 decision flow.

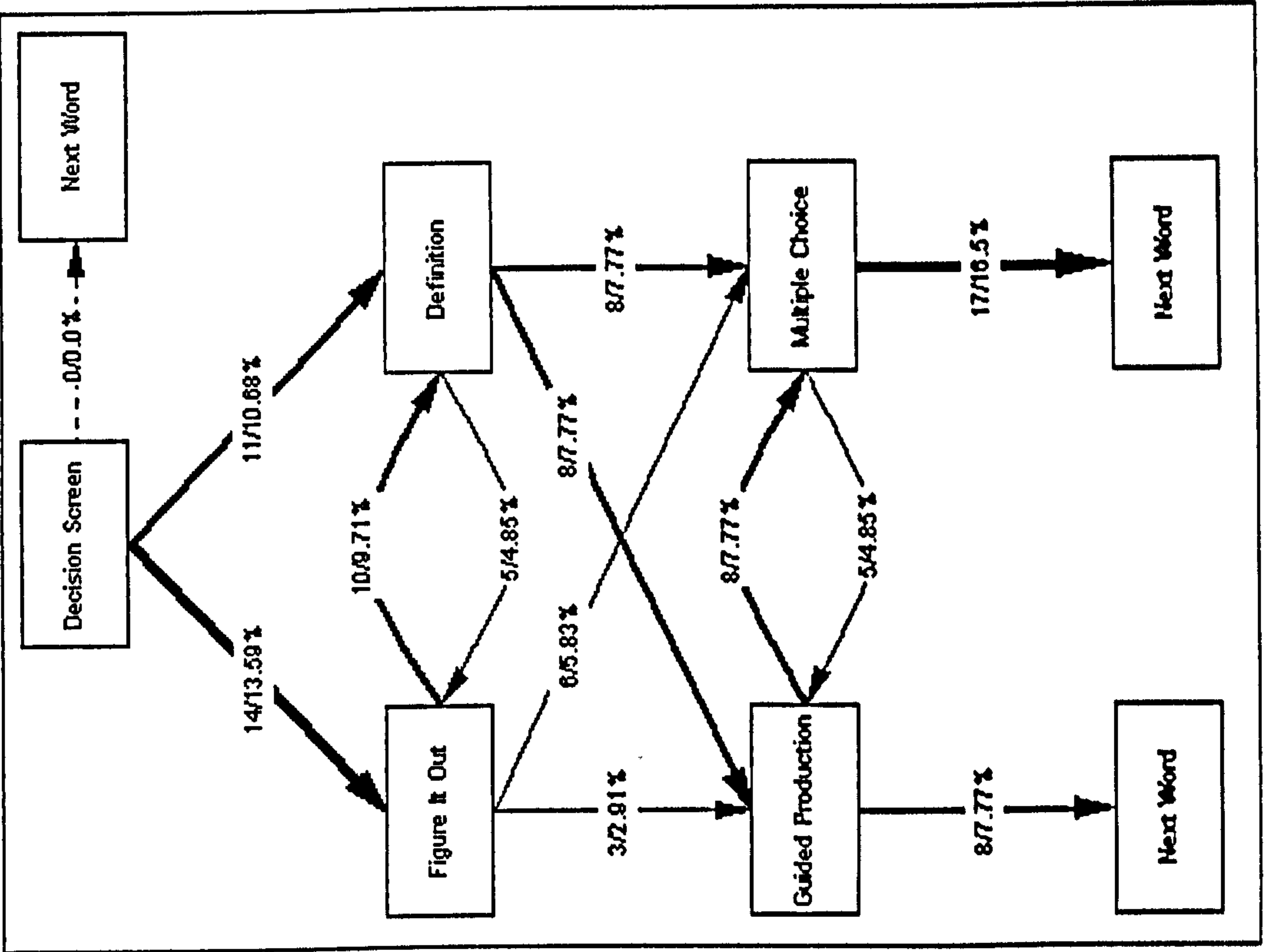
