

THE EFFECTS OF DIFFERENT TASK TYPES ON L2
LEARNERS' INTAKE AND ACQUISITION OF TWO
GRAMMATICAL STRUCTURES

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ABSTRACT

Recent years have seen a growing interest in the role of tasks in second language acquisition. A substantial body of research now exists investigating the effects of different task types and their accompanying instructions on learning. Less is known about how tasks affect intake and the relationship between intake and acquisition.

This study investigated the effects of 1) implicit and explicit inductive instructions and 2) various task types on both intake and acquisition of two English grammatical structures. Fifty adult ESL learners enrolled in private language schools in New Zealand were pretested with the help of a timed and an untimed grammaticality judgement test for prior knowledge of negative adverbs and adverb placement and were randomly assigned to either a dictation, an individual reconstruction, or a collaborative reconstruction treatment. Treatments were accompanied by either implicit instructions (containing only practical instructions on how to perform the task) or explicit instructions (drawing participants' attention to the target structures and giving an example of them). Performance on the treatments was taken as a measure of intake, and talk-aloud reports were obtained to gauge participants' awareness during task completion. Gain scores from pretest to posttest and to delayed posttest were taken as an indication of learning effects.

The results show that the explicit instructions of the inductive type used in this study were unable to affect participants' intake and acquisition in comparison with the implicit instructions. Also, the three types of treatments did not have an effect on acquisition in many cases. Where there was an effect, the treatments differentially

affected intake and acquisition. Dictation led to high intake, but less acquisition, and the individual reconstruction treatment led to low intake, but greater acquisition. The collaborative reconstruction treatment was the most consistent of the three. The cognitively more demanding reconstruction treatments (i.e. those involving the retention of larger amounts of texts over longer periods of time) resulted in greater acquisition than the dictation treatment.

The main theoretical implications of the results are that the type of inductive and low-level explicit instructions used in this study were not sufficient to differentially affect intake and acquisition. Other, more explicit types of treatments may be necessary. The results also indicate that task types that are relatively easy, affect intake to a greater extent than more demanding tasks, but that more demanding tasks are more likely to affect acquisition.

On a methodological level, the concept of intake was found to be very difficult to operationalise, and it is suggested that additional measures be developed. Finally, the implications for teaching practice are that for relatively complex structures such as negative adverbs and adverb placement exposure to the input with minimal pedagogic intervention may not be sufficient. Teachers may also want to consider the effects of different task types on both intake and acquisition and both teachers and researchers need to be careful in drawing conclusions on the basis of immediate task performance.

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It depends on what your definition of is is

(Bill Clinton)

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¹ For the uninitiated, this is the name of a cocktail. What were you thinking?

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CHAPTER ONE

INTRODUCTION

1.1 Motivation for the study

This research stems in large part from my own interest in a phenomenon that I have observed over many years of my own and others' language study. Why was it that under very similar circumstances (same language class, same teacher, same amount of tuition, even similar motivation/goals) some learners succeeded and others do not? I have experienced this in secondary school French classes in Holland, in Arabic classes at universities in Cairo and Damascus, in Hebrew classes in Jerusalem, and in many other settings. As for myself, I knew it could not (only) have to do with the 'hard wiring' of the language learning system; I have always been poor at memorising vocabulary and even poorer at hearing differences in pronunciation, yet I have often been relatively successful at mastering languages. My own instinct told me it had to something to do with what I used to call 'focus'. Now I would probably call this attention, although I still like the term focus as it is something that would be present (or absent) in a more general sense rather than being related to a particular task or situation. A friend once referred to this as 'having your radar on' (which sounds a lot like Tomlin & Villa's "alertness"; 1994). Students who keep their eyes and ears open *at all times* for the new language, who constantly try to monitor others' and their own speech, and who actively hypothesise about the language as they go along, are the ones who do best. My studies in applied linguistics led me to the field of autonomy and self-directed language learning which further confirmed me in my thinking. However, in these areas it is not always clear what

is meant when it is said that successful learners are “more proactive” or more “independent”. I decided that to investigate more deeply what affects learning at this level, I had to turn my attention to, well, attention.

Much research has been done investigating the role of attention in second language learning (cf. Robinson, 1996; Schmidt, 1990, 1994, 2001). Although there continue to be some fierce debates, it appears that there is a consensus that more attention leads to increased learning. One way to investigate attention is by looking at intake; the intermediate stage between input and acquisition. If learners take in information, it has to have been attended to. But if information has been attended to, is it learned? What factors affect this? How can learners’ attention be increased, and can it be directed towards specific features in the language? It is these and other questions that prompted me to design the present study. I use tasks as tools to investigate the effects of different variables affecting 1) intake, 2) acquisition, and 3) I look at the relationship between intake and acquisition.

Recent years have seen a growing interest in the role of tasks in aiding second language learning and instruction. Tasks are now commonly researched for their relative effects on learning and their pedagogical contribution to classroom and out-of-class learning. Although advances have been made in isolating task characteristics beneficial to learning (e.g. various types of planning; Foster & Skehan 1998, the effects of task repetition; Lynch & Maclean 2001, the interaction between task and grammatical structure; Tarone 1985), it is not yet clear what task characteristics aid in directing learners’ attention to

specific features of the input. A related question is whether successfully directing learners' attention to formal aspects of the language results in the development of explicit knowledge of those aspects. Another debate has focused on the roles of input, output and interaction in learning. Some have argued that providing learners with an opportunity to interact in the target language (Long, 1996; Swain, 1995), has a greater effect on acquisition than exposure to input only. Others have argued instead for the importance of learners processing the input before producing it (VanPatten, 1990). Other task characteristics such as the amount of time available to learners (Chaudron, 1985), whether the task is completed individually or collaboratively (Oxford, 1997), whether its completion requires attention to meaning (Hulstijn & Hulstijn, 1984), all have been shown to affect learning. However, the possibilities to be investigated are far from exhausted.

There is now also an increasing interest in the cognitive processes leading to learning and how tasks and activities in general affect those processes. Researchers such as Leow (1995, 1998) and Rosa & O'Neill (1999) have investigated the effects of tasks on both intake and learning. However, comparatively little empirical evidence exists for the specific workings of the relationship between the two. There is an obvious pedagogical interest in determining the effects of certain task and instructional types on affecting immediate intake and (task) performance on the one hand, and eventual learning on the other (cf. Schneider, Healy, & Bourne, 1998).

The purpose of the study is thus twofold:

- 1) To determine the relative effects of implicit and explicit instructions
- 2) To investigate the effects of different task characteristics

In addition I will investigate the effects of 1) and 2) on both intake and acquisition and the relationship between the two

1.2 Outline

I start by reviewing the relevant literature. Chapter 2 specifically looks at cognitive theories of general and second language learning, as well as a number of related topics such as the roles of memory, attention, and awareness. Chapter 3 discusses input, output and interaction as sources of data available to learners, and intake as the mediating process between that data and learning. Chapter 4 discusses the rationale behind task-based learning, as well as the various types of tasks and their effects on learning. Chapter 5 presents the design, method and results of the pilot study. Chapter 6 provides an in-depth discussion of the method used for the main study. Chapters 7, 8 and 9 present the results of the main study. Chapter 7 looks at the effects of the treatments on intake, chapter 8 at the effects of the implicit and explicit instructions on acquisition, and chapter 9 at the effects of three different task types on acquisition. Chapter 10 summarises and interprets the results for chapters 7-9 and makes comparisons between the effects of the treatments on intake and acquisition. Chapter 11 draws a number of conclusions and discusses implications as well as limitations of the study.

CHAPTER TWO

COGNITIVE APPROACHES TO SECOND LANGUAGE ACQUISITION

2.1 Introduction

This study investigates the effects of different task types on intake and acquisition of negative adverbs and adverb placement, as well as the effects of the accompanying instructions. It is predominantly cognitive in nature and the literature review reflects this. The first chapter deals with cognitive approaches to second language acquisition. The first part reviews general cognitive psychological theories of knowledge processing, storage and learning. The second part discusses cognitive approaches to second language acquisition. I will focus primarily on topics and concepts that will be of relevance in subsequent chapters such as different types of (second language) knowledge and learning and the roles of attention and awareness.

2.2 Cognitive theories of information processing, storage, and learning

The field of second language acquisition has increasingly drawn on research in cognitive psychology for theory building and further research. This first section gives an overview of the main theories that have influenced second language acquisition research.

2.2.1 Information processing

Cognitive psychology is the study of how information is processed and investigates aspects of memory, awareness, and perception. An information-processing approach

investigates how information is selected, processed, learned, and retained. McLaughlin and Heredia (1996, p.214) list six characteristics of the information processing approach:

- 1) Humans are viewed as autonomous and active.
- 2) The mind is a general-purpose, symbol processing system.
- 3) Complex behavior is composed of simpler processes. These processes can be modular.
- 4) Component processes can be isolated and studied independently of other processes.
- 5) Processes take time; therefore, predictions about reaction time can be made.
- 6) The mind is a limited-capacity processor.

One of the first limited-capacity theories (see point six above) was developed by Broadbent in the 1950's. He proposed (1958) that human processing is characterised by 1) limited attention (i.e. when dealing with information we can only attend to a limited number of stimuli), and 2) effortful attention (there is a finite pool of resources we draw on when attending to information). Because attentional capacity is limited, not all information is processed and attention is allocated selectively to filter out part of the input, on the basis of its physical characteristics. Dual-task performance studies, whereby participants are asked to listen to two auditory sources (for example two sound recordings, one for each ear) but ignore one, result in poor recall of information presented on the unattended channel. Broadbent took this as evidence that information that is not attended to is discarded. However, later studies (e.g. Allport, Antonis, & Reynolds, 1972)

showed that this is not always the case and that it depends on the degree of similarity between the messages. Auditory and visual stimuli for example, can relatively easily be attended to simultaneously. In addition, Broadbent assumed that since participants had no awareness of the unattended information that it was not processed for meaning, but this was proven not always to be true (cf. Von Wright, Anderson, & Stenman, 1975)¹.

In response to these criticisms, Treisman (1964) proposed an attenuation theory of information processing and suggested that unattended information is attenuated or reduced, with all information being processed first for its physical aspects, and then for meaning. Yet others (e.g. Deutsch & Deutsch, 1963) have proposed a late filter theory in which all information is completely analysed automatically, with attention only necessary to determine which aspects of the analysed information will enter into the subject's response. There is now considerable evidence against the late filter theory (cf. Cowan, 1988).

Studies into dual-task performance resulting in impaired performance appeared to provide evidence for the limited capacity that humans have for dealing with information. Kahneman (1973), although largely in agreement with this, suggested however that this capacity is flexible to some extent. He stressed the importance of task demands (e.g. complexity, novelty) and their resulting arousal on determining the total pool of resources available for a certain task.

¹ It is, however, as Cowan (1995) points out, not always possible to be sure that the unattended channel, was in fact not attended to at all.

Results from studies of dual-task performance were taken by some as evidence that attentional resources are distributed centrally by a single multi-purpose processor executive (e.g. Baddeley, 1986; Norman & Shallice, 1986). Others focused more on humans' apparent ability to engage in different tasks, if and when they are sufficiently different and suggested that this required the availability of a number of specific processing resources (e.g. Allport, 1989). Wickens (1984, 1989), suggested that information is processed perceptually based on different modalities (e.g. visual, auditory), then processed either verbally or spatially, and finally responded to manually or vocally. These different modalities, codes, and responses represent different resource pools and interfere with each other to varying degrees. This explained, according to Wickens, why some tasks can be performed more successfully together than others.

In the 1970's a number of researchers started to point out that the effortful processing in early information processing models was not always evident in human behaviour (which is different from saying it is not a precondition for that behaviour developing). Shiffrin & Schneider (1977, 1984) and Schneider & Shiffrin (1977) were among the first to distinguish between controlled and automatic processing. Controlled processing is a) of limited capacity, b) requires attention, and c) can (to some extent) be allocated flexibly. Automatic processing on the other hand is a) not bound by capacity limits, b) does not require attention, but c) is difficult to alter. Shiffrin & Schneider pointed out that a large part of human processing is automatic, for example the execution of everyday tasks. In order to perform complex tasks (such as driving a car, or speaking a second language) quickly and with a reasonable degree of accuracy, the necessary knowledge needs to be

readily available for use. Their “automaticity model” explains skill development as an increasing efficiency with which tasks are executed as a result of faster application of the underlying rules through practice. However, their theory has been criticised for having only descriptive and little explanatory power. Their experiments provide evidence of automatic processing, but do not explain how this takes place. Their suggestion that underlying patterns, similarities or rules pertaining to the stimuli are applied faster is not substantiated. Cheng (1985), for example points out that it may be that the nature of the knowledge changes rather than (just) the application of the knowledge.

Anderson’s (1982, 1983) ACT (Adaptive Control of Thought) theory and its later version, the ACT* (pronounced “act star”) (1993) build on Shiffrin & Schneider’s work. Anderson makes a distinction between declarative and procedural knowledge. The former is consciously accessible and comes in two shapes; episodic knowledge, which is autobiographical, and semantic knowledge, which is abstract knowledge, stored without reference to the context in which it was acquired. Procedural knowledge, on the other hand, is usually highly automatised and its application is dependent on specific context requirements. ACT* suggests that all knowledge starts out in declarative form before it can become proceduralised. Recently Anderson has attenuated his position somewhat and has suggested that not all knowledge has to start out as declarative knowledge. It has been pointed out (Eysenck & Keane, 2000) that the model best fits fairly well-defined knowledge domains, and is less applicable to domains involving a greater degree of flexibility and creativity where it is difficult to identify the original declarative knowledge.

Logan's (1988) "instance theory" explains the development of automaticity not as a change from one type of knowledge to another but by suggesting that each encounter with a stimulus is stored separately, and obligatorily so once attended to. The more encounters occur, the more information is stored about the stimulus and the faster retrieval of that information becomes. Retrieval is automatic when encountering similar stimuli; 'Automaticity is memory retrieval: performance is automatic when it is based on a single-step direct-access retrieval of past solutions from memory' (p. 493). Automaticity in this view is thus not the speeding up of attentional control processes, but develops independently of such processes. Logan describes this retrieval process as a race between direct memory access and the outcome of a computational algorithm. When enough encounters with certain stimuli have been stored, access to them becomes direct, and outperforms any computational algorithm; it has become automatic. Robinson & Ha (1993) investigated some of the claims made by instance theory, specifically for second language learning. They found evidence that new items required the activation of an algorithm-based operation, and old items were retrieved through direct access. They also found that whole chunks ("instances") had been encoded by participants, rather than only parts of them, providing confirmation of Logan's theory.

Similarly, in connectionist theories of learning, repeated encounters with a stimulus determine the extent to which it is retained. However connectionist theories see each encounter as strengthening existing connections, rather than as being stored separately. Connectionist theories do not view knowledge as stored discreetly, or symbolically (e.g. in rules), but as relational representations, or as distributed across a network of

interconnected units, also referred to as a neural network (McClelland, Rumelhart, & Hinton, 1986). There is no rigid distinction between processing, learning, and the representation of information, as all are modelled in terms of units. Bechtel & Abrahamsen (1991) suggest that one of the main commonalities in connectionist theories is the connectivity of the units in a neural network. Activation (e.g. as the result of perceptual data entering the system) spreads through this network, thus relatively strengthening some connections and weakening others. There is no need for control of this activation by an executive processor and in this sense too, connectionist accounts differ from most symbolist accounts that do assign a role to controlled processing of stimuli. A term often used in relation to connectionism is parallel distributed processing (PDP) which forms one branch of connectionism research emphasising the importance of distributed representation, as opposed to localised representation (in the former view, information is stored across different points, in the latter it is stored separately, and wholly). An exhaustive discussion of connectionism is out of place here but for more information the reader is referred to Plunkett & Elman (1997).

2.2.2 Information storage

The studies and theories discussed above all concern themselves with the way information is *processed*. Closely linked to this is the investigation of how information is *stored*. One of the earlier theories by Atkinson & Shiffrin (1968) proposed that there are three types of memory stores; a sensory, a short-term store, and a long-term store. The sensory store deals with perceptual data (audios, visual, tactile and olfactory information). Attention to specific information in sensory memory is required for

information to enter short-term memory where it needs to be rehearsed in order to be retained in long-term memory. The sensory store deals with incoming perceptual information (in separate sub-stores, for example an iconic store for visual information, and an echoic store for auditory information). It has been found to be very limited in the amount of information it can contain. Short-term memory also has a very limited capacity (about seven items; Miller, 1956) and it too is prone to rapid decay or displacement, unlike long-term memory which has a seemingly unlimited capacity and can retain information indefinitely (although the information may become inaccessible over time).

There is evidence for the existence of separate memory stores but Atkinson & Shiffrin's model was later found to be overly simplified. For example, studies involving patients with brain damage showed that different types of new information were apparently stored in different short-term memory stores. Cowan (1995) points out that information also does not necessarily proceed from sensory memory to short-term, and from short-term memory to long-term memory in a linear fashion. Information can enter sensory memory, be matched with information already stored in long-term memory, the result of which may be sent to short-term memory which processes it (with the help of long-term memory) and sends the result to long-term memory, in a recursive process. Cowan (1993) referred to short-term memory as 'the interface between everything we know and everything we perceive or do' (p. 166).

Baddeley & Hitch (1974) proposed that the concept of short-term memory should be replaced with that of working memory. Working memory has three components:

- A central executive or supervisory attentional system that regulates information flow within working memory, allocates attention to particular input modalities or long-term memory systems, activates or inhibits whole sequences of activities guided by schemata or scripts and resolves potential conflicts between ongoing schema-controlled activities.
- A phonological loop comprising a phonological store and a process of articulatory rehearsal where inner speech can be used to refresh the decaying representations in the phonological store.
- A visuo-spatial sketchpad that generates images, mental maps, etcetera.

The central executive processor activates the phonological loop and the visuo-spatial sketchpad. Further research (Baddeley, Thomson, & Buchanan, 1975) showed that the former consists of 1) a passive phonological store directly concerned with speech perception, 2) an articulatory process linked to speech production that gives access to the phonological store. Presentation of auditory information directly activates the phonological store; visual information only indirectly if there is subvocal articulation. The visuo-spatial sketchpad was found to consist of a visual cache, which stores information about visual form and colour, and 2) an *inner scribe* which deals with spatial and movement information (Logie, 1995).

A distinction is frequently made between implicit and explicit memory. According to Schacter (1987) implicit memory is revealed 'when previous experiences facilitate performance on a task that does not require conscious or intentional recollection of those

experiences' (p. 501) and conversely, explicit memory does involve conscious recollection. Evidence for the latter has been found in studies of priming (in which participants are exposed to input, such as words they need to complete a task later, without being told so beforehand). Butler & Berry (2001) have pointed out, however, that in order to demonstrate implicit memory is drawn on it is necessary to provide proof (amongst others) that performance reflects an unintentional retrieval strategy (this is called the "intentionality criterion"; cf. Schacter, 1989) and that performance is not accompanied by conscious recollection. Performance would also have to be affected equally on both perceptual tasks (tasks where the original stimulus and the retrieval stimulus are similar) and conceptual tasks (where the original and retrieval stimuli are only *conceptually* related). Butler & Berry (*ibidem*) reviewed a number of studies and concluded that 'considerably more studies using perceptual, rather than conceptual, implicit memory tasks have met the intentionality criterion' (p. 195) and that none had met both criteria. Following Richardson-Klavehn, Clarke, & Gardiner (1999), they suggested the use of the terms intentional versus incidental memories, rather than explicit/implicit memories. This would then make the distinction different from that proposed by N. Cohen & Squire (1980) between declarative (knowing that) and procedural (knowing how) memory. Tulving (1972), in addition, proposes a distinction between episodic (relating to specific memories of actual events) and semantic memory (relating to general knowledge about the world).

Some have argued that the different types of memory are related to different memory stores (e.g. one for implicit and one for explicit memory; cf. Schacter & Tulving, 1982;

Paradis 1994) but others have claimed that the two need not be dissociated (for a review, see Robinson, 1995). Memories could be activated (as opposed to stored) differently. For example, a memory could be activated automatically without activation of its contextual (i.e. episodic) information (Graf & Mandler, 1984). Robinson (ibidem) holds the view that ‘...level of attentional awareness during retrieval is a function of task demands and automatic processes, which jointly determine access to a single long-term memory store’ (p. 317).

Tulving (1993) attempted to provide a synthesis of research until that time and suggested that there were five types of memory:

- 1) procedural memory (involved in skill learning, implicit)
- 2) perceptual representation (implicit)
- 3) short-term memory (explicit)
- 4) semantic memory (knowledge system, categorical memory, implicit)
- 5) episodic memory (autobiographical, personal memory, explicit)

Although there is increasing evidence for the existence of different types of memory, a great deal of research has so far only provided descriptions rather than actual explanations of the findings. Nonetheless, research into memory storage has greatly aided our understanding of the processes of learning.

2.2.3 Theories of learning

Memory research is of course closely linked with the study of learning. Craik & Lockhart were two memory researchers who proposed a theory called ‘depth of processing’ to explain the effects of different types of processing on retention of information. The original theory was developed in 1972 and later expounded in a number of articles and books (e.g. Craik & Tulving, 1975; Cermak & Craik, 1979). Depth of processing theory claims that the way information is processed will to a large extent determine learning, with more elaborate forms of processing leading to more learning. What one remembers can be ‘[...] regarded as the byproduct of perceptual processing; [...] the resulting memory trace may be more or less elaborate depending on the number and qualitative nature of the analyses carried out on the stimulus (Craik & Tulving, 1995, p. 270), and: ‘stimuli that are attended to, fully analyzed, and enriched by associations or images yield a deeper encoding of the event, and a long-lasting trace’ (ibidem p. 270). After publication of the original theory Craik and associates (e.g. Craik & Tulving, 1975), have suggested that “spread” and “elaboration” may be better descriptors than “depth” as the latter may be taken to imply quantity (e.g. time) rather than quality. They summarise the effects of processing as follows:

The memory trace could usefully be regarded as the byproduct of perceptual processing; just as perception may be thought to be composed of a series of analyses, proceeding from early sensory processing to later semantic-associative operations, so the resultant memory trace may be more or less elaborate depending on the number and qualitative nature of the analyses carried out on the

stimulus. It was further suggested that the durability of the memory trace is a function of depth of processing. That is, stimuli which do not receive full attention, and are analyzed only to a shallow sensory level, give rise to very transient memory traces. On the other hand, stimuli that are attended to, fully analyzed, and enriched by associations or images yield a deeper encoding of the event, and a long-lasting trace. (p. 270)

A number of problems with the depth of processing model have been identified. Baddeley (1990) notes that it is difficult to determine to what depth information has been processed. Even where it is possible to do so, it is not always clear how to interpret this as what may be shallow processing in one situation may be deep and meaningful processing in another, depending on the type of retrieval the learner expects to have to perform. In addition, research has showed improved learning without a change in processing depth (for example through task repetition). Baddeley (*ibidem*) points out that for some types of learning the forming of associations is more important for an increase in performance. This may well be true for a great deal of language learning too. Another problem is that the tests used to measure learning were biased towards deep processing. Morris, Bransford, Franks, Morris & Stein (1979) showed that whether information is stored depends on its relevance to the subsequent test and labelled this the “transfer-appropriate processing theory”. The type of memory test used in most of the earlier levels-of-processing studies involved deliberate and conscious recall of information (i.e. explicit memory), but results were not always corroborated on tests of implicit memory.

The process of information retention can take place with or without conscious awareness of either the information (implicit or explicit memory), or the process of retention (implicit or explicit learning). Reber is one of the best-known researchers to have investigated especially implicit learning. He conducted a large number of experiments (e.g. 1967, 1969, 1976, 1989) whereby participants were typically exposed to strings of letters conforming to a Markovian finite-state grammar. When subsequently asked to classify novel strings as grammatical or ungrammatical, participants performed above chance but could not verbalise the rules of the underlying grammar. A famous experiment was conducted by Berry & Broadbent (1984) in which participants had to manage complex processes to maintain certain production levels of a fictional sugar factory. Participants learned to perform this task quite well but could not report how they were able to do so. Sequence learning experiments expose participants to a sequence of (traditionally) lightflashes with recurrent patterns. Participants are able to predict patterns, without being aware of those patterns (cf. Curran & Keele, 1993).

Reber claimed that his own and others' research provided evidence for implicit learning. He defined implicit learning as 'a primitive process of apprehending structure by attending to frequency cues' as opposed to a 'more explicit process whereby various mnemonics, heuristics, and strategies are engaged to induce a representational system' (1976, p. 93). He also claimed that the knowledge resulting from such learning is abstract.

However, researchers have pointed out that in many cases it is difficult to be certain that participants did not develop any explicit knowledge in the course of the experiment. Not being able to verbalise knowledge may not be the same as not having any discreet knowledge of it. Shanks & St. John (1994) argue that for learning to be taken as implicit, two criteria would have to be met:

- 1) the information criterion (i.e. the information participants are asked to provide on an awareness test must be the information that has caused improved performance.).
- 2) The sensitivity criterion (i.e. the measure of awareness needs to be sensitive to *all* possible types of awareness of information.).

One well-known attempt to show that a great deal of learning labelled as implicit is in fact explicit learning, was made by Perruchet & Pacteau (1990). They carefully investigated some of the learning in Reber's experiments and showed that increased performance could be due to a development of explicit knowledge of bigrams or trigrams (simple relationships between two or three items of information), rather than the abstraction of rules. They pointed out that a lot of research investigating implicit learning may not have found evidence for the development of explicit knowledge because the tests used to measure explicit learning favoured certain types of explicit knowledge only. Pothos & Bailey (2000), for example, found that decisions in Reberian experiments were often made not on the basis of grammaticality but on the basis of similarity between items and the strength (e.g. reliability) of certain chunks. It is also not clear that gained knowledge transfers to new exemplars; 'the Granada of unconscious rule learning'

(DeKeyser, 2003). Dekeyser (*ibidem*) cites some studies that appear to have found such learning to take place (e.g. Brooks & Vokey, 1991). Redington & Chater (1996) argue, however, that such transfer phenomena can be explained if it is assumed that participants learn fragments (bigrams and /or trigrams) during the training phase of the experiment, and only abstract across the fragments at test time.

However, there appears to be some research that satisfies the above points as well as the information and sensitivity criteria postulated by Shanks & St. John (e.g. Howard & Howard, 1992). Additional evidence comes from research into the activation of different brain areas (cf. Gazzaniga, Ivry, & Mangun, 1998) under implicit and explicit learning conditions. Recent research (Willingham & Goedert-Eschmann, 1999) suggests that the two types may develop in parallel rather than one after the other, lending support to earlier suggestions by Graf & Schacter (1985) that the two systems (implicit and explicit) may not be dissociable because they operate concurrently.

Another common distinction is that made between inductive and deductive learning. Deductive learning proceeds from the general (e.g. a rule) to the specific (e.g. examples of the rule in use). Inductive learning proceeds from the specific to the general, resulting in the development of patterns and generalisations (Decoo, 1996).

Holland, Holyoak, Nisbett, & Thagard (1987) emphasised especially the importance of induction in their framework of cognitive processing which they described as 'all inferential processes that expand knowledge in the face of uncertainty' (*ibidem*, p. 1). An

important element of their framework is its flexibility and its ability to incorporate experiences from failed processings. People avoid drawing up large numbers of hypotheses because ‘they see constraints that can be derived from the general nature of an information-processing system that pursues goals in a complex environment and receives feedback about its success in attaining its goals’ (p. 2). In order to do this learners draw on events which inform their expectations about future events.

Holland and associates see a role for rules as the building blocks for mental operations but argue that for efficiency, rules need to be organised in relation to each other. This implicit organisation results from patterns of conditions and actions dependent on context. The resulting rule cluster can operate quickly in response to future events that are similar enough to trigger its activation. The authors point out that this explains how sometimes complex sets of interrelationships are learned more quickly than a single relationship between two events.

Processing in their framework is in the form of condition-action rules (IF/THEN statements) which operate when the condition part is matched by salient features of the environment. Specific rules gain dominance on the basis of their strength, their past performance, their specificity, and the amount of support they receive from other rules (the extent to which situational features affirm the relevance of the selected rule). Their framework differs from connectionist models in that it allows for both the strengthening of existing rules and the generation of new rules. It may thus result in immediate and radical behaviour changes.

2.2.4 Recent cognitive research

Recent research in the areas of information processing, storage, and learning, looks particularly promising and relevant to the field of second language acquisition. Neurobiological research is already increasing our understanding of processes of (second) language intake (see the following chapter) and new technologies such as PET (Positron Emission Tomography) and CAT (Computerised Axial Tomography) scans allow us to identify brain activation during language use and learning, aiding in our understanding of how language is processed. One recent area of investigation is that of the effects of different task types and instructions on dual-task performance. One finding from early experiments was that dual-tasks (in which participants are engaged in two tasks simultaneously or in sequence) result in slowed and/or impaired performance. The response to the second of a pair of stimuli is slower than that to the first stimulus. The time difference is called the *psychological refractory period*. Initially this phenomenon was explained with reference to the central bottleneck theory which holds that certain mental operations cannot be performed in parallel but instead must be performed one at a time (Welford 1952). More recently, however, alternative explanations have been put forward. Meyer & Kieras (1997a, 1997b) proposed a model called Executive-Process/Interactive Control (EPIC) which suggests that it is possible to perform multiple tasks at the same time without loss in performance. In this model, task execution is to some extent under the control of executive processes (e.g. task selection, monitoring) that will determine how and in what order tasks are executed (see also Baddely, 1986; Logan 1985; Norman & Shallice, 1986; Shiffrin & Schneider, 1977, 1984). If there is no incentive to carry out tasks in parallel, they will be executed sequentially.

Subsequent research has found that tasks can influence this process to the extent that in some cases dual-task slowing has been eliminated (Schumacher et al. 1997, reported in Levy & Pashler, 2001). Levy & Pashler (2001) termed this the instruction dependent hypothesis (IDH) and conducted a replication study of Schumacher et al.'s research to further investigate the findings. This involved participants responding with a keypress to the location of a figure appearing in one of three locations on a computer monitor and producing a vocal response to the pitch of a computer-generated tone. Participants were asked to give equal weight to each task and were given a financial incentive for speedy and accurate performance. These conditions were thought to favour parallel processing. As a result, in Schumacher et al.'s study the psychological refractory period was in some cases reduced to zero. In Levy and Pashler's study some of the variables were altered; in one experiment participants were asked to produce a keypress in response to the tone and a vocal response to the location of the figure. In another experiment, participants had to produce two responses to separate attributes of one stimulus. All experiments included items that required only one response (as a control). On the direct replication of Schumacher et al.'s study, no significant difference was found between items involving one or two stimuli/responses, which seems to support the instruction dependent hypothesis. However, the authors point out that in the case of the task requiring both a keypress and a vocal response, the keypress was made so quickly that the required processing could have been completed before the vocal response was made, but that it was likely that at least some overlap took place. In other experiments there were significant differences, confirming expectations based on a central bottleneck theory. In conclusion, there appears to be some preliminary evidence that dual-tasks slowing may

be eliminated, but not in all cases. The authors suggest further research be conducted varying, for example, stimulus onset of the different stimuli used.

This type of research may not have direct implications for studies of second language acquisition but aids in a greater understanding of processes of task performance and the effects of instructions. If evidence for unimpaired dual-task is further established, then it may in future be possible to identify language learning task demands and instructions that will enable learners to engage in dual processing, such as attending to both formal and meaning-related aspects of the language simultaneously.

2.3 Cognitive approaches to second language acquisition

Findings from cognitive psychology have increasingly influenced second language acquisition theory building and research. In this section, first a number of such theories are reviewed, followed by a discussion of more specific topics such as the role of memory, attention, and awareness in second language acquisition.

2.3.1 Cognitive theories of second language acquisition

Over time a number of theories of second language acquisition have been proposed that are predominantly cognitive in nature (e.g. Faerch & Kasper, 1980; Gass, 1991; Krashen, 1982, 1985; McLaughlin, 1978; Sharwood Smith, 1986; Skehan 1998; Schmidt, 1990, 1994, 2001; VanPatten 1990, 1996). A number of pedagogical applications in second language instruction, such as certain task-based approaches (e.g. Long & Crookes, 1992; R. Ellis, 1993), also draw heavily on cognitive theories.

Krashen's theory of second language acquisition (1982, 1985) has been highly influential. His monitor model encompasses a number of hypotheses, most prominently that there is a distinction between acquisition and learning of a language. The former is a relatively effortless inductive process and is similar to the way children learn their first language. Learning is a more conscious and controlled effort, such as often found in classrooms. The products of these two types of learning are used differently; acquired knowledge is used for language production, learned knowledge is used to monitor language processes (e.g. to check for accuracy). Simple rules may be learned but the use of that knowledge for monitoring purposes depends on the situation and factors such as the availability of time, and task demands (e.g. in formal language tests, learned knowledge may be called for). The two types of knowledge are separate; one cannot become the other. The second part of Krashen's theory, the natural order hypothesis, claims that language is acquired in a predictable order, regardless of instruction. Difficult rules are acquired later than easier rules. The monitor hypothesis claims, as mentioned above, that learned knowledge can be applied to 'edit' language production. In order for this to happen time, a focus on form, and knowledge of the rule are necessary. Monitor use, according to Krashen, is difficult to encourage. Krashen identifies three types of learners: monitor over-users, under-users, and optimal monitor users who make use of the monitor when it does not interfere with communication. The input hypothesis claims that acquisition is driven by input that is slightly beyond the learner's linguistic competence (called "i+1"). The input feeds into a Language Acquisition Device, an innate mental structure for language. Learners make use of non-language cues such as context, prior knowledge and expectations to understand the message. Krashen gives the example of

caretaker speech, which is roughly tuned to the child's level of understanding. The advantage of rough tuning (as opposed to, for example, the targetting of a specific language feature), is that "i+1" is likely to occur automatically. In classrooms, rough tuning is likely to benefit more students. The final hypothesis is the affective filter hypothesis, which claims that (mainly) acquisition can be impeded by anxiety, a lack of motivation, or self-confidence. The role of the classroom is to provide a low-anxiety environment.

A large number of criticisms have been levelled at the monitor model over the years (cf. Gregg, 1984; McLaughlin, 1987; Skehan, 1998), and counter-evidence has been presented against some of its claims. It has also been suggested that the model is not testable and / or falsifiable, and that some of its claims depend on other claims (e.g. its argumentation is circular). Rather than dealing with each of these points in isolation, alternative theories are discussed below.

McLaughlin was one of the first second language researchers to propose a detailed cognitive theory of second language acquisition. In his seminal 1978 paper he suggested, based on current thinking in cognitive psychology at that time, that second language acquisition consists of a number of competing processes, all vying for attention. In this framework, learning involves the transfer of information to long-term memory and is regulated by controlled processes each of which requires attention (although not necessarily conscious awareness), which in turn takes time. Automatic processing, on the other hand, results from routinisation and does not require attention, and thus frees up

resources to be allocated elsewhere. Automaticity develops over time, but is necessarily preceded by controlled processing. A distinction was also made between focal and peripheral attention (McLaughlin, Rossman, & McLeod, 1983), reflecting opposite ends of a continuum of degrees of attention. When automatic versus controlled processing and focal and peripheral attention are combined into a matrix, there are four possible distinct types of learning; from focal controlled (performance based on formal rule learning), to focal automatic (performance in a test situation), to peripheral controlled (performance based on implicit learning or analogic learning), to peripheral automatic (performance in communication situations).

Gass's model (first presented in 1988 and later expanded in 1997) is an attempt to capture the entire acquisition process and includes several stages from apperceived input, to comprehended input, to intake, integration, and finally, output. Gass defines apperception as 'a process of understanding by which newly observed qualities of an object are related to past experiences' (1997, p .4). Or: 'the recognition (by the learner) that there is something to be learned, that is, that there is a gap between what the learner already knows and what there is to know '(p. 4). Input that is apperceived is processed for meaning and results in *comprehended input*. Not all input that is comprehended is made available to the developing system, i.e. not all of it becomes intake. For example, intake can be processed for meaning only to meet communicative demands, and not be processed for syntax (cf. Faerch & Kasper, 1980). Integration occurs when hypotheses are tested against available intake, or existing knowledge is strengthened. Knowledge may be integrated into existing knowledge by adding to it (for example in the case of an

exception to a rule), but also by replacing existing knowledge or otherwise restructuring the interlanguage. The role of output is important to Gass for testing hypotheses, the result of which can feed back into the intake component.

Bialystok (1982, 1985, 1994; Bialystok & Mitterer, 1987) has proposed, and over the years offered various versions of a framework aiming to account (amongst others) for the implicit/explicit distinction in (both first and second) language knowledge and learning. The framework has two components, analysis, ‘the process by which linguistic and conceptual representations become more explicit, more structured, and more accessible to inspection’ (1994, p. 561) and control, related to the degree of intentionality in language use. These components draw on universal linguistic knowledge, on conceptual knowledge (the individual’s knowledge of the world), and on language-specific details. These various types of knowledge and information interact with each other. In Bialystok’s view, explicit knowledge 1) can be derived from implicit knowledge through analysis, 2) is organised around formal categories, and 3) can be uniquely accessed (p. 561). It also can be conscious and may be accessed automatically. Language knowledge becomes increasingly explicit as it is analysed throughout development, however explicit knowledge does not become implicit. Instead, access to it changes, facilitating a process of automatisisation. ‘The nature of representation must not be confused with access to that representation’ (p. 567). For Bialystok, learning is a process of increasing explicitness: ‘the explicit knowledge dynamically evolves from the implicit knowledge through development, as the whole system moves towards a state of increasing explicitness’ (p. 567).

This position is different from that taken by a number of cognitive theorists, such as Anderson (1982), who see a development from a controlled declarative stage, to an automatised procedural stage, as well as that of most second language acquisition researchers. Hulstijn writes: 'it should be emphasized that the acquisition of language skills is not merely a speeding up of the execution of essentially the same procedures originally formed from declarative knowledge. Rather, language acquisition essentially consists of the establishment of new procedures which *reorganize* a body of facts and rules previously acquired' (1990, p. 32; emphasis in original). Hulstijn (*ibidem*) criticised Bialystok's framework for 1) failing to explain development, but instead only applying to task demands, 2) the assumption that learning must start with unanalysed knowledge, 3) the assumption that learning starts with low control (implicit knowledge, in later work), 4) its complexity due to its dual nature, 5) for being too domain-unspecific, 6) for failing to take into account the quantitative difference between novices and experts, and 7) indeterminacy of the concept of automaticity. (See Bialystok, 1990, for a response).

The theories discussed above have in common that they take a limited-capacity view of learning and see it as effortful allocation of attention. However, capacity limited models and SLA theories based on them are not without criticism (cf. Truscott, 1998). Several SLA researchers (e.g. DeKeyser, Salaberry, Robinson & Harrington, 2002) have pointed to recent developments and sometimes a resulting abandonment of limited-capacity models in the field of cognitive psychology (cf. Neumann, 1987; Sanders, 1998; see also the first section of this chapter). Contrasting theories have proposed that attentional capacity is unlimited but that demands that stimuli, especially conflicting ones, place on

the system cause performance to be reduced. Particularly where the information that the system acts upon is similar or if the information is confusing in some way, efficiency and speed are affected². DeKeyser et al. (ibidem) cite Gopher (1992, pp. 279-280): ‘considerations of resource scarcity or the performer’s ability to allocate sufficient processing efforts are irrelevant. The limits on task performance are not conceived in these terms. Attention control is constrained to a decision to engage, disengage and shift attention between tasks and the pursuit of intentions. In ... [such] models the only limited resources are time and its derived scheduling constraints’ (p. 808).

An interesting quote from James in this respect is the following:

The number of *things* we may attend to is altogether indefinite, depending on the power of the individual intellect, on the form of the apprehension, and on what the things are. When apprehended conceptually as a connected system, their number may be very large. But however numerous the things, they can only be known in a single pulse of consciousness for which they form one complex ‘object’, so that properly speaking there is before the mind at no time a plurality of *ideas*, properly so called. (1890, p. 262)

One researcher working within a competing (connectionist) paradigm is MacWhinney (1987, 2001a, 2001b; MacWhinney & Bates, 1989). In his competition model input plays the role of providing “cues” for comprehension. The availability (e.g. frequency,

² The difference may be merely theoretical; it may be difficult to distinguish between reduced performance as a result of processes that have slowed down, or reduced performance as a result of sequential processing.

saliency) and reliability (e.g. regularity) of these cues determine in what order they are acquired, and to what extent they aid in comprehension of the input. Learner differences such as brain development and “plasticity”, differences in working memory, learners' first language and transfer between the L1 and the L2, and time on task all influence acquisition, as does (support derived from) the context. However, cues inevitably impinge on the system and do not necessitate conscious attention at time of encoding.

The purpose of this section has not been to promote one theory over another but to highlight the range of current perspectives. One important distinguishing factor is the role theorists assign to attention and awareness in the learning of a second language. They also differ greatly in how they explain the storage and retrieval of information. These topics will now be dealt with in some more detail.

2.3.2 The role of memory in second language acquisition

This next section looks specifically at literature on the role of memory in second language acquisition processes. Different aspects of memory have been investigated, from the influence of short-term memory on learning (Miyake & Friedman, 1998; Williams, 1999), to the relationship between chunking in phonological memory and the acquisition of longer-distance dependencies (N. Ellis & Schmidt, 1997), as well as the relationship between memory and attention (Robinson, 1995, 2003). These different approaches will be briefly reviewed below.

N. Ellis has conducted a number of investigations into different aspects of memory for second language and its effects on acquisition (cf. N. Ellis, 1996, 2001, 2003; N. Ellis & Beaton, 1993; N. Ellis & Sinclair 1996; N. Ellis & Schmidt 1997). N. Ellis & Sinclair (1996) discuss the role of working memory in language acquisition and point out that a large part of language learning involves the learning of sequences. This is the case for vocabulary learning, but also for syntax, discourse and other aspects of language. The authors posit that working memory is necessary for sequence information to be retained short-term and that especially rehearsal encourages the commitment of information to long-term memory. To test this, they conducted a study in which they aurally presented participants with recordings of sentences containing a particular Welsh grammatical structure (soft mutation). They instructed some participants to repeat all utterances, and prevented others from doing so by instructing them to count when listening to the input. (This pertained only to the exposure phase; participants were able to speak as they wished at other times). The authors assessed learning with the help of a grammaticality judgement test, a test of metalinguistic awareness, and a speech production test. They found that participants prevented from rehearsal had impaired performance at 'a) comprehension and translation, b) explicit metalinguistic knowledge of the detailed content of grammatical regularities, c) acquisition of the foreign language forms of words and phrases, d) accuracy in pronunciation, and e) some aspects of productive, but not receptive, grammatical fluency and accuracy.' (p. 234).