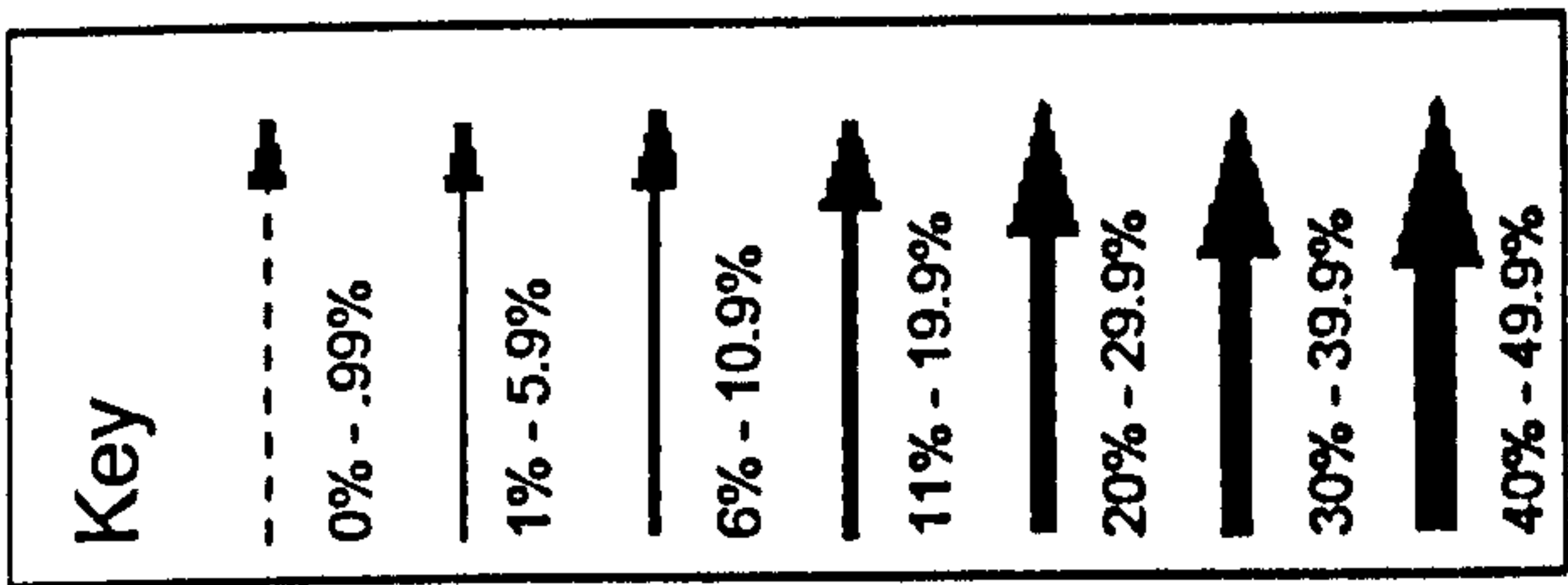


Figure 39: Level 2 decision flow.



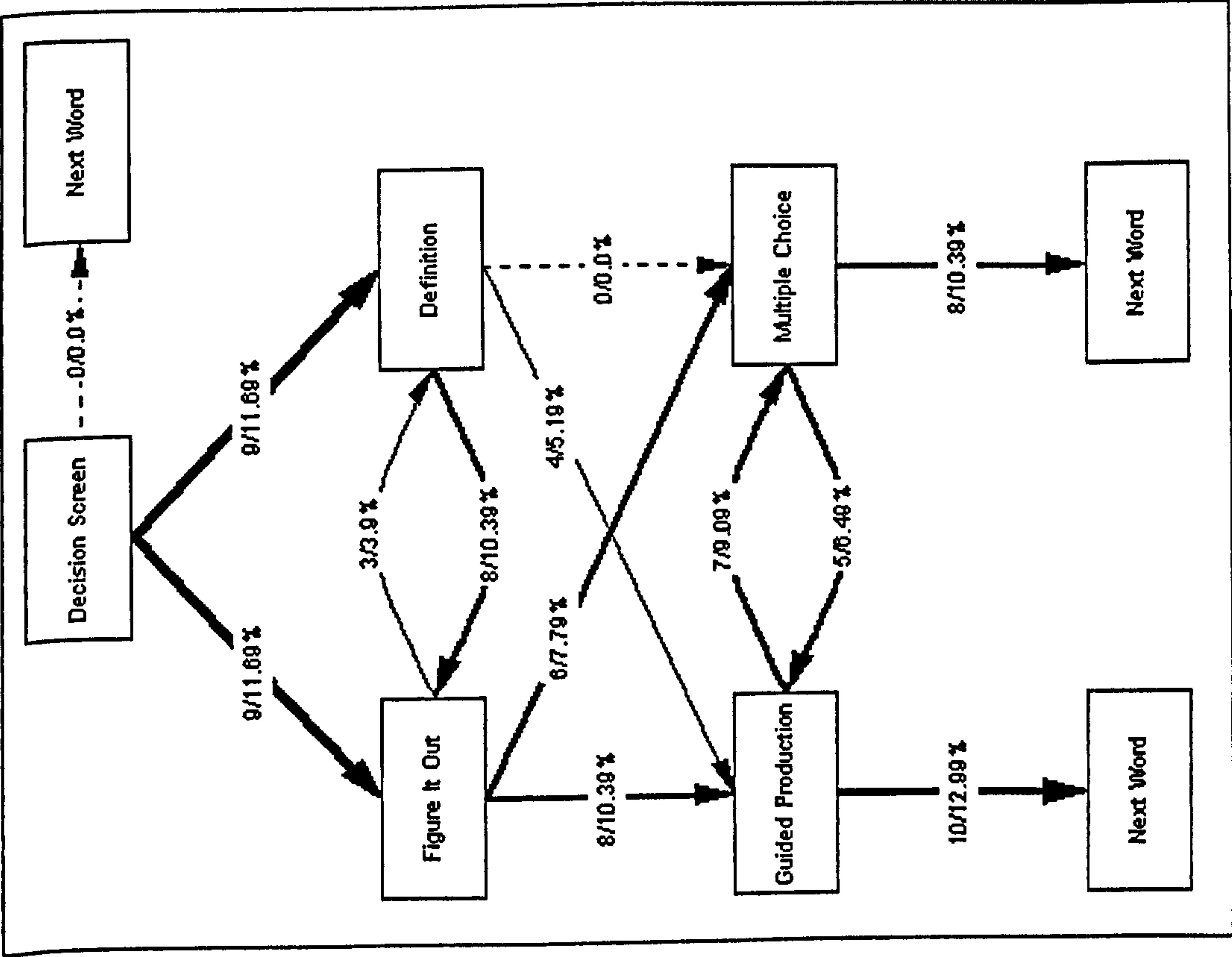


Figure 40: Level 3 decision flow.