In a further study, N. Ellis & Schmidt (1997) investigated the effect of phonological memory on the retention of longer distance dependencies (such as subject-verb

agreement), which they expected to be heavily dependent on individual differences in short-term memory capacity. Through a number of experiments, using both natural and artificial language, they concluded: 'phonological memory span serves as the window on language evidence. If an individual's phonological STM cannot represent the stretch of language surface form that contains a particular syntactic agreement, then they should be unable to abstract information about that dependency' (p. 159). They also investigated the relationship between the availability of chunks that form the regularities in the input and subsequent retention of utterances containing those chunks. They found significant interactions between both long-term memory and short-term memory retention of utterances.

Gathercole & Thorn (1998) specifically investigated phonological short-term memory and found an interaction between the ability to hold representations in the phonological loop, prior knowledge of the phonological system, and learning. The authors compared two groups of children; the first were bilingual in French and English, the second monolingual in English. They found that the groups performed similarly on the English version of the digit span and non-word repetition tasks. On the French version, the monolingual children performed much more poorly than the bilingual children. 'the monolingual children's depressed performance on these French phonological memory tasks provides a clear indication that familiarity with a language critically influences the functioning of the phonological loop' (p. 153).

N. Ellis (2001) came to a similar conclusion:

As learners practise hearing and producing L2 words, so they automatically and implicitly acquire knowledge of the statistical frequencies, and sequential probabilities of the phonotactics of the L2. In turn, as they begin to abstract knowledge of L2 regularities, they become more proficient at short-term repetition of novel L2 words. And so L2 vocabulary learning lifts itself up by its bootstrap. (p. 49)

J. Williams (1999) investigated the relationship between memory for input and inductive learning of morphological rules. He administered a verbatim memory task in which participants had to recall sentences after a certain time interval. No grammatical instruction was given, nor was any mention made of the subsequent tests. The memory task was followed by a translation task that required participants to select words from a range of alternatives. In a second experimental group the vocabulary used in the task was taught beforehand to reduce memory load. In addition, the target structures were highlighted to increase participants' attention to those grammatical features. In a third group, feedback was given during the memory task.

Williams points out that the results show a dissociation between first learning to segment words into stems and affixes, and subsequently learning the rules that govern the distribution of grammatical morphemes. Results from the first experiment suggested that segmentation is a memory-dependent, and essentially data-driven process. However, in

the two other experiments highlighting and vocabulary pre-training did enhance learning, mainly of segmentation, without affecting memory. This suggested a conceptually-driven process. Despite this, some evidence was found for the role of memory on overall performance. In an effort to reconcile these findings, Williams suggested that a distinction be made between simple verbatim memory and the construction of instances (associations with long-term memory). Encoding in verbatim memory would have been sufficient for segmentation to be learned, but not for distributional properties of morphemes, which involves attention to relations between words. Williams suggested that neither simple maintenance rehearsal (using the phonological loop), nor elaborative processing (committing input to long-term memory) had taken place but rather “integrative processing” which, quoting Graf (1994),

Focuses on connections among the units that define an individual item [...] ; these kinds of connections are formed or strengthened when the subject either perceives coherence among separate stimulus components (e.g., under the guidance of preexisting representations or gestalt laws like proximity or common fate) or conceives a structure for processing target features as a single entity. (p. 685)

Williams points out that participants were under continuous strain during the verbatim task and would have only been able to allocate the necessary time for this type of integrative processing on a small number of items. Most likely, these would be items occurring later during the treatment when a certain level of familiarity with additional aspects like word order and lexis had been achieved.

Overall, however, there was an effect for increased attention in experiments two and three. Williams concludes: 'if learning distributional rules is critically dependent upon the subjects initially paying attention to relations between elements in the input, then it follows that even the simplest rules might not be learned if the subjects for some reason fail to attend to those relationships' (p. 32). In addition to the effects of attention, Williams found evidence for the crucial role of phonological long-term memory as a necessary, but not sufficient, prerequisite to learning. Data-driven processing probably precedes more conceptually-driven processing.

Robinson (1995) set out to investigate evidence for the noticing hypothesis (see below), which claims that there is no learning without awareness. Robinson claims that most research has been done on visual and perceptual processes, but not on control of memory and action. After reviewing literature on the relationship between attention and memory, he summarises (p. 317):

- There is minimal evidence of encoding into long-term memory without awareness. Most of the debate concerns issues relating to memory activation and retrieval without awareness.
- Short-term memory should be distinguished from long-term memory. It is a subset of long-term memory in a currently activated state. Short-term memory is where noticing takes place.
- Retrieval from long-term memory can be a consequence of conceptually-driven or data driven processing.
- There can be automatic activation of previously attended information encoded

into long-term memory.

- The level of awareness during retrieval is a function of task demands and automatic processes.

In relation to this last point, Robinson writes: 'differential performance on implicit and explicit learning and memory experiments is caused by differences in the consciously regulated processing demands of training tasks and not by the activation of consciously and unconsciously accessed systems' (pp. 283-284). This has implications for task design and research on task effects, and this topic will be taken up again in chapter four.

In summary, SLA researchers have found evidence for the importance of 1) phonological short-term memory, 2) working memory, and 3) rehearsal on the learning of a) segmentation, b) individual words, and c) longer-distance dependencies, and 4) the relationship between attention and memory. In addition, several researchers have found an interaction between prior memory for language and subsequent learning.

2.3.3 The role of attention and awareness in second language acquisition

Where earlier theories had made use of the general term 'consciousness' to distinguish between controlled "learning" and naturalistic "acquisition" (cf. Krashen, 1981), Schmidt (1990, 1993, 1994) further separated consciousness into intentionality, attention, awareness, and control. Both intentional and incidental learning are considered possible, but Schmidt sees little evidence for non-attentional learning of new information (as opposed to reinforcement of existing knowledge). He further claims that attention

‘necessarily entails conscious registration of the contents of focal attention’ (1994, p. 17). This has become known as the ‘noticing hypothesis’ and it claims that ‘noticing is the necessary and sufficient condition for the conversion of input to intake for learning’ (ibidem, p. 17). Schmidt suggests that consciousness as awareness refers to different levels of awareness, such as a global awareness of the input, or awareness at the level of understanding. Consciousness as control refers to the distinction between automatic and controlled processing.

Responding to Schmidt, Tomlin & Villa (1994) argued that awareness needs to be more carefully separated from attention. They based themselves on the work of Posner and other cognitive psychologists (e.g. Posner & Petersen, 1990; Posner & Rothbart, 1992) who divided attention into alertness (a state of readiness for incoming data), orienting (allocation of resources on the basis of existing knowledge and expectations), and detection (allocation of resources to specific (aspects) of incoming data). Tomlin & Villa argued that none of these require noticing as in Schmidt’s definition: ‘none of the central components of attention – alertness, orientation, or detection – require awareness, either to operate or as the result of processing’ (1994, p. 193). They argued that detection is the concept closest to Schmidt’s noticing and is crucial for learning. They proposed the following definition for detection: ‘the process by which particular exemplars are registered in memory and therefore could be made accessible to whatever the key processes are of learning, such as hypothesis formation and testing’ (pp. 192-193) and claim that ‘there is considerable evidence indicating that information can be cognitively detected even though the individual is not aware of it having occurred’ (p. 193).

VanPatten's main objection to claims such as those by Tomlin & Villa is that the subjects in the studies they cite are not involved in the processing of novel form-meaning mappings; they are asked to perform with knowledge that they already have (1996, pp. 44-45). 'The lack of awareness of adult native-speaking subjects in studies such as lexical priming could be a *result* of learning and extended language use' (ibidem, p. 45). Studies such as those by Carlson & Dulany (1985), Carr & Curran (1994), Dulany, Carlson, & Dewey (1984, 1985), and Reber (1976) present learners with a finite state grammar and give them a surprise test. Subjects perform above chance but cannot articulate the underlying rule. VanPatten claims that this type of learning is not of the same type as that which takes place in learning a natural second language. Finite grammars do not have any meaning and the studies based on them 'involve purely visual processing during the learning phase' (p. 45). The subjects learn new arrangements of knowledge they already possess and can therefore not be said to have acquired new knowledge without awareness.

Robinson (1995) makes an attempt to reconcile these different ideas by defining noticing as 'detection plus rehearsal in short-term memory, prior to encoding in long-term memory' (p. 296). What is noticed is first detected and is 'then further activated following the allocation of attentional resources from a central executive' (p. 296). Robinson argues that there is no evidence of prolonged effects of detection without awareness and cites Holender (1986) and Shanks & St. John (1994) as claiming that registration without awareness cannot be seen as evidence of learning. Research by Curran & Keele (1993) has on some occasions been used as evidence for non-attentional forms of learning, however, Robinson (ibidem) points out that no such evidence could be

found from the results, and that there was only evidence for learning with a minimal amount of attention. Robinson concludes that ‘dissociations in the extent of knowledge, and awareness of knowledge arising during learning, are consequences of the particular encoding and retrieval operations required by particular tasks’ (p. 302).

Truscott, on the other hand, specifically argued for a dissociation between consciousness and attention. In an attack (1998) on Schmidt’s noticing hypothesis he put forward arguments against some of the claims made by Schmidt and other researchers. Truscott claimed that 1) there is no evidence to suggest that attention necessarily involves anything other than (non-conscious) detection, 2) most studies cited by Schmidt (e.g. Carr & Curran, 1994; Curran & Keele, 1993; Dienes, Broadbent, & Berry, 1991; Nissen & Bullemer, 1987; Winter & Reber, 1994), involve only a global awareness of the task, rather than awareness of specific features of the input. The one study cited by Schmidt (Hanson & Hirst, 1988) seemingly showing the necessity of attention to features of the input a) did not involve natural language, and b) found only that attention was helpful (not necessary) for learning certain features, 3) studies from learning research cited by Schmidt a) did not involve complex skills, and b) are inconclusive, 4) the noticing hypothesis is too vague and difficult to test, 5) it is unclear what aspects of the input the learner would have to notice, and 6) research in SLA cited to support the noticing hypothesis is either inconclusive or does not support Schmidt’s claims. Truscott suggests that the noticing hypothesis should be limited to claims about the acquisition of metalinguistic knowledge, for which conscious noticing is important.

Schmidt (2001) attempts to resolve some of these issues in a review chapter by focusing on the role of attention rather than awareness in second language learning. However, he points out that ‘it is probably impossible to separate attention and awareness completely, because of the common assumption that attention and awareness are two sides of the same coin [...] and the reliance, in many experimental studies, on verbal reports as a method of assessing the allocation of attention’ (p. 5). Instead, Schmidt takes a more restricted approach to the concept of noticing as involving ‘awareness at a very low level of abstraction’ (p. 5) and adopts the definitions proposed by Tomlin & Villa (1994), Gass (1988), and Robinson (1995), none of which include awareness. Noticing is taken to refer to the attending to surface forms in the input, rather than abstract rules. Schmidt argues that the role of attention in second language acquisition theories and research is important, and is used to explain 1) language development, where ‘attention to input is seen as essential for storage and a necessary precursor to hypothesis formation and testing’ (p. 6), 2) language variation in task performance, 3) fluency (where automaticity can free up attentional resources), 4) individual differences (learners differ in their attentional capacity), 5) the role of instruction (instructors can draw attention to specific features in the input using a variety of techniques). Basing himself on research in cognitive psychology, Schmidt surmises that attention is 1) limited, 2) selective, 3) subject to voluntary control, 4) controls access to consciousness, 5) is essential for the control of action, and 6) is essential for learning. Schmidt points out the difficulties in distinguishing registration with awareness (“noticing”) and registration without awareness (“detection”), in that ‘in positive priming studies one can never be really be sure that subjects did not allocate any attention or have at least fleeting awareness of what

they could not later report' (p. 26). Some studies (e.g. DeSchepper & Treisman, 1996) appear to have found some evidence for non-attentional learning but the effects were small, and the studies involved very simple learning tasks with highly contrastive (visual) information. Schmidt thus summarised: 'although recent evidence [...] indicates the possibility of some unattended learning, this appears limited in scope and relevance for SLA. There is no doubt that attended learning is far superior, and for all practical purposes, attention is necessary for all aspects of L2 learning' (2001, p. 3).

A number of studies have set out to investigate the role of attention on second language acquisition. Leow (1998b) was specifically interested in the effects of the three components of attention proposed by Tomlin & Villa (1994), (alertness, orienting, and detection) on acquisition of Spanish preterit forms. Participants were asked to perform a crossword puzzle and were randomly assigned to one of four groups; + or – detection and + or – orientation. Orientation was operationalised by giving participants an added instruction, printed in boldface, to note that some of the verb forms were irregular or by directing participants' attention to the non-target items. Detection was encouraged by providing clues helpful in finding the right answer. Participants were asked to talk aloud to identify when they detected the target forms. It was found that detection was crucial for learning to take place. Orientation and alertness were helpful but not crucial in aiding learning.

Simard & Wong (2001), however, claimed that Tomlin and Villa's (1994) division of attention into three components (alertness, orienting, and detection) does not necessarily

apply to second language learning. According to them the three components interact depending on task demands, learner differences, and a host of other variables. They review studies which have been cited to lend support to Tomlin and Villa's claim that awareness is not a prerequisite for learning. They point out that the studies 1) either did not investigate second language learning, and/or 2) did not show evidence for learning without awareness, but only less learning with less awareness. In doing so they echo earlier comments by Robinson (1995) and Schmidt (1995). They point out that in Leow's study alertness was not investigated separately, and that orienting was only done by giving participants the instruction to note the target forms, which may not have been enough to bring out its effects. In responding to this critique, Leow (2002) argues that Simard & Wong's suggestions for an alternative model need to be worked out in much greater detail to be testable.

Shook (1994) investigated the effect of attention by providing written input 1) with typographical enhancements, 2) with typographical enhancements and an instruction to focus on the target feature and to come up with the underlying rule, 3) without any enhancements and instructions (acting as a control group). He found that groups 1) and 2) outperformed group 3). In addition he found that participants performed better on the present perfect than on the relative pronouns. Shook argued that this was because the former are more meaningful features of the input.

Gass, Svetics, & Lemelin (2003) investigated to what extent attention to linguistic form affects acquisition of different aspects of language and the relationship between focused

attention and participants' proficiency level. Learners of Italian were randomly assigned to receive either a syntactic, a morphosyntactic or a lexical treatment and were pretested for prior knowledge. Participants in the syntax and morphosyntax + focused attention groups read a text with the target words underlined (and were asked to pay attention to the underlined words) and read a rule concerning the structure, with examples. Next, they practised the structure. Participants in the – focused attention groups were told to answer comprehension questions about the text and the practice sentences were designed to draw away their attention from the target words. In the lexical + focused attention group, the target words were underlined and questions about the words were asked. Next, participants received instructions on how to guess the meaning of words. Finally they were asked to answer questions about the words to gauge their understanding, but were given practice sentences containing hints about the meaning of the target words. In the lexical – focused attention group words were not underlined and the practice sentences were designed to draw away their attention from the target words. The results showed a beneficial effect for the + focused attention groups, but learning was also evident in the – focused attention groups. The greatest effect was found on the group learning the syntactical items, contrary to the authors' expectation, as it was the most complex of the three groups: 'focused attention is better utilized in more complex areas. That is, learners cannot use their own internal sources for learning in areas that are highly complex and abstract. Focused attention may indeed be necessary for learning in these areas to take place' (p. 527). They also found an interaction between proficiency level and focused attention with participants of a higher level not benefitting as much as the lower level participants from the focused attention instructions. 'Thus, as learners gain greater

knowledge of the language, they can use their own internal resources to “figure out” aspects of the language’ (p. 529).

In summary, the role of attention and especially awareness in second language acquisition is contentious. However, most second language acquisition researchers appear to agree that attention is crucial for learning to take place. Several studies have been able to show what aspects of the input learners pay attention to. The role that instructional tasks can play in this will be further discussed in chapter four.

2.3.4 Implicit and explicit knowledge and learning of second languages

The issues of attention and awareness in second language acquisition are related to the distinction between implicit and explicit knowledge (see above) and this area has generated a significant amount of research (cf. N. Ellis, 1994).

According to Bialystok (1979), implicit knowledge ‘is used without attention to the rule or with inability to verbalise the rule’ (p. 82). Explicit knowledge, refers to ‘that knowledge of language about which users are consciously aware’ (R. Ellis, 2004). R. Ellis contends that it is knowledge *about* language as opposed to knowledge *of* language (R. Ellis, 2004; Han & R. Ellis, 1998). R. Ellis (2004) warns against not clearly distinguishing knowledge and the use to which it may be put. He quotes Paradis (1994) as saying that explicit knowledge is knowledge that individuals ‘are capable of representing to themselves and of verbalising on demand’, which ‘confuses the ability to verbalize knowledge with the knowledge itself’ (p. 23). The ability to verbalise knowledge and

metalinguistic knowledge also need to be separated. Hulstijn & Hulstijn (1984) investigated the effects of time pressure and focus of attention on correct use of grammar. They found that participants with explicit knowledge of the rules benefited from the guiding of their attention to the target structures, however, this applied equally to those participants who were and those who were not able to verbalise the rules. Bialystok objected to the conflating of knowledge and access to that knowledge. In order to avoid that problem Bialystok's two-dimensional framework (1982, 1994) includes "analysis", which concerns the way knowledge is represented cognitively and the ways in which representations change in the course of linguistic development. The knowledge system is implicit but becomes more explicit and more organised formally. "Control" concerns the use of linguistic knowledge and determines access to linguistic knowledge. In later models this dimension was broadened to include, besides automaticity, the ability to select, coordinate, and integrate relevant information in real time.

R. Ellis (2004) proposes several characteristics of explicit knowledge, including that it is conscious (as opposed to intuitive knowledge) and comprises declarative knowledge (i.e. facts about the L2) that is often imprecise and inaccurate. He suggests that this knowledge can become more extensive as well as more sophisticated, and can be accessed through controlled (rather than automatic) processing. Learners attempt to access declarative information when faced with a difficult language task and can potentially verbalise this explicit knowledge. Finally, explicit knowledge can intentionally be learned. As a definition Ellis proposes:

Explicit knowledge is the declarative and often anomalous knowledge of the phonological, lexical, grammatical, pragmatic, and sociocritical features of an L2 together with the metalanguage for labeling this knowledge. It is held consciously and is learnable and verbalizable. It is typically accessed through controlled processing when L2 learners experience some kind of linguistic difficulty in the use of the L2. Learners vary in the breadth and depth of their L2 explicit knowledge. (pp. 244-245)

R. Ellis (2005) has operationalised the constructs of implicit and explicit knowledge, as shown in Table one (see the following page). In the left-hand column, he puts forward criteria which distinguish implicit and explicit knowledge, such as degree of awareness. Next, Ellis suggests what elements a task would need in order to measure either implicit or explicit knowledge. Thus, for degree of awareness, a task measuring implicit knowledge would require learners to respond intuitively or by 'feel', while a task measuring explicit knowledge would need to encourage learners to consciously draw on their knowledge of rules.

Table 1: Operationalising L2 implicit and explicit knowledge

Criterion	Implicit Knowledge	Explicit (analysed) Knowledge
Degree of awareness	The task requires the learner to respond according to 'feel'	The task encourages the learner to respond using 'rules'.
Time available	The task is time-pressured	The task is performed without any time pressure
Focus of attention	The task calls for a primary focus on meaning	The task calls for a primary focus on form
Systematicity	The task results in consistent responses.	The task results in variable responses.
Certainty	The task results in responses that the learner is certain are correct/ incorrect.	The task results in responses the correctness/ incorrectness of which the learner is uncertain about.
Utility of Knowledge of metalanguage	The task does not require the learner to use metalinguistic knowledge.	The task invites the learner to use metalinguistic knowledge.
Learnability	The task favours learners who began learning as children.	The task favours learners who have received form-focussed instruction.

Up to this point implicit and explicit *knowledge* have been discussed. Closely related is the topic of implicit and explicit learning. DeKeyser, in a review chapter (2003), quotes Reber as one of the pioneers of (not second language-specific) research in this area, who defines implicit learning as 'a primitive process of apprehending structure by attending to frequency cues' as opposed to a 'more explicit process whereby various mnemonics, heuristics, and strategies are engaged to induce a representational system' (1976, p. 93). DeKeyser points out that implicit learning should not be equated with automaticity as it is the result of the learning process (not the process itself). Secondly, it should also not be equated with incidental (i.e. non-intentional) learning, as even participants in implicit learning experiments often set out to learn *something*, although this may be something different from what the researcher is interested in. Thirdly, it also needs to be distinguished from inductive learning, which could be either implicit (such as when children acquire their L1), or explicit (when a learner is instructed to 'find the rule'), like deductive learning can be explicit (traditional rule teaching), or implicit (parameter setting). Finally, also implicit learning and implicit memory are distinct. Implicitly learned knowledge can become explicit and vice versa. DeKeyser proposes as a working definition for implicit learning 'learning without awareness of what is being learned'. (p. 314).

Berry (1993) warns that it is important not to entirely dissociate explicit learning (which she calls learning with awareness) from implicit learning (learning without awareness):

[We] believe that it is more useful to think in terms of there being a continuum of modes. It also seems unlikely that each mode operates in isolation. Rather, performance in complex learning situations is likely to involve a subtle combination of implicit and explicit processes. Similarly, knowledge gained is likely to involve both implicit and explicit aspects, rather than relying solely on one or the other. (pp. 249-250)

Berry concludes by saying: ‘taken together, the [...] studies suggest that dissociations might not be as complete as was at first thought. It seems that people clearly develop some explicit knowledge as a result of experience’ (pp. 250-251).

Implicit learning, at least in the view of Reber and others, is largely affected by frequency. N. Ellis (2002a, 2002b) discusses frequency effects in second language acquisition. He points out that humans are very good at guessing and noticing different aspects of frequency in language, and that much of language is difficult or impossible to convey in rules. Frequency also determines what we notice in subsequent input as what we have seen or heard before (and thus already has connections to other knowledge in our brain) will be more easily perceived. That does not mean that new knowledge does not have to be consciously noticed to be learned: ‘associations that are more complex than adjacency or immediate succession in artificial grammar learning experiments do require more conscious explicit learning and hypothesis testing to acquire’ (p. 306; cf. Curran & Keele, 1993; A. Cohen, Ivry, & Keele, 1990). This may account for a lack of learning of new aspects of the language but does not explain why many learners fail to

achieve competence in a second language despite massive and prolonged exposure. Ellis suggests that 1) lack of salience of some forms, 2) decreased neuronal learning with age, 3) entrenchment of neuronal commitment (which involves certain neuronal paths becoming unable to ‘change course’; it causes fossilisation), 4) transfer from L1, and 5) developmental readiness, could play major roles.

Many studies have investigated the relative effects of implicit and explicit learning. N. Ellis (1993) investigated their effects on acquisition of ‘soft-mutations’ (word-initial consonant shifts) of Welsh as a second language. Participants were assigned to receive 1) exposure only, 2) rule presentation, followed by exposure, or 3) rule presentation with examples, followed by exposure. Rule presentation comprised of a list of consonants and information about whether they mutate or not, but did not include a formal grammatical explanation of the underlying rules. The exposure-only group quickly learned the items they were exposed to, but showed little or no transfer. Participants who were shown the rules slowly learned the rules but were not able to apply them systematically in practice. Participants in the rule presentation plus examples group learned slowest but showed evidence of abstraction of the rules and transfer.

Alanen (1995) also investigated the effects of rule presentation but compared this with the effects of input enhancement on acquisition of locative suffixes and consonant alternation in Finnish as a second language. There were four experimental groups: 1) exposure only (acting as a control group), 2) input enhancement (with target words in italics), 3) rule presentation (which involved a full-page explanation of the target

structures), and 4) rule presentation plus input enhancement. Participants were told that they would be asked questions about the content but were also unexpectedly given a word translation and a sentence translation task. The effects for the four groups on acquisition were as in the order above. Rule presentation in particular had a clear beneficial effect. Think-aloud protocols showed input enhancement to stimulate recall and use of the targets. A clear finding was that the locus of attention during task performance influenced learning outcomes to a large extent.

Robinson (1996) set out to investigate claims made by Reber in the field of cognitive psychology and Krashen in second language acquisition (see above) that implicit learning is superior to explicit learning of complex input, and that explicit learning of simple and complex input is possible if rules are made salient. In an experimental study, participants were pretested for knowledge of an easy and a hard grammatical structure (adverb-induced subject-verb inversion and pseudoclefts) through a grammaticality judgement test. Participants were then randomly assigned to one of four training conditions in which they were shown grammatical sentences (i.e. positive evidence only) with either of two targetted structures:

- 1) In the implicit condition participants were encouraged to remember instances of the input. They were told they were going to do an exercise in reading and would have to remember the position of words in the sentences;
- 2) In the incidental condition participants were encouraged to process input for meaning. They were given yes/no questions about the content of the input and received feedback on their answers.

3) In the rule search condition participants were encouraged to identify the rules shown by the sentences and were asked at various points whether they thought they had already found the rule.

4) In the instructed condition participants read through and practised a set of rules and had written versions of them available during the training sessions. After being shown the sentences they were asked yes/no metalinguistic questions about the rules.

In the transfer phase subjects were asked to respond as quickly as possible on a grammaticality judgement test. Finally there was a debriefing questionnaire designed to gauge participants' awareness of the rules. Robinson found no difference in accuracy or reaction time between the implicit and the incidental conditions. He also found that the instructed condition outperformed all others in accuracy (on both simple and complex rules), and there was a trend showing improved speed for the rule-search condition. Another point that is clear from the results is that the rule search condition is considerably poorer than the implicit and incidental conditions in terms of accuracy on the hard rule. Robinson points out that the distinction between the rule-search and instructed conditions is essentially one between inductive and deductive instruction. Clearly, the deductive condition was considerably more favourable to learning than the inductive condition. Little evidence was found in any of the conditions for verbalisation of the rules. Participants in the rule-search condition did not verbalise more rules than those in the implicit or incidental conditions. Participants in the instructed condition verbalised more rules. In conclusion, Robinson did not find evidence to support claims made by Reber and Krashen, for second language acquisition. However, he points out

that in contrast to the vast amount of data needed for implicit learning to take place (cf. N. Ellis, 1993), the amount of exposure in the study was small. In addition, it is not clear from the study if participants in the instructed condition received more exposure to the target structures through the practice sentences.

DeGraaff (1997) used a modified version of the artificial language Esperanto to investigate the effects of explicit instruction on learning of simple (plural noun ending and negation position) and complex (imperative mode and object position), morphological and syntactical grammatical features. Participants used the computer to complete a self-study package over a period of five weeks. This consisted of the provision of several dialogues with meaning comprehension activities, a translation of the dialogues into Dutch, vocabulary activities, form-meaning connection activities, production activities (fill-in-the-gap), and sentence-level production activities. All participants received immediate feedback on their responses and were shown the correct answer. All incorrect items were repeated at the end of each section. Participants in the explicit condition received an explanation of the target structures, highlighting of the target structures, and explanatory feedback on incorrect responses (as opposed to 'right/wrong' feedback for the implicit condition). Participants in the implicit condition, in addition, received extra practice sentences to balance the amount of exposure to the target feature between the two groups. An aptitude test was administered in week one, and proficiency tests half-way through, on completion, and five weeks after completion of the whole programme. These consisted of a timed grammaticality judgement test, a gap-filling task, a vocabulary translation task, and a sentence judgement and correction

task. Explicit instruction was found to be beneficial for the acquisition of the target structures. Language aptitude equally affected performance on the implicit and the explicit conditions. Explicit instruction was found to favour acquisition of the complex syntactical rule over the simple rule, but this was not the case for the morphological structure, where no difference was found.

Rosa & O'Neill's study (1999) investigated intake of Spanish contrary-to-fact conditionals (although it will be questioned in the following chapter to what extent the study looked at intake, as opposed to acquisition). A few days prior to the treatment participants received classroom instruction in this grammatical structure. Participants in the explicit condition in addition received written instruction in a different use of the structure, on the day of the treatment. The treatment itself consisted of a multiple-choice jigsaw puzzle with think-aloud. Participants in the rule-search condition were asked to think of a rule to explain the different verb tenses of the missing pieces. Participants who did not receive the rule-search instruction were asked to memorise information contained in the puzzle. A control group did not receive any additional instructions. The think-aloud protocols were analysed for evidence of awareness of the target structure. Awareness was operationalised as a verbal reference to the target feature during task execution. This was labelled "noticing" if no reference was made to the underlying rules, and "understanding" if there was. Rosa & O'Neill found that participants who had received the explicit instruction outperformed those who had not. There was no difference between the explicit and the rule-search conditions. There was a significant interaction between level of awareness and performance with more aware participants, both those showing greater

“noticing” and those showing greater “understanding”, performing better on a multiple-choice recognition task. There was also a positive relationship between the explicit instruction and the level of awareness. These results lend support to claims made by Schmidt for the role of awareness in second language learning. However, it is worth bearing in mind that the jigsaw puzzle in itself was most likely awareness-raising (as there was only one correct answer) and that all participants received instruction on one version of the target structure. The pretest consisted of 12 sentences and 10 distractors which is a rather high ratio of target sentences and may have further increased awareness, as may have the instructions to all participants to ‘form a correct sentence’. Although this did not affect performance of participants receiving neither rule explanation nor the instruction for rule-search it may have affected performance of participants in the rule-search group and produced results contrary to Robinson (1996) who found poor performance for his rule-search condition compared with the instructed, and in some cases even implicit and incidental conditions (see above). It is unclear from the description if participants in the instructed group received more input (as part of their instructions) than participants in the other groups.

A similar study was conducted by Radwan (2005) who investigated the effects of 1) input enhancement, 2) rule provision, and 3) a focus on meaning only, on a) learning, and b) awareness of English dative alternation. He also investigated if c) differences in awareness affected learning. Forty-two lower-intermediate participants were pretested for prior knowledge of the target structure, and one day later given a short story to read which contained a high number of datives. Reading of the short story was followed by

comprehension questions. The next day, a similar treatment was administered but in addition participants were given a narration task which involved describing a set of pictures. Participants were asked to think aloud while completing the task in order for the researcher to gauge their awareness. The treatments were followed by a posttest (one day later) and a delayed posttest (one month later). A control group only completed the tests, but did not receive any treatments. Radwan found a significant advantage for the rule-group over the other groups on acquisition, which failed to make significant progress. This advantage was maintained on the delayed posttest. He also found that participants showing a greater degree of awareness during the narration task did better on the tests. However, awareness at the level of noticing was not as good a predictor of learning as awareness at the level of understanding.

2.3.5 Inductive and deductive learning

As mentioned earlier in this chapter deductive learning proceeds from the general to the specific, and inductive learning from the specific to the general. In second language classroom instruction the former is generally taken to mean instruction of rules and the latter the instruction to learners to search for a rule. DeKeyser defines the two as follows: 'inductive learning means that examples are encountered before rules are inferred. Deductive learning means that rules are presented before examples are encountered' (1995, p. 380). Decoo (1996, p. 95) points out that in second language instruction the distinction is not a dichotomy and suggests five modalities:

- A – Actual deduction (the grammar rule is explicitly stated at the beginning).
- B – Conscious induction as guided discovery (the teacher asks key questions to encourage discovery of the underlying rules).
- C – Induction leading to an explicit ‘summary of behaviour’ (learners practise a structure and try to find a rule. The teacher provides an explicit summary of the rule at the end).
- D – Subconscious induction on structured material (no explicit rule presentation takes place. Input materials are structured (through sequence, repetition, gradation, etcetera) to encourage distilling by the learners of the rules).
- E – Subconscious induction on unstructured material (only (intense) language input is provided).

DeKeyser (1995) warns that inductive learning should not be confused with implicit learning (learning without awareness of what is being learned) and gives the example of rule-search as a form of inductive and explicit learning.

Robinson (1996) compared the effects of an instructed condition, where participants read through the rules that were the focus of the study before the practice session (i.e. an explicit deductive condition) with a rule-search condition. The latter was explained as an exercise in identifying the rules illustrated by sentences (i.e. an implicit inductive condition). Robinson found that the instructed group outperformed the rule-search group both in speed and in accuracy.

Erlam (2003) investigated the relative effects of deductive and inductive instruction on comprehension and production of direct object pronouns in French. She found that participants in the deductive group significantly outperformed participants in the control group. This was not the case for participants in the inductive group. Overall effects were greater for the deductive group on both comprehension and production measures. The author points out, however, that the results need to be approached with caution due to difficulties in tapping implicit knowledge, which she expected the inductive instruction to mainly have affected. The most reliable measure of acquisition (a listening test) showed the least of the gains for the deductive group. She found some evidence that inductive instruction benefitted the acquisition of morphological rather than syntactical aspects of the language.

2.4 Summary

My own research is cognitive in nature and specifically investigates (how different tasks and instructional types affect the mediation process between input and learning. From the discussion above some key points emerge in relation to 1) the registration, encoding and storage of stimuli, 2) how this relates to eventual learning, and 3) the relative effects of different instructional approaches to (second language) learning. I will briefly review these points here in light of my own research interests.

This chapter has shown considerable differences in how various cognitive theories view registration and further processing of stimuli. Connectionist theories, for example, see a direct relationship between registration and storage; each encounter with a stimulus

inevitably affects the whole system (although connectionists are less explicit on the registration of *novel* stimuli; cf. Schmidt, 2001). Other theories posit a number of intervening variables and processes that determine if, and to what extent, stimuli impinge on the system. One of these variables is attention. The role of attention is contentious with some claiming that it is necessary for learning to take place and others pointing to research seemingly showing unattentional learning. Although no conclusive evidence has yet been found, and regardless of the theoretical merit of the discussion, unattentional learning 'appears to be of little potential benefit for language learning' (Schmidt 2001, p. 28). Schmidt (ibidem) quotes Kellogg & Dare as saying even if it is shown to exist, it 'does not imply that unattended encoding has any practical value...[since] the degree of elaboration resulting from unattended encoding appears to be too limited to have any substantive influence on human cognition or behaviour' (1989, p. 412). It would certainly be safe to say that pedagogical tasks that require more attention have more likelihood of resulting in learning than tasks that do so to a lesser extent.

Related to the discussion of attention is that of the role of noticing and awareness. Does attention involve conscious registration and is this necessary for learning to take place (Schmidt, 1994), or do the various components of attention (detection, alertness, orientation; cf. Tomlin & Villa, 1994) not involve awareness and is learning without awareness thus possible (cf. Truscott, 1998)? Again, the theoretical debate is interesting but several studies have shown (e.g. Carrell, 1989, 1992; Radwan, 2005; Rosa & O'Neill, 1999) that increased levels of awareness positively affect learning and this appears the conclusion most practically relevant to second language research seeking to investigate

the effects of various instructional types; those that require or result in greater awareness can be expected to be more likely to be successful (cf. Schmidt, 2001).

Where attention to and awareness of stimuli have a positive effect, additional encoding and other memory processes (for a discussion of the effects on retrieval see Roediger, 2000) largely determine the extent to which the stimuli are incorporated into the system. In the general learning domain levels of processing theory (Craik & Lockhart, 1972) claims retention is dependent on the depth to which information is processed, with deeper processing resulting in greater retention. Levels of processing theory has been extensively criticised, notably for failing to specify how to determine and measure the required depth of processing and for not explaining, but merely describing the process of learning. Even so, its general thrust that greater cognitive commitment, (or more “elaborate processing” as it was later called) is a characteristic of successful learning, seems to hold. Research on second language acquisition has for example found beneficial effects for verbal rehearsal (N. Ellis & Sinclair, 1996), for task repetition (Bygate, 1996; Leow, 1998a), for active participation in classroom interaction as opposed to observation only (Mackey, 1999) and has found differential effects for various types of memory processes, where the lower level processes such as those resulting in storage in verbatim memory were found to be less successful than those making connections with long-term memory (Williams, 1999). In sum, cognitive commitment appears to be closely related to ultimate attainment. In the words of Robinson (2001): ‘the greater the *cognitive demands* of a task, the more they engage *cognitive resources* (attention and memory), and so are likely to focus

attention on input and output, which will have *performance effects*.’ (p. 305; emphasis in original).

A review of several studies on second language instruction (e.g. DeKeyser, 1995; Erlam, 2004; Robinson, 1996) has shown that 1) implicit, and 2) inductive instruction can lead to learning, but that 3) explicit and 4) deductive instruction are generally more successful. Norris & Ortega (2000) conducted a meta-study of 49 studies into the effectiveness of second language instruction and found that 1) instruction is beneficial and durable compared with exposure to input, or meaning-focused communication only, 2) explicit types of instruction outperform implicit types, and 3) there are differences in performance between different types of explicit instruction (with instructional approaches like consciousness-raising and input-processing performing better than for example rule-oriented focus on form). The authors suggested that further research be undertaken comparing the effects on learning of these different sub-categories. Although these results pertain to the effects of instruction in general, and not specifically to the effects of tasks, the results imply that more explicit tasks will do better than more implicit ones.

In summary then, tasks that make great attentional demands, require processing that is cognitively demanding, and that are explicit in nature, are the most likely to affect learning. Next we will turn to a discussion of the roles of input, output and interaction on intake and learning.

CHAPTER THREE

INPUT, OUTPUT, INTERACTION, AND INTAKE

IN SECOND LANGUAGE ACQUISITION

3.1 Introduction

The first part of this chapter looks at input, output, and interaction as sources of language data for second language learners to draw on. The second part looks at how learners extract linguistic information from this data and considers a crucial stage in the input-to-acquisition process, namely intake.

3.2 Input, output and interaction

3.2.1 The study of input

The role of language input is acknowledged by researchers with different perspectives on second language acquisition. All agree that some form of input is needed for language learning to occur³ (cf. Gass, 1997). How input is related to learning is an area of contention: ‘it is uncontroversial that a learner needs input in order to acquire a language [...]. Unfortunately the consensus stops about there. How much input is necessary? What kind of input? Under what conditions need it be provided?’ (Gregg, 2001, p.167).

³ Although proponents of an innatist view of language learning (see below) point out that input can affect areas of a second language not contained in the input itself.

What is input? Sharwood Smith defines input as ‘the potentially processable language data which are made available by chance or by design, to the language learner’ (1993, p. 167) and thus emphasises the point that input need not be *used* (processed), but potentially can be. Also, the *intent* with which the language data are presented or sought out, does not determine what is and what is not input. Carroll (2001) makes a distinction between stimuli as ‘all [...] observable instantiations of the second language’⁴ (p. 8) and input, which she reserves for stimuli that have entered the brain. To her, input is not physical information (sounds, visual data), but a mental representation, available for internal processors to use.

Not all definitions of input are quite as neutral as the above. Gregg’s definition (2001) of input is ‘information that is fed into an input-output device; the output is grammar’, (p. 167). Gregg takes a mentalist view of language learning that sees language as innate and its development as set or ‘triggered’ by the language data available to the learner. Input here is seen as ‘evidence’. Several researchers see the role of input as the main source of information from which language develops. Krashen (1982, 1985; see the previous chapter) makes a distinction between input in a general sense and *comprehensible input*, i.e. language data that are understandable to a learner. Comprehensible input in Krashen’s view is sufficient for acquisition to take place. When talking about input, authors such as Krashen (but see also Faerch, Haastrup, & Phillipson, 1984; VanPatten 1996) thus often take it to mean a specific kind of (qualitatively different) language data.

⁴ This appears to differ somewhat from the commonly held view in cognitive psychology that ‘stimuli’ are ‘anything in the environment we respond to’.

Beebe (1985) argues that what constitutes input is determined to a large extent by the learner:

Studies of input in second language acquisition must view non-native speakers not simply as passive recipients of comprehensible or incomprehensible input from native speakers, but as active participants in choosing the target language models they prefer and thus acquiring 'the right stuff' according to their values. In other words, learners have 'input preferences' (or 'model preferences') in the sense that they consciously or unconsciously choose to attend to some target language models rather than others. (p. 404)

Another way of saying this is that input is what learners *pay attention to* in the language. This appears similar to what Sato & Jacobs (1992) write: 'in the present perspective, input is viewed as the object of the learner's attention' (p. 269). This is clearly different from Sharwood Smith's 'language data that are potentially available for processing' in that it combines information with the process of selecting it.

The different approaches to (research into) input were described by Schachter (1986) who identified 1) a data-oriented approach which observes, records, and transcribes actual learner - native speaker interaction, 2) a language-model approach which attempts to describe language itself (attempting to answer questions such as 'what does knowledge of a language consist of?'), and 3) a processing-model approach which focuses primarily on the processing learners engage in when interacting with the second language. Although

these three approaches are all valid ways of investigating second language acquisition, most researchers would probably agree with the basic meaning of the word input as 'linguistic data'. This is also the working definition I adopt in this study.

3.2.2 Positive and negative evidence

Research has shown that the input learners receive does not provide all the information they need to learn a language. This has been referred to as the 'logical problem' of language acquisition (Bley-Vroman 1989). Chomsky (1959, 1965), most prominently, suggested that humans make use of internal building blocks ('universal grammar'), and that the input they receive serves as evidence of what is and what is not possible in the language that is learned. Language is thus to a large extent innate and the input triggers its development. In second language acquisition research the most vocal subscriber to this view is Krashen who has argued for the importance of comprehensible input as a necessary and sufficient condition for acquisition to take place (1982, 1985). Language develops on the basis of positive evidence, i.e. examples of actual language use.

Others, however, have argued that such comprehensible input alone is not sufficient for learning to take place; it can be used for comprehension only (e.g. Faerch & Kasper, 1980) without affecting change in the learner's interlanguage. 'Paradoxically, comprehensible input may actually inhibit learning on occasion, because it is often possible to understand a message without understanding all the structures and lexical items in the language encoding it, and without being aware of not understanding them at all' (Long, 1986, p. 425). Chomskyan researchers have proposed that in addition to

universal rules, learners are also endowed with a set of language constraints, limiting the number of grammatical possibilities. However, if participants make use only of the input they receive and the positive evidence contained in it, then how is it possible that they make mistakes they themselves have never encountered before?