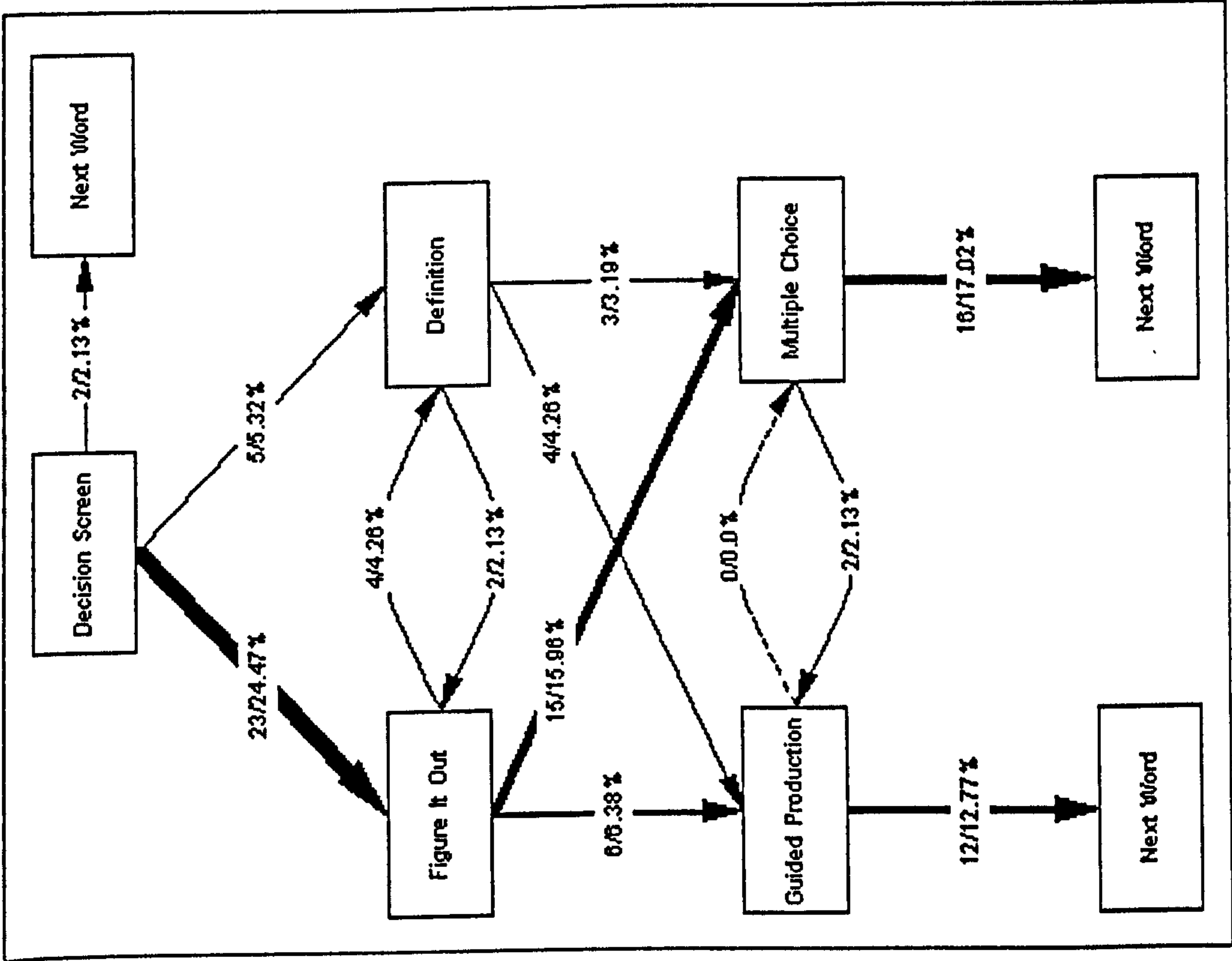
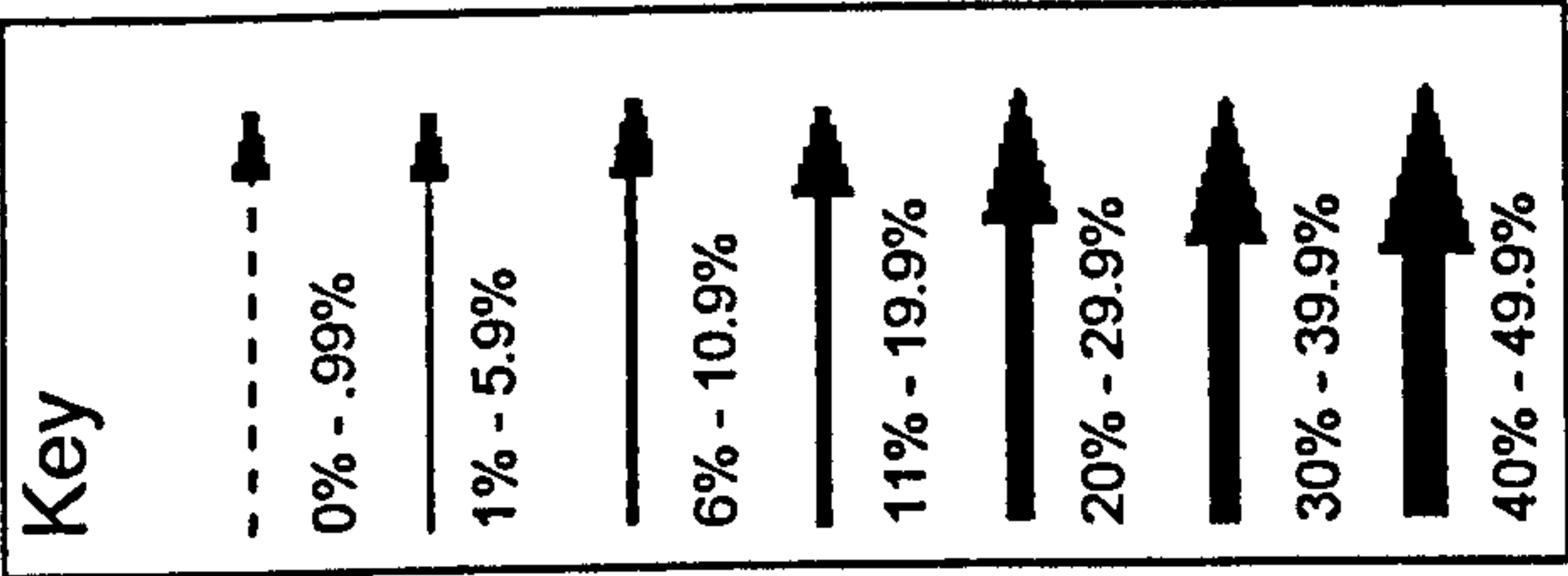