L. White found (1989b) that learners' language behaviour supports the transfer hypothesis. This states that second language learners primarily make decisions of acceptability on the basis of their first language. When the first language (e.g. English) is more restrictive (for example in requiring adverb adjacency) than the second (e.g. French), learners will limit themselves to the more restrictive use found in their first language. To avoid this type of transfer White has argued that negative evidence is needed (e.g. L. White, 1987, 1989a, 1991; see also Bley-Vroman, 1986). Negative evidence is defined as 'the type of information that is provided to learners concerning the incorrectness of an utterance' (Gass, 2003, p. 225) and may help by drawing learners' attention to language form. Trahey writes: 'exposure to positive evidence can lead to changes in linguistic competence when the structure to be acquired is readily available in the input. However when the problem is one of 'unacquiring', as in the case of SVAO, positive evidence appears not to be sufficient' (1996, p.134).

The role of negative evidence, however, is disputed. Some have claimed that it is not clear that it occurs at all outside instruction (Pinker, 1989). However, several studies have shown it to exist in both first (Farrar, 1992), and second language acquisition (Oliver, 1995). Mackey, Oliver & Leeman (2003) investigated 48 native speaker/non-native

speaker and non-native speaker/non-native speaker dyads consisting of both adults and children while completing an information gap task. Although they found differences between the various groups (with native speakers notably providing more feedback than non-native speakers), in all cases at least 30% of errors resulted in feedback and between 25% and 41% of these resulted in modified output.

It has, however, been argued that even if negative evidence occurs, it is not relevant to learning. Schwartz (1993) writes:

If there were a *translation algorithm* that could take the knowledge that results from being told “This is not a grammatical sentence in this language” and convert it into information that is in a form the processes in the language module could make use of, then ND [negative data] could be usable. It appears, however, that there exists no such mechanism’ (p. 158).

Schwartz does not argue that negative evidence cannot result in learning, but says that it does not result in the type of knowledge underlying second language proficiency.

However, evidence exists that learners can in fact make use of negative data. An often cited study in this respect is one by Bohannon & Stanowicz (1988) which showed that children do benefit from negative evidence in learning their first language⁵. Also for second language learning there appears to be evidence showing a facilitative effect on learning (see below), but it has been pointed out that in interpreting the results of such

⁵ Although their study has been criticised for only investigating one particular socio-economic stratum of society, thus questioning its generalisability to other groups of learners.

studies one has to be careful to distinguish between immediate effects (uptake) and delayed effects (learning) (cf. Birdsong, 1989).

Negative evidence can be provided in different ways. Long (1996) distinguishes between explicit negative evidence (such as error correction), and implicit negative evidence (such as when one interlocutor shows not to have understood the other, or reformulates an utterance without it interrupting the flow of the conversation (i.e. recasts). Negative evidence can perform different functions. Firstly, it can help learners ‘notice the gap’ between the input and their own output. R. Ellis (1995) describes this as making a cognitive comparison⁶. As a result of realising this gap, participants can then attempt to reformulate their utterance or store information about that aspect of the language. It may also result in quite sudden shifts in the learner’s interlanguage, for example when it leads to a realisation that certain forms cannot be used in the target language at all. Secondly, negative evidence can also increase learners’ awareness of the target language in a broader sense. By drawing attention to what is *not* possible in the target language, negative feedback necessarily contrasts different linguistic forms and encourages learners to understand the differences (Schmidt, 1990).

Research on various types of negative evidence has shown facilitative effects on learning. Carroll & Swain (1993) for example, investigated instruction of English dative alternation combined with one of four types of feedback. Learners either 1) received metalinguistic information about their responses, 2) were told when their answer was

⁶ Although this term appears broader in that it need not involve a ‘gap’ in the sense of an inability to express oneself, i.e. the comparison could be made between two sources of input. Swain (1998) refers to this as noticing a ‘hole’.

wrong, 3) received a recast with a model answer, or 4) were asked if they were sure about their answer. The results showed that all four groups improved performance, but that the metalinguistic group did best.

Z. Han (2002) investigated the effects of recasts for tense consistency provided during eight sessions over a period of two months in written and oral narration tasks. Feedback was given individually, and was consistent; all errors were recasted. Using a pretest-posttest-delayed posttest design she found recasts to lead to increased awareness (and much greater awareness than in the no-recasts group), and improved tense consistency both on the production tasks and on an immediate and delayed posttest⁷. Recasts were given in individual settings, and Han suggests that this may have contributed to the results.

A number of other studies have also found benefits for negative feedback on second language learning (e.g. Pica, 1994; Mackey & Philp, 1998), however a small number did not (e.g. Sanz & Morgan-Short, 2004). Mackey, Oliver & Leeman (2003) point out that a range of variables (types of dyads, type of interaction, age, etc) affects the provision, uptake and learning effects of negative evidence and that more research needs to be done to isolate and investigate those variables.

⁷ It has to be pointed out that the participants in the study were at an upper-intermediate level and reported high motivation for learning English.

3.2.3 Input and learnability

For some researchers the primary role of input is to trigger the development of innate knowledge of language (Krashen, 1981; Schwartz, 1993; L. White, 1989a). Pienemann (1984, 1985, 1988, 1989, 1998), sharing this viewpoint, argues that language (including a learner's second language) develops in a predictable, and pre-determined way. His language processing theory posits a number of determinants of the relative difficulty and acquisition order of various linguistic features in the input. The first of these is psychological complexity and refers to the extent to which 'the language learner must re-order and re-arrange linguistic material in the process of mapping underlying semantics onto surface forms' (1987, p. 89). The second is saliency; items that are more salient are easier and will be acquired earlier. Items are more salient if they come in sentence initial or sentence final position. The third determinant is the distance between an item that triggers a transformation and the place in the sentence where the transformation is effected. The greater the distance, the harder the item. The most important premise of processing theory, however, is that learners must go through various "levels" which they cannot skip. At the first level learners are unable to organise lexical material into word classes or categories and cannot identify where the information in the sentence is. At the second level they are partially able to do so but generally only on the basis of salient sentence items (e.g. sentence first or sentence final). At the third level learners are able to organise some of the lexical material into categories but transformation is limited to either word or constituent initial or final position. At the fourth level they are able to recognise all elements in a sentence. The fifth level, S-procedures, deals with an exchange of information between internal constituents. Pienemann sees these levels as an

‘implicational hierarchy of processing procedures’. Implicational here means that each procedure necessarily builds on the other; ‘the learner cannot acquire what he/she cannot process’ (p. 87). Again, language development is seen as predetermined.

Others see a more active role for the learner and more possible variation in the acquisition of various features in the input. Goldschneider & DeKeyser conducted a metastudy (2001) of second language research on the acquisition of morphemes. Using multiple regression analysis they identified five determinants explaining a large portion of the variation in performance found in the individual studies. These were: 1) perceptual saliency, or how easy it is to hear or perceive a given structure⁸. 2) Semantic complexity or how many meanings are expressed by a certain form. 3) Morphophonological regularity as the degree to which a grammatical feature is affected by its phonological environment. 4) syntactic category as the difference between lexical and functional and free versus bound items. 5) frequency. All of these factors will, to some extent, impact on the order in which they are acquired⁹.

N. Ellis (2002a, 2002b) specifically investigated point 5) above and argued that frequency largely determines acquisition. Second language acquisition, in his view, is to a large extent exemplar based and not based on abstract rules or structures (2002a): ‘the acquisition of grammar is the piecemeal learning of many thousands of constructions and

⁸ Saliency is a term also used by other researchers with sometimes different or additional meanings. For example Bardovi-Harlig (1987) defines it ‘in terms of availability of data’ (p. 401), (which appears to be similar to frequency) and uses it to explain findings of acquisition order (preposition stranding before preposition pied piping) which appear to go against the order predicted by universal grammar (unmarked construction such as preposition stranding are acquired first).

⁹ Goldschneider & DeKeyser point out that ‘we have argued that these five factors are not a completely heterogeneous set, but can all be seen as aspects of salience in a broad sense of the word’ (p. 37).

the frequency-biased abstractions of regularities within them' (p. 168). He sees second language learning as a form of implicit learning, dependent on input. However, he points out that this may not apply to initial registration of language forms, which may require attention and conscious noticing. What gets registered initially gets grouped later, by 'unconscious processes of association to form larger units that are henceforth used in pattern recognition' (p. 174).

Other aspects of the input have been identified as affecting noticing and learning. VanPatten (1985, 1990, 1996; VanPatten & Cadierno, 1993) argues that learners assign varying degrees of "communicative value" to different aspects of the input, defined as 'the meaning that a form contributes to overall sentence meaning' (2001, p. 759) and 'the relative contribution a form makes to the referential meaning of an utterance [...] based on the presence or absence of two features: inherent semantic value and redundancy within the sentence-utterance' (1996, p. 24). The communicative value of a form is greater if its semantic value is greater and if it is not redundant. In his 1990 study, VanPatten asked subjects to mark all the occasions they heard the Spanish article *la*, the third-person plural verb morpheme *-n*, or the word *inflación*. His results showed that attending to the verb morpheme or the definite article resulted in lower comprehension levels. He attributed that to their lower communicative value and suggested that learners first look for content words in the input. If sufficient attentional resources are available grammatical forms may then be processed. VanPatten's concept of communicative value has come under heavy criticism. DeKeyser et al. (2002) argue that both form and meaning *can* be processed simultaneously and that to expect the internal parser to scan all

content for communicative value first while saving certain parts of the input to be processed later is not congruent with current thinking and findings from research into sentence processing.

3.2.4 Output and interaction

The roles of output and interaction on acquisition have received considerable attention since the publication of Hatch's early papers (1978a, 1978b) in which she drew attention to their potential benefits to learning. For some (e.g. Krashen, 1981; see the previous chapter) the role of interaction is predominantly that it provides learners with comprehensible input (i.e. input that is attuned to their developmental level). For others, interaction and the output it generates directly contribute to learning. Long is well-known for his interaction hypothesis (1981, 1983, 1996) which emphasises the crucial role of the process of negotiation on learning. Negotiation, or the 'modification and restructuring of interaction that occurs when learners and their interlocutors anticipate, perceive, or experience difficulties in message comprehensibility' (Pica, 1994, p. 493), has a number of beneficial effects. Firstly, it aids in increasing understanding, and thus results in the learner receiving more, and more comprehensible input, necessary for learning to take place. Negotiation exchanges are said to result in 'denser' than average speech, with more repetitions, reformulations, expansions, extra stress, and a range of other features, all of which increase frequency and saliency of aspects of the input. Learners are also more likely to benefit from this enhanced input as they have at least partial control over the semantic content of the interaction and can thus free up attentional resources to pay

attention to form in the input. They are likely to be alert as they try to get their meaning across and as a problem in the communication occurs.

Secondly, interaction takes place in a context that is meaningful to the interlocutors. From this context learners derive a degree of support which helps them in their understanding as well as in getting their meaning across. They also derive support from their conversation partners who may supply words, or restate utterances, and in so doing provide scaffolding, allowing learners to express meaning they would otherwise be unable to.

Next, interaction can also lead to the occurrence of negative feedback (one form of negative evidence, see above), i.e. information about what is and is not understandable and/or correct in a speaker's output:

Negative feedback is generally facilitative of L2 acquisition, and necessary for the acquisition of specifiable L2 structures (such as the English adverb-placement example for French speakers) for which positive evidence will be insufficient. A mechanism is posited whereby, while correct-form meaning associations are strengthened both by positive evidence *and* that negative feedback that contains positive evidence, incorrect associates are weakened and in some cases ultimately relinquished altogether as a result of both negative evidence *and* prolonged absence of support in the input. (Long, 1996, p. 430).

Gass (1997; Gass & Varonis, 1994) has argued that since such negative feedback is situated in a communicative context and is thus linked to actual communicative goals, it is more likely to be usable to the learner.

However, it is not entirely clear how much negotiation of meaning takes place, with some claiming that it is substantial (Pica, 1994), and others that it is not (Skehan, 1998). It has also been pointed out that although interaction can have beneficial effects, conversational success in itself does not necessarily result in learning (Faerch & Kasper, 1980).

Swain has argued for the important role of learner production in learning. Her “output hypothesis” (1985) developed from observations of Canadian immersion students who, despite years of receiving exposure to the second language, did not fully develop in particular certain grammatical aspects of the target language. Swain found that the immersion classes were characterised by a lack of opportunities for output and afforded few opportunities for “pushed output”, i.e. output that required them to ‘stretch their interlanguage’. Many students were able to get by using communication strategies to get their meaning across and were never challenged to further develop their language. Swain suggested that by requiring learners to produce comprehensible output, they would be pushed to be more accurate and to pay attention to both form and meaning, and in so doing move from semantic to syntactic processing. In addition, Swain (1998) suggested that output would 1) induce noticing, 2) allow for hypothesis formation and testing (see also R. Ellis & He, 1999; Pica 1988), and 3) give opportunities for meta-talk. The effect of output on 1) noticing, was investigated in another article (Swain & Lapkin, 1995) in

the context of a writing task with a think-aloud protocol. The authors found that learners do become aware of problems in their writing and engage in strategic thought processes to solve those problems. Swain (1985) has suggested that output can also serve to help with developing automaticity (referred to as the fluency function of output) and this seems to have been corroborated by research showing that when producing the language, connections in the brain are strengthened, aiding the process of automatization (cf. de Bot, 1992, 1996). Izumi, in several studies, investigated the effect of output on noticing (2002, 2003; Izumi, Bigelow, Fujiwara, & Fearnow, 1999). He suggested (2002) that Swain & Lapkin's study may have found an effect for the noticing induced by the output because their measurement was immediate task performance. To investigate if there was also a delayed effect he made use of a written reconstruction task to measure noticing of English relative clauses, followed by a series of posttests. He found that in comparison with a control group who received a receptive (meaning-focused) task only, output did have an effect on both noticing and learning.

Benefits have been found for non-interactive language production. In the general learning domain, Baddely (1990) writes about the effects of producing an item: 'the act of successfully recalling an item increases the chance that that item will be remembered. This is not simply because it acts as another learning trial, since recalling the item leads to better retention than presenting it again; it appears that the retrieval route to that item is in some way strengthened by being successfully used' (p. 156).

In the second language acquisition domain N. Ellis & Sinclair (1996) found that subjects encouraged to rehearse foreign language utterances were better than both silent controls and subjects prevented from rehearsal by articulatory suppression at a) comprehension and translation, b) explicit metalinguistic knowledge of the detailed content of grammatical regularities, c) acquisition of the foreign language forms of words and phrases, d) accuracy in pronunciation, e) some aspects of productive, but not receptive, grammatical fluency and accuracy.

Although not rejecting a role for output and interaction, VanPatten (1996, 2002a; VanPatten & Cadierno, 1993) has argued that the role of input and input processing are crucial for language development. VanPatten & Cadierno (1993) compared traditional form-focused instruction (rule presentation followed by output practice) on direct object pronouns with 'Processing Instruction' which 'involves explanation and practice/experience processing input data, taking learner strategies in input processing as the starting point for determining what explicit instruction should look like' (p. 225). In the study, participants receiving processing instruction were given an explanation of the target structure as well as 'explanations of important points to keep in mind about the position of object pronouns of Spanish' (p. 231). This was followed by a reading or listening exercise in which participants had to demonstrate understanding of the structure, and an activity in which they had to respond to the content of the input. VanPatten & Cadierno found that input processing led to significant gains for both comprehension and output skills, compared with a significant improvement for output skills only for the traditional group. VanPatten argued that second language instruction should include an

increased focus on improving the way learners process the input, as opposed to focusing primarily on output practice. However, in a replication study, DeKeyser & Sokalski (1996; see also DeKeyser et al., 2002), found that the relative effectiveness of production versus comprehension practice depends on the complexity of the target structure and on the delay between practice and testing; there may be an immediate, but no lasting effect for comprehension practice. Allen (2000) investigated acquisition of French causatives and compared the effects of processing instruction and production-based instruction. She did not find an advantage for the processing instruction group compared with the production group, but both groups did improve compared with a control group. Other studies have reported similar findings (Erlam, 2003; Salaberry, 1997).

Despite VanPatten's suggestions, there appears to be evidence of a facilitative effect for output and interaction¹⁰. In sum, output and interaction can:

- provide additional input
- result in comprehensible input which impacts on learning
- enhance fluency by allowing participants to produce the target language
- facilitate form-meaning connections
- result in negotiation of meaning which in turn can raise awareness of the target language
- provide opportunities for negative feedback
- impact on learning directly as a result of verbalisation

¹⁰ VanPatten (2002) has recently clearly acknowledged a number of important roles for output, such as that it can function as a 'focusing device', drawing learners to mismatches between the input and their own output, and he has acknowledged its role in the development of fluency.

3.3 Intake

3.3.1 Definitions of intake

The term intake ‘has taken on a number of different meanings, and it is not always clear what a particular investigator means in using it’ (McLaughlin, 1987, p.13). That was true nearly two decades ago, and it still is true today. The purpose of this section, then, is to review these different meanings and identify the commonalities and differences between them. The issue of operationalisation of intake is taken up in chapter six.

Definitions of intake come into three broad categories: those that see intake as a product, those that see it as a process, and those that see it as a combination of the two. Coming into the first of these categories is Corder (1967) who provides the earliest recorded definition of the term as: ‘a mental representation of a physical stimulus’ (p. 165). For Corder, intake is thus something that has been detected but has not yet been integrated into the learner’s developing second language system as it is still linked to the physical stimulus. Others also see intake as a product, but give it quite a different meaning.

Krashen, for example, on the basis of an investigation of caretaker speech (1978) concludes: ‘“intake” is, simply, where language acquisition comes from, that subset of linguistic input that helps the acquirer learn the language’ (1981, p. 101) and: ‘intake is first of all input that is *understood*’ (p. 102; emphasis in original). Interestingly, Krashen talks of input in first language acquisition containing ‘a high proportion of *intake*’ (p. 102, 1981; emphasis in original) by which he means language input of which a great deal is understood. This is interesting because it shows that for Krashen the occurrence of

intake is something that is not so much dependent on the learner as on the quality of the input. It appears that in Krashen's view one cannot help but understand appropriately used input, and thus be provided with intake. It must be noted that, perhaps as a result of this interpretation, Krashen appears to use the terms input and intake somewhat arbitrarily. For example, on a different occasion, he talks about language acquisition developing better when the intake is communicative and understood. Finally, Krashen claims that intake 'builds' acquisition, but how this happens is not elaborated on.

Also Faerch & Kasper (1980) see intake as a product but make a distinction between intake for communication and intake for learning. Intake for communication is detected input that the learner has comprehended (maybe partially on the basis of non-linguistic aspects relating to the communication that takes place), whereas on the basis of intake for learning 'the learner forms her hypotheses about the L2 rules and tests them out subsequently' (p. 64). Intake for learning is clearly processed more deeply as it requires the learner to (consciously or not) make a comparison between current knowledge and new information, whereas this is not the case with intake for communication. Loschky & Bley-Vroman (1993) see intake for communication as depriving the learner of the potential for feedback and thus a chance to notice a difficulty with his/her performance:

Thus, it may be possible to (1) comprehend native speaker input, or (2) make one's interlanguage output comprehensible to a native speaker without (3) focusing on or using the target form of instruction. [...] this is certainly possible through use of strategic competence. Second, as a consequence of this, negative

feedback which could potentially destabilize one's target language hypotheses may be either absent or non-salient. The learner may never 'notice a gap'. (p. 131).

Sharwood Smith (1986) does not specifically discuss intake but does make a similar distinction as do Faerch & Kasper. He talks about input having dual relevance, for immediate communicative purposes but the input may also 'contribute to the substantiation or reflection of some current hypothesis about the target language system' (p. 243). Input may not be relevant for acquisition where the learner is not developmentally ready or where the demands of the communicative exchange are heavy, even though the input can be interpreted. Sharwood Smith later defined intake as 'that part of input which has actually been processed by the learner and turned into knowledge of some kind' (1994, p. 8). He specifies this by saying 'input is, as it were, the goods that are presented to the customer, including the articles that the customer picks up to look at. Intake is what is actually bought and taken away from the shop, i.e. what passes into the ownership of the customer' (pp. 8-9). This is ambiguous. What is meant by 'ownership' here? Is it a hire-purchase which may be returned at any time, are 'the goods' consumed before the buyer even arrives home, are they shelved for future use, or are they used every day?

Carroll (2001) also sees intake as a product but makes a very clear distinction between comprehension and intake. She describes comprehended speech as a 'speech signal which has been successfully parsed and re-encoded in semantic terms' (p. 9). Carroll rejects the view that intake consists of comprehended speech as it would mean that all learning would involve concept learning. To her, comprehending speech is 'something that

happens as *a consequence* of a successful parse of the speech signal' (p. 9; emphasis in the original). She sees intake as a subset of the input; stimuli that are perceived by the learner. She defines it as 'that which is taken in by the hearer' (p. 10). In addition, perceived stimuli are characterised as "transduced stimuli", or stimuli neurally available for processors to extract further information from. Carroll emphasises that intake is not input to the learning mechanisms, but input to speech parsers. Her view of intake thus diverges from that of the other authors cited here.

Gass's (1997) model of second language acquisition consists of a number of stages starting from raw input. Several factors (including time pressure, frequency, affect, salience, associations and prior knowledge) influence whether input gets noticed, or apperceived. Apperception is conceptualised as a priming device. It prepares the learner for the possibility of subsequent analysis. Some or all of the noticed input may be comprehended, with comprehension relating to a continuum of properties of the apperceived input, from meaning-related properties to deeper, grammatical features. What gets comprehended may (depending on a range of factors) become intake, which Gass defines as the 'process of assimilating linguistic material' (p. 5). Intake can thus be conceptualised as apperceived input that has been further processed. This further processing can take the form of hypothesis testing, rule strengthening, storage for later use, or the intake may remain unused. It is interesting to note that unlike Faerch & Kasper (1980), Gass sees comprehension (comprehended input) as a prerequisite for intake to take place.

VanPatten's (1996) definition of intake is similar to Gass's: 'intake is the subset of filtered input that serves as the data for accommodation by the developing system. It is the input that has been processed in some way by the learner during the act of comprehension. Intake [...] are the data made available for further processing (e.g. internalization) once the input has been processed' (p. 10). More recently VanPatten (2002) defined intake as 'the linguistic data actually processed from the input and held in working memory for further processing' (p. 757). For VanPatten, as for Gass, intake follows or occurs simultaneously with the process of comprehension. Leow holds a similar view: 'intake, [...] is that part of the input that has been attended to by second language learners while processing the input' (1993, p. 334).

Others have approached intake as a process, rather than as a product. Chaudron's definition of intake (1985a), for example, encompasses the processes Carroll, Gass and others refer to: 'intake is processing of target language input', or 'the mediating process between the target language available to learners as input and the learners' internalized set of L2 rules and strategies for second language development' (p. 1). And: 'in speaking of intake we are, in effect, referring not to a single event or product, but to a complex phenomenon of information processing that involves several stages, roughly characterized as (1) the initial stages of perception of input, (2) the subsequent stages of recoding and encoding of the semantic (communicated) information into long term memory, and (3) the series of stages by which learners fully integrate and incorporate the linguistic information in input into their developing grammars' (p. 2). Chaudron refers to this process as a continuum from preliminary to final intake, although he concedes that

the two ends of the continuum constitute very different categories of cognitive activity (1983, pp. 438-439).

Also Boulouffe (1987) conceptualises intake as a process and calls it ‘the notoriously impenetrable interval between input and output’ (p. 245). She describes intake as ‘the locus of the learner’s active search for inner consistency’ (p. 246) by which she means a process of equilibration through accommodation or assimilation of new knowledge. She gives examples of students receiving feedback on an incorrect production of a target sentence. The number of attempts represent the intake process whereby the new knowledge (the correct sentence structure) is assimilated. She clearly sees intake as the process of learning, hypothesis testing, transfer etcetera. It is also a process that requires the learner’s active participation as it is something that is subject to control.

Similarly, Hatch (1983) writes: ‘if the learner “casts a net” into the input, the result is supposedly intake’ (p. 79) and ‘for me, all input is intake if the learner does respond in some way to it’ (p. 81).

We might say that input is what the learner hears and attempts to process. That part that learners process only partially is still input, though traces of it may remain and help in building the internal representation of the language. The part the learner actually successfully and completely processed is a subset called intake. That part, then, is the language that is *already* part of the internal representation. (p. 81).

Yet others acknowledge that intake can be seen as both a product and a process.

Kumaravadivelu (1994) provides an overview of the preceding 25 years of theorising into intake and suggests that a focus on intake as either a product or a process is flawed. He proposes a synthesis of a range of intake factors (age, affective factors, negotiation etc) and intake processes (structuring, inferencing, transfer etc) that dynamically interact and are co-requisites for intake. Intake factors determine which aspects of the input get engaged. These receive attention and as a result of this, consciously or unconsciously, a mismatch is detected between that aspect of the input and existing knowledge the learner has. As a result of this mismatch a range of intake processes execute that form the process of learning. Like Chaudron then, Kumaravadivelu includes within intake the whole process from detection to final acquisition. It is difficult to see how this proposal of intake can be distinguished from one of learning in general.

Finally, although not concerning itself so much with attempts to define intake, some recent neurobiological research has made efforts to come to a more precise understanding of what constitutes intake and where in the brain the product or process is localised. Sato & Jacobs (1992) identified the nucleus reticularis thalami (NRT) as that area of the brain that seems to facilitate processing in other areas of the brain known to be involved in (language) learning and production, including the hippocampus, the cerebellum, the basal ganglia, and the cingulate gyrus. The authors propose that the NRT functions as a “gating mechanism” that allows or inhibits information flow to these areas. As such the NRT can be said to facilitate intake from input in a literal sense. Their assertion, however, that ‘the

key assumption here is that information ascending through the NRT to the cerebral cortex constitutes intake (or at least potential intake)' (p. 287) casts some doubt on their own claims as it shows that by adding the afterthought between brackets, the authors make a distinction, perhaps implicitly, between what enters the system and aspects of that information that may be used for language learning. Although the authors admit that 'the NRT's posited role in language acquisition is at present neither directly observable nor testable' (p. 287), identifying the neurobiological correlates of the intake process is a promising approach to arriving at a more precise, and meaningful interpretation of the processes that the concept of intake is said to embrace.

Research into brain activity may help make such processes 'observable'. One relevant example is the work of Buckner (2000) who, quoting himself, writes:

Neuroimaging data suggest a pattern relating localized brain activity and memory encoding. Several neuroscientific hypotheses have proposed that certain regions within the frontal cortex participate in the short term maintenance and manipulation of information over brief periods of time, as would be required during many kinds of information processing tasks. Deep processing tasks and intentional tasks make use of such processing, while shallow processing tasks do not (Buckner & Tulving 1995).' (p. 285)

Buckner relates this to the formation of memory traces and writes: 'one speculation would be that the critical cascade that drives episodic human memory formation occurs

when frontal activity provides a source of information (input) to medial temporal lobes and functions to bind together the outcomes of information processing from frontal and other cortical regions to form lasting, recollectable memory traces' (p. 285). The same could apply to language learning where frontal processing provides input to the rest of the developing system. This is an interesting, but as of yet little explored avenue for research into the topic of intake.

3.3.2 A working definition of intake

Above a wide range of existing definitions have been discussed. Next I turn to what I believe are the key elements in these definitions and drawing on these I will propose the working definition which underlies my study.

First, I make a distinction between input and stimuli, where stimuli are seen as the language potentially available to a learner, and input as those stimuli that have entered the learner's system. Secondly, and in line with most of the authors mentioned above, I see intake as resulting from that subset of the input that is detected by the learner.

Following Tomlin & Villa (1994; see the previous chapter), I do not equate detected input with noticed input. A definition of intake or an operationalisation of it, should probably leave open the question of whether or not intake can only be derived from noticed input, until greater evidence for either position has been found (cf. Schmidt, 2001). For some (e.g. Carroll, 2001; Sato & Jacobs, 1992¹¹) this detected input equals intake. However, detected input can be used for comprehension only and this need not

¹¹ Sato & Jacobs specify this by suggesting that only detected input that enters certain areas of the brain affect language learning.

involve any attention to the formal aspects of the input, nor does there have to be any link with long-term memory. To resolve this, Faerch & Kasper (1980) proposed a distinction between intake for comprehension and intake for learning. However, this seems to create unnecessary confusion, as these two terms refer to different representations and subsequent uses of input. It may be more accurate to distinguish between detected input, the influence of which does not reach beyond the moment, and intake, the influence of which is potentially lasting.

Tomlin & Villa (1994) define detection as ‘the process by which particular exemplars are registered in memory and therefore could be made accessible to whatever the key processes are of learning, such as hypothesis formations and testing.’ (pp. 192-193).

Assuming that ‘memory’ in the above definition refers to ‘working memory’, I see intake as a subset of this detected input, which is accessible (and not merely could be made accessible) to ‘whatever the key processes are of learning, such as hypothesis forming and testing’. Which exemplars or what subset of the detected input becomes intake depends on a large range of factors, including (but perhaps not necessarily) the amount of attention given to that subset of the detected input. This in turn depends on aspects of the input, such as its saliency, on the learner and the state of her interlanguage, and on other, non-cognitive factors such (e.g. motivation).

Intake is thus detected input that goes beyond what is held in working memory for immediate recognition and comprehension. It establishes a link with long-term memory. In case of a subsequent encounter with the particular linguistic phenomenon these links

and/or connections are strengthened. This would explain frequency effects (N. Ellis, 2002a, 2002b). The degree to which this happens, again, depends on a large range of factors including the amount of attention paid to the input, the strength of existing connections, as well as learning aptitude etc. As a working definition then, I propose the following:

Intake is a subset of the detected input (comprehended or not), held in short-term memory, from which connections with long-term memory are potentially created or strengthened.

The above is quite similar to how Tomlin & Villa (1994, p .196) describe what precedes potential acquisition by a learner. They write:

1. The learner must discern the presence of some element of grammatical form.
2. The learner must discern that there is a new or unusual character to the event representation witnessed.
3. The learner must discern that there is a relationship holding between these two levels of grammatical form and mental representation.
4. The learner must send those observations off for further processing (hypothesis formation and testing).

The result of stages 1-3 is intake. However, in an attempt to accommodate connectionist views on acquisition, the working definition includes the possibility of the strengthening

of existing knowledge as opposed to the learner discerning only a ‘new or unusual character to the event representation’.

3.4 Conclusion

Although there are great differences in the various positions researchers have taken in relation to the roles of input, output, interaction, and intake in second language acquisition, there is certainly also considerable agreement. First, there appears to be a consensus that language learning cannot take place without input (although, as mentioned above, input can affect the development of aspects of the language not contained in the input itself). There appears to be a reasonable degree of consensus that certain types of input are more favourable to learning than others, and that input at the very least has to be *comprehensible*. A range of characteristics of the input determine what is acquired (within the constraints of a predetermined developmental order) and a manipulation of those can affect learning. There is evidence, at least for second language learning, that both output and interaction to some extent facilitate learning, either through the provision of more comprehensible input, or by drawing attention to certain aspects of the input, or the learner’s own output.

Of all the information available to the learner, only some sticks. This is where the road forks. Connectionists argue (see the previous chapter) that information that is not detected is discarded, but all information that is detected, affects the learner’s developing system. It is unclear what the role of intake in such a system is, if indeed there is any; it is perhaps telling that I was unable to find a clear account in the literature of how such a

process would fit into a connectionist approach (but see N. Ellis 2002a, 2002b, for a discussion of the role of noticing in essentially frequency drive implicit learning). Many second language researchers working from an information-processing perspective view this differently: information may be detected but that does not mean that it has any lasting effect. It can be used for communication purposes or be lost before it is stored. Although this group of researchers holds very different views on the exact process affecting what information is incorporated and what is not, they do appear to agree that there is a level of processing that takes place on the input, that determines whether aspects of it may potentially be learned or not. Some have labelled one or more of the various stages in this processing as 'intake' (one exception appears to be Carroll, for whom intake equals something more akin to input, as defined by most other second language researchers), others (e.g. Sharwood Smith) appear to be talking about this stage without using the same term. Leow points out that the concept is useful to have and apply: 'the distinction between input and intake has theoretical value because it proposes that there is at least one intermediate stage of input processing through which the input second language learners receive must pass before any or all of it can become part of learners' developing linguistic system' (1993, p.334). Although some refer to the actual processing as intake, others to its product, and yet others to both, investigating this processing or its product is crucial in understanding how input becomes part of a learner's system.

CHAPTER FOUR

THE ROLE OF TASKS IN SECOND LANGUAGE ACQUISITION

4.1 Introduction

This chapter looks at tasks, how they have been defined and classified, and how they have been found to affect the allocation of attention and learning. Special consideration will be given to individual, collaborative, and dictation tasks, as these match the types of tasks I used for my study.

4.2 What is a task?

Bygate, Skehan, & Swain (2001, p. 9) list a number of definitions of what constitutes a task. Several of these specifically characterise tasks as involving a focus on meaning; ‘a piece of classroom work which involves learners in comprehending, manipulating, producing, or interacting in the target language while their attention is principally focused on meaning rather than form’ (Nunan, 1989), and ‘tasks are always activities where the target language is used by the learner for a communicative purpose (goal) in order to achieve an outcome (Willis, 1996; see also Skehan, 1998). Other definitions are more general and focus on the structured aspect of tasks: ‘any structured language learning endeavour which has a particular objective, appropriate content, a specified working procedure, and a range of outcomes for those who undertake the task’ (Breen, 1987; see also Carroll, 1993). It is interesting to note that Breen does not focus on tasks as taking place in a classroom; the definition leaves open the possibility that tasks can take place outside the classroom, and perhaps even without teacher guidance. Other definitions do

emphasise the classroom setting (cf. Nunan, 1989). Long's (1985) definition is even more open-ended: 'a task is a piece of work undertaken for oneself or for others, freely or for some reward' and does not even have to involve the use of language. A common feature of all is the purposefulness of the activity.

R. Ellis (2003, pp. 9-10) suggests that, despite the great variation in the existing definitions, there are a number of critical features of tasks:

- 1) A task is a 'workplan', meaning that 'it takes the form of materials for researching or teaching language. A workplan typically involves the following: (1) some input (i.e. information that learners are required to process and use); and (2) some instructions relating to what outcome the learners are supposed to achieve.' (2000, p. 195).
- 2) A task involves a primary focus on meaning.
- 3) A task involves real-world processes of language use.
- 4) A task can involve any of the four language skills.
- 5) A task engages cognitive processes.
- 6) A task has a clearly defined communicative outcome.

Ellis (*ibidem*) distinguishes between tasks, where the primary focus is on meaning, and exercises, where the primary focus is on form. Using the above criteria, he reviews a number of activities commonly used in classroom teaching, to determine to what extent they can be said to be tasks or exercises. His examples show that it is not always possible to clearly distinguish between the two as they 'manifest features of both' (p. 16), and that

some activities are more 'task-like' than others. Similarly, Nunan (1989) writes: 'it is not always possible to draw a hard and fast distinction between 'communicative' and 'non-communicative' tasks' (p. 10). Breen (1989), however, is more inclusive in his view of what constitutes a task and considers any type of language activity to be a task.

Tasks can be classified in different ways according to their form and content. R. Ellis (1991b) distinguishes between reciprocal and non-reciprocal tasks. The former require an exchange of information whereas the latter do not (i.e. they are reading or listening tasks). Ellis sees an advantage in the use of non-reciprocal tasks in research as they allow for easier investigation of task effects on learning. Tasks can also be more open or closed; closed tasks require 'that the speakers (or listeners, readers and writers, of course) attempt to reach a single correct solution [...] determined beforehand by the designer of the task and again (crucially) known to the participants to have been so determined' (Long, 1989, p. 18). Open tasks, on the other hand, do not have predetermined outcomes. The distinction between open and closed tasks is probably more of a continuum than a dichotomy. Tasks can also require participants to exchange more indeterminate or more discrete information (Loschky, 1988, reported in Losckhy & Bley-Vroman, 1993). Loschky (1998) has argued that closed tasks lead to more negotiation than open tasks because the task demands a particular solution, which in turn requires participants to work together to arrive at that solution.

Another distinguishing factor is the degree to which tasks encourage or even require the use of certain aspects of the language. Fotos & R. Ellis (1991; R. Ellis, 1991b; Fotos,

1993, 1994; Rutherford & Sharwood Smith, 1985) used ‘consciousness-raising’ as a task-based approach that is communicative in nature but that requires learners to pay conscious attention to language form. In Fotos & Ellis’ approach, learners are given information about a grammatical structure, including metalinguistic terminology and are asked together with a partner to discuss and come up with a rule; i.e. they communicate about grammar¹². Fotos & Ellis (ibidem) compared the effects of such an approach with traditional grammar-based instruction and found that performance on an immediate posttest was comparable but that on the delayed posttest the grammar lesson outperformed the task-based lesson. Of course, there may be additional benefits to the interaction generated by the task, such as enhanced fluency, and motivation, but these were not measured and compared.

Also the instructions that accompany a task can direct learners to some extent to language form. An extreme version of this is a task that *necessitates* the use of certain linguistic knowledge. Such tasks are designed to help learners notice gaps in their knowledge by requiring them to produce specific linguistic aspects and are referred to as ‘structure trapping’. Loschky & Bley-Vroman (1993) suggest that there are varying degrees in which the use of a certain structure is needed for task completion. “Task-naturalness” refers to the extent to which a grammatical structure may arise naturally during task completion. “Task-utility” refers to the situation where use of a particular structure facilitates task completion, but where it is not essential. “Task essentialness” refers to the situation where use of a particular structure is needed to complete the task. The authors point out that task essentialness is difficult to achieve. They also point out that in each of

¹² According to Robinson (2001) this does not constitute a task as it includes a focus on form.

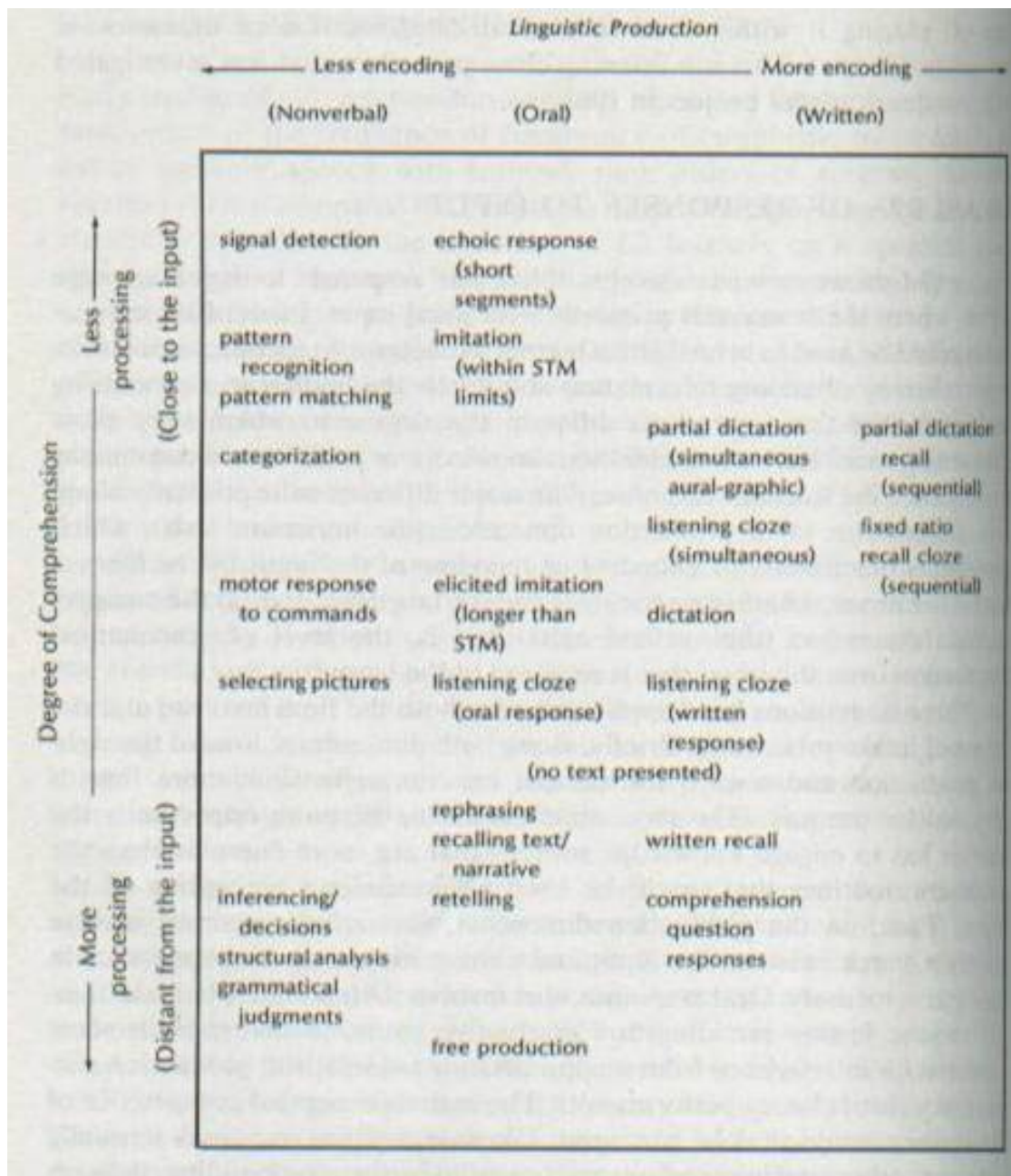
these cases clear feedback is needed for the tasks to result in the greatest amount of learning. They also note that ‘there is no guarantee that a task in which a structure naturally occurs will, by itself, trigger the initial acquisition of that structure, even if the structure is modelled, primed, or otherwise ‘taught’ in the task’ (p. 131) and that this type of task may be more useful for the automatising of existing knowledge, rather than the learning of new knowledge. Willis (1996) argues that the role of the teacher is not to push learners towards using particular structures but to help them notice what language is required to do a particular task. Communicative tasks that lead to negotiation of meaning can play such a role (Pica 1994; Varonis & Gass, 1985). Tasks where members hold different pieces of information, where there are convergent goals, or that have a single outcome, lead to more negotiation. Jigsaw tasks and information gap tasks are examples of these.

Tasks such as the above that are essentially meaning-focused but include a focus on form in some way, are referred to by R. Ellis (2001) as “focused tasks”. Other examples are tasks involving some form of input enhancement. Input enhancement refers to attempts to increase the typographical or acoustic salience of selected forms. This is distinct from input flooding (Trahey, 1996), which is the presentation of input containing large numbers of the targeted linguistic features. Input modification is the alteration of the original text or speech to improve comprehension and/or learning. This can be done while retaining the original text, for example through the provision of glosses, or vocabulary translations. It can also be done through simplification of the original text, rearrangement, etcetera. Some studies have found a positive effect for such modifications (especially

with regards to comprehension), however it appears as yet unclear what (if any) the effect of input enhancement is on language acquisition, which grammatical features may profit most from it and for learners of what level (cf. Leow, 2001b, J. White 1998).

Some researchers (e.g. Robinson 2001; Skehan & Foster, 2001) have focused on the cognitive demands of tasks. Chaudron (1985b; see Figure 1) presents an interesting model of the influence of tasks on the degree of encoding and the degree of processing they involve. However, even though he uses the word ‘tasks’ some of the activities he describes (e.g. cloze, dictation) are at best task-like. In his model, degree of encoding varies from non-verbal, to oral, to written and is termed “linguistic production”. Degree of processing in the model refers to the amount of time that is involved in an activity and the various stages of intake processing. The more time available, the more processing and production will take place.

Figure 1: Chaudron's 'dimensions of tasks responding to input'



The model is, however, somewhat problematic. Firstly, it seems to conflate various phenomena. The “degree of comprehension” dimension for example is represented as

varying in the degree of processing that takes place. Chaudron refers to this as the level of grammatical abstraction. It is, however, not necessarily the case that greater comprehension is accompanied by more processing or greater grammatical abstraction. Greater comprehension can utilise non-verbal clues. One of the examples that Chaudron mentions as requiring greater comprehension are grammatical judgments. Although in order to make a correct judgement participants have to pay attention to form and have a degree of understanding, grammaticality judgements are notorious for requiring participants to respond, even if they do not know the answer; they have by some been said to measure the success of guessing (cf. Birdsong, 1989) and are not commonly seen as a strong measure of understanding.

Secondly, Chaudron claims that activities involving more encoding or more processing require more time, but this is not always clear because 1) activities such as grammaticality judgments (one of the activities in the model at the extreme end of the processing dimension) may not necessarily require more time than activities such as rephrasing or listening clozes (represented lower on the processing dimension), and 2) more encoding does not necessarily take more time in the way suggested in the model. The “linguistic production” dimension begins with non-verbal encoding, and moves to oral, and then to written encoding. It is not evident from the examples how for example a recall cloze activity requires less encoding than free oral production. Also, an activity combining reading and writing might require less encoding than one combining reading and speaking. Although many of the “tasks” Chaudron mentions are not commonly seen

as such, his model is nevertheless helpful in trying to better understand the relative cognitive demands of various (task-like) activities.

Robinson (2001) distinguishes between task *complexity* and *difficulty*. The former are ‘design features of tasks, which are proactively manipulable by the task designer, and can be used as the basis of sequencing decisions’ (p. 295). Task difficulty ‘concerns learners’ *perceptions* of the demands of the task, and these are determined by both *affective* variables (such as motivation to complete the task) and by *ability* factors such as aptitude (p. 295; emphasis in original). Task *demands* ‘are the attentional, memory and reasoning demands of tasks that increase the mental workload the learner engages in performing the task’ (p. 302), affecting task complexity. These include +- here-and-now (with tasks not referring to the immediate context being more difficult), +- single task demand (the more tasks, the more demanding), +- planning time (the less time the more demanding), +- prior knowledge (the less learners know about a topic, the more demanding the task), and +- many elements (tasks requiring selection of certain aspects of the information available are more challenging). Skehan (1996) proposes three areas that together determine task complexity: 1) code complexity, including linguistic complexity and variety, and vocabulary, 2) cognitive complexity, including familiarity with the topic, genre, and task, and the way information is organised, the amount of processing required, and the clarity and sufficiency of the information given, and 3) communicative stress, including time pressure, the number of participants and the length of the included texts, modality, stakes, and opportunity for control.

4.3 The case for task-based instruction

Several potential uses of tasks have already been mentioned above, such as their ability to induce the use of certain linguistic forms, to encourage discussion, and negotiation of meaning. More broadly there are a number of different rationales for the study and use of tasks. For some (e.g. R. Ellis, 2003; Long, 1985), tasks are an essential means for preparing learners for real-life communication; a task-based approach is seen as a way of providing learners with opportunities to practise meaningful communication and to acquire implicit knowledge. ‘It is clear to me that if learners are to develop the competence they need to use a language easily and effectively in the kinds of situations they meet *outside* the classroom they need to experience how language is used as a tool for communicating *inside* it’ (R. Ellis, 2003, p. ix; emphasis in original).

Ellis (*ibidem*) distinguishes between *task-supported* and *task-based* language teaching. Task-based teaching goes further in that it sees tasks as providing a cornerstone for a course or curriculum; in this view the rationale for tasks is that they offer all the opportunities needed for learners to develop proficiency in the language. One example of a task-based approach is Prabhu’s (1987) “procedural syllabus”, developed as part of the Bangalore project in Southern India. In this approach, classroom activities were heavily focused on “meaningful” activities involving communication, and the development of the ability to share information and express ideas. Classroom activities were used as a preparation for learners carrying out practical real-life tasks by themselves. The focus during the activities was on meaning, and any focus on the language form was incidental. Breen & Candlin (see Breen, 1987) developed a “process syllabus” which emphasises the

active role of the learner in the learning process. Learners are encouraged to analyse their needs, develop personal plans, and to *negotiate* the curriculum. This curriculum emerges over time, rather than being predetermined. Learners take a role in evaluating both the process and the outcomes of their learning. Class time is made up of negotiated activities whereby the teacher acts as a ‘facilitator’ and suggests possible options. Approaches such as Prabhu’s and Breen’s have in common a preference for authentic communication, and a focus on meaning rather than form. Both share the use of tasks as tools to implement their pedagogic ideas.

4.4 Task effects

Tasks have frequently been used for research purposes, either directly as the object of investigation for determining the relative effects of different tasks and task variables, or as research tools to measure learning, attention, awareness, etcetera. Leow (1998a) argues that the use of tasks can be more successful for this purpose than classroom investigation, as the latter is less easily controlled; tasks are better at directing learners’ attention to certain aspects of the input and in engaging prior knowledge. In class it is much less predictable in what ways learners process the input.

My own study is cognitive in nature and investigates the relative effects of different task characteristics on intake and acquisition in an experimental setting (see chapter six). My main interest is theoretical although the results may have a number of pedagogical implications (see chapter 11). Despite the fact that a large amount of research has been done on the pedagogical application of tasks in classroom settings, I will focus in my

review on studies that take a cognitive approach to the study of tasks. Several authors have now explored the extent to which design features of tasks can manipulate learner attention and cause incidental noticing of certain formal features of task input. The rationale for developing such tasks is summarised by Eysenck (1982): 'memory performance is determined far more by the nature of the processing activities engaged in by the learner than it is by the intention to learn per se' (p. 203). Bygate (1999) points out that tasks can direct attention to different features of a language:

Different tasks seem to activate different linguistic muscles; some tasks may be more lexical, others more syntactic, some may be more verby, others perhaps more nouny; or using a different metaphor, it may be a bit like dietary balance. Feed people with narrative tasks and they will crunch up some aspects of language in one way, sharpening certain linguistic teeth, i.e. cognitively mapping certain types of language against certain types of communicative demand. Feed them different tasks, and different linguistic teeth might develop. (pp. 38-39)

He also notes that tasks can cause different types of processing. Tasks have been shown to succeed in differentially encourage attention to accuracy, fluency, or complexity (cf. Skehan, 1998).

Tarone (1985) investigated the effects of different activities (some more task-like than others) on the production of a range of English morphological and grammatical forms. Twenty participants performed a grammaticality judgement, an oral description, an oral

narration, and an oral interview task (the latter with a native speaker). Tarone found that participants' performance on the target structures varied considerably across the four activities, and that unexpectedly in some cases (notably the use of articles) performance during relatively spontaneous language production (such as in the interview) was more accurate than during the grammaticality judgement. However, this did not apply to all target structures. Tarone took this as evidence that 'second language users treated different sets of grammatical forms differently under identical style-shifting conditions' (p. 385). Tarone argues that great caution needs to be taken in interpreting results from different activities, as performance on them may not give a clear indication of the state of a learner's interlanguage.

Hulstijn & Hulstijn (1984) investigated the effects of the amount of time participants had to complete a task and focus of attention (on content or on grammar) on a story retelling task. Performance on subject-finite verb inversion and verb final position in Dutch was measured and on completion of the task participants were interviewed to assess their level of explicit linguistic knowledge. Attention to grammar positively affected accuracy scores, but, interestingly, was not dependent on participants' explicit knowledge.

Hulstijn (1989) used a number of different activities (some more task-like than others) to investigate acquisition of Dutch as a second language and acquisition of an artificial language. In both cases learning took place implicitly (without explicit grammar instruction) and incidentally (without the explicit purpose of learning the target rule). In the study participants were pretested with the help of a sentence copying task (this was

also used as a posttest) and subsequently asked to complete one of a range of tasks, differing in their instructions, aimed at inadvertently orienting attention either to the formal properties of the target sentences, to their meaning, or to both form and meaning. In what was called the Form Group, participants had to complete an anagram task. This involved presentation of sentences on a projection screen which were also given on paper. However, on paper the sentences were divided into eight parts with each part randomly ordered and printed vertically below the sentences. Participants were instructed to write a number before each part, corresponding to its position in the sentence on the screen. In the Meaning Group, subjects were also shown sentences on a projection screen but were only asked to look at and respond to the meaning of the content. This involved participants responding to the content of the sentences by writing their opinion in the form of a short statement. Sentences were visible for students for a length of time (30 seconds) similar to that which it took participants in the Form Group to complete the anagram task. However, participants only used about half the time to complete the task and may have engaged in additional (non-semantic) processing. For this reason a second Meaning Group was added for whom the sentences were only visible for 10 seconds. The final group was asked to pay attention to both form and meaning without completing a task and was called the Form and Meaning group. The tasks were followed by an unexpected cued recall tests in which participants had to remember and write down the sentences they had just seen.

Scoring in the tasks was based on the number of correct constituents produced. Performance on the cued recall test was scored for a combination of both grammar and

content. Hulstijn found that participants in the Form Group performed better on the structural aspects of the cued recall test and participants in the two Meaning groups better on aspects relating to the content. The Form and Meaning group outperformed the others on both grammar and content. Posttest scores were found to be 12% higher than pretest scores but no differences were found between the different groups. This may have been because of differences in the participants' prior L2 knowledge. For this reason an additional study was undertaken. This time a combination of Dutch and an artificial language was used, to negate the effects of prior L2 knowledge. A control group was added in which participants only did the pretest and the posttest and were asked to complete a reading comprehension test instead of one of the 'regular' activities.

Results on the cued recall test were similar to that of the first experiment. Form Group participants performed better on the structural aspects of the test, and the Meaning Group participants better on the content. The Form and Meaning Group performed less well than both. However, the control group students were still able to reproduce a substantial number of artificial elements, although they had not taken part in the learning activity. The writing down of partly artificial sentences from a screen thus appeared to be an activity allowing for successful processing of at least some artificial elements. The main findings of the study that relate to my own were thus that a) attention can be directed through tasks, b) attention to form results in (more) intake and acquisition of form, c) attention to meaning results in (more) intake and acquisition of content, d) formal aspects of the language are still learned to some extent even when participants are engaged in a meaning-focused task, or do not complete any additional tasks (as in the control Group).

Investigating collaborative learning, Swain & Lapkin (2001) assigned participants to either a dictogloss or a jigsaw task. The dictogloss task required participants to listen to a passage spoken by a native speaker twice, take notes, and then work together on its reconstruction. This task was expected to encourage more attention to form as a result of the native speaker example. The jigsaw task required participants to work together in reconstructing a story based on pictures of which each of the two participants in a pair held half. This type of task was expected to offer many opportunities for negotiation of meaning, said to be beneficial for learning (see the previous chapter). Both tasks were preceded by a short lesson on French pronominal verbs. Audiorecordings were made of the interaction between the participants, and the reconstructions and stories were investigated for the number of language-related episodes and qualitative differences. In addition, a pretest and posttest were administered to investigate learning of the pronominal verbs. The findings show that the dictogloss task resulted in participants producing fewer language-related episodes, probably due to the fact that it was less open-ended than the jigsaw task. However, it also resulted in greater accuracy and more complex language. Contrary to expectations, there was no significant difference in the degree to which the tasks led participants to focus on the formal aspects of the language, nor in the posttest scores. The authors suggest that the preceding lesson and the fact that in both tasks the end result had to be written down, focused participants' attention on language form. This appears to be corroborated by the fact that the total number of language-related episodes was substantial.

4.5 Types of tasks used in this study

4.5.1 Individual learning

Although many studies investigate different aspects of instruction and learning in individual settings, very few exist that specifically set out to investigate individual as opposed to collaborative learning. Yet, much, if not most language learning is an individual endeavour, certainly outside but also to some extent within the language classroom. Leow (1998a) makes a distinction between “learner-centered” and “teacher-centered” approaches, the first of which refers to task-based learning. Although such tasks can of course be both individual and collaborative in nature, Leow points out that the benefit of the learner-centered approach lies in its ability to encourage the learner to actively interact with the task, and to activate prior knowledge and personal schemas; in other words, tasks requiring individual learning may engage learners more which in turn may positively affect learning. Theories of self-directed learning (Brookfield, 1985; Winne & Hadwin, 1998; Zimmerman & Schunk, 2001) propose a number of benefits for individual learning; learners potentially have greater control over the learning process than in teacher-led or group contexts. They are able to select information relevant to them and apply the most appropriate type of processing. On a broader level they are able to develop individual pathways and work towards personal, rather than externally pre-determined goals. Researchers have, however, been at pains to point out that individual learning should not be equated with the *ability* to successfully self-direct one’s learning (Benson, 2000).

One type of task both used in individual as well as collaborative learning situations is the reconstruction task. Thornbury (1997) points out that one of its roles is that, in requiring learners to produce the language, it may lead to noticing of form, and perhaps mismatches between the target model and the learner's output in that a learner may realise that they cannot express something they heard or read before. Thornbury sees the greatest contribution when learners are allowed to compare their reconstruction with the model text.

4.5.2 Cooperative and collaborative learning

A distinction is made in the literature between cooperative and collaborative learning. Whereas the former focuses more on specific techniques for teaching and learning which attempt to give the learner more control over the learning process, the latter is a more philosophically-grounded approach focusing on the social and contextual aspects of learning. Although in practice, it may be difficult to tell the two apart.

Oxford (1997) describes cooperative learning as 'a particular set of classroom techniques that foster learner interdependence as a route to cognitive and social development' (p. 443). In cooperative learning, learners are encouraged to participate actively in the learning process. In small groups learners interact with each other so as to achieve a common goal. In this approach the learners play a major role in their own learning and the teacher's role is to facilitate the learning process. The work of Hewitt & Scardamalia (1998) underlies much of the work in cooperative learning. In their theory of distributed cognition they postulate that knowledge resides not in an individual's head, but develops

as a result of an interplay between an individual and their local circumstances. These include situations and cultural artifacts, but also other people. Knowledge cannot, according to their theory, be studied without taking into account its settings. On a more practical level it is argued that with the advent of technological forms of information storage and distribution, knowledge is dispersed throughout a large number of media in a number of places, and tends to be increasingly specific and short-lived. No one individual can retain all this changing and highly specific knowledge; cooperation is essential. This is especially true for more specialised content such as that taught at universities. Its use and application in students' professional lives, depends on being able to successfully cooperate with peers.

Cooperative learning requires learners to make explicit their reasoning, and to develop and revise personal knowledge on the basis of new knowledge provided by other members of the group. This is a very active process that leads to a critical examining of one's own and others' schemas and representations, the identification of problems and the thinking up of possible ways of solving problems. The different steps of this process often need to be verbalised which forces participants to structure their thinking. In addition, cooperative learning requires and stimulates the development of sociocognitive skills that are useful outside the immediate learning context. These ideas have also been applied to second language learning and teaching. They have especially been related to the role of interaction and negotiation of meaning (see the previous chapter).

The same applies to collaborative learning, said by Oxford (1997) to have ‘a social constructivist’ philosophical base, which views learning as a construction of knowledge within a social context and which therefore encourages acculturation of individuals into a learning community’ (p. 443). Vygotsky’s (1978) work is particularly relevant in this respect. In Vygotsky’s view learning is situated in and derives from the social and interpersonal context in which it takes place. Learning is facilitated by interaction and construction of knowledge between learners, guided (as opposed to taught) by the teacher (or “facilitator”) and building on support from all resources available, including human resources. This support provides a type of “scaffolding” which helps learners to build up their knowledge and apply it up to a level they would not individually be able to reach. The role of scaffolding needs to be reduced over time to allow learners to apply their knowledge on their own. Successful scaffolding, and learning in general, takes place at a developmental level close to the learner’s current level but challenging enough to encourage advancement (Vygotsky calls this the “zone of proximal development”).

Oxford (*ibidem*) discusses interaction separately from cooperative and collaborative learning, although she acknowledges that interaction underlies both. Interaction simply ‘involves interpersonal communication’ (p. 448). Tasks such as role-play, games, simulations, can all encourage interaction. Scarcella & Crookall (1990) argue that such tasks positively impact on learning through the authentic language they generate, and their motivational effects, and Bygate (1999) points out that tasks can, but certainly do not always succeed in and may even hinder, fluency and creative use of language resources, and the identification of language problems.

4.5.3 Dictation

Stansfield (1985) gives a historical overview of the use of dictation for language teaching and testing. Over time arguments both in favour of and against dictation have been given. At the end of the 19th century, developments in language teaching away from traditional grammar-translation methods to a “natural method” emphasising communication over form-focused instruction, rejected dictation. Stansfield (*ibidem*) quotes Gouin: ‘no more dictation lessons. This deplorable exercise is severely interdicted [...] It would be better simply to copy; the pupil at least would not make mistakes, and to copy he does not need a master’ (1894, p. 331). In the early years of the 20th century, however, dictation regained popularity, especially as it provided a measure to test performance on the then increasingly commonly taught phonetic features of languages. After WWII behaviourist approaches to language teaching (e.g. the audiolingual method) favoured the drill-like practice of language that was thought to more closely resemble target language use. As dictation is not a skill used outside the classroom, it was not accorded any role and there was severe criticism against it (cf. Lado, 1961). However, later studies found high correlations between performance on dictation tests and overall language proficiency. Oller (1971) pointed out that dictation is a measure of the learner’s interlanguage at work and as such is a valid measure of language proficiency. Different types of dictation exist and Sawyer & Silver (1972) note that they may serve different purposes at different times. They identify 1) phonemic item dictation, involving presentation of individual sounds, 2) phonemic text dictation, whereby learners phonetically transcribe a short text, 3) orthographic item dictation, the dictating of individual words used for testing spelling, and 4) orthographic text dictation, using short texts rather than individual words.

Morris (1983) notes that in terms of its use for teaching (as opposed to testing) purposes, dictation is somewhat frowned upon by many teachers, who may see it as going against principles of communicative teaching. She argues, however, that by requiring learners to respond quickly, practising dictation skills may help them become better at activating and storing items in their short-term memory. Dictation practice may also alert learners to context clues and key words, and focus attention on spelling. Frodesen (1991) also sees a pedagogical advantage. Dictation can be ‘an effective way to address grammatical errors in writing that may be the result of erroneous aural perception of English [...] Dictation can help students to diagnose and correct these kinds of errors as well as others’ (p. 268).

Kiany and Shiramiry (2002) investigated the effects of dictation tasks on the listening comprehension of Iranian elementary level learners of English as a foreign language. The control group engaged in listening practice and exercises from their course book (Headway) for the duration of the term. The experimental group did some of the exercises from the book and in addition did a dictation task on 11 occasions. Using a pretest-posttest design, they found that the experimental group had significantly improved their listening comprehension in comparison with the control group. The authors took this as evidence that, despite the focus of the dictation task on form, this could positively affect participants’ understanding as well.

4.6 Conclusion

Tasks have been used for a variety of pedagogic and research purposes. One specific use relevant to my own study is for drawing learners’ attention to form in meaning-based

contexts and there is some evidence that this can be helpful. However, as Robinson points out (1995) there ‘[...] has been no attempt at a systems-level characterization of why attention is allocated to input under certain task conditions and not others’ (p. 286). In other words, something is influenced, but it is not clear what. Also, the successfulness of tasks in directing learners’ attention to certain aspects of the input is of course dependent on many factors outside the direct influence of the task. Of particular importance in this context are learners’ varying ability to process input (Schmidt, 1990), their working memory capacity (Miyake & Friedman, 1998), as well as their readiness to notice and more broadly their developmental stage (Pienemann, 1985).

Despite the wide range of variables affecting the success of tasks, there is evidence that different task characteristics do result in attention being drawn to different aspects of the input. What remains unclear is how these variables differentially affect intake and acquisition, and this is one of the main foci of my study.

CHAPTER FIVE

PILOT STUDY

5.1 Introduction

The pilot study was conducted in order to establish the appropriate design, procedures and materials for the main study. It also helped in identifying the appropriate proficiency level of participants for the chosen target structure (negative adverbs), which also formed part of the main study.

5.2 Research questions

The pilot study specifically addressed the following research questions:

1) How suitable are grammaticality judgement tests and jumbled sentences tests for measuring acquisition of negative adverbs?

Grammaticality judgement tests (GJT) and jumbled sentences tests (JST) were designed to measure participants' pre-existing knowledge of negative adverbs and changes in their knowledge over time. Acquisition in the pilot study was thus measured as an improvement in participants' judgement of the target items (GJT) as well as their ability to produce the correct word order by dragging and dropping missing words in the right place in a sentence (JST), presented on a computer. Target items consisted of both previously encountered items (to allow for an investigation of item learning) as well as items not previously encountered (to investigate generalisation of the underlying rule). The pilot study aimed to identify any potential problems with using these types of tests.

2) How suitable are preference tests for measuring intake?

A preference test was designed to identify what participants had noticed from the input they had just been exposed to by asking them to select the correct sentence out of two options, immediately after completing the treatment task. Intake was operationalised as above-chance performance on the preference test.

3) What are the effects of various productive and receptive treatments on intake and acquisition of negative adverbs?

A range of both productive and receptive treatments were developed and investigated in the pilot study for their overall suitability, the proficiency level required to complete them, and their effect on participants' intake and acquisition of negative adverbs.

4. What are the effects of priming questions on the intake and acquisition of negative adverbs?

Some of the treatments mentioned under 3) included priming questions that directed participants' attention to parts of the input that contained the target structure. The pilot study investigated the effects of such questions.

5.3 Participants

Participants were students in an English language self-access centre which is part of an English language school. Most of the participants were enrolled in various language courses in the language school. Some were in general English classes, others in academic English classes.

Students from a range of different proficiency levels were invited to participate. 39 of a total of 65 participants scored below the various thresholds (see below) and were asked to complete the study. 22 of them returned for the treatment, 21 returned for the first posttest and only 13 returned to do the second posttest.

Of the 21 participants who came back for the first posttest seven were at pre-intermediate level, 12 at intermediate, and one at upper-intermediate level. One of the participants had not yet taken the placement test but reported having just achieved a 6.5 score on the General IELTS test. Eight of them were male and 13 female. 10 of the participants (self-) reported Chinese as their L1, four Korean, two Portuguese and one each for Vietnamese, Japanese, Ukrainian, Spanish, and French.

5.4 Design and procedures

All participants were given a Participant Information Sheet and were asked to sign a Consent Form, in accordance with the University of Auckland Human Participants Ethics Committee's requirements (see appendix A).

The tests and treatments were administered on the computer and participants could be asked to participate individually, at any time. All tests and treatments included instructions, examples and practice sentences. Participants were instructed to ask for help if they had any difficulty when completing the practice items. Scoring as well as storing of the results took place electronically. The files with the results were collected and analysed off-site by the researcher.

All participants completed a pretest consisting of a Grammaticality Judgement Test (see the following chapter for more information about grammaticality judgements) and a Jumbled Sentences Test (see below) to determine their existing knowledge of the target structure. The same tests were used as posttests and finally, as delayed posttests, but items were presented in a different order and a number of the items were replaced by exemplars not encountered on the pretest or during the treatments. Participants who scored below the threshold of 66% on the grammaticality judgement test and below 50% on the jumbled sentences test were invited to participate in the rest of the study. These percentages were chosen as a conservative indication of participants' pre-existing knowledge of the target structures. As scores of 50% indicate at-chance performance on the GJT participants would have to score well above that to be excluded from the study. In the JST there were more options and thus more opportunities for participants to make incorrect responses. It was deemed unlikely that participants with no or little prior knowledge of the target structure would score over 50%.

The week after the pretest, participants were randomly assigned to one of four treatments, consisting of either a dictation, an imitation, a reading comprehension, a listening comprehension treatment, or a control group which did not complete a treatment but returned for the posttests only. The treatments were followed by a test of intake in the form of a preference test. All treatments and tests were designed using professional authoring software (Opus Pro XE, 2003) and delivered on the computer. Table two shows the design of the pilot study.

Table 2: Design of the pilot study

Pretest	Grammaticality Judgement Test
	Jumbled Sentences Test
Treatment	Imitation, dictation, listening, or reading treatment
Intake test	Preference test
Posttest	Grammaticality Judgement Test
	Jumbled Sentences Test
Delayed posttest	Grammaticality Judgement Test
	Jumbled Sentences Test

5.5 Target structure

Negative adverbs were chosen as the target structure. These adverbs cause subject-auxiliary inversion such as in this example:

Seldom had he seen such a beautiful woman

*(*Seldom he had seen such a beautiful woman)*

This structure is discussed in greater detail in the following chapter.

5.6 Materials

This section describes the various materials used in the pilot study. Section 5.1 looks at the treatments, section 5.2 at the test of intake, and 5.3 at the pretests and posttests.

5.6.1 Treatments

For the treatments a number of texts were written containing selected negative adverbs and distractor items. The sentences containing negative adverbs were modelled on sentences in the British National Corpus (see the following chapter). However, they had to be simplified considerably due to their complexity and length. Adverbs of time (e.g. yesterday, sometimes) were used as distractor items so as to not unnecessarily attract attention to the negative adverbs as the only adverbs in the input.

The written sentences and texts were cross-referenced against general vocabulary lists (Nation, 1984) to determine whether they could reasonably be assumed to be part of intermediate and upper-intermediate learners' lexical repertoire. Nearly all words in the treatments (and tests) occurred in either the 1,000, or 2,000 word lists (Nation, 1984, 1996). A small number of words did not, but they were deemed to be known by the

participants in the study as they related to school or study-related situations that all were currently in (e.g. “essay”).

A first draft of the treatment texts was given to two native speakers to comment on. On the basis of their feedback, changes were made and one text was replaced. Next, a small questionnaire was developed to obtain feedback from four native speakers about the grammatical accuracy of the (revised) texts and the vocabulary used. After this some of the texts were rewritten.

Some of the treatments involved participants listening to audio recordings (see below). The recordings were made by a native speaker and recorded directly onto a computer using a headset microphone. Care was taken to make the texts sound natural and to ensure that the target structure was not unnecessarily emphasised in any way. To this end the person recording the texts was not made aware of their purpose.

5.6.1.1 Dictation

Participants were first asked to read a number of questions about the content of the texts they were about to hear. Answers to the questions could be found in the (10 out of 17) chunks containing the target structure, and they thus functioned as priming devices. Next, participants were asked to listen to a number of separate sentences (which together formed a short text) and type in exactly what they heard immediately after hearing each sentence. Participants were not allowed to take notes. After they finished the dictation

part, they were asked to answer the questions they had read before. The questions were shown again on screen but this time accompanied by multiple choice options.

5.6.1.2 Imitation task

Participants were shown a number of (unrelated) sentences on the screen. Participants could look at a sentence for as long as they wanted but were not allowed to take notes. When they were ready they clicked a button on the computer screen which made the sentence disappear. They then said the sentence out loud into a headset-microphone connected to the computer. There were no (priming) questions in this treatment.

5.6.1.3 Reading comprehension task

Participants were given a text to read followed by a number of questions about the content of that text, the answers to which could be found in sentences that did not contain the target structure. Participants were not allowed to take notes while reading the text.

5.6.1.4 Listening comprehension task

Participants were first asked to read a number of priming questions, the answers to which could be found in the text they were about to hear. Next they were asked to listen to a text on the computer. Participants were not allowed to take notes. After they finished listening they were asked to answer the initial questions which were shown on screen but this time accompanied by multiple choice options.

5.6.1.5 Control group

The control group did not complete any treatments but instead only participated in the pretest and the posttests (see below). Table three below summarises the 4x2 design of the pilot study treatments.

Table 3: Design of the pilot study treatments

	Noticing Prime	Production
Imitation	No	Yes
Dictation	Yes	Yes
Listening Comprehension	Yes	No
Reading Comprehension	No	No
(Control)	n/a	n/a

5.6.2 Test of intake

All treatments were followed by a test of intake. This consisted of a preference test in which participants were shown a number of sentence pairs, each with one correct and one incorrect version of a sentence, and were asked to choose which one they thought was the right one. Fifteen of the sentence pairs contained the target structure, ten were distractors. The items were the same ones as those used in the treatments. The imitation and the dictation task had in fact two measures of intake as the reproduction of the texts was taken as a measure of intake as well.

5.6.3 Pretests and posttests

The tests (pretest, posttest and delayed posttest) consisted of two parts; a Grammaticality Judgement Test (GJT) and a Jumbled Sentences Test (JST). In the pretest, both of these contained 15 sentences containing the target structure (five different adverbs in combination with three auxiliaries each) as well as 10 distractors. In the posttests there were 16 target items (eight adverbs x two auxiliaries each) and also 10 distractors. Three of the adverbs did not appear in the pretests nor in the treatments. Correct performance on the new items could thus be seen as possible evidence of generalisation of the underlying rule, and improvement in performance on previously encountered items as evidence of retention.

5.6.3.1 Grammaticality Judgement Test

In the grammaticality judgement tests participants were presented with a sentence and were asked to judge whether or not the sentence was correct by clicking on the corresponding button on the computer screen. There was no time limit. No changes could be made.

5.6.3.2 Jumbled Sentences Test

In the jumbled sentences test participants were given a sentence with several words missing. The missing words were shown above the sentence (the order in which the missing words appeared above the sentence differed from one sentence to another). Participants were instructed to create a correct sentence by dragging the words to the

right places. Changes could be made until the participant was satisfied with the answer but not once they had moved on to the next item.

5.7 Results

Section 5.7.1 describes the results for the treatments and the test of intake. Section 5.7.2 looks at the results on the pre,- and posttests.

5.7.1 Treatments and test of intake

Table four shows the results for the treatments as well as participants' scores on the intake test. It is important to point out that the treatment scores below mean different things for the different treatments. For example, for the reading comprehension treatment scores reflect participants' performance on the content questions (which did not refer back to sentences containing the target structure), whereas for the dictation treatment there are two scores, one for participants' answers to the (primed) questions and one for their performance on the dictation treatment.

Table 4: Pilot study treatment and intake scores

		M	SD
Listening Comprehension N=7	Treatment	50%	12%
	Intake	34%	20%
Reading Comprehension N=6	Treatment	70%	26%
	Intake	38%	21%
Dictation N=2	Treatment a	75%	7%
	Treatment b	10%	14%
	Intake	50%	0%
Imitation N=3	Treatment	60%	53%
	Intake	57%	31%

These results are difficult to interpret because the numbers are very small and, as mentioned above, the scores mean different things for the different treatments. The dictation and imitation treatments appear to result in greater intake but with only two and three participants respectively, it is difficult to say. There is no clear difference between the treatments that contained priming questions (the listening comprehension and dictation treatments) and those that did not. Performance on the intake test was rather poor overall; the average score was only 41.1% , i.e. well below chance. It appears that the treatments did not have much effect.

5.7.2 Tests

Table five below shows the average scores on the pretests and posttests for participants in the four treatments and for participants in the control group.

Table 5: Performance on pretests and posttests

	Pre1		Pre2		Pos1		Pos2		Dps1		Dps2	
	Avg	Sd	Avg	Sd	Avg	Sd	Avg	Sd	Avg	Sd	Avg	Sd
T	39%	.125	29%	0.17	47%	0.135	23%	0.157	59%	0.04	54%	0.208
C	22%	.101	20%	.13	47%	.09	22%	.215	53%	.042	50%	.0424

T = Treatment (N=24), C = Control (N=3), Pre1 and Pre2 = Pretest 1 (GJT) and pretest 2 (JST), Pos 1 and Pos 2 = Posttest 1 (GJT) and posttest 2 (JST), Dps 1 and Dps 2 = Delayed posttest 1 (GJT) and delayed posttest 2 (JST).

The results show that the control and treatment groups performed almost identically, even though the control group has lower scores on the pretest (however, it has to be pointed

out that there were only three participants in the control group). The increase in scores thus appears to be a practice effect. Because of the very small numbers in the various groups no inferential analyses were performed.

Participants' performance on the distractors was quite good. The average score ranged from a minimum of 68.8% (GJT pretest) to a maximum of 95% (JST delayed posttest). The language used during the study appeared not have been overly difficult for the participants.

5.8 Discussion

There are several possible explanations for the results. Izumi (2002) investigated English relativisation and found that her treatments did not have the expected result: 'it was suggested that a combination of formal complexity and functional expendability of the form might have contributed to this result' (p. 546). Negative adverbs are formally complex, formally expendable, and the inversion they cause does not in itself carry meaning (see the following chapter for a further discussion of negative adverbs). This may make them difficult to notice and learn. This also makes them an interesting feature to investigate. The results from the pilot study seem to show, however, that the treatments as designed and administered were not sufficient to make learners take in or acquire negative adverbs. One of the main possible reasons is the brevity of the treatments. Participants only completed one treatment and the different types of treatments were all short. The reading comprehension task was completed in well under ten minutes by most participants. This may simply not have been enough to make participants notice the

structure. At the same time, the numbers in the study were too small to make conclusive statements about the effects or lack of them of the treatments.

In addition, the design of the study and the treatments themselves caused a number of problems. First, there were differences in the amount of exposure participants had to the input. The reading comprehension group was able to view the text for as long as they wanted to, whereas for example the listening comprehension group could only hear the text for as long as the recording lasted. However, participants in the reading comprehension group did not seem to have made use of this opportunity, and in fact, some of them completed the treatments in a very short time.

Second, as shown by the results for the control group, the tests may have raised awareness of the target structures. For example, the Jumbled Sentences Test forced participants to make a choice with regards to word order (see below) and this could have drawn attention to the fact that inversion was the feature under investigation. This makes it more difficult to identify any effects the several conditions may have had but does not explain why the participants in the various groups did not improve more.

Another limitation of the pilot study was the fact that the proficiency level of the participants was not known exactly due to the large number of different classes they were enrolled in. The productive tasks (imitation and dictation) proved to be very difficult for participants of lower proficiency. For that reason only more advanced students were asked to do those tests, which may have skewed the results. Similarly, a number of the

items on some of the tests were found to be more difficult than others which again, could have affected the results.

A major difficulty was getting participants to come back and complete the tests as shown by the disappointing numbers on especially the delayed posttest. In addition, perhaps because participants did not return as group, they did not all return at exactly one week intervals, although in most cases their tests were between six and eight days apart.

5.9 Changes resulting from the pilot study

As a result of the above findings, a number of changes were made to the main study (see for a full description of the main study the following chapter). These included:

1) Inclusion of more, and longer treatments

As briefly discussed above, one of the reasons for the lack of effect for the treatments could have been the brevity of the treatments. It was decided to increase the number of treatment sessions from one to three and to make each treatment longer by including more sentences and/or longer texts.

2) Similar amount of exposure

In the pilot study participants in different treatments experienced potentially different amounts and lengths of exposure to the input. In the main study all treatments had aural input only, and of similar length. The number of exposures was strictly controlled, ensuring that the total amount and length of input was very similar for all participants.

3) Exclusion of verbal production tasks

The imitation treatment required participants to take a number of steps to start and stop the recording and required oral reproduction of sentences. This proved to be difficult for many. It was decided not to include this type of treatment in the main study.

4) Exclusion of receptive treatments

In order to make the various treatments easier to compare it was also decided to leave out tasks that only involved receptive skills, such as the pilot study reading comprehension treatment. In the main study all treatments involved some form of production (but not oral imitation).

5) Inclusion of an extra grammatical feature

The pilot study only investigated one structure, negative adverbs. In the main study another adverbial structure was added, adverb placement. The reason for adding an extra, simpler, structure was to allow for a comparison between two groups of learners of different proficiency as well as to investigate the influence of the treatments on the acquisition of two structures that differ in complexity.

6) Exclusion of priming questions and inclusion of implicit/explicit instructions

There was no clear effect for the priming questions in the pilot study. The targeted feature, negative adverbs, was deemed to be too opaque for the questions to have an effect. Instead two sets of instructions were used; one implicit and one explicit, with the

latter asking learners to pay specific attention to the target feature and giving them an example of it.

7) Changes to the pretests and posttests

The JST was removed as it was realised that it could possibly be awareness-raising for negative adverbs. By blanking out the words following the negative adverb participants could be made aware that the order of the words following the negative adverb was the focus of the test. Instead it was decided to have two versions of the GJT, one timed, and one untimed. This decision was made in conjunction with the choice to differentiate treatments by the inclusion of either implicit or explicit instructions (see above). It was thought that the timed test would tap more implicit knowledge and the untimed test more explicit knowledge (R. Ellis, 2004).

8) Small improvements to the sentences and texts used

A number of individual words and sentences that had proven to be difficult or ambiguous were replaced or re-written. A new negative adverb ('in no way') was added.

CHAPTER SIX

METHODOLOGY

6.1 Introduction

This chapter will discuss all aspects relating to the design and execution of the main study. It will start by presenting the research questions and the operationalisations of the relevant concepts. Next it will describe in detail research design, participants, treatments, and tests. Reliability and validity issues will also be considered.

The pilot study (described in the previous chapter) and the main study shared a number of characteristics, one of which was that they were both experimental in nature and were mostly concerned with quantitative rather than qualitative analysis. Van Lier (1988) talks about qualitative research as involving watching and asking and quantitative analysis as involving measuring and controlling. Brown & Rodgers (2002) define experimental research as ‘studies that compare group behavior in probabilistic terms under controlled conditions using random assignment to groups’ (p. 12). Neither of the studies described here involved observations of naturalistic language learning and both controlled the type and amount of input in laboratory-like conditions.

N. Ellis & Schmidt (1997) discuss some of the downsides of laboratory research and claim that experimental research typically ‘(a) concentrates on just one aspect of language acquisition, using either artificial languages or severely restricted samples of natural languages (thus the language studied is often a travesty of natural language), (b) it

describes a few hours, or, at most, days of language learning (the time period of study falls far short of lifespan practice), (c) it involves laboratory conditions of learning, with materials presented under experimental control by scripted stooges or, more usually, programmed computers or teaching devices (the exposure conditions are far from naturalistic), and (d) it studies learners who volunteer, for reasons like course requirements or financial incentive or social pressure, to be subjects in laboratory experiments (the learners are often atypical in their motivations and demographics).’ (p. 146). All these factors may endanger a study’s ecological validity.

Despite these drawbacks there are good reasons for conducting laboratory research. These include that a) the type and amount of input can be controlled. In the case of my study this was crucial as one of the target structures, negative adverbs, is not frequently encountered in authentic input. b) The type of interaction with and processing of the input can be controlled. As my study investigated the effect of different types of tasks and their accompanying instructions this was also important. The fact that the study offered only limited exposure to the target structure was an important aspect of the investigation of the task effects. c) Intake is a psychological process and cannot be directly observed. As such it is difficult to observe in naturalistic settings. N. Ellis & Schmidt (1997) concluded that conducting laboratory studies can yield better results than directly investigating acquisition for (amongst others) the above reasons. They also put forth one additional and important argument regarding the study of the *process* of learning a second language, rather than (just) the product:

SLA research aspires to understand acquisition, and acquisition results from dynamic processes occurring in real time. It is difficult to gain an understanding of learning and development from observations of the final state, when we have no record of the content of the learners' years of exposure to language nor of the developmental course of their proficiencies. If we want to understand learning we must study it directly. (p. 146)

The present study concerns itself with the process and the relationship between the process (intake) and the product (acquisition) and is predominantly cognitive in nature, i.e. it primarily considers linguistic processes, and less so the emotional and social dimensions of learning a second language (cf. Lantolf, 2000). It investigates language learning within a framework originally developed by Jenkins (1979) and adapted and expanded by Hulstijn (1989). This framework comprises five factors:

- 1) Processing mode: the way in which the linguistic input is processed by the learner.
- 2) The learner's current L2 knowledge.
- 3) Linguistic characteristics of the grammatical features to be learned: target structures.
- 4) Number and frequency with which the target structures appear in the input.
- 5) Compatibility between learning and retention tasks.

6.2 Research Questions

The study investigated the following research questions:

RQ1 - What are the relative effects of listening tasks with implicit versus explicit instructions, administered under incidental learning conditions, on the *intake* of negative adverbs and adverb placement?

RQ2 - What are the relative effects of listening tasks with implicit versus explicit instructions, administered under incidental learning conditions, on the *acquisition* of negative adverbs and adverb placement?

Implicit instructions were operationalised as only containing directions on how to perform the task, but no information on the target structure. The explicit instructions involved drawing attention to the target structure and the inclusion of an example, but no rule presentation. As such the tasks were inductive (cf. DeKeyser, 2003). Also following DeKeyser, the drawing of participants' attention to specific language form could be classified as a type of explicit instruction; DeKeyser categorises instruction as explicit if 'rule explanation comprised part of the instruction [...] or if learners were directly asked to attend to particular forms and to try to arrive at metalinguistic generalizations of their own' (1995, p. 437). However, as several authors have pointed out (cf. Robinson, 1996), implicit and explicit instructions do not form a dichotomy, but rather should be seen as operating on a continuum. The explicit instructions used in this study come at the lower end of the range of explicit instructions.

The tasks were administered under incidental conditions; participants were not asked or encouraged to learn the target feature or any other aspect of the language nor were they informed that they would be tested on them (Hulstijn, 2001, 2003). This may not have precluded some of the participants from intentionally attempting to memorise or deduce rules from the input. Only the tasks and instructions were incidental and inductive, the resulting learning may not have been, although it was expected that mainly incidental learning would take place. Craik & Lockhart (1972) point out an important rationale for investigating incidental learning:

An important characteristic of the incidental learning paradigm is that the subject processes the material in a way compatible with or determined by the orienting task. The comparison of retention across different orienting tasks, therefore, provides a relatively pure measure of the memorial consequences of different processing activities [...] Under incidental conditions, the experimenter has a control over the processing the subject applies to the material that he does not have when the subject is merely instructed to learn and uses an unknown coding strategy. (p. 677)

More extensive information is given below, but in short, intake was operationalised as either a) correct suppliance of the target structure when performing the treatment tasks, or b) for the individual reconstruction and collaborative reconstruction tasks, in addition, correct suppliance of the target structure during the talk-aloud protocols. Acquisition was operationalised as improved performance on a) an untimed grammaticality judgement

tests, or b) a timed grammaticality judgement test, where performance on the specific items encountered in the treatments was taken as evidence of retention and performance on items not encountered in the treatments as evidence of generalisation of the underlying rule.