Figure 41: Level 4 decision flow.



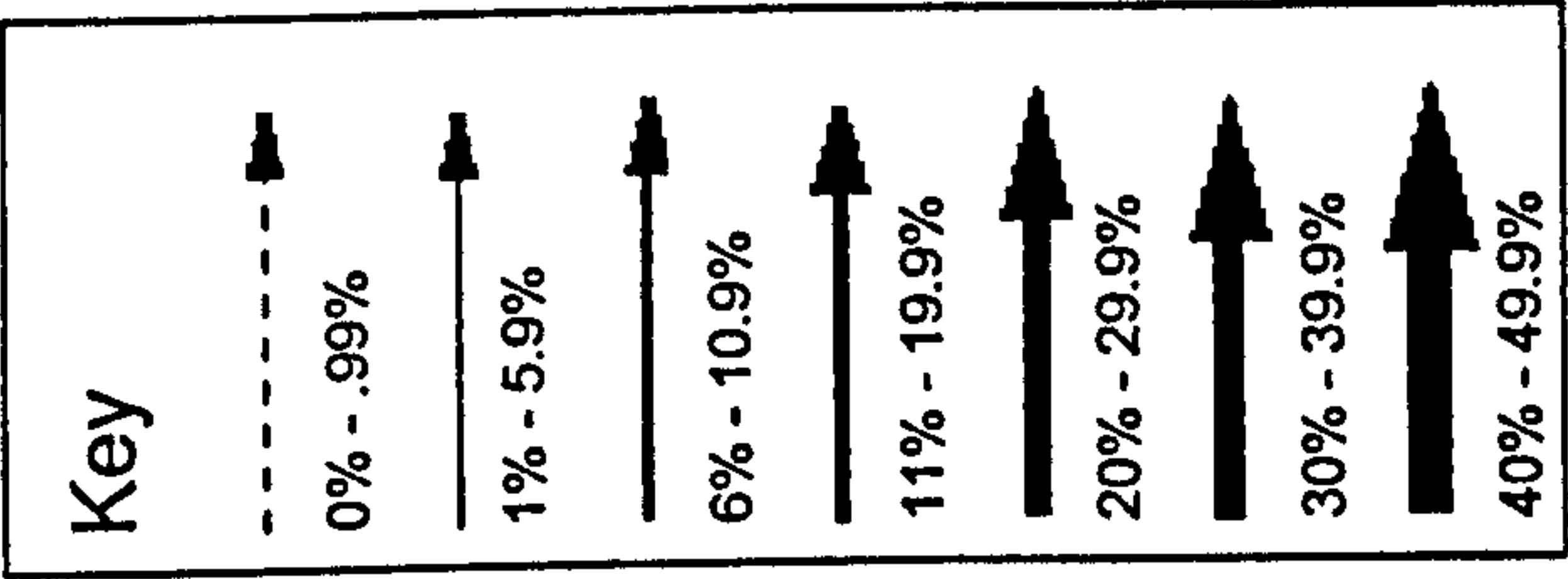