It was expected that the explicit instructions would succeed in drawing participants' attention to the target features and that this would lead to a) increased intake, and b) increased acquisition. This expectation was based on findings from previous research such as DeKeyser's (1995) who found evidence for the positive effects of explicit instruction (involving rule explanation) over implicit instruction on simple grammatical rules. Robinson (1996) used four training conditions; an implicit memory task, an incidental meaning-focused task, a rule-search task (labelled "enhanced input"), and an instructed condition. Robinson found a significant advantage for the latter two for both simple and complex rules. Norris & Ortega (2000) conducted a meta-analysis of studies investigating L2 instruction and among others divided studies into those involving explicit instruction where 'rule explanation comprised part of the instruction (in this first sense, explicit designates deductive and metalinguistic) or if learners were directly asked to attend to particular forms and to try to arrive at metalinguistic generalizations on their own (in this second sense, explicit designates explicit induction)' (p. 437) or implicit if this was not the case. A clear advantage was found for the studies involving explicit instruction.

It was also expected that c) the effects of the explicit instructions on acquisition would be more noticeable on the untimed tests than on the timed tests. Finally, it was expected that

d) there would be no difference in scores on the timed tests between the groups receiving implicit and explicit instructions.

RQ3 - What are the relative effects of dictation versus individual reconstruction versus collaborative reconstruction tasks administered under incidental learning conditions on the *intake* of negative adverbs and adverb placement?

RQ4 - What are the relative effects of dictation versus individual reconstruction versus collaborative reconstruction tasks administered under incidental learning conditions on the *acquisition* of negative adverbs and adverb placement?

The tasks are described in detail below. In short it was expected that a) the short chunks in the dictation task (it may not be accurate to call dictation a task; see below) would facilitate noticing and intake of the target structures, and that b) this would lead to greater acquisition than the individual reconstruction and the collaborative reconstruction tasks. This expectation was prompted by previous research (N. Ellis, 1996, 1997) that found evidence for the crucial role of phonological short-term memory on acquisition. As dictation involves activation of phonological short-term memory it was expected that this task would aid learning. It was also expected that the nature of the collaborative task would increase the likelihood of the target structures being noticed and that thus c) intake and d) acquisition would be greater than that resulting from the individual task. This expectation was based on previous research into the effects of social context (cf. Lantolf, 2000) and collaborative dialogue (Swain, 1988; Swain & Lapkin, 1995).

6.3 Target structures

Two structures were chosen for the main study: negative adverbs and adverb placement. The two structures will be described here separately, followed by a discussion of (amongst others) their relative acquisition order, complexity, and saliency. Finally, the process of selecting exemplars for inclusion in the study will be described.

6.3.1 Negative adverbs

Negative adverbs are adverbs or adverbial structures that lead to inversion of subject and auxiliary. For example: “seldom **had he** seen...”. Other examples include “rarely”, “not only”, “in no way”, etcetera. Swan (1998) says that “he had hardly...” and “hardly had he...” are both possible with the latter being the more formal or literary version. Such adverbs:

- Are followed by non-assertive rather than assertive forms. e.g. ‘I seldom get any sleep’ (* ‘I seldom get some sleep’).
- When in pre-subject position, are accompanied by subject-operator inversion : ‘Rarely does crime pay so well as...’ (* ‘Rarely crime does pay so well as...’)
- Are followed by positive rather than negative tag-questions : ‘She scarcely seems to care, does she?’
- Are placed after the simple tenses of *to be* (‘he is rarely in time’) but before the simple tenses of all other verbs (‘they rarely stay up all night’).
- Cannot be used with a negative; ‘This violation of the double negative rule is curious because these adverbs are not truly negative in meaning’. (The online American heritage grammar resource, n.d.).

As for learner grammars, not all of them describe or explain negative adverbs. One example of an online resource (Edufind, n.d.) that does, has the following to say:

*However, some negative adverbs can cause an **inversion** - the order is reversed and the verb goes before the subject*

Example:

I have never seen such courage. - Never have I seen such courage.

She rarely left the house. - Rarely did she leave the house.

Negative inversion is used in writing, not in speaking.

Other adverbs and adverbial expressions that can be used like this:

seldom, scarcely, hardly, not only

but also, no sooner

than, not until, under no circumstances.

Interestingly, learner grammars are not always accurate. For example in the above example it is said that negative adverbs are not used in speaking. This, as will be discussed below, is not correct.

How difficult is this structure? Pienemann's language processing theory (1989; see chapter three) posits that language is acquired in a predictable and pre-determined order. His theory proposes several language attributes used to determine the relative difficulty

and acquisition order of individual features of a language. The first of these attributes is psychological complexity and this refers to the extent to which the learner has to actively manipulate language (such as through re-ordering) in order to come to a correct language form. In the case of negative adverbs the sentence structure needs to be rearranged to accommodate auxiliary-subject inversion. The second attribute is saliency; items are more salient if they come in sentence initial or sentence final position. In the case of negative adverbs the items that trigger the inversion (the adverbs) are in sentence initial position but the resulting inversion is not. Third, difficulty is in part determined by the distance between an item that triggers a transformation and the place in the sentence where the transformation is effectuated; the greater the distance, the more difficult. In the case of negative adverbs inversion generally immediately follows the triggering adverb (but not always, e.g. “not until”). Pienemann also suggested that learners go through five different stages in their development (see chapter three). Inversion has been identified by Pienemann to be acquired at stage three (1998). However, there are different contexts in which inversion occurs (e.g. questions) and not all of these are equally salient, with negative adverbs being one of the less salient forms. For this reason it is likely that they are acquired at level three or higher; i.e. relatively late.

Goldschneider & Dekeyser’s meta-study (2001; see chapter three) identified five determinants affecting acquisition of morphemes. Some of these determinants may be useful in better understanding the relative difficulty of negative adverbs too. The first of these determinants is perceptual saliency, or how easy it is to hear or perceive a given structure. In the case of negative adverbs the “trigger” for inversion consists of the adverbs which are separate words and are as such easily identifiable. However, their

“negative” aspect is not always perceptually recognisable (e.g. rarely, hardly, as opposed to not only, never), but only semantically (and then only to a limited extent). In fact, Long (1996) specifically mentions negative adverbs as one example of a nonsalient structure: ‘and some, such as subject-auxiliary inversion after preposed negative adverbials (*Seldom have I seen...*) and uses of *whom*, are too rare or perceptually nonsalient’, (p. 427). This leads to the second factor, 2) semantic complexity or how many meanings are expressed by a certain form. The difficulty with negative adverbs lies in that they trigger inversion as a result of their negative meaning. However, the negative aspect is not immediately clear (e.g. “scarcely”) and some grammar resources more precisely prefer to call them “adverbs of limitation”. They are also semantically complex in that they combine a negative aspect with a positive one. For example “not until” has the meaning of X not being present or not taking place, but at the same time indicates that X is or will be present or take place if a certain condition is met. Another example is “rarely” which means “not often”. It is negative in its meaning and usage but at the same time indicates that something is present or does take place, albeit infrequently. This semantic complexity makes it harder for a learner to distill a rule pertaining to negative adverbs. In many cases, perhaps, no rule is formed and only individual items are remembered as causing inversion. 3) Morphophonological regularity refers to the degree to which a grammatical feature is affected by its phonological environment. With negative adverbs this is not generally the case as they occur in sentence initial position and are separate words which in speaking often receive stress. 4) Syntactic category is more difficult to apply as it refers to the difference between lexical and functional and free versus bound items. 5) Frequency. N. Ellis (2002a, 2002b) has stressed the role of

frequency in the input as a factor influencing acquisition, although he acknowledges a certain developmental order. Negative adverbs are not common, although somewhat more so than often thought. Their use, however, is restricted to some extent to more formal situations. Participants in the study would be unlikely to encounter this structure during the period the study was conducted.

The structure is also unlikely to be required in use. Relard (1976) found for French that learners avoid inversion in their questions until late in their development and that inverted questions were, in fact, not common at all. Instead, frequent use was made of declarative word order followed by a rising intonation, which can be found in authentic language as used by the teacher or as encountered elsewhere. As for negative adverbs, alternative sentence positions are possible and are by far the most common. It is easy for learners to avoid this structure completely when producing the language.

In summary, negative adverbs can be considered complex, relatively infrequent and are most likely only to be acquired by participants at an advanced level.

6.3.2 Adverb placement

Adverb placement involves sentences such as the following:

Mary kissed John passionately

**Mary kissed passionately John*

The focus of the research was on the acquisition of SAVO word order as opposed to *SVAO (Jackendorff, 1972; Swan, 1998).

To determine the relative complexity of this structure and the developmental stage it is likely to be acquired at, once again Pienemann's work was consulted (1989, 1998). The acquisition of SAVO as opposed to *SVAO is dependent on noticing the adverb in a non-salient, sentence-internal position. This makes the structure more difficult. However, the adverbs carry meaning and often stress which increases saliency (Goldschneider & DeKeyser, 2001). However, SAVO versus *SVAO is not semantically determined. Clearly, adverb placement is easier than negative adverbs but still requires the recognition of different word classes. As such it is well above the lower levels in Pienemann's hierarchy.

L. White (1991) has pointed out that for learners whose first language allows SVAO, English adverb placement involves "unlearning". For example In French, the adverb can come between the verb and the object whereas in English this is not the case. This would not be clear on the basis of input containing positive evidence alone. (See also Trahey, 1996).

To summarise, there are several reasons why the two structures were selected:

- Inversion has been identified as being late-acquired (e.g. Pienemann 1989, 1998) and sometimes not at all (Relard 1976). Negative adverbs are one very specific

example of a grammatical structure accompanied by inversion. The participants in the study were unlikely to have known it beforehand.

- It was unlikely to be covered in class during the study.
- Inversion as a result of negative adverbs does not clearly contribute to meaning. Intake and acquisition would be a result of noticing the form only and thus provide a relatively pure measure of task effects.
- Adverb placement is acquired at an earlier stage than negative adverbs and thus allowed for a comparison between two groups of participants with differing levels of proficiency.
- Although earlier acquired than negative adverbs, adverb placement is by no means easily acquired (cf. Trahey & L. White, 1993) and, like negative adverbs, does not clearly contribute to meaning.
- Two adverbial structures were chosen to allow for a better comparison of treatment effects.
- Both structures involve word order rules, again allowing for a meaningful comparison.

6.3.3 Selection of target items

To select appropriate adverbs and find examples of their use in authentic, written English, the British National Corpus was consulted (Aston & Burnard, 1998). This helped to identify:

- the frequency of (negative) adverbs (as individual words)
- the frequency of negative adverbs followed by inversion

- the relative frequency of certain adverb/auxiliary combinations
- contexts in which negative adverbs and adverb placement in SVOA order appear and their use in those contexts

Items were selected on the basis of their frequency, but for negative adverbs preference was given to adverbs followed immediately by the auxiliary (e.g. “seldom has he...”) rather than those where there is some distance between the adverb and the auxiliary (e.g. “not until...was he...”).

All adverbs were checked against the Cobuild Corpus of Spoken English to see if their use was restricted to written contexts only. This, for most items, was not the case. As for negative adverbs, they are used in speaking, and albeit less frequently than in writing, not much less so. It is interesting to note that by no means did all found instances occur in formal contexts only. Some clearly derived from TV shows and other more informal contexts. Nonetheless, negative adverbs appear infrequently in sentence-initial position. A list of all items used in the main study is included in appendix C.

6.4 Intake

In chapter three existing definitions of intake were discussed in detail and the following working definition was proposed:

Intake is a subset of the detected input (comprehended or not), held in short-term memory, from which connections with long-term memory are potentially created or strengthened.

The following sections look at existing operationalisations and measurements of intake and describe how I have operationalised intake in my study.

6.4.1 Operationalising intake

The term “intake” has been used to describe a number of different linguistic processes and also types of linguistic knowledge. Hence, the concept has been operationalised and measured in a number of different ways. Several authors operationalise intake as a change in performance. Zobl (1985) simply sees changes in a learner's rule output after an exposure session as evidence of intake. Similarly, Rosa & O’Neill (1999) recommend performance measures when attempting to measure intake such as recall protocols, cloze tests, grammaticality judgements, and rule formation, all to be administered soon after the treatment or exposure to the target input. They concede that intake tasks that introduce production as a factor may be inadequate in that ‘there is some potential for interference from inappropriately automatized production routines’ (p. 286). In their own study they made use of a multiple-choice recognition task. Interestingly Rosa & O’Neill write in a footnote to their 1999 article: ‘in order to minimize the possibility of learners performing the posttest on the basis of memorized material, all of the test sentences containing the target structure were different than the sentences included in the treatment task’ (p. 549). This appears to measure learning, not intake.

Leow (1993, 1995) also used multiple-choice recognition tasks and gave participants very limited time to complete their tasks, which were administered immediately after exposure.

To measure learners' intake of linguistic items in the input, a multiple-choice recognition assessment task was carefully designed to address only the linguistic item that had been attended to by the learners in the input. The three factors crucial to this assessment task were a) the administration of the assessment task immediately after exposure to the input, b) the limited amount of time learners had to complete the task (cf. Chaudron, 1985), and c) a single, final answer. (1993, p. 337).

The fact that only items that had been attended to by the learners in the input were included in the recognition test may have raised participants' awareness of those items. In a later study (2001a) Leow also made use of think-aloud protocols. In that study he aimed to investigate the effects of awareness on acquisition and recorded correct verbal production of the target form. Chaudron (1985) warns that production measures need to be used with caution as they could cause interference from previous knowledge.

Shook (1994) made use of both production tests (cloze test, sentence completion) and a recognition test (multiple-choice sentence completion) all of which were administered immediately following the exposure. Shook claims that 'it is most improbable that the

data collection procedures used could reflect anything except the immediacy of Process I [the input-to-intake stage], and thus this study does not reflect any acquisition of the grammatical input' (p. 85).

6.4.2 Intake in the present study

The above measures of intake have in common that they attempt to probe beyond what is held in short-term memory (and as such aim to measure intake as opposed to detected input). Likewise, they attempt to avoid measuring (performance based on) previous knowledge. A measure of intake should also avoid measuring acquisition; any measure that requires retention of knowledge for extended periods of time is an indication of knowledge in long-term memory, not intake. Intake tests, then, can only be administered after, but reasonably soon after exposure to the second language. This does not preclude task performance as a measure of intake, however, exposure to the target language (i.e. a listening or reading passage) needs to be separated in time from the activities participants are asked to perform on that input.

Forced recognition tests, grammaticality judgment tests, as well as measures containing a degree of production, including fill-in-the-gap, jumbled sentences tests etcetera, are all potentially valid measures, despite their individual drawbacks (provided they are administered not too long after exposure to the input). However, more subtle measures such as the forced recognition tests, are more likely to be sensitive to intake in the early stages of the learning process. Measures requiring production need to be used with care. Free production, and measures such as fill-in-the-gap without multiple-choice options are

more likely to measure integrated knowledge, and can sometimes (as was deemed to be the case in the present study of incidental learning) be awareness-raising.

For my own study I used a performance measure; I took correct use of the target structures as evidence of intake. (For a description of the treatment tasks and procedures, see below). Participants received aural input and then had to perform either a dictation or a reconstruction task. I believed the time between hearing the texts and completing the task to be sufficiently long to prohibit mimicking (and also the different modalities (i.e. writing after listening) would have mitigated against this) and sufficiently short for it to remain a subset of the detected input rather than it being a measure of learning. The fact that the tasks would have potentially differing effects on participants' intake (and acquisition) did not invalidate them as the effect of the tasks was one of the research foci of the study.

Verbal protocols were obtained in two of three task types which involved participants talking aloud while performing the task or discussing with another participant. These were used as an additional measure of intake and as a comparison with performance on the treatment tasks.

6.5 Operationalising acquisition

A wide range of options exist to measure learning that can broadly be categorised as those that involve production and those that do not. Productive measures may have greater ecological validity as they resemble real-life goals that language learners have.

They are also a clear measure of learning; being able to produce a linguistic feature accurately and appropriately is often taken as the ultimate proof of having acquired it. However, there is also a good case for using measures not involving production. Non-productive measures are more sensitive and allow for the detection of subtle changes in a learner's interlanguage. They can also be easier to administer, especially with learners of lower proficiency.

In the present study the focus was on improving recognition as it was expected that the three relatively short treatments would not be sufficient to affect the ability to use these (particularly in the case of negative adverbs rather complex) structures. It was decided to make use of grammaticality judgements for a variety of reasons (see below for a discussion of the various drawbacks of grammaticality judgement tests). This means that there was a disparity between the treatments (and thus the intake measure), which involved production (in the form of a dictation or a reconstruction task) and the acquisition measure, which did not. The reasons for choosing a production measure for intake have been discussed above. Although there was no direct relation between the treatment task and the tests, the combination of the production task with a more sensitive measure of learning was deemed to be the best option.

6.6 Design

A similar design to that of the pilot study was used. Participants were pretested for knowledge of the target structure (negative adverbs for upper-intermediate participants and adverb placement for intermediate level participants; see below). Next, they were

randomly assigned to one of three treatment types (dictation, individual reconstruction, or collaborative reconstruction) with either implicit instructions or explicit instructions (see below). The first treatment took place one week after the pretest and treatments two and three in one-week intervals after that. The final treatment was followed by an immediate posttest, and a week later by a delayed posttest. The weekly intervals were chosen for practical reasons (it would have been impossible to test all participants in the time given if the interval had been shorter due to the fact that all of them were enrolled in intensive language courses) and because one week was considered the minimum between test administrations to avoid a practice effect.

Table 6: Design of the main study

Week 1	Pretest Timed GJT Untimed GJT
Week 2	Treatment 1
Week 3	Treatment 2
Week 4	Treatment 3 Posttest Timed GJT Untimed GJT
Week 5	Delayed posttest Timed GJT Untimed GJT

6.7 Participants

Participants in the main study were students in one of the oldest language schools in Auckland, the largest city in New Zealand (this school was different from the one where the pilot study took place). The school is a private provider that caters mainly to international students, many of whom come to New Zealand for a short period of time (e.g. a few months) to learn English, as well as some local students, such as new migrants. The school was chosen because of existing contacts, its location very close to the University of Auckland, and its reputation for providing good quality education. Most of its students come from socio-economically advantaged backgrounds as they are able to afford the trip from their home countries to New Zealand and pay fees of up to NZ\$1500 per month excluding accommodation.

Students in the school are given an in-house placement test which determines their class level. After one week, consultation between the student and the classroom teacher, and where necessary the Director of Studies, takes place to ensure the student is in the right class. On-going monitoring of students' progress determines when they go up to a higher level. A total of 22 participants completed the intermediate tests and 28 completed the upper-intermediate tests. Intermediate classes in this school are considered to be at the equivalent level B1 of the Common European Framework of Reference for Languages (Council of Europe 1996) or level five of the International English Language Testing System (IELTS). Upper-intermediate classes are considered to be at level B2 of the European Framework, or level six IELTS. There are lengthy descriptions of around 15 pages for each level but the global descriptions are given below.

Intermediate:

Can understand the main points of clear standard input on familiar matters regularly encountered in work, school, leisure, etc. Can deal with most situations likely to arise whilst traveling in an area where the language is spoken. Can produce simple connected text on topics which are familiar or of personal interest. Can describe experiences and events, dreams, hopes and ambitions and briefly give reasons and explanations for opinions and plans.

Upper-intermediate:

Can understand the main ideas of complex text on both concrete and abstract topics, including technical discussions in his/her own field of specialization. Can interact with a degree of fluency and spontaneity that makes regular interaction with native speakers quite possible without strain for either party. Can produce clear detailed text on a wide range of subjects and explain a viewpoint on a topical issue giving the advantages and disadvantages of various options.

The reason for including learners of different proficiency levels was to allow for comparisons to be made: ‘studies that treat multiple levels of subjects would probe the accessibility of certain grammatical features for different levels of language learners and would allow a more accurate picture of the developmental characteristics of the input-to-intake phenomenon, that is, how much experience with the language might affect the ability to process the input’ (Shook, 1994, p. 64). The participants completed a background questionnaire on the computer (see appendix D). Twenty-nine of the

participants were female and 21 were male. Table seven shows the participants' country of origin and first language.

Table 7: Country of origin and first language of participants

Country of origin		First language	
Japan	13	Japanese	13
Switzerland	8	Chinese	9
Korea	6	Swiss German	8
China	6	Korean	6
Taiwan	3	French	4
France	2	Spanish	2
Italy	2	Italian	2
Brasil	2	Portuguese	2
Saudi Arabia	1	Arabic	1
Czech Republic	1	Czech	1
Thailand	1	Thai	1
Russia	1	Russian	1
French Polynesia	1		
Colombia	1		
Belgium	1		
Argentina	1		

The average age participants had started to learn English at was just over 14. There were some older students who had started late in life (the oldest one had started at age 48) but most had probably started when they entered secondary school. There were only five participants who had started when they were less than ten years old.

The vast majority of participants had lived in an English speaking country (New Zealand or other) for less than six months (40 out of 50). Most participants indicated they now used English most of the time (41 out of 50).

Participants had studied English for just under seven years (6.7) on average. Half of them had experienced mainly formal tuition (phrased on the questionnaire as “most time was spent studying grammar”), just under half (22) had had a mixture of formal and informal tuition and only three participants indicated they had received mainly informal tuition (“most of the time was spent communicating in English”). Although no data was collected on participants’ ages, almost all the participants appeared to be in the 18-28 age bracket (and most between 19-24), with five older students participating.

6.8 Procedures

Data collection took place on two occasions. On the first occasion school management asked a number of classroom teachers (selected on the basis of the proficiency levels of their classes) to take their students to the school’s computer room in class time. Two levels of classes were included; intermediate and upper-intermediate with the former

being assigned to the adverb placement group (see below) and the latter to the negative adverbs group.

All students did the pretest and all scored below 65% on the structure pertaining to their level, i.e. adverb placement for intermediate and negative adverbs for upper-intermediate students. All were invited to participate in the study. Participants were randomly assigned to one of three different treatments and to either the group receiving implicit or the group receiving explicit instructions. Care was taken in the collaborative treatment not to pair participants with the same L1.

Follow-up appointments were scheduled outside class time. Although many students agreed to participate, the following week a large number did not return for their appointments. Of the ones who did return most were able to be persuaded to complete the entire study, although this involved reminding them frequently via email or through their classroom teachers, and where necessary scheduling alternative times if they had not shown up for their appointments. Participants were made aware that their results were completely confidential and would not be shown to their teachers or influence their final course marks in any way. They were given a Participant Information Sheet, explaining the purpose of the research, and signed a Consent Form, in accordance with Human Ethics regulations at the University of Auckland (see appendix A).

There was a gap for most learners between their morning and their afternoon classes during which they were expected to engage in self-study in the School's self-access

centre. Permission was given by the School's management to do the testing during this time. Due to the limited amount of time available and the fact that most tests involved oral production and thus would have to be done individually (see below), it was necessary to enlist research assistants to help with administering the treatments. Four assistants were recruited and they were given a summary of the research so as to understand its background and purpose. A week before the first treatment administration a training session was held which included a trial of each of the tests and treatments which was done several times until everyone understood how everything worked. The main researcher was present during all test and treatment administrations. No problems arose with the assistants and their work.

The final number of participants who completed all tests was a little bit lower than had been anticipated and some data was lost due to wrong test administrations (a small number of participants were accidentally given a treatment for adverb placement when they should have done the one for negative adverbs, or vice versa. Their data was discarded), which necessitated a second data collection. This took place in the same school, approximately 10 weeks after the original data collection was concluded. This time participants were recruited by approaching students working in the school's self-access centre and by announcements made by school teachers in class. Again, only participants in intermediate and upper-intermediate classes were included. To make the data collection easier to conduct and to ensure a higher rate of retention, participants were

offered a financial compensation of NZ\$60 (or approximately \$12 per hour) to be received upon completion of all tests¹³.

During the second test administration participants in classes that started later in the morning were asked to come before class (at 09:30) and participants in morning classes were asked to come after class

There was no separate control group in the main study. The main reason for this was the practical constraint of testing in a language school. Ideally there would have been a control group but it proved to be difficult to a) recruit and b) retain participants in the study. Recruitment and testing were done in the school which placed a burden on administrators and teachers and also reduced classroom availability. As an alternative, performance on the distractor items (adverb placement items for participants in the “negative adverbs group” and vice versa) on the tests was used as a control.

During the individual and collaborative reconstruction treatments participants were recorded by using a small portable analogue tape recorder with a built-in microphone. This was placed on the corner of the table the participant was working at and was

¹³ In order to investigate if the two samples could statistically be considered to be derived from the same population a one-way ANOVA was performed on the combined scores on the three tests. This revealed no significant difference between the two datasets on timed tests ($F(1,98)=.371, p=.631$), nor on untimed tests ($F(1,98)=.801, p=.724$). Additional analyses of the pretest and posttests, and for grammatical and ungrammatical items separately, also did not show any significant differences.

switched on after completing the instructional part of the treatment and before the start of the actual task. A researcher remained present during administration of the treatment and reminded the participant(s) to continue talking aloud if they were silent for more than five seconds. It was found that after completing the first text during the first treatment, participants generally were able to complete the other texts without further reminders from the researchers. None of the aural texts in any of the treatments could be rewound, paused, or repeated.

6.9 Materials

This section describes the treatments and the tests, as well as the process of creating them.

6.9.1 Treatments

Audiorecordings for the treatments were made by a professional speaker in a soundproof environment on a digital Sony DPC recorder. The recordings were transferred to the computer and incorporated into the computer programmes (created with Opus Pro XE) containing the treatments. All texts were presented in black, on a white background, using Times New Roman 12-point font size. Standard QWERTY keyboards were used.

Participants were randomly assigned to receive either implicit or explicit instructions. Implicit instructions were operationalised as only containing mechanical instructions on how to perform the task, e.g.:

In this task you will listen to a passage twice. Next, type in the passage exactly as you heard it. You are allowed to take notes.

The explicit instructions focused the participants' attention on the target structure and gave an example of it (in accordance with Dekeyser's operationalisation of explicit (inductive) instructions; 1995), e.g.:

In this task you will listen to a passage twice. Next, type in the passage exactly as you heard it. You are allowed to take notes.

Listen carefully and pay attention to where the adverb is placed in each sentence. For example, in this sentence

'He sent the letter electronically'

The adverb is 'electronically' and it comes at the end of the sentence.

The number of participants in the implicit and explicit groups is shown in table eight.

Table 8: Number of participants in the implicit and explicit groups

	AP	NA	Total
Implicit	11	17	28
Explicit	11	11	22
Total	22	28	50

6.9.1.1. Dictation

The first of the three treatment types was a dictation in which participants were asked to listen to a passage of about 60-70 words on a laptop, during which they were not allowed to take notes. Next, they heard the passage again but this time part by part. Each part contained no more than 10 words but mostly around seven or eight. Next, they were asked to type in what they had heard. The treatment thus involved immediate recall. There were four passages during each test administration containing three target items each, one per week for a period of three weeks, i.e. a total of 36 target items. The actual treatment was preceded by three practice passages. All texts were grammatically correct and thus participants were provided with positive evidence of the target structures only. This applies to all three treatment types.

Although some researchers (e.g. Breen, 1989) include any structured language learning activity under the heading “task”, others make a distinction between tasks (where the primary focus is on meaning) and exercises (where the primary focus is on form). R. Ellis (2003) proposed that tasks 1) consist of a workplan with input and instructions for the purpose of learning a language. This is the case with the dictation treatment. 2) Involve a primary focus on meaning. This is arguable; success on a dictation treatment is facilitated by attention to both form and meaning, but may be completed with limited attention to meaning. 3) Involves real-world processes. Dictation has been criticised (e.g. Lado, 1961) for not being a “real” skill. 4) Can involve any of the four language skills. 5) Engages cognitive processes. This is clearly the case. 6) Has a clearly defined communicative outcome. This is not the case. The only language production required is a repeat of what

is already contained in the input. It appears then, that the dictation treatment does contain some elements of a task, but does not meet all the requirements; perhaps it is a task-like activity, rather than a task. However, for the sake of consistency I shall refer to the dictation treatment as a task, but with the caveat provided above.

6.9.1.2. Individual reconstruction

In the individual reconstruction task participants were asked to listen to a passage twice and then to reconstruct it. This task thus involved delayed recall of what was heard. Participants were allowed to take notes.

The instructions given for talk-aloud were in the form of a video where a student could be seen conducting the task while a voice-over explained the procedure. The part of the instruction referring to the talk-aloud was:

When you try to reconstruct the passage, I want you to talk aloud. By talk aloud I mean that you say out loud everything that goes through your mind. Just act as if you are alone in the room talking to yourself. If you stop talking for any length of time I will remind you to keep talking.

After watching the video participants had a chance to practise the procedure with two passages. If additional practice was necessary, the research assistants were able to repeat the passages. The passages were of the same length as those used for the dictation task and so was the number of both practice (three) and treatment passages (four). In the

individual reconstruction treatment, the focus is predominantly on meaning (although there is no clearly defined communicative outcome) and the activity is thus more task-like than dictation.

6.9.1.3 Collaborative reconstruction

The collaborative reconstruction task was similar to the individual reconstruction task except that two participants were paired and were asked to reconstruct the text together. It therefore also involved delayed recall. This task bears some similarity to the dictogloss task (Wajnryb, 1988, 1990) which is primarily intended to be used as a classroom task in which a short text is read aloud while participants take notes. However, in dictogloss this is often preceded by a short grammar lesson and generally followed by participants working together in small groups (not pairs) to reconstruct the text together and final versions are then analysed and compared.

The instructions also included a video recording demonstrating how to do the task. The instructions asked participants to:

Talk with your partner and help each other type out the passage. If you stop talking for any length of time I will remind you to keep talking.

As mentioned above, participants were randomly allocated to one of the three treatment types with either implicit or explicit instructions. The number of participants in each group is presented below:

Table 9: Number of participants in the dictation, individual reconstruction, and collaborative reconstruction groups

	AP	NA	Total
Dictation	9	9	18
Individual reconstruction	7	8	15
Collaborative reconstruction	6	11	17
Total	22	28	50

6.9.2 Tests

In the grammaticality judgement tests participants were shown a total 50 sentences, half in grammatical and the other half in ungrammatical form. Of these 50 sentences, 20 were target sentences and 30 distractors. The distractor items consisted of 20 negative adverbs for participants in the adverb placement group, and vice versa, plus an additional 10 items pertaining to the difference between adverbs and adjectives. Some items only occurred as part of the tests, others served as input during the treatments as well. Of the former (called “new items”) there were nine for the negative adverbs and eight for the adverb placement. For the latter (called “old items”) there were thus 11 and 12 for negative adverbs and adverb placement respectively.

6.9.2.1 Timed grammaticality test

On the timed tests, sentences were shown on screen and participants had to press the “enter” key if they thought the sentence on the screen was correct, and the left-hand “shift” key if they thought it was not. The keys were labelled with stickers indicating

“correct” and “incorrect”. There were eight practice sentences, not involving the target structure. While participants completed these the researcher was present to give clarification where needed.

The tests were trialed with 10 native speakers. They were told to answer quickly and that there was a time limit. In reality the time limit was set to such a level that native speakers would be unlikely to be unable to respond in time. This level was determined by the researcher (a second language speaker) who took the test himself and added three seconds to each item. Average response times for each individual sentence were calculated. Next, the same test, with the same instructions, was given to eight non-native speakers of intermediate and upper-intermediate level and two seconds were added to the average time taken by the native speakers. The participants’ time on individual sentences was once again calculated and compared with the native speakers’ average. The difference between the two was calculated and a third of this time difference was added to the average obtained for the non-native speakers (e.g. if the native speakers took an average of average 3.2 seconds for a particular sentence and the non-native speakers 4.4, then $\frac{1}{3}$ of 1.2, i.e. 0.4 seconds, were added to the non-native speaker average, thus to arrive at a total of 4.8 seconds). In the actual tests there were eight practice sentences which became progressively quicker so as to give participants time to get used to the test. The above procedure was chosen to allow for sentences to be given differing lengths of time. Previous research (e.g. Bialystok, 1979; Y. Han, 2000) had set fixed lengths for all sentences, but as pointed out by R. Ellis (2004), individual sentences may well require more or less processing time. Giving too little time will obviously impair understanding,

whereas giving too much time risks allowing participants to reflect on the sentences, and make the test too similar to the untimed version. For the first actual test items, participants were given a little bit of extra time: 0.3 seconds for the first two items, 0.2 for items three and four and 0.1 for items five and six. Participants were informed that they might not be able to answer all questions in time and that they should try to answer as many as they could.

6.9.2.2 Untimed grammaticality judgement test

The untimed test was similar to the timed test except there was no time limit. In addition, participants were asked to rate how sure they were their answer was correct by typing in a percentage from 0-100%. They were also asked to select if they used “feel” or a “rule” when choosing their answer. The instructions for this were:

After you answer each question, you will be asked how sure you are that your answer is correct. If you are totally certain, you write '100%' in the box.

If you are not certain, you will write down a score between 0% and 100 % to show your level of certainty.

0% would mean you are not certain at all and that you guessed.

Finally, you will be asked how you made your decision, by using a 'rule' or because it 'felt right'.

6.10 Validity and reliability

This section discusses the various ways in which validity and reliability issues were taken into consideration in designing and administering the treatments and the tests.

6.10.1 Treatments

The treatments consisted of three different tasks: dictation, individual reconstruction and collaborative reconstruction. These tasks had the dual purpose of a) providing the language input to the participants and b) providing a measure of intake; correct suppliance of the target structure in completing the tasks was taken as evidence of intake or lack thereof.

As for the first of these two purposes it is important to ask if the tasks provided the type of exposure that was intended. The input containing the target structures, negative adverbs and adverb placement, was specifically written for this study; i.e. the input was not authentic. However, it was intended to be as natural as possible. To this end drafts of the texts were shown to native speakers until they were satisfied with the accuracy of the texts and did not find them unduly unnatural (see above). An attempt was made to ensure the tasks were similar to the types of tasks participants would encounter in class. This was done to increase participants' familiarity with the tasks and also to increase the relevance of any effects the study might show; in other words, to increase their ecological validity (Neisser, 1976). To find out if this was indeed the case a questionnaire (see appendix E) was administered to all teachers who had one or more students in their classes participating in the study. This took place after all testing had been completed.

The questionnaire asked (among others) whether the types of tasks the students were asked to do as part of the study (dictation, individual and collaborative reconstruction) were sometimes used as part of normal classroom practice. All respondents indicated that this was indeed the case.

There is significant correlation between scores on the three treatments in several cases¹⁴. This shows that individual participants perform the tasks in similar ways. Clearly none of the tasks were considerably easier or harder to complete than the others.

6.10.2 Verbal protocols

Online data-gathering techniques have been used for many years in psychology but are a relatively recent addition to the repertoire in the field of second language acquisition. Various types of online measures exist including recording eye movements, measuring brain activity, verbal protocols and others. In the field of SLA the most commonly used technique is that of verbal protocols.

In an early article, Ericsson & Simon (1980) summarise:

For more than half a century...the verbal reports of human participants have been thought suspect as a source of evidence about cognitive processes...verbal reports, elicited with care and interpreted with full understanding of the circumstances

¹⁴ The results for negative adverbs show there are significant correlations between treatment time one and treatment time three ($r=.568$, $p=.021$) and treatment time two and three ($r=.837$, $p.<.001$). The results for adverb placement show significant correlations between treatment time one and treatment time three ($r=.59$, $p=.003$), and treatment time two and treatment time three ($r=.642$, $p=.001$).

under which they were obtained, are a valuable and thoroughly reliable source of information about cognitive processes...They describe human behavior that is readily interpreted as any other human behavior. (p. 247)

Ericsson & Simon (1987, 1993) discuss various types of verbal protocols. They make a distinction firstly between concurrent and retrospective verbalisation, the first of which takes place during task execution and the second after a task has been completed. Next, they distinguish between three types of concurrent verbalisation. Type I verbalisation is a direct reproduction of information in the form in which it was heeded. Type II involves recoding of a non-verbal internal representation. Type III involves verbalization of only selected information. Type III can also involve verbalisation of information not normally heeded by the participants. This results in inferencing and generative processes. In sum, with level I and II verbalisation the sequence of heeded information is not affected and no additional information is heeded. On the other hand, level III verbalisation requires attention to additional information and may affect the sequence of heeded information. (1993, pp. 18-19).

Cohen (2000) raises some general issues in relation to verbal protocols that need to be taken into account when making use of them in second language research. These include:

- 1) The amount of time between process and report needs to be carefully considered. Where concurrent reporting is not feasible the amount of time needs to be controlled. In the present study concurrent reporting was used.

2) Cohen stresses the need for training in providing verbal reports such as through examples and practice sessions. The treatment tasks included instructions, a video with an example, and practice texts.

3) Reactive effects, i.e. effects of the verbal reports on the execution of the task at hand need to be carefully considered and reported (cf. Stratman & Hamp-Lyons, 1994). These effects need not be negative, as in the case of interference with task execution, but could also facilitate task performance (cf. Swanson-Owens & Newell, 1994). Cohen sees a potential role for verbalisation in increasing attention: 'the potential value of verbal report data to the study of language learning is similarly great. It may well provide further important insights for enhancing learners' attention to language input, facilitating their efforts to speak fluently, assisting them in reading more efficiently, and guiding them in successful vocabulary learning' (1987, p. 92).

4) The language participants are asked to report in needs to be carefully considered. Considering 1) the level of the participants in the study (intermediate and upper-intermediate), 2) the wide range of their first languages, and 3) the fact that the treatment tasks included a collaborative reconstruction task, it was decided to ask participants to report in English.

Although verbal protocols are a popular means of gathering data, several authors have pointed out specific drawbacks (Seliger, 1983; Deese 1984). Their main points of criticism are:

- Online measures add an extra task to the task(s) at hand.
- Humans do not have access to implicit processing systems.
- Verbal reports can be incomplete, i.e. only give a partial view of the underlying process.
- They can be epiphenomenal, i.e. result independently of whatever processes underlie the learner's non-verbal behaviour (cf. Ericsson & Simon, 1993).

With regard to the first of these points, the different types of verbal protocols can be expected to result in varying degrees of interference with the task participants are engaged in. In my study I used type II verbalisation. This type of verbalisation does not cause additional information to be heeded; it is likely to result only in a minimal additional cognitive load on participants. In addition, the collaborative reconstruction task is a task that is commonly used in classroom situations. Verbalisation in this case is not an *additional* task but is part of the task itself. Admittedly this does not apply to the individual reconstruction task but verbalisation could be expected by most participants to be seen as a valid language learning task. For this reason the talk-aloud requirement in the reconstruction tasks was not expected to unduly affect the tasks, except perhaps to have a beneficial effect.

The third and fourth points above deserve further consideration. If the verbal protocols are incomplete or do not reflect the cognitive processes that go on in the learner's head, they do not yield useful information about when intake occurs. To find out if this was the case in this study a comparison was made between the two measures of intake obtained;

i.e. between what learners said and what they typed in when completing the reconstruction. In almost all instances the two coincided. If an item was spoken correctly it was typed in correctly. The verbal protocols provided additional information; they showed some of the hesitations, the internal discussions, and noticing processes that would have otherwise been difficult to gauge. There is clearly a practical argument for employing verbal protocols.

Ericsson & Simon (1993) warn against allowing too much time to lapse between a mental operation and the participant's report of it as it may affect the type of cognitive processes the participant is engaged in. They also strongly recommend making sure participants do not talk to someone but rather just report what goes on in their minds. To these ends the instructions accompanying the tasks made it clear that participants had to keep talking, and would be reminded to do so if they did not, and that they were to pretend they were alone in the room, talking to themselves (see above for the actual instructions given).

6.10.3 Tests

Grammaticality judgement tests involve participants 'deciding whether a sentence is well-formed or deviant' (R. Ellis, 1991a). They are a popular means of assessing acquisition in second language acquisition research, even 'the most often consulted behavior in the linguistic literature' as Sorace claims (1996, p. 391). They are, however, not without drawbacks. In the words of Birdsong (1989) 'metalinguistic data [from GJTs] are like 25-cent hot dogs: they contain meat, but a lot of other ingredients too' (p. 25). Some of the criticisms are discussed below.

1) Grammaticality judgement tests may have low validity as it is not always clear on what basis test-takers make judgements (e.g. intuition, context, certain parsing strategies; Y. Han, 2000; Y. Han & R. Ellis, 1998; Sorace, 1996). This is referred to as the indeterminacy issue. R. Ellis (1991a) investigated this and found that participants who are uncertain about their responses change their responses on subsequent tests.

It is also unclear whether participants judge sentences on the basis of the target structure or other linguistic features. One possible explanation may be that participants make judgements not with reference to some internal grammar, but simply on the basis of memory (Brooks & Vokey, 1991; Vokey & Brooks 1992). If an item physically resembles an item earlier encountered, participants would judge it as “correct”.

2) Unless it is made clear what is intended, participants can interpret “grammaticality” in different ways, thus reducing validity (Birdsong, 1989).

3) Native speaker grammars may be indeterminate. This makes scoring performance on grammaticality judgement tests difficult as there is no stable benchmark against which to compare the results. This reduces reliability of the tests. Gass (1994) specifically set out to investigate the issue of reliability on GJTs and found this to be reasonably high but a function mainly of syntactic factors.

Despite these points it was decided to employ grammaticality judgement tests because of 1) the relative infrequency of at least one of the target features (negative adverbs, and to

some extent also the sentence internal position of adverbs in the adverb placement groups) which would have made it difficult to find more authentic means of testing language acquisition, e.g. through production (cf. R. Ellis, 1991a). 2) In order to allow for a comparison of performance on pretest and posttests it was desirable to use the same tests. Grammaticality judgement tests were less likely to draw attention to the target structures than some other types of tests (e.g. jumbled sentences tests, as became clear during the pilot study; see the previous chapter). 3) With the grammaticality judgement tests it was possible to have two versions, one timed and one untimed (see below).