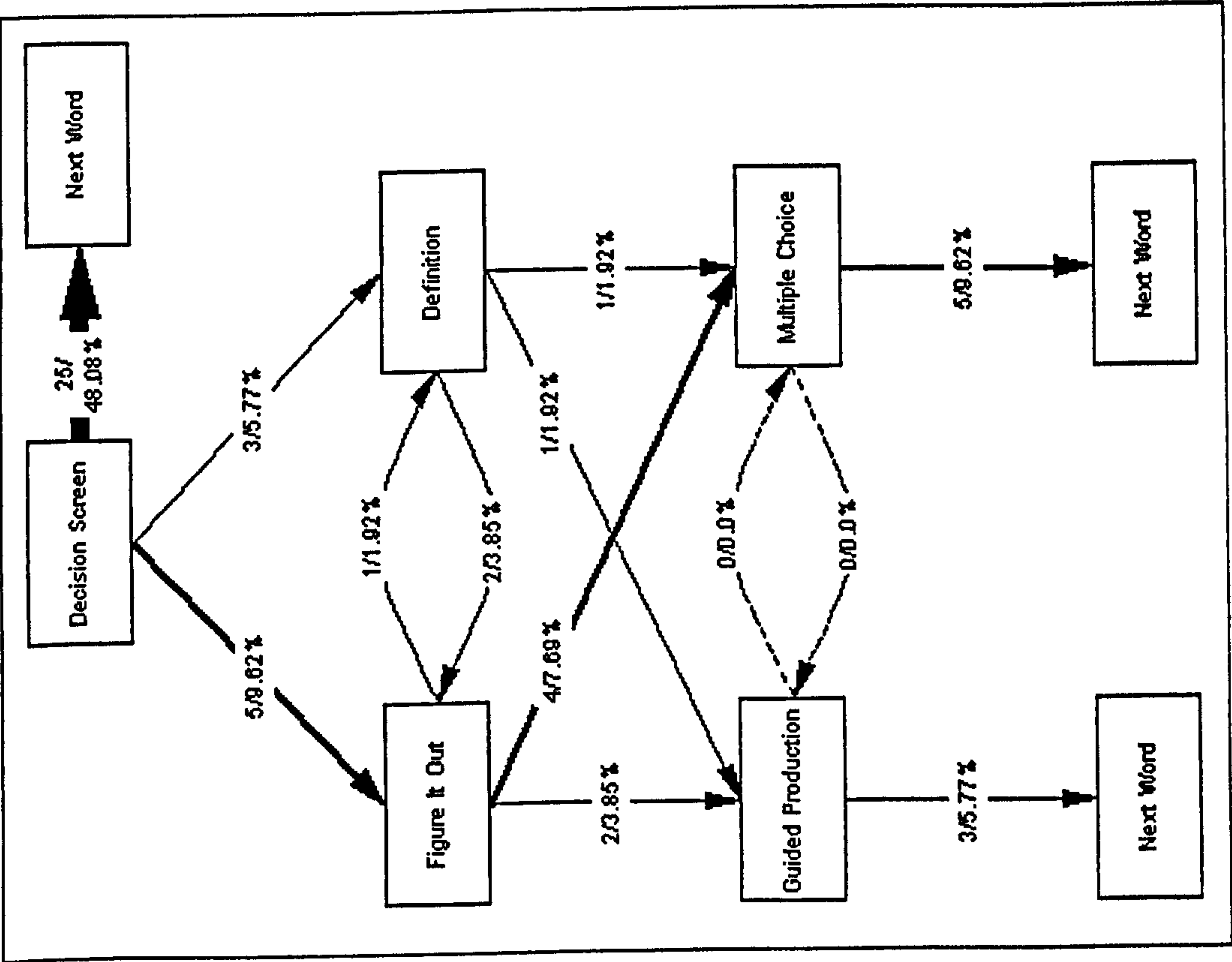
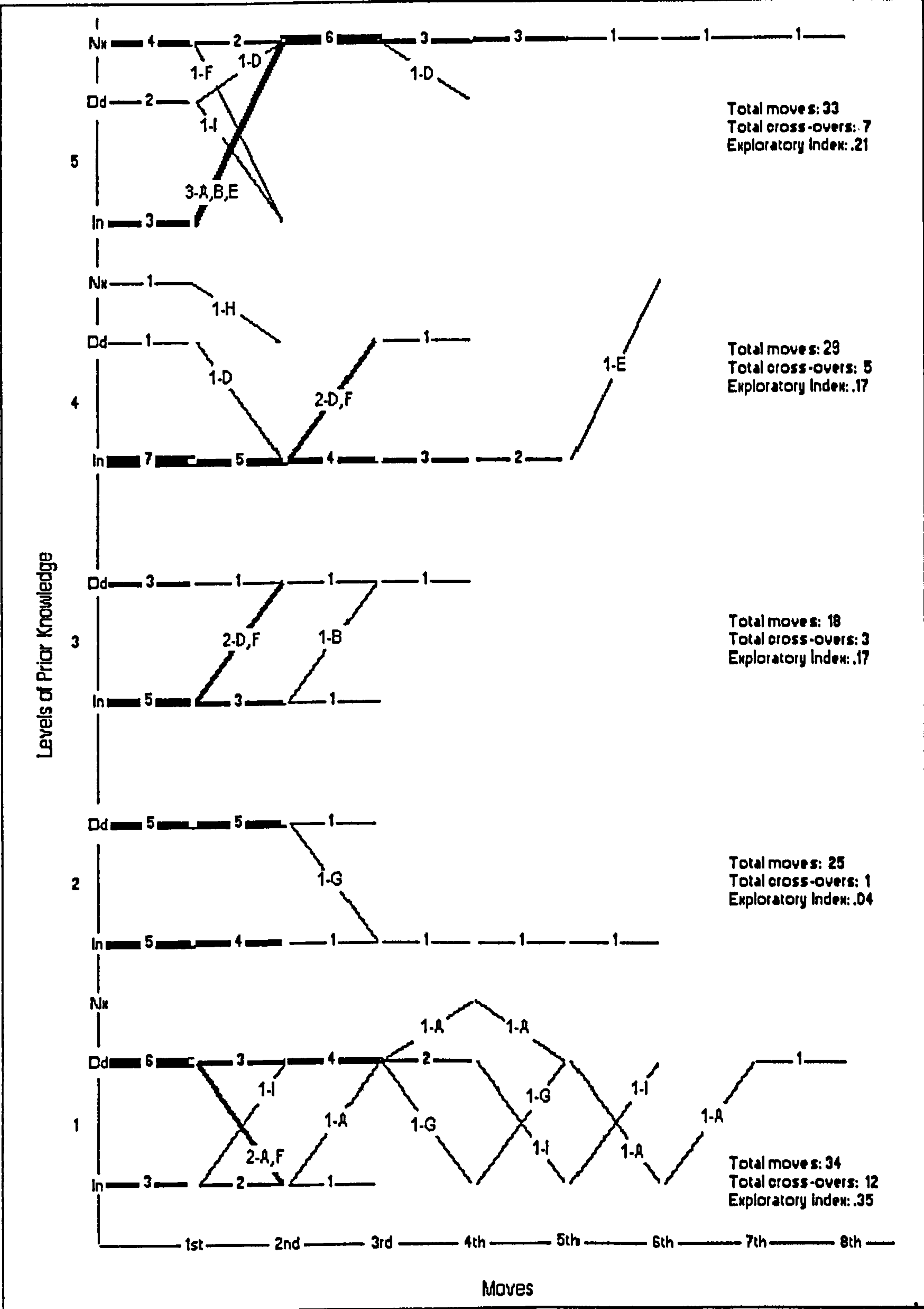