The aforementioned points of criticisms were taken into account by 1) carefully choosing unambiguous practice sentences (for both content and grammar) which would leave as little room as possible for the interpretation of “grammaticality”. 2) To ensure reliability the tests were given to native speakers (as described above), their performance was monitored, and any items where there was a discrepancy between participants were replaced. 3) Although the grammaticality judgement tests only asked participants to select “correct” or “incorrect”, to enhance validity this data was complemented in the timed condition by recording response latencies and in the untimed condition by including an additional question asking participants to rate the certainty with which they made their choice as advocated by Sorace (2000).

The process of writing the treatment texts and test sentences has been described above. A number of sentences and a couple of texts were replaced as they were found to be too easy or difficult during the pilot study in comparison with the other items. The changed

or new texts and sentences were subjected to the same procedure as described in the previous chapter for the pilot study items. These procedures were used to ensure content validity of the tests. Comparison between native speakers' performance on the trial tests and performance by non-native speaker test takers showed a clear difference; native speakers made very few errors on the tests, in stark contrast with the non-native speakers.

The above does not, however, address the issue of whether the grammaticality judgement tests were appropriate for measuring acquisition of the target structures (i.e. their construct validity). The types of knowledge the study aimed to investigate were different for the treatments involving implicit and explicit instructions. These two conditions were hypothesised to lead to an increase in a) more implicit and b) more explicit knowledge respectively (cf. R. Ellis, 2004). For this reason two types of measurements were used: timed tests which had a time limit within which participants had to respond, and untimed tests which did not have such a time limit. It was expected that the untimed test would allow participants who had received explicit instructions to draw on any explicit knowledge they had developed and thus perform better on those tests than participants who had only received implicit instructions.

Timed and untimed grammaticality judgement tests may well tap different types of knowledge. For example, Y. Han & R. Ellis (1998) used three grammaticality judgement tests (among a range of others) to investigate learners' knowledge of verb complementation. In a factor analysis of the various tests, they found two factors which they labelled implicit and explicit knowledge, respectively. The time-pressured

Grammaticality Judgement Test (giving participants 3.5 seconds to respond) and the Oral Production Test both loaded on the implicit factor, while the delayed response Grammaticality Judgement Test and the Metalingual Comments Test loaded highly on the explicit factor. Han & Ellis also found that a repetition of the time-pressured grammaticality judgement tests resulted in a somewhat even distribution between the two factors. They suggest that although this grammaticality judgement tests was timed, learners' familiarity with the test due to their previous performance on it, allowed them to access more explicit knowledge. They suggested that administering grammaticality judgement tests under time constraints may affect the type of knowledge learners access in making their responses. Grammaticality judgement tests with limited response times predispose learners to draw more on implicit knowledge while unlimited response times can allow learners to access more explicit knowledge.

R. Ellis (2004) proposes that participants potentially undergo a three step process when performing grammaticality judgement tests:

1. Semantic processing (i.e. understanding the meaning of the sentence).
2. Noticing (i.e. searching to establish if something is formally incorrect in the sentence).
3. Reflecting (i.e. considering what is incorrect about the sentence and, possibly, why it is incorrect).

Ellis argues that untimed grammaticality judgement tests allow participants to potentially perform all three operations; however, he and others point out that participants are not necessarily obliged to reflect (step number three) and that even with unlimited time,

participants may rely on intuition (implicit knowledge) to judge a sentence. The point is, however, that with unlimited time learners have the opportunity to reflect on the sentence, and thus draw on their explicit knowledge. In order to get them to rely only on their implicit knowledge, grammaticality judgement tests must not give them time to reflect on the sentence.

In order to investigate whether in the present study the timed and the untimed tests tapped different types of knowledge, Pearson correlation coefficients between timed and untimed test results were calculated for negative adverbs and adverb placement. Table 10 shows the results separated for “old items” (items that occurred on both the treatments and the tests) and “new items” (items that occurred only on the tests), for negative adverbs:

Table 10: Correlation between tests and items, for negative adverbs

N=28	Old	New	Old	New
	untimed	untimed	timed	Timed
Old untimed	1	0.484	0.147	0.11
		0.008	0.454	0.574
New untimed	0.484	1	0.169	0.296
	0.0089		0.389	0.124
Old timed	0.147	0.169	1	0.436
	0.454	0.389		0.02
New timed	0.11	0.296	0.436	1
	0.574	0.124	0.02	

These figures show that there is a lack of correlation between the timed and untimed tests. Clearly they measure different things, most likely different types of knowledge. A significant correlation was found between old and new items both on the timed and the untimed tests. This means that performance on the tests (acquisition) does not depend on whether an item has been encountered before.

Table 11 shows that also on adverb placement items there is a correlation between performance on the old and the new items on the timed test. If we accept that performance on the timed test predominantly draws on one's implicit knowledge, then the effects of the treatments appear to extend to new exemplars. However, on the untimed test there is no correlation. When participants are encouraged to draw mainly on their

explicit knowledge, they perform better on items previously encountered. Also here there is no correlation between performance on timed and untimed tests.

Table 11: Correlation between tests and items, for adverb placement

N=22	Old untimed	New untimed	Old timed	New timed
Old untimed	1	0.237	-0.031	-0.111
		0.286	0.89	0.621
New untimed	0.237	1	-0.118	0.055
	0.286		0.601	0.804
Old timed	-0.031	-0.118	1	0.754
	0.89	0.601		<.0001
New timed	-0.111	0.055	0.754	1
	0.621	0.804	<.0001	

Finally, R. Ellis (2004) noted that internal reliability measures are often not given when grammaticality judgement tests are used (only two out of 19 studies published in *Studies in Second Language Acquisition* between 1997-2001 included a measure of reliability). In the present study, KR20 analyses were performed to calculate participants' response consistency across the various tests. The figures are shown below:

Table 12: Reliability figures for the grammaticality judgement tests

	Pre Tim	Pre Unt	Post Tim	Post Unt	Dpt Tim	Dpt Unt
AP	0.841	0.725	0.928	0.789	0.84	0.852
NA	0.605	0.77	0.779	0.882	0.732	0.857

AP = adverb placement, NA = negative adverbs, Pre = pretest, Post = posttest, Dpt = delayed posttest, Tim = timed, Unt = untimed.

Most of the reliability figures are acceptable, the only clear exception being the negative adverbs timed pretest with a score of .605. The other figures were all over the .7 threshold generally set for minimum acceptability.

An additional measure of the reliability of the test items is provided by participants' performance on the pretest. There were no significant differences between the three treatment types, the implicit and explicit groups, nor between items that were included in the treatments and those that only occurred as part of the tests (see chapters eight and nine).

6.11 Analysis of the results

Below I will briefly describe the various types of data obtained during the main study:

- A. Treatments – performance data
- B. Treatments – verbal reports
- C. Grammaticality judgements - timed
- D. Grammaticality judgements – untimed

6.11.1 Performance data from the treatments

The treatments yielded information about the effects of the treatments on intake of the target structures. All three treatments required participants to either type in a text they had just heard or to reconstruct that text. Their final text was saved and analysed for correct suppliance of the target feature in all obligatory contexts. The only determinant of correct suppliance for negative adverbs was evidence of inversion with the correct word order being adverb-auxiliary-subject. Spelling errors were not counted nor were errors in the rest of the sentence. An extreme example of a sentence that was counted as correct is:

no sooner is it solution, snd the other problem is the ice

The original sentence read “No sooner does there seem to be a solution then another problem arises”. The wrong auxiliary was chosen but the order was correct so the entire sentence was judged to be correct. Sentences starting with an adverb followed by a subject were categorised as “incorrect”. Sentences where no adverb was present or could be made out were categorised as “missing”. An example is:

No sooner that I arrived

Similarly if no subject could be identified the sentence was judged incorrect:

No sooner had arrive

Exceptions were made for sentences where there were obvious spelling errors. For example, the following sentence was judged correct as it was deemed unlikely that “the” could have been anything other than a spelling error for “they”.

no sooner do the finish that course grade go on up.

In the same way, the following sentence was accepted as “to” was an obvious misspelling for “do”:

seldom to people to get such a chance,

In the case of the individual and collaborative reconstruction tasks, it was possible to verify this by listening to the relevant part of the recording.

A similar procedure was used for the adverb placement groups. SAVO was categorised as correct, SVAO as incorrect and anything else as “missing”. Correct suppliance was awarded one point and incorrect/missing responses zero points.

6.11.2 Data from the verbal reports

For the individual and collaborative reconstruction groups the audiorecordings were transcribed. Initially they were analysed in a way similar to that used for the participants’ reconstructed text. However, it was soon found that there was a great deal of overlap between what participants said and what they typed in. This was especially true for the

individual reconstruction group. It was decided to identify a) verbally expressed thoughts on the target items (i.e. metalingual comments) and b) mismatches between what participants said and what participants (finally) produced as their reconstruction on the computer. This yielded information about the degree of focus on form participants displayed during task completion as well as their overall level of awareness.

6.11.3 Timed grammaticality judgements

The grammaticality judgement tests were automatically scored by the programme developed to administer the tests and stored in text files, which were later imported into statistical software for analysis. The results were in the form of an item number followed by a “0” or a “1” for incorrect and correct answers respectively. A separate file stored reaction time. Items that participants did not respond to in time were scored as incorrect and the maximum amount of time (before the test would move on to the next item) for the item was allocated. Total scores were calculated for each participant as the percentage of correct responses. This was done for both target and control items. All responses were analysed to determine improvement between the pretest and posttests (or lack thereof). A distinction was made between items that had been encountered during the treatments and those that had not (see above). A further distinction was made between grammatical stimuli and ungrammatical stimuli as previous research (e.g. R. Ellis, 2004) had shown that they might elicit different types of responses.

This data yielded the following:

- 1) A measure of participants' prior knowledge of the target structures.
- 2) A measure of task effect on the acquisition of implicit knowledge of the target structures. The data also allowed for an investigation of the potentially differential effects of the treatments on grammatical and ungrammatical items, and old and new items.
- 3) A control measure (performance on control items).

6.11.4 Untimed grammaticality judgements

The untimed tests were recorded and analysed in the same manner as the timed tests with the difference that participants could not "time-out". There were therefore only two possible ways to code the responses; correct (1 point) and incorrect (0 points).

The untimed test data yielded the following:

- 1) An additional measure of participants' prior knowledge of the target structures.
- 2) A measure of task effect on the acquisition of explicit knowledge of the target structures. As with the timed tests, the data also allowed for an investigation of the potentially differential effects of the treatments on grammatical and ungrammatical items, and old and new items.
- 3) A control measure (performance on control items).

6.11.5 Statistical analyses

Average scores (as percentages of the number of correct responses) on both the treatments and tests were calculated for each of the conditions (implicit/explicit instructions, individual/collaborative/dictation treatments) for both negative adverbs and adverb placement. Results are presented separately for grammatical and ungrammatical items, and for target and control items. There were significant differences between scores on target and control items on the pretest¹⁵, and as this could be expected to have affected subsequent performance, it was decided to use gain scores for investigating differences between the various treatments. For this purpose both t-tests and ANOVAs were performed. As participants in the study completed multiple treatments and tests, it was decided to use repeated measures models. Significance levels (set at $p < .05$) were calculated and included in the statistical reporting.

However, it has been pointed out that significance or the lack thereof in itself is not meaningful (cf. J. Cohen, 1997a, 1997b; Norris & Ortega, 2000). The main problem with significance testing is that it is not the null hypothesis that is tested, but a given value against an assumed truth. It asks not what the chance is that the null hypothesis is true based on certain observations, but what the chance is that certain observations were to be found if the null hypothesis were true. In the words of Tukey: 'it is foolish to ask 'Are the effects of A and B different?' They are always different – for some decimal place' (1991, p. 100). Significance levels do not provide sufficient information to determine the size or

¹⁵ For negative adverbs timed scores there was no evidence of a difference ($F(1,110)=2.09$, $p=.151$) (but there was a difference on grammatical items ($F(1,54)=32.59$, $p<.001$) and on ungrammatical items ($F(1,54)=12.06$, $p=.001$), for negative adverb untimed scores the difference was significant ($F(1,110)=13.27$, $p<.001$), as it was for adverb placement timed scores ($F(1,86)=4.53$, $p=.036$), and adverb placement untimed scores ($F(1,86)=5.92$, $p=.017$).

importance of an effect, or its the reliability. For this additional measures are necessary. The 5th edition of the APA manual (2001) recommends: 'for the reader to fully understand the importance of your findings, it is almost always necessary to include some index of effect size or strength of relationship' (pp. 25-26). In addition effect sizes allow for a) greater comparability between research findings, and b) allow meta-studies (e.g. Norris & Ortega, 2000). In this study effect sizes were calculated by comparing the difference between the means of the various groups divided by their standard deviations. In this way Cohen's d figures were arrived at and were included in all results. In interpreting the results Cohen's (1977) recommendation was followed; effect sizes of .2 were deemed small, .5 as medium, and .8 as large. Similarly estimates of error and standard errors were included.

For post-hoc analyses the Least Significant Differences (LSD) method was used. This method is considered liberal in that it compares means for all possible data sources separately, rather than combined. Considering the fairly small number of data sources, and considering that the present study was exploratory, the use of LSD was deemed acceptable.

CHAPTER SEVEN

WHAT ARE THE EFFECTS OF THE INSTRUCTIONAL TREATMENTS ON INTAKE?

7.1 Introduction

This chapter reports the results of the main study for the following two research questions:

RQ1 - What are the relative effects of listening tasks with implicit versus explicit instructions, administered under incidental learning conditions, on the *intake* of negative adverbs and adverb placement?

and

RQ3 - What are the relative effects of dictation versus individual reconstruction versus collaborative reconstruction tasks administered under incidental learning conditions on the *intake* of negative adverbs and adverb placement?

The first section of this chapter deals with the relative effects of implicit and explicit instructions on intake (RQ1). The second section deals with the relative effects of the individual reconstruction, collaborative reconstruction, and dictation treatments on intake (RQ3). Within each section, results are first presented for negative adverbs, followed by

results for adverb placement. Throughout the chapter intake has been operationalised as correct suppliance of the target structure on the treatment tasks (see the previous chapter).

7.2 The relative effect of implicit and explicit treatments on intake

This section investigates the effects of the implicit and explicit treatments on intake of the two grammatical structures. The implicit treatment consisted of procedural instructions on how to perform the various tasks described in section three of this chapter. The explicit treatment included the same instructions but in addition asked participants to pay attention to the target structure and included an example of it. As described in the previous chapter it was expected that the explicit instructions would succeed in drawing participants' attention to the target structures and that this would lead to increased intake.

First the results are presented for negative adverbs, followed by the results for adverb placement. The structures are dealt with separately because the two structures formed the target items for two different groups of participants with different levels of proficiency in English. Within each section first descriptive results are presented, followed by a repeated measures one-way ANOVA (using the raw scores of the three treatment times combined) for "treatment type" (referring to the implicit and explicit treatments). The results include effect sizes for all significant findings.

7.2.1 Descriptive statistics for intake of negative adverbs

Table 13 presents the descriptive statistics for negative adverb intake scores for both implicit and explicit treatments for the three treatment times.

Table 13: Intake scores for negative adverbs, by treatment type

	Time 1		Time 2		Time 3	
	Mean	SD	Mean	SD	Mean	SD
Implicit (N=17)	.155	.152	.328	.236	.441	.276
Explicit (N=11)	.126	.113	.454	.356	.606	.327

The results for negative adverbs show a clear improvement for scores obtained on both treatment types from treatment time one to treatment time two and from treatment time two to treatment time three (although the standard deviations also increase from treatment time one to treatment time two; clearly there is considerable variation in the scores). This time difference was found to be significant ($F(1,81)=28.82$, $p<.001$) for scores on implicit and explicit treatments combined.

Explicit scores are higher on treatment time two and three than implicit scores but the standard deviations are also larger.

7.2.2 The relative effect of implicit and explicit treatments on negative adverbs

To investigate whether the differences between implicit and explicit treatment scores for negative adverbs were significant, a one-way ANOVA for treatment type was performed.

This showed no significant effect for treatment type ($F(1,81)=2.41$, $p=.124$).

7.2.3 Descriptive statistics for intake of adverb placement

Table 14 presents the descriptive statistics for adverb placement intake scores for both implicit and explicit treatments for the three treatment times.

Table 14: Intake scores for adverb placement, by treatment type

	Time 1		Time 2		Time 3	
	Mean	SD	Mean	SD	Mean	SD
Implicit (N=11)	.545	.274	.454	.239	.598	.288
Explicit (N=11)	.666	.226	.545	.218	.621	.183

Adverb placement scores obtained on both implicit and explicit treatments show reasonably high scores at treatment time one which do not improve over time (in fact, there is a dip in the scores at treatment time two and explicit scores are lower at treatment time three than at treatment time one). There is no significant difference in scores (on implicit and explicit treatments combined) on the three treatments ($F(1,63) < .001$, $p = .958$).

Explicit scores are somewhat higher than implicit scores for all three treatments but the standard deviations are quite large.

7.2.4 The relative effect of implicit and explicit treatments on intake of adverb placement

To investigate whether the differences between implicit and explicit treatment scores for adverb placement were significant, again an ANOVA was performed for treatment type. This did not show a significant effect ($F(1,81) = 2.41$, $p = .124$), indicating that the explicit treatment did not have a facilitative effect on intake compared with the implicit treatment.

7.2.5 Summary of the results

The descriptive results show that scores for negative adverbs improve over time, but scores for adverb placement do not. The descriptive results also show that explicit scores are slightly higher than implicit scores, but this difference was not found to be significant for either negative adverbs, or adverb placement. This was contrary to expectations.

7.3 The relative effect of individual, collaborative, and dictation treatments on intake

This section investigates the effects of the individual reconstruction, the collaborative reconstruction, and the dictation treatments on intake of negative adverbs and adverb placement. Participants in the individual reconstruction group listened to a passage twice (they were allowed to take notes) and then had to reconstruct it from memory while performing a talk-aloud task. Participants in the collaborative reconstruction group did the same but worked together in pairs. Participants in the dictation group heard a passage once in its entirety and then part by part. After hearing each part they typed in what they had heard. As described in the previous chapter it was expected that the short chunks in the dictation treatment would facilitate task performance, and hence intake of the target structure. It was also expected that the collaborative reconstruction treatment would lead to greater intake compared with the individual reconstruction treatment, because the collaborative reconstruction treatment allowed participants to work out solutions together, thus increasing the chance of a correct answer.

First the results are presented for negative adverbs, followed by the results for adverb placement. Within each section first descriptive results are presented, followed by repeated measures ANOVAs for treatment type (referring to the three different treatments; dictation, individual reconstruction, and collaborative reconstruction).

7.3.1 Descriptive statistics for intake of negative adverbs

Table 15 presents the descriptive statistics for negative adverb intake scores for the three treatment types for the three treatment times.

Table 15: Intake scores for negative adverbs, by treatment type

	Time 1		Time 2		Time 3	
	Mean	SD	Mean	SD	Mean	SD
Dictation (N=9)	.154	.147	.462	.317	.638	.325
Individual (N=8)	.028	.055	.145	.152	.333	.251
Collaborative (N=11¹⁶)	.219	.119	.477	.263	.59	.251

The descriptive statistics show a clear improvement for scores for all three treatment types, from treatment time one to treatment time two and from treatment time two to treatment time three. However, also the standard deviations increase considerably. This time difference was found to be significant ($F(1,80)=.41.57, p<.001$).

¹⁶ There were 11 collaborative participants because one did not complete the posttests and was eliminated from the dataset.

The figures show that for negative adverbs, dictation scores are the highest at treatment time three, and individual scores are clearly the lowest. Dictation scores show the greatest improvement over time, followed by collaborative scores. Individual scores also improve but not nearly as much.

7.3.2 The relative effect of the individual, collaborative, and dictation treatments on intake of negative adverbs

To investigate whether the differences between scores for negative adverbs on the three treatment types were significant, an ANOVA (3 x treatment types) was performed. The results show a significant effect for treatment type ($F(2,80)=11.01$, $p<.001$). Post-hoc analyses (Least Significant Differences) show 1) a significant advantage for the collaborative reconstruction treatment over the individual reconstruction treatment ($p<.001$), and 2) a significant advantage for the dictation treatment over the individual reconstruction treatment ($p<.001$). The effect size for treatment type is small ($d=.115$).

7.3.3 Descriptive statistics for intake of adverb placement

Table 16 presents the descriptive statistics for adverb placement intake scores for the three treatment types for the three treatment times.

Table 16: Intake scores for adverb placement, by treatment type

	Time 1		Time 2		Time 3	
	Mean	SD	Mean	SD	Mean	SD
Dictation (N=9)	.791	.222	.52	.226	.718	.231
Individual (N=7)	.52	.25	.452	.24	.479	.242
Collaborative (N=6)	.472	.155	.527	.239	.638	.172

Intake scores do not improve over time ($F(1,62) < .001$, $p = .956$), and in fact decline on both the dictation and the individual treatments.

Dictation scores are the highest of the three treatment types. Collaborative scores are the only ones that increase steadily from treatment time one to treatment time two and from treatment time two to treatment time three. Individual scores are the lowest of the three treatment types.

7.3.4 The relative effect of the individual, collaborative, and dictation treatments on intake of adverb placement

To investigate whether the differences between scores for negative adverbs on the three treatment types were significant, an ANOVA for treatment type was performed. The results show a significant effect for treatment type ($F(2,62) = 4.33$, $p = .017$), and post-hoc analyses (Least Significant Differences) show a significant advantage for the dictation over the individual scores ($p = .005$). The effect size is small ($d = .083$).

7.3.5 Summary of the results

The main findings from this section are:

- Dictation scores are the highest for the three treatment types on both negative adverbs and adverb placement, followed by collaborative scores.
- Collaborative scores are the only ones to increase steadily from treatment time one to treatment time two and from treatment time two to treatment time three on both negative adverbs and adverb placement.
- Individual reconstruction scores are the lowest for the three treatment types for both negative adverbs and adverb placement.
- The collaborative reconstruction treatment significantly outperforms the individual reconstruction treatment on negative adverbs.
- The dictation treatment significantly outperforms the individual reconstruction treatment on both negative adverbs and adverb placement.
- Negative adverb scores appear to improve over time, adverb placement scores do not.
- Standard deviations increase over time.

Table 17 visually represents the results above and presents the average intake scores for the three treatment types across the three treatment times.

Table 17: Mean intake scores for the three treatment times for negative adverbs and adverb placement

	Negative Adverbs	Adverb Placement
Dictation	.418	.677
Individual	.169	.348
Collaborative	.32	.546

7.4 Discussion of the results

7.4.1 The relative effect of implicit and explicit treatments on intake

Although explicit scores were observed to be somewhat higher than implicit scores for both negative adverbs and adverb placement, this difference did not reach significance. In other words, the explicit treatment did not lead to greater intake than the implicit treatment, contrary to expectations.

In the case of negative adverbs, it could be that the grammatical structure is simply too complex for participants to notice it. As discussed in chapter six negative adverbs are semantically not transparent and may be difficult to recognise. Their negative aspect (causing the inversion) is not particularly salient and the structure is generally late acquired. The explicit instructions given in the treatments drew participants' attention to the negative adverbs but did not explain their use or give a rule. This drawing of participants' attention to the target structure may have increased its saliency, (albeit not

that of its negative aspect). However, the instructions did not reduce the structure's complexity. As a result the instructions did not affect the degree to which it was noticed in the input and thus did not help the participants to attend to the word order at that time.

As for adverb placement, scores for the first treatment were considerably higher than those for negative adverbs but did not improve over time. The treatments apparently did not succeed in affecting a change in what participants were able to take in from the input in relation to the placement of adverbs. In addition, although explicit scores appeared to be somewhat higher than implicit scores, there was no significant difference between the two treatment types. This was contrary to the expectation that the explicit treatment would lead to greater intake than the implicit treatment.

One possible explanation for these findings is that the input in both treatments consisted of positive evidence of adverb placement only. Some researchers have argued (cf. L. White, 1991) that the acquisition of adverb placement requires negative evidence. This may also apply to participants' ability to *take in* this aspect from the input. Apparently the position of the adverb in a sentence is indeterminate in the interlanguage of participants of intermediate level (as witnessed by their at,- or near-chance performance). Until they receive specific information about what is *not* possible in relation to English adverb placement, the input they receive may not make a difference. This could also explain why the explicit treatment did not result in an improvement over the implicit treatment. As the explicit treatment only included an example of correct adverb placement (positive

evidence) and the instruction to pay attention to the place of the adverb in the sentence, it did not provide the additional information participants may have needed.

Robinson (1996) investigated the effects of implicit, incidental, rule-search, and instructed conditions on learning (i.e. not intake). His rule-search condition required participants to search for a rule in the input they were exposed to but only gave positive evidence of the target structures and did not provide any type of explanation or rule presentation. The rule-search condition yielded low scores, considerably lower than the instructed condition, and in some cases even lower than the implicit and incidental conditions. Robinson points out that the rule-search condition comprised an inductive type of instruction, as opposed to the deductive rule presentation condition. The findings reported here for intake appear similar to findings from Robinson's research as the explicit condition was essentially inductive in nature (attention was drawn to the target structure but no rules governing its use were presented). This did not appear to be any more successful than the implicit condition, similar to what Robinson found.

7.4.2 The relative effect of individual, collaborative, and dictation treatments on intake

The three main observations from the descriptive statistics were that 1) the individual reconstruction treatment resulted in the lowest intake scores, 2) the collaborative reconstruction treatment resulted in higher scores than the individual reconstruction treatment, but lower scores than the dictation treatment, and improved consistently across the three treatment times, 3) the dictation treatment yielded the highest intake scores overall. The ANOVAs showed that 1) collaborative reconstruction scores were

significantly higher than individual reconstruction scores for negative adverbs, and that 2) dictation scores were significantly higher than individual reconstruction scores for both negative adverbs and adverb placement. 3) There was no significant difference between collaborative reconstruction and dictation scores.

7.4.2.1 The dictation treatment

The dictation treatment resulted in the highest intake scores and significantly outperformed the individual treatment on both negative adverbs and adverb placement. There may be several reasons for this. First of all, the dictation treatment requires immediate recall (the passage was heard once in its entirety and then part by part whereby the participant was required to type in each part immediately after hearing it) as opposed to the more delayed recall of the individual and collaborative reconstruction treatments (where participants had to finish listening to the entire passage and then recall that). In this sense the dictation task may have been easier as it placed a smaller cognitive load on participants' working memory and did so for a shorter length of time. Hence there may have been more opportunity for attention to be directed at the target structure. Research in information processing has posited that task difficulty greatly affects the amount of attention available for learners to peruse and allocate to form as well as meaning (Kahneman, 1973; Kahneman & Treisman, 1984; McLaughlin, Rossman, & McLeod, 1983). The dictation task may have left participants with a good deal of opportunity to focus on the target forms.

In addition, in the dictation treatment the passage was presented in isolated parts. Although together they formed a meaningful passage, the input consisted of chunks that in themselves may not have much meaning (e.g. ‘seldom had he seen...’). This requires attention to be directed at the linguistic minutiae of the input. At the same time more mental processing capacity may be available for this as less has to be allocated to decoding of meaning (cf. VanPatten, 1990).

7.4.2.2 The individual reconstruction treatment

The individual reconstruction treatment resulted in the lowest intake scores, and significantly lower scores than the collaborative reconstruction treatment on both negative adverbs and adverb placement. The reason for the relatively poor performance of the individual reconstruction treatment may be that it requires participants to pay attention to meaning, or at least more so than for example the dictation treatment. In order to remember the entire passage participants will have to make use of mnemonic cues derived from the topic (including logical and chronological information). These may deflect attention away from the target structures in the input and negatively affect the results. The treatment may also be quite demanding in that it is done individually. The relatively long stretches of text need to be remembered and supplied without the help of a partner. This combination of task demands and the individual aspect arguably make the individual treatment the least likely to result in participants correctly supplying the target forms. However, this does not necessarily mean that the target feature has not been noticed and that some type of internal connection has not been made; it is however, unlikely to show from the participant’s production. There is a clear limitation evident here in the

chosen operationalisation of intake as a production measure. Some additional information could be obtained from the participants' talk-aloud protocols and this is discussed below in section 7.4.3.

One of the distinguishing factors between the treatments was the presence or absence of verbalisation. Baddeley & Hitch (1974) identified three components of working memory, the central executive, the visuo-spatial sketchpad, and the phonological loop. The phonological loop comprises a phonological store and a process of articulatory rehearsal where inner speech can be used to refresh the decaying representations in the phonological store. Verbalisation in the form of talk-aloud is intended to be similar to inner speech (the instructions given to participants asked them to 'say out loud anything that goes through your mind as you do the task'; see chapter six for a description of the talk-aloud tasks) and may have assisted this process of 'refreshing decaying representations'. However, some researchers have warned that verbalisation adds another task for the participant and thus affects performance (e.g. Seliger, 1983). Previous research on the effects of verbalisation has not produced clear-cut findings. Ericsson & Simon (1993) in the introduction to their well-known book on protocol analysis write: 'our claim is that for each selective request for verbalized information an associated underlying thought sequence mediates any effect on behavior and performance. The effect is clearly not due to the mere act of verbalization, for investigators have been able to produce the same changes in performance with instructions to generate reasons covertly (Wilder & Harvey, 1971)' (p. xxxii). However, of the nearly 30 studies they reviewed to support this claim, none investigated second language acquisition. Verbalisation and the purpose of the task at hand (to learn to understand and express

oneself in the target language) are more naturally linked than in some other tasks (e.g. mathematics) and thus verbalisation may have effects that would not be present in other learning situations. A study by Stratman & Hamp-Lyons (1994) found a negative effect of think-aloud on a writing task, but other studies have found beneficial effects on writing (Swanson-Owens & Newell, 1994), and vocabulary learning (Crutcher, 1990). Ericsson & Simon (1993) claim that different types of verbalisation have a differing influence on task performance, with talk-aloud being relatively unobtrusive and less so than think-aloud tasks (for the distinction between the two, see chapter six). The significantly lower intake on the individual reconstruction task, however, could point to the talk-aloud instructions having had an effect, perhaps by placing additional demand on participants' cognitive capacity.

7.4.2.3 The collaborative reconstruction treatment

The collaborative reconstruction treatment resulted in relatively high intake scores and significantly higher scores than the individual reconstruction treatment on negative adverbs. The reason for the success of this treatment may lie in its collaborative nature. There is an increased likelihood that at least one of the two participants notices the structure and thus that it will be included in the reconstructed text. This is in line with claims resulting from interactionist and sociocultural theories of learning. As Tharp & Gallimore (1988) write: 'a key feature of this emergent view of human development is that higher order functions develop out of social interaction' (pp. 6-7). Lantolf (2000) emphasises the role of social context and collaborative dialogue in second language learning. The collaborative nature of the reconstruction task and the support participants

derive in their reconstructive effort from each other while discussing the task would be expected to result in greater success in completing the task.

Above it was suggested that the talk-aloud protocol may have negatively affected performance on the individual reconstruction treatment. Although the collaborative reconstruction treatment also involved talk-aloud, the actual type of talk generated by the treatment is more similar to normal dialogic speech and does not involve verbalisation of inner speech. For this reason one might expect less interference from the task at hand.

7.4.3 Additional information from the talk-aloud protocols

To corroborate some of the findings reported above, participants' talk-aloud protocols from the individual reconstruction and collaborative reconstruction treatments were investigated. A random selection was made of just over half (16) of the participants who completed either the collaborative or the individual treatments and for each participant one tape was selected of either the first, second, or third treatment, resulting in a total of eight tapes each for the individual and collaborative treatments, of which six were of treatment time one, and five each were of treatment times two or three. Half of these were implicit treatments, and half explicit treatments.

Analysis consisted of a transcription of the recordings followed by a) the identification of mismatches between verbal protocols and suppliance of the target structure on screen, and b) the identification of negotiation or meta-comments about the target structure. A sample transcript has been included as appendix F.

The analyses revealed that 1) the amount of talk in the individual reconstruction treatment was very small. In essence, participants only said out loud what they typed in, word for word. No significant mismatches occurred between what was said and what participants typed in. In this sense, the verbal protocols as a measure of intake appeared to be identical to participants' performance on the treatments. 2) The amount of talk in the collaborative reconstruction treatment was greater and negotiation took place between the participants. However, with regards to the target structure, performance almost perfectly mirrored that of the reconstructed texts, with only one mismatch found on one item in all of the 16 transcriptions. 3) There were no significant differences between participants' transcriptions depending on whether they were completing the implicit or the explicit treatment. 4) There were only very few cases of participants making comments about the (frequency of the) target structure. An example occurred in a collaborative task on treatment time two (note that the participants do not arrive at the correct solution).

S1 a typing course

S2 a typing course

S1 No sooner...I don't know why but they like this...it's all the time..no sooner...no sooner..all the time

S2 yeah, right...laughs

S1 No sooner they finish the course...and I guess we have (to say both).

Ya?

S2 *ya*

S1 *no sooner they.....dot dot dot...grew?*

S1 = Student 1

S2 = Student 2

These results run counter to findings from some other studies, at least as far as the collaborative treatment is concerned. Both Swain (1998) and Swain & Lapkin (2001) found a high number of language-related episodes (LREs) in a comparison of a dictogloss and a jigsaw treatment (incidentally, their expectation that the jigsaw task would generate significantly more meaning-focused LREs and the dictogloss task more form-focused LREs was not borne out). However, Swain points out (1998) that the language-related episodes did not focus on the target structure but on other formal aspects of the language. That was the case in the present study too, but the number of such episodes was much lower than that reported by Swain. Similar to this study, others (e.g. Radwan, 2005) have also found small numbers of comments in verbal reports.

As shown above, the transcriptions of the reconstruction treatments did not reveal a focus on the target linguistic form in any of the treatment types. In addition, there was no discernible difference between the transcriptions of either the implicit or the explicit treatments. This partly corroborates the findings from the descriptive statistics and the ANOVAs reported above that showed no effect for the explicit treatment over the implicit treatment. There is no evidence that participants paid conscious attention to the target structures as a result of the attention-drawing instructions they had received. This

observation is somewhat similar to that made by Robinson (1996; see above) who found that participants in the implicit, incidental, and rule-search conditions did not verbalise the target structure to any great extent.

7.4.4 Summary of the results

This chapter set out to investigate the effects of 1) the implicit and explicit treatments, and 2) the individual reconstruction, the collaborative reconstruction, and the dictation treatments, on intake of negative adverbs and adverb placement. Contrary to expectations, the explicit treatment did not have a greater effect on intake of negative adverbs or adverb placement than the implicit treatment. In line with expectations, however, the dictation treatment and the collaborative reconstruction treatment outperformed the individual reconstruction treatment.

CHAPTER EIGHT

WHAT ARE THE RELATIVE EFFECTS OF IMPLICIT AND EXPLICIT TREATMENTS ON ACQUISITION?

8.1 Introduction

This chapter reports the results of the main study for the second research question:

RQ2 - What are the relative effects of listening tasks with implicit versus explicit instructions, administered under incidental learning conditions, on the *acquisition* of negative adverbs and adverb placement?

The first section of this chapter deals with the relative effects of the implicit and explicit treatments on acquisition of negative adverbs and adverb placement as measured through performance on the *timed* grammaticality judgement test. The second section deals with the relative effects of the implicit and explicit treatments on acquisition as measured through performance on the *untimed* grammaticality judgement test. The results on timed and untimed tests are presented separately because performance on the two types of tests was found to be significantly different (for negative adverb target items $F(2,168)=7.67$, $p<.001$, for adverb placement target items $F(2,168)=4.72$, $p=.01$). Within each section, results are first presented for negative adverbs, followed by results for adverb placement. The results are presented separately as they represent scores for different groups and levels of participants. Scores for negative adverbs and adverb placement are also significantly different (for timed tests $F(1,598)=-3.68$, $p<.001$ and for untimed tests $F(1,598)=-4.12$, $p<.001$).

The results include descriptive statistics, followed by repeated measures ANOVAs for the following:

- 1) Overall scores.
- 2) For scores on grammatical items (items presented on the grammaticality judgement tests in correct form).
- 3) For scores on ungrammatical items (items presented in incorrect form). The results for grammatical and ungrammatical scores are presented separately because significant differences in performance were found (for negative adverbs timed scores ($t(83)=4.78$, $p<.001$), for negative adverbs untimed scores there was no difference ($t(83)=1.74$, $p=.086$), for adverb placement timed scores ($t(66)=7.81$, $p<.001$) and for adverb placement untimed scores ($t(66)=12.68$, $p<.001$).
- 4) For scores on old items (items that occurred on both the treatments and the grammaticality judgement tests) and new items (items that occurred on the tests only). The results are presented separately for adverb placement as significant differences were found on timed ($t(131)=4.16$, $p<.001$) and untimed scores ($t(131)=3.83$, $p<.001$). On negative adverbs no differences were found, either on the timed ($t(167)=.83$, $p=.407$) or on the untimed scores ($t(167)=-.02$, $p=.982$) and the results have therefore not been presented separately for old and new items.

Within each of these sections it was first established whether the instruction had any significant effect on acquisition. This was done by investigating whether gains for target items were greater than those for control items. To this end a 2 (target/control) x 3 (gain scores) ANOVA was performed. Where the target items were negative adverbs, the

control items were adverb placement items and vice versa. Participants did not receive any instruction on the control items (the control items did not occur as part of the treatments). The three gain scores are the scores on the three gain pairs (gain 1 = gains from pretest to posttest, gain 2 = gains from pretest to delayed posttest, gain 3 = gains from posttest to delayed posttest). Gain scores were used because there were significant differences between scores on target and control items on the pretest (see chapter six) and these differences may have affected subsequent performance.

Where no effect was found for the target items there was no evidence that the treatments had any effect on acquisition. In those cases, no further analyses have been performed. Where an advantage for the target items was found, a further one-way ANOVA for treatment type (implicit/explicit) was performed on target scores only to identify whether there was an effect in favour of the implicit or the explicit treatment. Results include significance levels (set at $p < .05$) and effect sizes (Cohen's d).

As described in chapter six, it was expected that the explicit treatment would lead to increased acquisition. It was also expected that the effects of the explicit treatment on acquisition would be more noticeable on the untimed tests than on the timed tests, as the explicit treatment was expected to favour the development of explicit knowledge. Previous research has shown that the application of explicit knowledge is facilitated by increasing the amount of time available to participants (R. Ellis, 2004).

8.2 The effects of implicit and explicit treatments on acquisition (timed tests)

In this section the effects of the implicit and explicit treatments on acquisition as measured by performance on the timed tests are investigated. The results for negative adverbs are presented first, followed by the results for adverb placement. Within both sections, descriptive results are presented first, followed by repeated measures ANOVAs.

8.2.1 Descriptive statistics for negative adverbs

Table 18 presents the descriptive statistics for negative adverb scores on the timed tests, for both implicit and explicit treatments. The table shows mean scores and standard deviations for the target items and for the control items (i.e. the scores for adverb placement) as well as grammatical and ungrammatical items separately.

Table 18: Mean scores for the timed grammaticality judgement test for negative adverbs, by treatment type

NA Timed tests	Target				Control			
	Grammatical Mean	SD	Ungramm. Mean	SD	Grammatical Mean	SD	Ungramm. Mean	SD
Pretest								
Implicit (n=17)	.347	.154	.27	.172	.629	.175	.179	.084
Explicit (n=11)	.454	.196	.372	.167	.681	.175	.179	.084
Posttest								
Implicit (n=17)	.588	.244	.329	.211	.588	.244	.329	.211
Explicit (n=11)	.572	.331	.445	.258	.672	.237	.3	.263
Delayed posttest								
Implicit (n=17)	.658	.234	.347	.245	.682	.17	.3	.144
Explicit (n=11)	.536	.366	.345	.225	.6	.352	.386	.256

Table 19 shows the mean gain scores 1) from pretest to posttest, 2) from pretest to delayed posttest, and 3) from posttest to delayed posttest.

Table 19: Gain scores for the timed grammaticality judgement test for negative adverbs, by treatment type

NA Timed tests	Target				Control			
	Grammatical Gain	SD	Ungramm. Gain	SD	Grammatical Gain	SD	Ungramm. Gain	SD
Pretest to posttest								
Implicit (n=17)	.241	.245	.058	.2	-.041	.197	.15	.213
Explicit (n=11)	.118	.357	.072	.241	-.009	.347	.127	.2
Pretest to delayed posttest								
Implicit (n=17)	.311	.228	.076	.301	.052	.18	.12	.141
Explicit (n=11)	.081	.354	-.027	.296	-.081	.389	.213	.23
Posttest to delayed posttest								
Implicit (n=17)	.07	.323	.017	.283	.094	.265	-.029	.261
Explicit (n=11)	-.036	.456	-.1	.322	-.072	.337	.086	.282

The main results for the target items are:

- Gain scores for the implicit treatment are higher than those for the explicit treatment almost across the board.
- Gain scores for the implicit treatment continue to be (just) positive from posttest to delayed posttest, but are negative for the explicit treatment.
- Gain scores are considerably higher on grammatical target items than on ungrammatical target items, but lower for control items.
- The standard deviations are very large across the board, but in most cases larger for the explicit group than for the implicit group.

8.2.2 The relative effect of implicit and explicit treatments on negative adverbs

The following three sections present results for 1) overall scores, 2) scores on grammatical items, and 3) scores on ungrammatical items. The results for scores on old and new items have not been presented separately as there was no significant difference in performance on these two types of items in the case of negative adverbs (see above).

8.2.2.1 Overall scores

First, it was investigated whether the differences between gain scores on target and control items were significant. To this end a 2 (target/control) x 3 (gain scores) repeated measures ANOVA was performed. This showed no effect for target ($F(1,333)=1.16$, $p=.283$). The treatments did not have an effect on acquisition of negative adverbs as measured by the timed tests.

8.2.2.2 Grammatical items

As with the overall scores (paragraph 8.2.2.1), it was first investigated whether there was a significant difference between gain scores on target and control items. This proved to be the case ($F(1,165)=9.71$, $p=.002$) to the advantage of the target items (the mean gain score for target items was .163, for control items -.011). The treatments did have an effect on acquisition of grammatical items with a medium effect size ($d=.482$).

Next, an ANOVA was performed to establish if there was an effect for treatment type. This was not the case for gain scores from pretest to posttest ($F(1,54)=.31$, $p=.581$). However, from pretest to delayed posttest there was a difference ($F(1,54)=4.95$, $p=.03$),

to the advantage of the implicit treatment (the mean gain score for the explicit treatment was .092, for the implicit treatment .311), but with a small effect size ($d=.088$). This was contrary to expectations. For gain scores from posttest to delayed posttest there was no difference ($F(1,54)=2.24, p=.14$).