Figure 42: Level 5 decision flow.

Appendix J Stage 4 Cross-Link Diagram



Key: A = Subject 1, B = Subject 2, D = Subject 4, E = Subject 5, F = Subject 6, G = Subject 7, H = Subject 8, I = Subject 9. Subjects 3 and 10 did not change preferences.

Appendix K Post-Hoc Interview Script: Subject 3

2. Stage: 4

3. For each of the following levels of word knowledge, what was the most likely choice to make?
Were you consistent in this? If not, why not?

Word Knowledge	See the Definition	Figure it Out	Both	Go to Next Word	Why?
I know this word and all its meanings very well.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
I know this word fairly well.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
I know this word in its simple forms but I need to practice it.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	See back #1
I'm not sure if I know this word.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Usually F:O only no definition
I definitely do not know this word.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	after

4. For each of the following levels of word knowledge, what was the most likely choice to make?
Why?

Word Knowledge	See the Definition F:O	Figure it Out F:O	Both	Sometimes one or the other	Why?
I know this word and all its meanings very well.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Although he doesn't
I know this word fairly well.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	change his first choice

The second choice changes frequently - see #2

I know this word in its simple forms but I need to practice it.

☐☐☐☒

I'm not sure if I know this word.

☐☐☐☒

I definitely do not know this word.

☐☐☐☒

5. More time and effort is put into certain words. Can you explain why this is so?

lwl 4 longer than lwl 2 - Looking for other usage - very interested in this.

6. Was there enough practice material?

Y (N)

Want more info on words - forms/prefix/suffix related words etc.

7. Are there any exercise types that you think should have been included? Why?

No - uses sentence making exclusively. Passive practice is just for words he knows well.

8. When did you make your decisions about the activities you wanted to do? (Right at the beginning or on the fly? Why?)

At knowledge screen, also considered interest/usefulness. Decision based on time limits - First half not fixed / then
Habit??
E.B - MC

9. How would you describe yourself as a language learner? (E.G. Do you like to practice grammar and memorise vocabulary? Do you think you learn more from real life communication?)

Right now

1. Environment (^{Advanced}ans in UK) means he has to learn from context all the time. Payke uses a dictionary for 2 out of 5 words. Payke 5 yrs ago didn't do this way.

Interesting.

2. Wants to vary activities for interest.

3. At advanced ^{knowledge} levels more interested in range of meanings.

Appendix L Post-Hoc Interview Script: Subject 8

2. Stage: 4

3. For each of the following levels of word knowledge, what was the most likely choice to make?
Were you consistent in this? If not, why not?

Word Knowledge	See the Definition	Figure it Out	Both	Go to Next Word	Why?
I know this word and all its meanings very well.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
I know this word fairly well.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	changed to def once - looking for possible other meanings
I know this word in its simple forms but I need to practice it.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Same as
I'm not sure if I know this word.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Same as
I definitely do not know this word.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<p>Guess first Definition second usually</p> <p>Same as text book</p> <p>See #1</p>

4. For each of the following levels of word knowledge, what was the most likely choice to make?
Why?

Word Knowledge	Multiple-Choice	Guided Production	Both	Sometimes one or the other	Why?
I know this word and all its meanings very well.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
I know this word fairly well.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
I know this word in its simple forms but	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Normal pattern is

I need to practice
it.

I'm not sure if I
know this word.

☐☐☐☐

I definitely do not
know this word.

☐☐☐☐

5. More time and effort is put into certain words. Can you explain why this is so?

No idea - very surprised.

6. Was there enough practice material?

(Y)

N

see back #4

~~ref~~

more examples

& match more meaning

7. Are there any exercise types that you think should have been included? Why?

missing words

8. When did you make your decisions about the activities you wanted to do? (Right at the beginning or on the fly? Why?)

Screen by screen - maybe planning some time.

9. Any comments on the scale for prior knowledge? Was it confusing at all? If you hadn't been asked, would you have thought about it anyway? Would the activities be different without it?

Sometimes confused - complicated layout - long sentences

very pictures

just looked at it in % terms.

better without p.k. screen.

10. How would you describe yourself as a language learner? (E.G. Do you like to practice grammar and memorise vocabulary? Do you think you learn more from real life communication?)

Prefer books.

1. "I can remember for a long time".
2. Usual pattern \rightarrow figure \rightarrow dep
3. Why always SP \rightarrow NC. - "more interesting" - 2 different things.
 - (a) GP - "really thinking"
 - (b) NC - "it's our ability to see tricky things"."complementary"
4. "If I had to do H.7 every week, I would be more selective"
"In the real world, I have to work much faster."
5. "Interface design slows down learning".