8.2.2.3 Ungrammatical items

On ungrammatical items there was also a significant difference ($F(1,165)=4.49, p=.035$), but it was to the advantage of the control items (the mean gain score for target items was .006, for control items .087).

8.2.2.4 Summary of the results

There was a difference between gain scores on target and control items to the advantage of the target scores only on grammatical items. However, contrary to expectations, the implicit treatment resulted in higher gain scores than the explicit treatment on the grammatical items.

8.2.3 Descriptive statistics for adverb placement

Table 20 presents the descriptive statistics for adverb placement scores on the timed tests, for both implicit and explicit treatments. The table shows mean scores and standard deviations for the target items and for the control items (i.e. the scores for negative adverbs) as well as grammatical and ungrammatical items separately.

Table 20: Mean scores for the timed grammaticality judgement test for adverb placement, by treatment type

AP Timed tests	Target				Control			
	Grammatical Mean	Ungramm. SD	Grammatical Mean	Ungramm. SD	Grammatical Mean	Ungramm. SD	Grammatical Mean	Ungramm. SD
Pretest								
Implicit (n=11)	.546	.176	.13	.125	.223	.178	.253	.096
Explicit (n=11)	.577	.281	.233	.312	.266	.273	.283	.247
Posttest								
Implicit (n=11)	.576	.271	.238	.287	.376	.294	.292	.23
Explicit (n=11)	.644	.324	.2	.273	.316	.223	.5	.264
Delayed posttest								
Implicit (n=11)	.684	.24	.284	.267	.33	.278	.23	.235
Explicit (n=11)	.744	.187	.2	.165	.5	.264	.26	.188

Table 21 shows the mean gain scores 1) from pretest to posttest, 2) from pretest to delayed posttest, and 3) from posttest to delayed posttest.

Table 21: Gain scores for the timed grammaticality judgement test for adverb placement, by treatment type

AP Timed tests	Target				Control			
	Grammatical Gain	Ungramm. SD	Grammatical Gain	Ungramm. SD	Grammatical Gain	Ungramm. SD	Grammatical Gain	Ungramm. SD
Pretest to posttest								
Implicit (n=17)	.03	.37	.107	.262	.153	.278	.038	.25
Explicit (n=11)	.066	.25	-.033	.132	.133	.269	.033	.154
Pretest to delayed posttest								
Implicit (n=17)	.138	.301	.153	.225	.107	.259	-.023	.265
Explicit (n=11)	.166	.295	-.032	.374	.233	.433	-.016	.301
Posttest to delayed posttest								
Implicit (n=17)	.107	.246	.046	.185	-.04	.236	-.061	.138
Explicit (n=11)	.1	.269	.001	.324	.1	.531	-.05	.246

The main results for target items are:

- Gain scores on grammatical items are similar for the implicit and explicit treatments, with a slight advantage for the explicit treatment from pretest to posttest and from pretest to delayed posttest.
- Gain scores on ungrammatical items are higher for the implicit than for the explicit treatment.
- Scores on target items continue to improve from posttest to delayed posttest (although on the explicit treatment negligibly so), whereas on control items they do not in three out of four cases.

8.2.4 The relative effect of implicit and explicit treatments on adverb placement

The following four sections present results for 1) overall gain scores, 2) gain scores on grammatical items, 3) gain scores on ungrammatical items (see above), 4) gain scores on old and new items.

8.2.4.1 Overall scores

As with the results for negative adverbs, it was first investigated whether there was a difference in the gain scores for target and control items. This proved not to be the case ($F(1,261)=.73$, $p=.393$). However, as the descriptive statistics showed some differences between scores on target and control items, especially between posttest and delayed posttest, it was decided to perform separate one-way ANOVAs for target/control on the different gain pairs. There was no significant difference in gain scores from pretest to posttest ($F(1,85)=.02$, $p=.883$). From pretest to delayed posttest there was an almost

significant difference ($F(1,85)=3.33$, $p=.071$) to the advantage of the target items (the mean gain score for target items was .145, for control items .036). There was a significant advantage for the target items from posttest to delayed posttest ($F(1,85)=5.28$, $p=.024$) (mean gain for target scores is .081, for control -.037) but with a small effect size ($d=.094$).

As there was an almost significant difference between gain scores on target and control items from pretest to delayed posttest, a subsequent one-way ANOVA was performed to establish whether there was an effect for the explicit treatment. This showed no effect for treatment type ($F(1,86)=.01$, $p=.919$). An ANOVA using gain scores from posttest to delayed posttest also showed no effect for treatment type ($F(1,86)=.19$, $p=.666$).

8.2.4.2 Grammatical items

There was no significant difference in the overall gain scores for grammatical target and control items ($F(1,129)=.01$, $p=.911$).

8.2.4.3 Ungrammatical items

There was no significant difference in the overall gain scores for target and control items ($F(1,129)=.88$, $p=.354$).

8.2.4.4 Old and new items

The distinction between old and new items refers to items that occurred on both the tests and the treatments (old items) or on the tests only (new items). The distinction only

applies to target items as control items did not occur in the treatments. ANOVAs for treatment type showed no effect on any of the three gain pairs for old ($F(1,130)=.01$, $p=.928$), nor for new ($F(1,130)=.68$, $p=.412$) items. There was no differential effect for the implicit and explicit treatments on acquisition of these two types of items, as measured by the timed tests.

8.2.4.5 Summary of the results

There was only an effect for the treatments on adverb placement on overall gain scores from posttest to delayed posttest, as measured by the timed grammaticality judgement test. No effect was found for treatment type, showing that the explicit treatment did not have a greater effect on acquisition as measured by the timed test, compared with the implicit treatment. This was contrary to expectations.

8.3 The effects of implicit and explicit treatments on acquisition (untimed tests)

In this section the effects of the implicit and explicit treatments on acquisition as measured by performance on the untimed tests are investigated. The results for negative adverbs are presented first, followed by the results for adverb placement. Within both sections, descriptive results are presented first, followed by repeated measures ANOVAs.

8.3.1 Descriptive statistics for negative adverbs

Table 22 presents the descriptive statistics for negative adverb scores on the untimed tests, for both implicit and explicit treatments. The table shows mean scores and standard

deviations for the target items and for the control items (i.e. the scores for adverb placement) as well as grammatical and ungrammatical items separately.

Table 22: Mean scores for the untimed grammaticality judgement test for negative adverbs, by treatment type

NA Untimed tests	Target				Control			
	Grammatical Mean	SD	Ungramm. Mean	SD	Grammatical Mean	SD	Ungramm. Mean	SD
Pretest								
Implicit (n=17)	.464	.301	.494	.204	.752	.211	.535	.216
Explicit (n=11)	.272	.272	.645	.201	.69	.225	.595	.201
Posttest								
Implicit (n=17)	.694	.219	.435	.228	.717	.197	.535	.244
Explicit (n=11)	.49	.301	.545	.206	.745	.143	.636	.227
Delayed posttest								
Implicit (n=17)	.717	.197	.452	.232	.741	.176	.585	.191
Explicit (n=11)	.627	.334	.409	.221	.781	.14	.59	.225

Table 23 shows the mean gain scores 1) from pretest to posttest, 2) from pretest to delayed posttest, and 3) from posttest to delayed posttest.

Table 23: Gain scores for the untimed grammaticality judgement test for negative adverbs, by treatment type

NA Untimed tests	Target				Control			
	Grammatical Gain	Ungramm. SD	Grammatical Gain	Ungramm. SD	Grammatical Gain	Ungramm. SD	Grammatical Gain	Ungramm. SD
Pretest to posttest								
Implicit (n=17)	.229	.271	-.058	.19	-.035	.176	0	.269
Explicit (n=11)	.218	.292	-.1	.282	.054	.211	.04	.204
Pretest to delayed posttest								
Implicit (n=17)	.252	.316	-.041	.308	-.011	.226	.05	.22
Explicit (n=11)	.254	.5	-.236	.372	.09	.344	-.004	.328
Posttest to delayed posttest								
Implicit (n=17)	.023	.185	.017	.255	.023	.204	.05	.235
Explicit (n=11)	.136	.441	-.136	.297	.036	.254	-.045	.342

The main results for the target structure are:

- Gain scores on grammatical items for the implicit and explicit treatments are similar from pretest to posttest and from pretest to delayed posttest.
- Gain scores on grammatical items for the explicit treatment are greater than those for the implicit treatment from posttest to delayed posttest
- Gain scores on ungrammatical items are negative for the explicit treatment for all three gain pairs. For the implicit treatment they are higher (but still negative) from pretest to delayed posttest but are positive from posttest to delayed posttest.
- Gain scores on grammatical items are considerably higher than gain scores on ungrammatical items.
- The standard deviations are large in general and larger for the explicit treatment than the implicit group.

8.3.2 The relative effect of implicit and explicit treatments on negative adverbs

The following three sections present results for 1) overall scores, 2) scores on grammatical items, and 3) scores on ungrammatical items (see above). The results for scores on old and new items have not been presented separately as there was no significant difference in performance on these two types of items on negative adverbs.

8.3.2.1 Overall scores

First, it was investigated whether the differences between gain scores on target and control items were significant. To this end a 2 (target/control) x 3 (gain scores) repeated measures ANOVA was performed. For overall scores there was no significant difference ($F(1,333)=.147, p=.225$). The treatments did not have an overall effect on participants' performance on the target items.

8.3.2.2 Grammatical items

For grammatical items there was a significant difference between gain scores on target and control items ($F(1,165)=15.75, p<.001$) to the advantage of the target items (the mean gain score for target items was .18, for control items .004) with a medium effect size ($d=.611$).

Next, ANOVAs were performed to establish if there was an effect for treatment type. This proved not to be the case for gain scores from pretest to posttest ($F(1,54)=.3, p=.586$), nor from pretest to delayed posttest ($F(1,54)=1.06, p=.307$), nor from posttest to delayed posttest ($F(1,54)=.74, p=.394$).

8.3.2.3 Ungrammatical items

For ungrammatical items there was a significant difference between gain scores on target and control items ($F(1,165)=5.37$, $p=.021$), however this was to the advantage of the control items (the mean gain score for target items was $-.074$, for control items $.022$).

8.3.2.4 Summary of the results

There was only a difference between gain scores on target and control items on grammatical items. This means that the treatments had an effect on the acquisition of negative adverbs only on grammatical items, as measured by the untimed tests.

No effect for treatment type was found. Contrary to expectations the explicit treatment did not have a beneficial effect on acquisition.

8.3.3 Descriptive statistics for adverb placement on the untimed tests

Table 24 presents the descriptive statistics for adverb placement scores on the untimed tests, for both implicit and explicit treatments. The table shows mean scores and standard deviations for the target items and for the control items (i.e. the scores for adverb placement) as well as grammatical and ungrammatical items separately.

Table 24: Mean scores for the untimed grammaticality judgement test for adverb placement, by treatment type

AP Untimed tests	Target				Control			
	Grammatical Mean	Ungramm. SD	Grammatical Mean	Ungramm. SD	Grammatical Mean	Ungramm. SD	Grammatical Mean	Ungramm. SD
Pretest								
Implicit (n=11)	.746	.151	.292	.165	.284	.244	.5	.154
Explicit (n=11)	.833	.187	.288	.126	.333	.282	.483	.19
Posttest								
Implicit (n=11)	.746	.198	.33	.213	.43	.252	.442	.169
Explicit (n=11)	.777	.156	.311	.236	.566	.32	.522	.305
Delayed posttest								
Implicit (n=11)	.761	.171	.353	.218	.4	.227	.473	.097
Explicit (n=11)	.822	.171	.433	.3	.633	.223	.422	.252

Table 25 shows the mean gain scores 1) from pretest to posttest, 2) from pretest to delayed posttest, and 3) from posttest to delayed posttest.

Table 25: Gain scores for the untimed grammaticality judgement test for negative adverbs, by treatment type

AP Untimed	Target				Control			
	Grammatical Gain	Ungramm. SD	Grammatical Gain	Ungramm. SD	Grammatical Gain	Ungramm. SD	Grammatical Gain	Ungramm. SD
Pretest to posttest								
Implicit (n=17)	0	.267	.038	.272	.146	.256	-.057	.173
Explicit (n=11)	.022	.268	.218	.292	.038	.269	.054	.211
Pretest to delayed posttest								
Implicit (n=17)	.015	.181	.061	.284	.115	.279	-.026	.139
Explicit (n=11)	.144	.343	.354	.5	-.061	.224	.03	.344
Posttest to delayed posttest								
Implicit (n=17)	.015	.247	.023	.291	-.03	.188	.03	.177
Explicit (n=11)	.122	.29	.116	.441	-.1	.173	.036	.254

The main results for the target items are:

- Gain scores for the explicit treatment are consistently higher than gain scores for the implicit treatment.
- Gains from pretest to posttest and from pretest to delayed posttest are considerably smaller for grammatical items than for ungrammatical items. Gains from posttest to delayed posttest are similar.
- Standard deviations are large, and greater for scores in the explicit group than for scores in the implicit treatment.

8.3.4 The relative effect of implicit and explicit treatments on adverb placement

The following four sections present results for 1) overall gain scores, 2) gain scores on grammatical items, 3) gain scores on ungrammatical items (see above), 4) gain scores on old and new items.

8.3.4.1 Overall scores

First, it was investigated whether the differences between gain scores on target and control items were significant. To this end a 2 (target/control) x 3 (gain scores) repeated measures ANOVA was performed. This showed no difference ($F(1,261)=.26$, $P=.613$) and there was thus no overall effect for the treatments on acquisition of adverb placement as measured by the untimed tests.

8.3.4.2 Grammatical items

There was a significant difference between target and control grammatical items ($F(1,129)=6.49, p=.012$), however it was to the advantage of the control items (the mean gain score for target items was $-.008$, for control items $.115$).

8.3.4.3 Ungrammatical items

There was a significant difference between gain scores on target and control items ($F(1,129)=4.65, p=.032$) to the advantage of the target items (the mean gain score for target items was $.064$, for control items $-.026$) but with a small effect size ($d=.379$).

There was no effect for treatment type from pretest to posttest ($F(1,19)=.04, p=.844$), nor from pretest to delayed posttest ($F(1,19)=.49, p=.491$), or from posttest to delayed posttest ($F(1,19)=.61, p=.444$).

8.3.4.4 Old and new items

ANOVAs for treatment type showed no effect on any of the three gain pairs for old ($F(1,130)=.02, p=.891$), nor for new items ($F(1,130)=.77, p=.382$). There was no differential effect for the implicit and explicit treatments on acquisition of these two types of items, as measured by the untimed tests.

8.3.4.5 Summary of the results

There was only an effect for the treatments on ungrammatical items, with scores on target items showing significantly greater gains than scores on control items. No effect was

found for treatment type, showing that the explicit treatment did not have any effect on acquisition as measured by the untimed tests, compared with the implicit treatment.

8.4 Discussion

The main results were:

- 1) The treatments did not have an effect on acquisition in many cases. Significant differences between scores on target and control items were only found for negative adverbs on grammatical items, on both timed and untimed tests. For adverb placement timed test scores a nearly significant difference was found on overall gain scores from pretest to delayed posttest and a significant difference on gain scores from posttest to delayed posttest. On untimed tests a significant difference was found on ungrammatical items.
- 2) The explicit treatment did not have a beneficial effect on acquisition, contrary to expectations.

8.4.1 Overall effects for the treatments on acquisition

8.4.1.1 Negative adverbs

There were no significant differences between scores on negative adverb target and control items on overall scores, nor on scores on ungrammatical items. The treatments only had an effect on participants' performance on grammatical items, on both the timed and untimed tests. Why was the effect for the treatments so limited? It could be that the target structure was simply too difficult to be acquired in the short space of time given to

participants (a total of three treatments of around 45 minutes each), or that the total amount of exposure was too small, or both. As noted in the previous chapter, negative adverbs are particularly complex and the exposure participants received may not have been sufficient.

It is interesting to note that participants did take in part of the input (as shown by performance on the treatments; see the previous chapter), but that this did not result in acquisition significantly greater than that of the control structure. This suggests that a lack of initial noticing (and correct suppliance) during treatment of the negative adverbs was not the main reason for the lack of acquisition.

R. Ellis (1995) identifies a number of processes involved in the acquisition of grammatical features. The first of these is “interpretation” and refers to learners paying attention to specific linguistic features. Successful noticing results in intake, and this is followed by “integration” into or “restructuring” of the learner’s interlanguage. The third and final stage is “production”. Why did participants in the present study interpret but not integrate negative adverbs? The instructions given to participants in both the implicit and explicit groups did not include 1) rule presentation, 2) feedback, or 3) negative evidence. Each of these characteristics may have prevented processing of the intake, beyond what was needed for immediate task performance.

Firstly, in the implicit group there was no attention drawn to the target structures. In the explicit group there was, but no rule presentation took place. This may have prevented

participants from developing metalinguistic knowledge of the target structure. Hu (2002) and Sorace (1985) have argued that metalinguistic knowledge can be applied during L2 production and help to facilitate subsequent learning. One advantage is the potential for transfer of knowledge from L1 to L2. However, although some research has found a facilitative effect for rule-presentation (e.g. Robinson 1996), other research has not (e.g. Sanz & Morgan-Short, 2004); it is not clear if in this the lack of rule presentation prevented participants from learning the target structure.

Secondly, the lack of feedback may have mitigated against participants noticing a gap in their performance (cf. Schmidt & Frota, 1986), or making a “cognitive comparison” (R. Ellis, 1995; see for a discussion of the role of feedback chapter three) between the input and their own output. The lack of feedback may have also inhibited participants from constructing and testing hypotheses about the target structure. “Clear feedback” was one of the requirements Loschky & Bley-Vroman (1993) found for tasks to be successful.

Thirdly, negative evidence other than through feedback, such as by way of an example in the instructions as to what is *not* possible in the target language, may also encourage acquisition, but in the present study this was not available to participants. As discussed in the previous chapter), some authors (e.g. L. White, 1991; Trahey & L. White, 1993) have argued that certain structures can only be learned with great difficulty without the help of negative evidence.

All these characteristics may have prevented participants from committing the intake to long-term memory. Rosa & O'Neill (1999) investigated the effects of implicit and explicit types of instruction and level of awareness during task completion on intake of Spanish contrary-to-fact conditional sentences. They found a strong correlation between level of awareness and performance on a number of posttests, as well as a beneficial effect for the explicit treatment. The present study included a far less explicit type of instruction than that used by Rosa & O'Neill. In addition, and insofar as this could be ascertained from the verbal reports (see the previous chapter), task completion was characterised by low levels of awareness. Schmidt (2001) makes a clear distinction between noticing as awareness of surface forms, and noticing as understanding, the latter being characterised by improved learning. There was very little evidence in the verbal protocols of participants displaying understanding of the target structure (although admittedly, the use of a *think*-aloud, as opposed to a *talk*-aloud protocol would have been more conducive to registering this). It appears that noticing did take place (as evidenced by the results for intake reported in the previous chapter), but with little awareness, and little understanding, there was little acquisition. Similar findings have been reported by Radwan (2005), who found that awareness at the level of noticing in a think-aloud task was a less powerful predictor of learning than awareness at the level of understanding.

Why was the effect for the treatments only found on grammatical items? Apparently the treatments did not affect participants' ability to judge ungrammatical sentences. R. Ellis (2004) argues that when learners experience a linguistic difficulty, they access explicit knowledge through controlled processing; in other words they consciously attempt to

access knowledge that may help them to solve the linguistic difficulty. The ungrammatical items were more challenging, as witnessed by the significantly lower scores participants attained on them compared with the grammatical items. This may have led participants to attempt to apply explicit knowledge. However, as the instructions they received did not include rule presentation, nor prolonged practice with feedback, they were unlikely to have developed this type of knowledge. For example N. Ellis (1993) has shown that rule presentation with examples was necessary for learners to be able to judge ungrammatical sentences.

8.4.1.2 Adverb placement

Effects for the treatments were only found in three cases: a nearly significant effect was found on timed tests on overall gain scores from pretest to delayed posttest and a significant effect was found on overall gain scores from posttest to delayed posttest. On untimed tests a significant effect was only found on ungrammatical items. As with negative adverbs the reason for this limited effect could be that the target structure was too complex for the (intermediate level) participants to be acquired in the short duration of the study, or with the limited exposure they received. As with negative adverbs, instruction on adverb placement did not include rule presentation, feedback, or negative evidence. Adverb placement in particular has been identified as benefitting from negative evidence (L. White, 1991).

In addition, there were differences in the pretest scores on target and control items:

1) scores on the pretest for adverb placement items were already reasonably high. There may simply have been less room for improvement.

2) scores on the pretest for control items were very low. There was considerable room for improvement in the scores. The reason why the scores were very low could be due to the fact that the control sentences (containing negative adverbs) were a) very difficult for the intermediate level students, and b) were very long. Participants may have initially been poor at judging these sentences and judged (correct) sentences as incorrect simply due to their length and complexity (a not uncommon phenomenon; cf. Birdsong, 1989). This appears to be partly corroborated by the fact that the scores on control items on the untimed tests, where participants have more time to read the sentences, were considerably higher than on the timed tests.

8.4.2 The effects of the implicit / explicit instructions on acquisition

Finally, there was no advantage for the explicit treatment. The explicit instructions did not result in participants improving performance on the grammaticality judgement tests, contrary to expectations. This may be due to the fact that the explicit treatment did not result in significantly greater intake than the implicit treatment. The reasons for this were discussed in the previous chapter.

On the timed tests on grammatical items an advantage was found for the implicit treatment on acquisition of negative adverbs. As the implicit treatment did not contain any instructions, examples, or input not also given in the explicit treatment, the logical

interpretation has to be that some aspect of the explicit treatment inhibited performance compared to the implicit treatment. It is possible that participants receiving the explicit treatment attempted to consciously apply what they had noticed in the input of the target structure when completing the grammaticality judgement test and that this took additional processing time, resulting in a failure to respond within the time limit, and thus lower scores.

It is also possible that in their attempts to use under-developed knowledge, participants became unsure and as a result performed worse than participants who received the implicit treatment and whose responses may have been more guided by activation of memory for individual instances of the target structure. This would be in accordance with previous research by N. Ellis (1993), who has shown that initial learning may be faster when it is implicit and incidental (memory-based), rather than explicit and intentional. It is interesting in the current study that the effect was only found on negative adverbs. The negative adverbs were considerably more difficult than adverb placement (as shown by the much lower scores); explicit instruction to pay attention to the target structure is unlikely to have had a beneficial effect on a structure of such complexity. A general instruction to 'pay attention' may have confused participants as it is unclear what operation needs to be performed on the target items. Participants may have attempted to formulate rules which, until they are perfected, lead to a worse performance than the knowledge gained from the retention one would expect from input-driven implicit learning. In this sense, the explicit treatment may have *inhibited* learning.

CHAPTER NINE

WHAT ARE THE RELATIVE EFFECTS OF THE INDIVIDUAL, COLLABORATIVE, AND DICTATION TREATMENTS ON ACQUISITION?

9.1 Introduction

This chapter reports the results of the main study for the third research question:

RQ4 - What are the relative effects of the individual reconstruction, collaborative reconstruction, and dictation treatments on acquisition of negative adverbs and adverb placement?

The first section of this chapter deals with the relative effects of the three treatment types on acquisition of negative adverbs and adverb placement as measured through performance on the *timed* grammaticality judgement test. The second section deals with the relative effects of the three treatment types on acquisition as measured through performance on the *untimed* grammaticality judgement test. The results on timed and untimed tests are presented separately because performance on the two types of tests was found to be significantly different (see previous chapter). Within each section, results are first presented for negative adverbs, followed by results for adverb placement.

The results include descriptive statistics, followed by repeated measures ANOVAs for the following:

- 1) Overall scores.
- 2) For scores on grammatical items (items presented on the grammaticality judgement tests in correct form).

3) For scores on ungrammatical items (items presented in incorrect form). The results for grammatical and ungrammatical scores are presented separately because significant differences in performance were found (see previous chapter).

4) For scores on old items (items that occurred on both the treatments and the grammaticality judgement tests) and new items (items that occurred on the tests only). The results are presented separately for adverb placement as significant differences were found (see previous chapter). On negative adverbs no differences were found and the results have not been presented separately for old and new items.

Within each of these sections it was first established whether the instruction had any significant effect on acquisition. This was done by investigating whether gains for target items were greater than those for control items. To this end 2 (target/control) x 3 (gain scores) ANOVAs were performed. The results of these analyses have been reported in detail in the previous chapter and only the main findings will be repeated below.

Where the target items were negative adverbs, the control items were adverb placement and vice versa. Participants did not receive any instruction on the control items (the control items did not occur as part of the treatments). Results are reported below for the three gain pairs. The three gain scores are the scores on the three gain pairs (gain 1 = gains from pretest to posttest, gain 2 = gains from pretest to delayed posttest, gain 3 = gains from posttest to delayed posttest). Gain scores were used because there were significant differences between scores on target and control items on the pretest and these differences may have affected subsequent performance (see previous chapter).

Where no effect was found for the target items there was no evidence that the treatments had any effect on acquisition. In those cases, no further analyses have been performed. Where an advantage for the target items was found, a further one-way ANOVA for the three treatment types (i.e. the individual reconstruction, the collaborative reconstruction, and the dictation treatments) was performed on target scores only to identify whether there was an effect in favour of any of the three treatment types. Results include significance levels (set at $p < .05$) and effect sizes (Cohen's d).

As described in chapter six, it was expected that the (originally predicted and later confirmed; see chapter seven) advantage for 1) the dictation treatment, and 2) the collaborative reconstruction treatment on *intake* would result in increased *learning* compared with the individual reconstruction treatment, with a further advantage for the dictation treatment over the collaborative reconstruction treatment. These expectations were based on previous research that has shown close links between short-term memory and learning (N. Ellis, 1996, 1997) which was expected to favour the dictation treatment, and the claimed advantage for collaborative learning and interaction (Lantolf, 2000; Swain, 1988) which was expected to favour the collaborative reconstruction treatment.

9.2 The effects of the three treatment types on acquisition (timed tests)

In this section the effects of the three treatment types on acquisition as measured by performance on the timed tests are investigated. The results for negative adverbs are presented first, followed by the results for adverb placement. Within both sections, descriptive results are presented first, followed by repeated measures ANOVAs.

9.2.1 Descriptive statistics for negative adverbs

Table 26 presents the descriptive statistics for negative adverb scores on the timed tests, for all three treatment types. The table shows mean scores and standard deviations for the target items and for the control items (i.e. the scores for adverb placement) as well as grammatical and ungrammatical items separately. Although these results will not be discussed in detail (the gain scores will; see below), it is worth pointing out that scores on the individual reconstruction treatment are the highest of the three treatment types (on the delayed posttest).

Table 26: Mean scores for the timed grammaticality judgement test for negative adverbs, by treatment type

NA Timed	Target				Control			
	Grammatical Mean	SD	Ungramm. Mean	SD	Grammatical Mean	SD	Ungramm. Mean	SD
Pretest								
Dictation (n=9)	.4	.2	.333	.193	.644	.187	.194	.126
Individual (n=8)	.412	.195	.287	.155	.675	.138	.15	.119
Collaborative (n=11)	.363	.156	.309	.186	.636	.174	.181	.078
Posttest								
Dictation (n=9)	.577	.281	.411	.208	.6	.217	.4	.234
Individual (n=8)	.6	.25	.287	.172	.8	.16	.225	.119
Collaborative (n=11)	.572	.313	.409	.287	.636	.254	.263	.145
Delayed posttest								
Dictation (n=9)	.522	.315	.322	.268	.522	.238	.372	.204
Individual (n=8)	.662	.333	.437	.297	.7	.311	.381	.231
Collaborative (n=11)	.645	.254	.3	.134	.718	.199	.268	.16

Table 27 shows the mean gain scores 1) from pretest to posttest, 2) from pretest to delayed posttest, and 3) from posttest to delayed posttest.

Table 27: Gain scores for the timed grammaticality judgement test for negative adverbs, by treatment type

NA Timed	Target				Control			
	Grammatical Mean	SD	Ungramm. Mean	SD	Grammatical Mean	SD	Ungramm. Mean	SD
Pretest to posttest								
Dictation (n=9)	.177	.356	.077	.148	-.044	.343	.205	.144
Individual (n=8)	.187	.322	.001	.106	.125	.198	.075	.119
Collaborative (n=11)	.209	.32	.1	.282	.001	.167	.081	.118
Pretest to delayed posttest								
Dictation (n=9)	.122	.281	-.011	.271	-.122	.315	.177	.182
Individual (n=8)	.25	.277	.15	.282	.025	.237	.231	.231
Collaborative (n=11)	.281	.256	-.009	.304	.081	.256	.086	.165
Posttest to delayed posttest								
Dictation (n=9)	-.055	.316	-.088	.226	-.077	.198	-.027	.171
Individual (n=8)	.062	.329	.15	.338	-.1	.37	.156	.277
Collaborative (n=11)	.072	.438	-.109	.341	.081	.282	.004	.118

The main results for the target scores are:

- There are no large differences in gain scores from pretest to posttest between the three treatment types, although scores for the collaborative reconstruction treatment are slightly higher on both grammatical and ungrammatical items.
- Gain scores from pretest to delayed posttest on grammatical items are greater for both the collaborative reconstruction and the individual reconstruction treatments than for the dictation treatment.
- Scores on the individual treatment are the only ones to improve from pretest to delayed posttest, and from posttest to delayed posttest on ungrammatical items.
- Target scores are generally higher on grammatical than on ungrammatical items.
- The standard deviations are very large.

9.2.2 The relative effect of the three treatment types on negative adverbs

The following three sections present results for 1) overall gain scores, 2) gain scores on grammatical items, and 3) gain scores on ungrammatical items. The results for scores on old and new items have not been presented separately as there was no significant difference in performance on these two types of items in the case of negative adverbs (see the previous chapter).

9.2.2.1 Overall scores

First, it was investigated whether the differences between gain scores on target and control items were significant. To this end a 2 (target/control) x 3 (gain scores) repeated measures ANOVA was performed. This showed no effect for target (see the previous chapter). The treatments did not have an effect on acquisition of negative adverbs as measured by the timed tests.

9.2.2.2 Grammatical items

As with the overall scores (paragraph 2.2.1), it was first investigated whether there was a significant difference between gain scores on target and control items. This proved to be the case (see the previous chapter) and the treatments thus had an effect on acquisition of grammatical items.

Next, an ANOVA was performed for each of the three gain pairs to determine if there was an effect for treatment type. For gains from pretest to posttest there was no effect ($F(2,53)=.38$, $p=.685$), nor was there for gains from pretest to delayed posttest

($F(2,53)=2.08$, $p=.134$)¹⁷, nor for gains from posttest to delayed posttest ($F(2,53)=1.01$, $p=.37$).

9.2.2.3 Ungrammatical items

On ungrammatical items there was a significant difference between scores on the target and control items, but it was to the advantage of the control items (see previous chapter), so no further analyses were undertaken.

9.2.2.4 Summary of the results

In summary, there was an effect for the treatments only on grammatical items. For gains from pretest to delayed posttest there was no overall effect for treatment type but post-hoc analyses did reveal an advantage for 1) the collaborative reconstruction treatment over the dictation treatment, and 2) the individual reconstruction treatment over the dictation treatment. These results are partly contrary to expectations in that the dictation treatment did not perform better than the other treatments, and the collaborative reconstruction treatment did not outperform the individual reconstruction treatment.

¹⁷ However, post-hoc analyses (Least Significant Differences) revealed a significant advantage for the collaborative reconstruction treatment over the dictation treatment ($p=.051$) with a medium effect size ($d=.639$) and for the individual reconstruction treatment ($p=.052$) over the dictation treatment, again with a medium effect size ($d=.512$).

9.2.3 Descriptive statistics for adverb placement

Table 28 presents the descriptive statistics for adverb placement scores on the timed tests, for the three treatment types. The table shows mean scores and standard deviations for the target items and for the control items (i.e. the scores for negative adverbs) as well as grammatical and ungrammatical items separately. It is noteworthy that the target scores on the individual reconstruction treatment are the only ones to improve consistently from pretest to posttest and from posttest to delayed posttest, on both grammatical and ungrammatical items.

Table 28: Mean scores for the timed grammaticality judgement test for adverb placement, by treatment type

AP Timed	Target				Control			
	Grammatical Mean	SD	Ungramm. Mean	SD	Grammatical Mean	SD	Ungramm. Mean	SD
Pretest								
Dictation (n=9)	.511	.196	.244	.3	0.167	.122	.244	.242
Individual (n=8)	.542	.276	.114	.121	0.3	.293	.238	.064
Collaborative (n=11)	.65	.187	.133	.163	.25	.217	.26	.156
Posttest								
Dictation (n=9)	.5	.308	.287	.387	.411	.276	.322	.259
Individual (n=8)	.8	.141	.157	.097	.388	.275	.319	.231
Collaborative (n=11)	.533	.307	.2	.244	.34	.378	.24	.164
Delayed posttest								
Dictation (n=9)	.577	.258	.266	.304	.322	.244	.307	.285
Individual (n=8)	.814	.121	.185	.146	.438	.311	.214	.187
Collaborative (n=11)	.783	.147	.3	.2	.480	.311	.190	.065

Table 29 shows the mean gain scores 1) from pretest to posttest, 2) from pretest to delayed posttest, and 3) from posttest to delayed posttest.

Table 29: Gain scores for the timed grammaticality judgement test for adverb placement, by treatment type

AP Timed	Target				Control			
	Grammatical Mean	SD	Ungramm. Mean	SD	Grammatical Mean	SD	Ungramm. Mean	SD
Pretest to posttest								
Dictation (n=9)	-.011	.391	.044	.492	.177	.366	.077	.4
Individual (n=7)	.257	.293	.042	.111	.142	.276	.021	.149
Collaborative (n=6)	-.116	.43	.066	.32	.1	.189	-.008	.165
Pretest to delayed posttest								
Dictation (n=9)	.066	.377	.022	.386	.211	.297	-.011	.431
Individual (n=7)	.271	.213	.071	.221	.071	.325	.071	.221
Collaborative (n=6)	.133	.273	.166	.242	.183	.263	-.05	.164
Posttest to delayed posttest								
Dictation (n=9)	.077	.307	-.022	.277	.033	.412	-.088	.231
Individual (n=7)	.014	.106	.028	.179	-.071	.111	-.028	.146
Collaborative (n=6)	.25	.294	.1	.209	.083	.299	-.041	.188

The main results for the target scores are:

- Gain scores from pretest to posttest on grammatical items only show an improvement for the individual reconstruction treatment.
- Gain scores from pretest to delayed posttest on grammatical items are the greatest for the individual reconstruction treatment.
- Gain scores from pretest to delayed posttest on ungrammatical items are the greatest for the collaborative reconstruction treatment.
- The standard deviations are large indicating considerable variation in the scores.

9.2.4 The relative effect of the three treatments on adverb placement

The following four sections present results for 1) overall gain scores, 2) gain scores on grammatical items, 3) gain scores on ungrammatical items (see above), 4) gain scores on old and new items.

9.2.4.1 Overall scores

As with the results for negative adverbs, it was first investigated whether there was a difference in the gain scores for target and control items. This proved not to be the case (see previous chapter). However, as the descriptive statistics showed some differences between target and control scores, especially between posttest and delayed posttest, it was decided to perform separate one-way ANOVAs for target/control on the different gain pairs. These showed an almost significant difference in favour of the target items from pretest to delayed posttest and a significant advantage for the target items from posttest to delayed posttest (see previous chapter).

As there was an almost significant difference between gain scores on target and control items from pretest to delayed posttest, a subsequent one-way ANOVA was performed to establish whether there was an effect for the three treatment types. This showed no effect for treatment type from pretest to delayed posttest ($F(1,40)=.81$, $p=.449$), nor from posttest to delayed posttest ($F(1,40)=1.54$, $p=.226$).

9.2.4.2 Grammatical items

There was no significant difference in scores for grammatical target and control items (see previous chapter). However, the descriptive data (see above) show higher scores for target items, especially on gain scores from posttest to delayed posttest, and there are clear differences in the scores for the three treatment types. It was thus decided to perform an ANOVA for treatment type for the three gain pairs separately. There was some evidence that there was an effect for treatment type on gain scores from pretest to delayed posttest ($F(2,18)=3.31$, $p=.059$). Post-hoc analyses (Least Significant Differences) revealed a significant advantage for the individual reconstruction treatment over the dictation treatment ($p=.03$) with a small effect size ($d=.106$). There was also a nearly significant advantage for the collaborative reconstruction treatment over the dictation treatment ($p=.067$), again with a small effect size ($d=.065$).

An ANOVA on the gain scores from posttest to delayed posttest showed no effect for treatment type ($F(2,18)=2.24$, $p=.134$)¹⁸.

9.2.4.3 Ungrammatical items

There was no significant difference between gain scores on target and control items (see previous chapter). The treatments did not have an effect on acquisition of adverb placement as measured by the ungrammatical items.

¹⁸ Post-hoc analyses did reveal a nearly significant advantage for the collaborative reconstruction treatment over the dictation treatment ($p=.058$). The effect size was small ($d=.346$). However, considering that there was no significant difference between scores on target and control items, these results need to be approached with the greatest caution.

9.2.4.4 Old and new items

The distinction between old and new items refers to items that occurred on both the tests and the treatments (old items) or on the tests only (new items). The distinction only applies to target items as control items did not occur in the treatments. ANOVAs for treatment type showed no effect on any of the three gain pairs for old ($F(1,130)=.106$, $p=.349$), nor for new ($F(2,129)=.9$, $p=.408$) items. There was no differential effect for the three treatment types on acquisition of these two types of items, as measured by the untimed tests.

9.2.4.5 Summary of the results

There was no evidence of any effect for the treatments on adverb placement, as measured by the timed grammaticality judgement test. There were some trends in the descriptive data showing an advantage for the target items, and analyses have been performed to establish if there was an effect for treatment type. However, as there were no statistically significant differences between the target and control items, the results of these analyses need to be treated circumspectively. The analyses showed a significant advantage for the individual reconstruction and a nearly significant advantage for the collaborative reconstruction treatment over the dictation treatment on gain scores from pretest to delayed posttest.

9.3 The effects of the three treatment types on acquisition (untimed tests)

In this section the effects of the three treatment types on acquisition as measured by performance on the untimed tests are investigated. The results for negative adverbs are

presented first, followed by the results for adverb placement. Within both sections, descriptive results are presented first, followed by repeated measures ANOVAs.

9.3.1 Descriptive statistics for negative adverbs

Table 30 presents the descriptive statistics for negative adverb scores on the untimed tests, for the three treatment types. The table shows mean scores and standard deviations for the target items and for the control items (i.e. the scores for adverb placement) as well as grammatical and ungrammatical items separately.

Table 30: Mean scores for the untimed grammaticality judgement test for negative adverbs, by treatment type

NA Untimed	Target				Control			
	Grammatical Mean	Ungramm. SD	Grammatical Mean	Ungramm. SD	Grammatical Mean	Ungramm. SD	Grammatical Mean	Ungramm. SD
Pretest								
Dictation (n=9)	.344	.278	.511	.236	.622	.222	.577	.183
Individual (n=8)	.4	.35	.625	.218	.725	.183	.637	.211
Collaborative (n=11)	.418	.302	.536	.196	.818	.208	.486	.22
Posttest								
Dictation (n=9)	.566	.282	.477	.192	.566	.165	.527	.256
Individual (n=8)	.587	.223	.525	.158	.812	.083	.681	.166
Collaborative (n=11)	.672	.3	.445	.291	.8	.148	.536	.262
Delayed posttest								
Dictation (n=9)	.644	.269	.377	.109	.633	.2	.561	.172
Individual (n=8)	.787	.258	.475	.276	.787	.083	.712	.124
Collaborative (n=11)	.636	.25	.454	.262	.836	.112	.518	.236

Table 31 shows the mean gain scores 1) from pretest to posttest, 2) from pretest to delayed posttest, and 3) from posttest to delayed posttest.

Table 31: Gain scores for the untimed grammaticality judgement test for negative adverbs, by treatment type

NA Untimed	Target				Control			
	Grammatical Mean	SD	Ungramm. Mean	SD	Grammatical Mean	SD	Ungramm. Mean	SD
Pretest to posttest								
Dictation (n=9)	.222	.204	-.033	.223	-.055	.181	-.05	.229
Individual (n=8)	.187	.304	-.1	.232	.087	.124	.043	.214
Collaborative (n=11)	.254	.35	-.09	.27	-.018	.213	.05	.232
Pretest to delayed posttest								
Dictation (n=9)	.3	.469	-.133	.212	.011	.261	-.016	.22
Individual (n=8)	.387	.269	-.15	.141	.062	.192	.075	.213
Collaborative (n=11)	.218	.252	-.081	.244	.018	.24	.031	.2
Posttest to delayed posttest								
Dictation (n=9)	.07	.426	-.1	.223	.066	.278	.033	.329
Individual (n=8)	.2	.192	-.05	.307	-.025	.103	.031	.883
Collaborative (n=11)	-.036	.417	.009	.216	.036	.143	-.018	.201

The main results for the target scores are:

- Gain scores for grammatical items are positive almost across the board. For ungrammatical items they are all negative or close to zero.
- Gains from pretest to delayed posttest on grammatical items are the greatest for the individual reconstruction treatment.
- There is an especially large continuing increase for the individual reconstruction treatment from posttest to delayed posttest on grammatical items, in comparison with the collaborative reconstruction and dictation treatments.
- The collaborative reconstruction treatment is the only one for which scores decline from posttest to delayed posttest on grammatical items.
- Standard deviations are very large indicating considerable variation in the scores.

9.3.2 The relative effect of the three treatment types on negative adverbs

The following three sections present results for 1) overall scores, 2) scores on grammatical items, and 3) scores on ungrammatical items (see above). The results for scores on old and new items have not been presented separately as there was no significant difference in performance on these two types of items in the case of negative adverbs (see the previous chapter).

9.3.2.1 Overall scores

First, it was investigated whether the differences between gain scores on target and control items were significant. For overall scores there was no significant difference (see the previous chapter). The treatments did not have an effect on participants' performance on the target items.

9.3.2.2 Grammatical items

A significant difference between gain scores on target and control items was found (see the previous chapter). Subsequent ANOVAs showed no effect for treatment type on gain scores from pretest to posttest ($F(2,24)=.32, p=.73$), nor on gain scores from pretest to delayed posttest ($F(2,24)=.95, p=.399$), nor on gain scores from posttest to delayed posttest ($F(2,24)=.9, p=.418$).

9.3.2.3 Ungrammatical items

For ungrammatical items there was a significant difference between gain scores on target and control items, however this was to the advantage of the control items (see the previous chapter). Hence no further analyses have been performed.

9.3.2.4 Summary of the results

There was only a difference between gain scores on target and control items on grammatical items. This means that the treatments had an effect on the acquisition of negative adverbs only on grammatical items, as measured by the untimed tests. No effect was found on overall gain scores or on ungrammatical items.

No effect for treatment type was found on negative adverbs. Contrary to expectations the dictation treatment did not outperform the collaborative reconstruction and the individual reconstruction treatments, nor did the collaborative reconstruction treatment outperform the individual reconstruction treatment.

9.3.3 Descriptive statistics for adverb placement

Table 32 presents the descriptive statistics for adverb placement scores on the untimed tests, for the three treatment types. The table shows mean scores and standard deviations for the target items and for the control items (i.e. the scores for adverb placement) as well as grammatical and ungrammatical items separately.

Table 32: Mean scores for the untimed grammaticality judgement test for adverb placement, by treatment type

AP Untimed	Target				Control			
	Grammatical Mean	SD	Ungramm. Mean	SD	Grammatical Mean	SD	Ungramm. Mean	SD
Pretest								
Dictation (n=9)	.766	.132	.288	.126	.377	.164	.477	.1
Individual (n=7)	.828	.205	.214	.157	.4	.331	.585	.241
Collaborative (n=6)	.75	.187	.383	.132	.083	.132	.408	.091
Pretest								
Dictation (n=9)	.711	.202	.277	.164	.544	.308	.472	.284
Individual (n=7)	.771	.213	.342	.243	.577	.263	.5	.254
Collaborative (n=6)	.816	.075	.366	.28	.316	.231	.45	.126
Posttest								
Dictation (n=9)	.722	.178	.322	.272	.533	.244	.433	.207
Individual (n=7)	.842	.139	.471	.319	.6	.27	.492	.198
Collaborative (n=6)	.816	.183	.383	.075	.316	.147	.433	.087

Table 33 shows the mean gain scores 1) from pretest to posttest, 2) from pretest to delayed posttest, and 3) from posttest to delayed posttest.

Table 33: Gain scores for the untimed grammaticality judgement test for adverb placement, by treatment type

AP Untimed	Target				Control			
	Grammatical Mean	SD	Ungramm. Mean	SD	Grammatical Mean	SD	Ungramm. Mean	SD
Pretest to posttest								
Dictation (n=9)	-.055	.3	-.011	.176	.166	.384	-.005	.26
Individual (n=8)	-.057	.257	.128	.292	.157	.315	-.085	.151
Collaborative (n=11)	.066	.206	-.016	.299	.233	.301	.041	.106
Pretest to delayed posttest								
Dictation (n=9)	-.044	.278	.033	.273	.155	.346	.044	.222
Individual (n=8)	.014	.211	.257	.315	.2	.31	-.092	.151
Collaborative (n=11)	.066	.206	0	.167	.233	.25	.025	.129
Posttest to delayed posttest								
Dictation (n=9)	.011	.271	.044	.324	-.011	.231	-.038	.223
Individual (n=8)	.071	.095	.128	.188	.042	.097	-.007	.12
Collaborative (n=11)	.001	.167	.016	.274	.001	.178	-.016	.087

The main results for the target scores are:

- Gains on control items are greater than those for target items almost across the board.
- The collaborative reconstruction treatment is the only treatment to show positive gains from pretest to posttest on grammatical items and has the greatest gains from pretest to delayed posttest on grammatical items.
- The individual reconstruction treatment is the only treatment to show positive gains from pretest to posttest on ungrammatical items and has the greatest gains from pretest to delayed posttest on ungrammatical items.
- The individual treatment shows the greatest gains from posttest to delayed posttest on both grammatical and ungrammatical items.

9.3.4 The relative effect of the three treatment types on adverb placement

The following four sections present results for 1) overall gain scores, 2) gain scores on grammatical items, 3) gain scores on ungrammatical items (see above), 4) gain scores on old and new items.

9.3.4.1 Overall scores

Once again it was first investigated whether the differences between gain scores on target and control items were significant. A 2 (target/control) x 3 (gain scores) repeated measures ANOVA showed no difference and there was thus no effect for the treatments on acquisition of adverb placement as measured by the untimed tests.

9.3.4.2 Grammatical items

For grammatical items there was no significant difference between gain scores on target and control items (see the previous chapter).

9.3.4.3 Ungrammatical items

On ungrammatical items there was a significant difference between gain scores for target and control items (see the previous chapter). ANOVAs showed no effect for treatment type on gain scores from pretest to posttest ($F(2,18)=.29, p=.754$), nor on gain scores from pretest to delayed posttest ($F(2,18)=.91, p=.421$), nor on gain scores from posttest to delayed posttest ($F(2,18)=.52, p=.603$).

9.3.4.4 Old and new items

ANOVAs for treatment type showed no effect on any of the three gain pairs for old ($F(2,129)=1.47$, $p=.233$), nor for new ($F(2,129)=2.27$, $p=.107$) items. There was no differential effect for the three treatment types on acquisition of these two types of items, as measured by the untimed tests.

9.3.4.5 Summary

There was only an effect for the treatments on ungrammatical items, with scores on target items showing significantly greater gains than scores on control items. However, no effect was found for treatment type.

9.4 Discussion

I had expected that the dictation treatment would result in greater acquisition than the collaborative reconstruction and individual reconstruction treatments. I had also expected that the collaborative reconstruction treatment would result in greater acquisition than the individual reconstruction treatment. Neither of these two expectations was borne out.

The main results were:

- 1) The treatments did not have an effect on acquisition in many cases. The possible reasons for this lack of an effect for the treatments have been discussed in the previous chapter.
- 2) There were no differences between the three treatment types in almost all cases. The only significant differences between the three treatment types were found on negative adverb gain scores from pretest to delayed posttest where there was no

overall effect for type but where post-hoc analyses showed a significant advantage for the collaborative reconstruction and individual reconstruction treatments over the dictation treatment, on the grammatical items on timed tests.

These results will be discussed below. Comparisons between performance on intake and acquisition are discussed in greater detail in the following chapter.

9.4.1 The relative effects of the three treatment types

Although several trends have been reported above, in almost all cases differences do not reach statistical significance. There are two possible reasons for this: 1) the treatments had similar effects. This is possible in the sense that they were simply not different from each other in how they affected acquisition. It is also possible in the sense that all three treatments had very little *overall* effect; in many cases there was only a practice effect and no differences between scores on target and control items were found. The possible reasons for this have been discussed in the previous chapter. It is also possible that due to the limited exposure and the small number of treatments (three), there was not enough time for the differences between the treatments to become evident. Or 2) differences existed but for some reason were not evident in the test scores. It was pointed out that the standard deviations in many cases were very large. The total number of participants was small (N=50) with even smaller numbers in each of the three treatment groups. A larger sample size may have brought out differences.

9.4.1.1 The effects of the dictation treatment

I had expected the dictation treatment to outperform the other treatments, as I had thought it would be easier for participants to focus on the target structures, and on the formal aspects of the input in general, due to the shorter length of texts to be retained. Instead, the descriptive results show that the dictation group performed considerably worse, and in one case significantly so (although in that case there was no overall effect for treatment type). Why did the dictation treatment do poorly?

One obvious characteristic of the dictation treatment is that it resulted mainly in the activation of short-term memory. N. Ellis (1996, 1997) conducted several studies in which he found evidence that short term memory for language utterances allows the consolidation into long-term memory of those utterances or for regularities and chunks within them: 'phonological memory span serves as the window on language evidence. If an individual's phonological STM cannot represent the stretch of language surface form that contains a particular syntactic agreement, then they should be unable to abstract information about that dependency' (1997, p. 159). There is clearly a strong relationship between short-term memory and learning, and performance on the dictation task measures mainly (phonological) short-term memory. However, the relationship is conditional. Good short-term memory is a requirement for successful learning, but does not in itself cause it and learning can be facilitated or inhibited by other factors. In the case of the dictation treatment it appears that the task was restricting in that it did not activate use of long-term memory, nor rehearsal of the information in short-term memory for any great length of time. The task could be completed by holding the short chunks in

short-term memory without recourse to interpretation of the semantic content and with only limited processing of the input. This application of short-term memory mechanisms only may have limited the effects of the treatment on allowing connections with participants' existing knowledge to be made and for the target structure to be incorporated.

Length of processing time or the time an item is kept in working memory may also affect to what extent it is retained. Ericsson & Kintsch (1995) suggest a model of information processing based on an investigation of (first language) reading processes that includes a long-term working memory store. Their basic claim is that reading involves very fast access to a subset of long-term memory, in addition to accessing short-term memory for the purpose of immediate decoding of the input. In the case of listening to (meaningful) passages there is a similar distinction between immediate decoding of the input (making use of short-term memory storage, similar to that in the case of the dictation treatment), and access to a long-term working memory which participants use to draw on previous knowledge, and to activate prior experiences and expectations. This would also explain why the dictation task did not result in more acquisition, even though it appeared to result in more (but perhaps poorly processed) intake.

Second, and related to the issue of processing time, is the total time that participants engaged in the treatment task. This was about a third shorter for the dictation task than for the individual task, which in turn was about a third shorter than the collaborative tasks.

The final distinguishing factor between the dictation and the other treatments was the presence or absence of verbalisation. The potential effects of this are discussed in the following section.

9.4.1.2 The effects of the individual reconstruction treatment

As mentioned above, I had expected the individual reconstruction treatment to perform worst on acquisition, and to be significantly outperformed by both the dictation and collaborative reconstruction treatments. Instead, the descriptive results showed it to have done considerably better than both and this difference reached significance for negative adverbs, on timed tests, grammatical items in comparison with the dictation treatment (although in that case there was no overall effect for treatment type). Why was this so?

The individual reconstruction treatment involved the storing and accessing of information over a length of time well exceeding one minute, and of information well exceeding what has generally been found to be kept in short-term memory (Baddeley, 1996). The task required participants to interpret the input for meaning in order to be able to remember the input. Semantic interpretation requires the activation of prior knowledge, and thus long-term memory. In addition, the task had to be completed individually, without the help of a partner. This required an even stronger commitment on the part of the participant to the task. This level of cognitive commitment may be reflective of what Craik & Lockhart (1972; see also Craik & Tulving, 1975; Cermak & Craik, 1979) have described as deep processing when they write that a 'memory trace can be understood as a byproduct of perceptual analysis and [...] trace persistence is a positive function of the

depth to which the stimulus has been analyzed' (p. 671). The authors claim that retention is determined by the way information is *encoded* rather than how it is *stored*. Different degrees (or “depths” in the authors’ terminology, later labelled “spread” or “elaboration”) of encoding are dependent on a range of factors including processing time and the amount of attention given to a stimulus. Cummins (1983) suggested that tasks that require more information to be processed at the same time are more demanding and Shortreed (1993) showed that this applied also to an operationalisation of such tasks as activities involving greater productive effort. Both of these characteristics (a greater amount of information to be processed, and greater productive effort) apply to the individual treatment. The individual reconstruction treatment required a great deal of attention and required cognitive processing of the information for both form and meaning and over a longer period of time than the dictation task. Craik & Tulving (1975) write: ‘stimuli which do not receive full attention, and are analyzed only to a shallow sensory level, give rise to very transient memory traces. On the other hand, stimuli that are attended to, fully analyzed, and enriched by associations or images yield a deeper encoding of the event, and a long-lasting trace’ (p. 270). In the individual reconstruction task fewer items may be able to be processed, but those that do may be more deeply processed and thus successfully retained long-term.

Verbalisation in the individual reconstruction task may also have had a positive effect on acquisition as a result of the activation of the phonological loop and the generally greater cognitive demand of having to perform the talk-aloud (resulting in less intake but a greater chance of retention for those items that do get taken in). N. Ellis (1996; see also

N. Ellis & Sinclair, 1996) has found through experimental research that participants encouraged to rehearse foreign language utterances perform better on subsequent (productive) tests than both silent controls and participants prevented from rehearsal by articulatory suppression.

9.4.1.3 The effects of the collaborative reconstruction treatment

The results for the collaborative reconstruction treatment were also contrary to expectations. As mentioned above, I had expected the collaborative reconstruction treatment to do worse than the dictation treatment but better than the individual reconstruction treatment. Neither of these expectations was borne out by the results. Instead, the descriptive results show that the collaborative reconstruction treatment performed considerably better than the dictation treatment, and in one case this was statistically confirmed (although in that case there was no overall effect for treatment type). Secondly, there was no advantage for the collaborative reconstruction treatment over the individual reconstruction treatment. Again, the descriptive results show instead an advantage for the individual reconstruction treatment, although this was not statistically significant.

Interestingly, there was no significant difference between intake scores for the collaborative reconstruction treatment and the dictation treatment (although the descriptive statistics did show higher scores for the dictation treatment), but the knowledge gained from the collaborative task was clearly more enduring. One reason for this comparative advantage may be that learning through interaction is likely to be more

“situated” in a particular context, and thus more persistent. This is one of the core claims made by Vygotsky (1978; see also Lantolf & Appel, 1994) in the general learning domain and has also been applied to second language acquisition theory (Lantolf, 2000) and second language teaching pedagogy (Hall, 2002; Ohta, 2001). Mackey (1999), for example, investigated the effects of interaction in four types of task-based treatments. Using a pretest-posttest design she investigated the acquisition of question formation and found that participants who actively participated and interacted with others were the most successful, as opposed to those who only observed. In the present study all participants in the collaborative reconstruction treatment received the same instructions and had the same role in the interaction. Although there were some differences in the degree to which participants participated in reconstructing the text with their partner, in general participants were actively involved, not merely observing, as shown by the transcripts of their collaboration. This interaction may have affected participants’ acquisition of the target structure. Other potentially beneficial characteristics of interaction such as the opportunity to receive implicit feedback, or error correction, and the additional input from interlocutors’ output (cf. Swain & Lapkin, 1998), probably had less influence. Transcripts of the verbal protocols (see chapter seven) produced by participants showed no additional mention of the target structure compared with other aspects of the input, and very little metalinguistic discussion in general.

An additional explanation for the advantage for the collaborative reconstruction treatment over the dictation treatment is likely to be the same reason as that given for the individual reconstruction treatment; the task required additional processing not required by the

dictation treatment. In both the collaborative and the individual treatments participants had to memorise relatively long passages for a relatively long length of time. The fact that both treatments did better than the dictation treatment seems to further corroborate this interpretation. The reason why the collaborative reconstruction treatment and the interaction it required did not result in greater acquisition than the individual reconstruction treatment may also be related to the issue of the processing requirements of the two treatments. Although the task demands in both groups were similar (the input and the instructions were almost the same) , in practice in the collaborative reconstruction group they were greatly reduced in that the need to pay attention to the input, memorise the sentences, and produce the correct reconstruction was shared. It may be that *together* the participants in the collaborative reconstruction group noticed more of the input (hence the higher intake figures) than participants in the individual reconstruction group. However, not all (aspects of the) input will have been noticed by both participants; the results show that sharing this noticed input during task completion between two participants does not necessarily result in acquisition, as in that case it would have been likely that the collaborative reconstruction treatment would have still outperformed the individual reconstruction treatment on the grammaticality judgement tests. Perhaps collaborative learning is useful for improving task performance, but less so for encouraging learning than otherwise similar individual tasks. However, since the differences between the two treatment types were not significant, this interpretation remains (at least in part) hypothetical.

Some supporting evidence for this interpretation comes from research by Foster & Skehan (1999). They looked at the effects of planning on task performance and compared teacher-led, individual and group-based conditions. The group-based planning session did not result in a significant effect on task performance (a slight decrease in fluency was detected). The individual group improved on fluency, complexity, and produced longer turns (the teacher-led group only improved on accuracy). Foster & Skehan conclude: 'left to themselves, it appears that student groups do not operate as efficiently as when either the pretask preparation time is organized by the teacher, or when learners are able to work independently. Needing to negotiate in groups may lead to useful interaction in itself, but it militates against efficient task planning' (p. 238). Although these results are for task-planning, and not task-execution, they do nonetheless reveal a similar pattern whereby collaborative efforts may be less successful than individual efforts.

9.4.2 Where effects were found

No significant effects for treatment type were found but on grammatical items on timed tests, post-hoc analyses for gain scores from pretest to delayed posttest showed a significant advantage for both collaborative reconstruction and individual reconstruction treatments over the dictation treatment. Why was an effect only found on negative adverbs, and then only on the timed tests and on grammatical items? First of all, negative adverbs were the target structure for the more advanced participants. Perhaps these more sophisticated learners were better able to benefit from the advantage the collaborative and individual reconstruction treatments had to offer compared with the dictation treatment. For example, the talk-aloud protocols may have helped them in their learning, whereas

for the less advanced participants the talk-aloud protocols were very demanding and may have slowed down performance. This may have in part negated the otherwise beneficial effects for the treatments discussed above.

Why was an effect only found on grammatical items? The ungrammatical items were considerably more challenging (as witnessed by the much lower scores on them than on grammatical items), so much so that they may have equalised the differential effects that existed (as shown by the descriptive statistics) to the point where there was no significant difference between the three treatment types anymore; all participants performed poorly on them. The grammatical items, on the other hand, were much easier; participants had a better chance to display their knowledge, and differences in that knowledge were brought out more easily. Also, it was suggested in the previous chapter that the treatments did not result in the development of explicit knowledge. Ungrammatical items are likely to require the activation of explicit knowledge (R. Ellis, 2004) and thus no effect could be expected to show on these items.

Finally, an effect was only found on the timed tests. These required participants to respond as quickly as possible and were designed to tap their implicit knowledge. Scores on the timed tests were lower than on the untimed tests on all three treatment types, but there were no significant differences between the three treatment types on the untimed tests. It appears, then, that the collaborative and individual reconstruction treatments mainly influenced performance on this measure of implicit knowledge. In the previous chapter it has been suggested that the treatments did not help participants develop the

explicit knowledge required for controlled processing. It was suggested that the explicit treatment may have even confused participants and resulted in impaired performance. It is not surprising then, that the effects of the treatments are found only on a measure of the type of knowledge they were likely to have actually developed.

CHAPTER 10

DISCUSSION OF THE RESULTS

10.1 Introduction

In the previous three chapters the effects of 1) the implicit and explicit treatments and 2) the individual and collaborative reconstruction, and dictation treatments on a) intake and b) acquisition were reported and discussed. In this chapter the results of those three chapters will be compared. In particular, attention will be given to the relationship between intake and acquisition. One observation was that the treatments differentially affected intake and acquisition and below I will make suggestions to explain these results.

In the previous chapters it has been reported that there was no effect for the treatments in many cases. The possible reasons for this have been dealt with elsewhere (see chapter eight) and will not be discussed again here. In summary, it was suggested that the reasons for the lack of an effect for the treatments could be:

- the limited amount of exposure during the treatments
- the lack of rule presentation, corrective feedback, or negative evidence
- the complexity of the target structures, particularly the negative adverbs
- the relatively high scores for adverb placement on the pretest compared with low scores on control items (i.e. negative adverbs)

10.2 The relative effect of implicit and explicit treatments on intake and acquisition

It had been expected that the explicit treatment would lead to 1) increased intake, and 2) increased acquisition, of both negative adverbs and adverb placement compared with the implicit treatment. Instead, it was found that:

- Descriptive scores for the explicit treatment were somewhat higher than scores for the implicit treatment but there was no significant effect for the explicit treatment on negative adverbs, nor on adverb placement.
- There was no effect for the explicit treatment on acquisition of negative adverbs, nor of adverb placement.
- In one case (on timed tests, on negative adverb grammatical items), there was an advantage for the implicit treatment.

In previous chapters it has been argued that the lack of an advantage for the explicit treatment for negative adverbs may have been due to a combination of the complexity of the structure and the nature of the explicit instruction. The explicit treatment only provided an example of a sentence containing the target structure and participants were asked to ‘pay attention’ to it. No rule was presented, no practice given, nor corrective feedback provided. Participants may have simply been unable to distill the underlying rule from the examples given in the input of this complex and non-transparent structure (see chapter eight).

The explicit treatment also did not have a beneficial effect on the intake of adverb placement. In chapter eight it was suggested that one possible reason for this could have been the fact that only positive evidence was provided. Several researchers have pointed out (cf. L. White, 1991) that adverb placement requires negative evidence to be acquired. This may apply to both intake and acquisition. As the treatments provided only positive evidence of the target structure, the additional information and instructions given in the explicit treatment may not have been sufficient for participants to benefit fully from them.

Many authors (Gass, 1997; VanPatten, 1990; Leow, 1995, 2001) have pointed out the close relationship between intake and learning; input needs to be taken in before it can be acquired. From this it flows logically that if a certain type of instruction does not affect the amount of intake, it can not be expected to affect the amount of acquisition. This appears to have been the case in the present study. In line with previous research that has shown increased learning with greater awareness (e.g. Radwan, 2005; Rosa & O'Neill, 1999) and claims to this effect from researchers such as Schmidt (1993, 2001), the explicit treatment, which drew participants' attention to the target feature, could have been expected to lead to increased awareness of the input and thus increased learning. However, no evidence for increased awareness was found in the verbal protocols (see chapter seven); the explicit treatment did not appear to have succeeded in making the target structure salient to the learners. The lack of any effect of the explicit treatment on acquisition, thus appears to corroborate research by the authors referred to above. There is no (increased) learning without (increased) awareness.

In fact, in several instances the explicit treatment resulted in lower scores than the implicit treatment. On the timed tests there was an advantage for the implicit treatment on negative adverb grammatical items. It is possible that the explicit treatment could have made participants unsure about their answers as they knew they had to pay attention to the target structure but did not have enough knowledge to successfully complete the tests (cf. Robinson & Ha, 1993). This option is further investigated below.

A related observation pertained to a difference in scores for negative adverbs and adverb placement on the implicit and explicit treatments. The descriptive statistics (see chapter eight) showed somewhat higher scores for the explicit treatment on adverb placement but lower scores on negative adverbs, especially on the untimed tests on grammatical items. To investigate if this difference was significant a 2 (implicit/explicit) x 2 (negative adverbs/adverb placement) ANOVA was performed on the gain scores. The results are shown below:

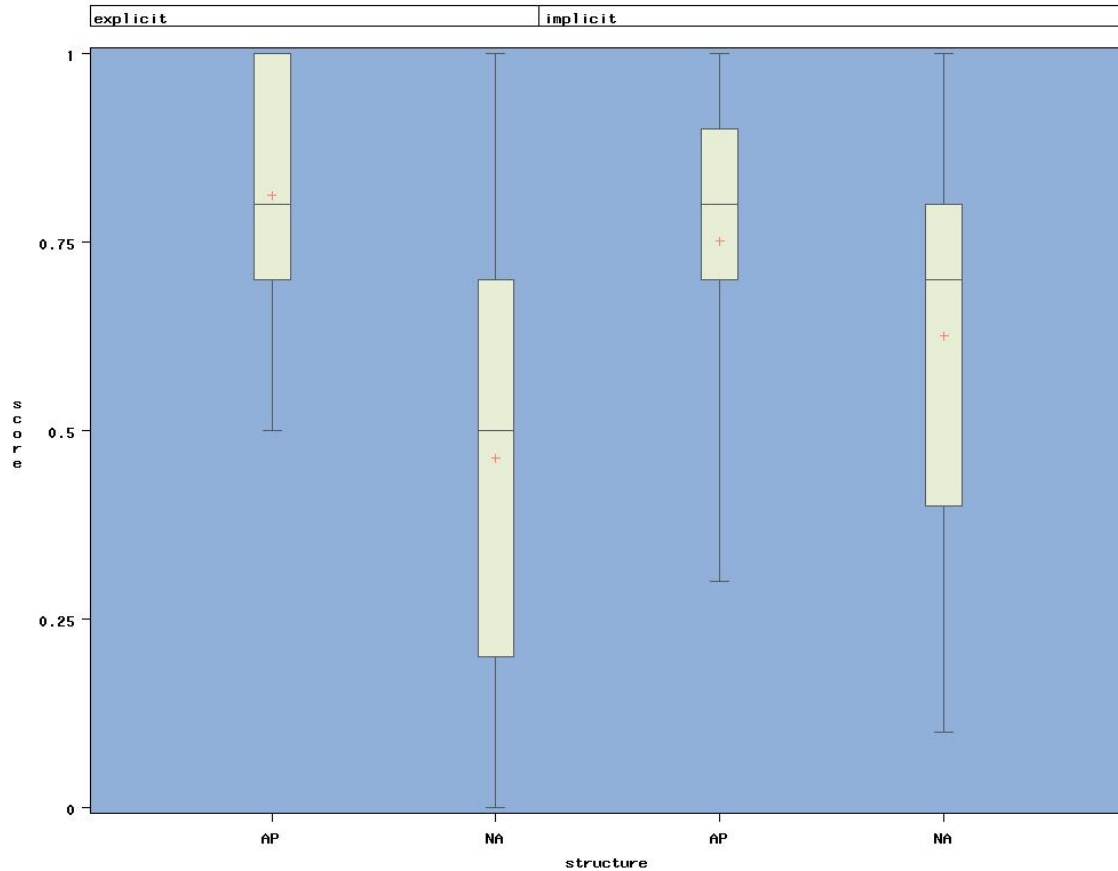
Table 34: ANOVA for type, structure, and time for untimed tests, grammatical items

Effect	DF	Value	Pr > F
type	1	2.56	0.111
structure	1	35.06	<.0001
type*structure	1	7.69	0.006

There was an effect for structure, as well as a significant interaction between the two treatment types and the two structures. A plot is included below to visualise these results, confirming the observations made above from the descriptive statistics; negative adverb scores are higher for the implicit treatment than for the explicit treatment. For adverb

placement there is a greater variation in the scores on the explicit treatment than on the implicit treatment and higher total scores. (This appears to apply across the board in that the previous chapters have, in many cases, shown greater variation in scores on the explicit than the implicit treatment). It could be that the effects for the implicit treatment are similar for most participants, comparatively more so than for the explicit treatment the effects of which are more dependent on individual variation (Reber, 1989).

Figure 2: Interaction between type and structure



This interaction between structure and treatment type can probably be explained as resulting from the difference in complexity between the two structures. Negative adverbs were more demanding for participants than adverb placement (as shown by the overall lower scores for negative adverbs). In chapter eight it was suggested that as a result the explicit treatment may not have been sufficient to affect a change in participants' ability to correctly recognise use of the negative adverbs and in fact, appears to have *inhibited* learning. As for performance on adverb placement, this was better for the explicit treatment. As the structure was easier, it was more likely that if participants paid attention to it, they would be able to distil the underlying rule. This appears similar to some of the findings from Robinson (1996) who found that participants in a rule-search condition were outperformed by participants in an implicit (attention to meaning only) and an incidental condition (in which participants were asked to remember the position of words in the input), on *the more complex* of two target structures. Data-driven processing may be more successful than an inductive approach like "rule-search" or the explicit treatment received in the present study (incidentally, Robinson found a significant advantage for an instructed condition in which participants were instructed and given practice in the target structure). N. Ellis quotes Danks & Ganks (1975): 'if there is to be explicit instruction then with complex material it is better to explain the structure and content of the rules than merely alert the learner to their existence' (p. 114).

R. Ellis (2002) compared findings from 11 studies that included a measure of free production (as indicative of implicit knowledge) and found that FFI had a differential effect on different aspects of the second language:

- a. formulaic (chunk-like structures)
- b. morphological (passé composé, past tense)
- c. syntactic (wh. questions, passive)

FFI was effective mainly for the first two. In addition it was effective for learners of intermediate and higher levels and when participants were exposed to the targeted structure for an extensive period of time. Ellis also found that it was more effective if the targeted structures were not too complex.

FFI would seem to have a better chance of success if it is directed at simple morphological features (e.g. verb forms, articles, or formulaic items) than at more complex syntactic structures involving permutations of word order (e.g. word order involving Spanish clitic pronouns and passive sentences). Perhaps FFI succeeds for simple morphological features because it makes such forms salient to the learner and because they can be processed; it is less successful in the case of complex syntactic features because these require more complex processing operations that can only be mastered sequentially over a long period of time, as proposed by Pienemann (1989). (p. 232)

These conditions did not apply in the study reported here. The total amount of exposure was limited and the target structure that most clearly did not benefit from the explicit structure was the more complex one (negative adverbs).

10.2.1 The relationship between intake and acquisition

A second interesting observation was that, although there was considerable intake and overall intake scores improved over time, there was no significant effect for either the implicit or the explicit treatment on acquisition in many cases. This shows that although intake may be *necessary* for learning, it is not *sufficient*. This finding is not new. Many researchers have pointed out that different types of intake are more or less conducive to learning. Faerch & Kasper (1980; see also Sharwood Smith, 1986) distinguished between intake for comprehension and intake for learning. Intake for comprehension is used to satisfy immediate communicative demands (such as when a non-native speaker copies a word used by a native speaker during conversation). The tasks used in the present study may have encouraged this type of intake.

The treatments may have been unsuccessful in encouraging participants to process the input for anything other than dealing with immediate task demands. It appears that tasks such as those used in the present study that are 1) inductive, 2) incidental, and 3) do not include rule presentation at any stage, nor corrective feedback, nor negative evidence, are simply not able to affect much change in participants' interlanguage. Even the inclusion of the instruction to pay attention to the target structure (as in the explicit treatment) proved to be insufficient to cause commitment of the intake to long-term memory. It is worth repeating in this context a citation made earlier from Williams (1999): 'if learning distributional rules is critically dependent upon the subjects initially paying attention to relations between elements in the input, then it follows that even the simplest rules might not be learned if the subjects for some reason fail to attend to those relationships' (p. 32).

Participants in this study appear to have noticed the target structures, but not the underlying rules governing the behaviour of those structures.

10.2.2 Performance on timed and untimed tests

Performance on the untimed tests was better than performance on the timed tests. This applies to scores for both the implicit and explicit treatments. For participants receiving the explicit treatment this conformed to expectations as the extra time on the untimed tests was expected to allow them to draw on knowledge they had gained as a result of the instructions. However, as there was no differential effect for the instructions this explanation does not hold. Participants receiving the explicit treatment probably did not develop any explicit knowledge, which they could have potentially drawn on when given the extra time on the untimed tests, compared with the timed tests. It is most likely then that the scores on the untimed tests were higher because the timed test was more difficult than the untimed test. As explained in chapter six, participants doing the timed tests were required to very quickly press “correct” or “incorrect” on a computer keyboard when judging the sentences and some may have had difficulty in doing this within the time limit given. The descriptive statistics in chapter eight show a considerable training effect, which seems to corroborate this interpretation.

10.3 The relative effect of the individual, collaborative, and dictation treatments on intake and acquisition

There were clear differences in the way each of the treatments affected intake on the one hand, and acquisition on the other. In this section the main differences in these effects are

summarised and possible reasons for this apparent lack of a relationship between intake and acquisition are put forward.

As for the dictation treatment, the descriptive results showed intake scores to be the highest of the three treatment types. In addition, a significant advantage for the dictation treatment over the individual reconstruction treatment was found on both intake scores for negative adverbs and adverb placement. However, the dictation treatment did not do so well on the timed and untimed tests of acquisition, with the descriptive results showing the scores to be the lowest of the three treatment types and with a significant advantage for both the collaborative and individual reconstruction treatments on grammatical items, on timed tests.

In chapter seven it was suggested that the dictation treatment resulted in high intake because it encouraged participants to direct their attention to formal aspects of the input. Participants only had to retain short chunks of text and these were often not in themselves meaningful. The individual and collaborative reconstruction treatments, on the other hand, required participants to make use of other than linguistic cues and derive content information to enable them to make use of meaning to remember the relatively long passages. This focusing on the formal features of the input and the additional processing time freed up by not having to attend to meaning to the same extent as participants in the individual and collaborative reconstruction treatments, may have allowed participants in the dictation treatment to perform better on the treatment. Why then, did the greater intake not result in more learning?

In the previous chapter it was argued that the dictation treatment resulted in relatively (although in only one case significantly) lower acquisition scores because it predominantly required participants to draw on short-term memory, and only for a short length of time. In order to complete the task, participants were able to simply store the chunks, without any need for deep processing of the input, and with a relatively small cognitive effort. This prevented a commitment of the intake to long-term memory.

In comparing the results it appears that certain characteristics of the dictation task can explain both the relatively high intake and low acquisition. If the dictation treatment was indeed easier, then this may have both facilitated immediate task performance, and at the same time deprived participants of the potential benefits of a more demanding treatment. Participants were able to attend to the formal aspects of the input but did not have to do so with a large degree of awareness, let alone understand the workings of the target structure. As the items were short enough to be successfully held in short-term memory, there was little or no incentive to activate long-term memory, even more so because the task at hand did not require participants to engage in any additional processing (for example by way of an instruction to memorise the content). Similarly, the short length of time the items had to be retained will have facilitated task performance, but not had a great effect on learning. In the previous chapter research was cited by Ericsson & Kintsch (1995) that suggested that length of processing time is in many cases positively correlated with learning. The amount of time participants interacted with the input was considerably shorter for the dictation treatment than for the other treatments. It is therefore understandable that the task characteristics on the one hand made the task easier, and on

the other hand inhibited learning. Buckner's (2000) dual effect theory of episodic encoding suggests that processing events can have two separate effects with very different functional outcomes. Processing during task completion determines performance, but in addition that processing 'sets in motion a corollary cascade of events that forms a memory for that episode' (p. 280). Different types of processing are more or less conducive to the creation of this type of episodic encoding. The author, basing himself on earlier work, (Buckner & Tulving, 1995), suggests that this type of encoding accompanies deep processing and intentional memorisation tasks, but not tasks involving shallow processing. It is likely that the short-term memory-based performance by the dictation treatment constitutes an example of such shallow processing.

The individual reconstruction treatment, on the other hand, resulted in the lowest (descriptive) intake scores of the three treatment types, significantly lower than the dictation treatment on both negative adverbs and adverb placement, and the collaborative reconstruction treatment on negative adverbs. At the same time, it resulted in the highest (descriptive) scores on the tests of acquisition and significantly higher scores on the timed tests than the dictation treatment for negative adverbs, on grammatical items.

In chapter seven it was suggested that the relatively poor performance of the individual reconstruction treatment on intake may have been due to the fact that it was difficult because of the length of the texts to be remembered (entire passages as opposed to individual chunks in the dictation treatment) and because it had to be completed individually; participants could not benefit from shared cognitive resources. It was also

suggested that it is not possible to be certain that participants did not notice the target structure; they may have simply been unable to reproduce it correctly, due to memory constraints (both in the number of items and the amount of time they had to be retained), i.e. there could be a limitation to the chosen measure of intake.

The greater success for the individual reconstruction treatment on acquisition was attributed in the previous chapter to the greater cognitive demand placed on learners during task performance. The activation of memory for extended lengths of time, the requirement to retain relatively long stretches of text, the fact that the input had to be processed semantically, and that the task had to be completed individually, were considered to have resulted in relatively deep processing of the input and the target structure. This was suggested to have facilitated commitment of the input to long-term memory.

On the face of it, these two explanations for intake and acquisition seem entirely compatible. If a task requires greater activation of one's cognitive resources, it may be expected to have a greater effect. What is interesting is that the greater effect was found not on immediate task performance, but on the development of knowledge. This is not always necessarily the case; some tasks that are too difficult to perform will have little or no effect on learning. Vygotsky (1978) has argued that tasks that are within a learner's zone of proximal development, are the most likely to cause learning. Tasks that are within the learner's immediate ability may be easily performed, but do not contribute (as much) to learning. Apparently, the individual reconstruction treatment and its content

were (unlike the dictation treatment) challenging for the participants, but not beyond their reach.

As suggested in the previous chapter, another possible effect may have come from the verbalisation as part of the talk-aloud protocols. Verbalisation may have made the treatment more difficult to perform by introducing an additional task, thus negatively affecting intake scores, but at the same time may have increased participants' cognitive commitment. The talk-aloud protocols were very closely related to the participants' reconstructions (and in most cases were identical, as shown by the verbal protocols; see chapter seven). The activation of the phonological loop and the resulting repetition in two different modes (writing and speech) of the target structures, may have facilitated learning.

The collaborative reconstruction treatment was successful in that it resulted in both relatively high intake and relatively high acquisition¹⁹. In explaining the results for the intake figures it was suggested that the task was likely to result in at least one of the two participants noticing the target structure, thus explaining the relatively high scores. Performance on the tests of acquisition was explained by referring to the degree of cognitive demand the task placed on participants. As the collaborative reconstruction

¹⁹ However, contrary to expectations, it did not perform better on acquisition than the individual reconstruction treatment and, in comparing the descriptive results for the two treatments, appears to have done slightly worse. The differences, were not, however, statistically significant.

treatment was more difficult than the dictation treatment, it required a greater commitment of mental resources, which led to more learning.

The collaborative reconstruction treatment was the most consistent in its performance when comparing the results for intake and acquisition; in both cases it did relatively well. The collaborative aspect of the treatment has been mentioned above as providing a practical benefit for immediate task performance. However, the collaboration, and especially the verbal interaction this generated may have also had a pedagogical benefit. Swain (1985, 1998; Swain & Lapkin, 1995) has argued for the benefits of discussing a task with a partner and more generally the role of output in learning a second language. One of the roles Swain sees for output is that it can function as causing noticing of form or of the difference with one's own interlanguage ("noticing the gap"), which in turn can aid learning. In one of her papers (1998) she investigated this with the help of a dictogloss task (Wajnryb, 1990). The dictogloss task was similar to the collaborative reconstruction task in the present study in that it a) also asked participants to listen to a text twice, b) asked participants to take notes and, c) reconstruct the passage together with their partner(s) (mostly in pairs, but sometimes in small groups). It differed in a number of respects in that unlike in the present study, a) in a mini-lesson preceding the dictogloss task participants were given time to review vocabulary that might be difficult and, b) participants were given a set of rules relevant to the targetted grammatical structure, c) the initial text was intended to provide practice in the use of the targetted grammatical constructions. Perhaps as a result of the various awareness-raising aspects of the task, she found participants to engage in a great deal of meta-talk about the content of

the listening passages with 40% of that focusing on language form. Language-related episodes, or interactions where the focus was on the language, were identified and tests specific to the language focus of the individual groups were designed and administered one week after the dictogloss task. These revealed a strong relationship between the solution participants came up with during the task and their answers on the posttest. Clearly, the collaborative task was successful in focusing participants' attention on language form, something that may have also been the case during the treatments in the present study. Interestingly, however, Swain also found that little of the meta-talk involved the target structures under investigation. This was true in the present study as well; there was little evidence of participants discussing or negotiating the meaning of the target structures (see chapter seven).

An alternative explanation for the beneficial effects of the collaborative reconstruction treatment is that, like the individual reconstruction treatment, it was cognitively demanding. It is possible that the benefit of the interaction that took place between the participants was mainly immediate; i.e. it affected task performance, whereas the relatively exhaustive processing the treatment required affected acquisition. However, there is no evidence to support this hypothesis as there was no additional collaborative group engaging in less exhaustive processing to allow for a comparison of the effects on intake and acquisition.

10.4 Additional findings

A number of observations were made that were not directly related to the research questions, but that may nonetheless be relevant. Firstly, it was pointed out that the treatments in many cases did not have an effect on acquisition; gain scores for target items were not significantly different from scores for control items. In chapter six a number of factors influencing learnability of the two target structures were discussed. It was suggested that especially negative adverbs were relatively complex, and probably late-acquired. The British National Corpus also shows that they are used infrequently, making the structure yet more difficult to acquire. It was thought that the structure would require learners to be at least at upper-intermediate level, and participants in the study were selected on this basis. However, the results show that the treatments in many cases were unable to affect acquisition of this structure for participants at this level. It was suggested that the structure may be so marked that it requires learners to be at an even more advanced level. Similarly, it was thought that adverb placement would be 1) relatively easy compared to the negative adverbs, but 2) fairly complex nonetheless (see chapter six), and it was thought that it would require participants to be at an intermediate level. However, although the raw scores for adverb placement were higher than those for negative adverbs in many cases, showing that adverb placement was somewhat easier for intermediate level learners than negative adverbs were for upper-intermediate learners, there was no effect for the treatments on acquisition of adverb placement, and the gain scores show no clear differences between acquisition of the two structures. It is possible that adverb placement was too challenging a structure for the intermediate level learners,

or at least that for learners at this level the type of treatment they received was not sufficient.

A second observation pertains to the standard deviations in the results. It was pointed out in the discussion of the preceding chapters that the standard deviations 1) were generally large, and 2) increased somewhat over time. There were clearly great differences in the effects the treatments had on individual participants. The standard deviations for the gain scores from pretest to delayed posttest are particularly large (and more so than those for gain scores from pretest to posttest), showing that over time these differences become larger. Considering that the treatments and the amount of input were exactly the same for all participants, it is likely that individual differences in learners' aptitude for language learning, their motivation to seriously engage with the treatments, or some other individual difference had an effect (cf. Skehan, 1989, 1998). This appears to be partly corroborated by the fact that the standard deviations are larger in many cases (but not in all cases) for target items than for control items. This may also explain why in many cases no effects were found; the large variation in the scores, combined with the small numbers of participants make the likelihood of finding significant differences small.

Finally, as pointed out in chapter six, both a timed and an untimed grammaticality judgement test were used in the study as it was thought that these would tap more implicit and more explicit knowledge, respectively. To investigate if the treatments favoured the development of implicit or explicit knowledge a one-way ANOVA was performed to identify if overall gain scores on the timed tests (measuring more implicit knowledge)

were greater or smaller than overall gain scores on the untimed tests (measuring more explicit knowledge). This proved not to be the case ($F(1,1198)=2.09$, $p=.148$) and the treatments did thus not have a differential effect on the development of either implicit or explicit knowledge. This is surprising in that the extra time available to participants in the untimed tests could have been expected to allow them to tap whatever partially formed knowledge of the target structures they had gained from the treatments. It would have been possible that the gains on the (more difficult) timed test were mainly due to a training effect and the gains on the untimed test more to actual gains. However, as shown in chapters seven and eight, there were no significant differences in gains on target and control items on both timed and untimed tests in most cases; gains for both were mainly due to a training effect.

10.5 Summary of the results

In this chapter the main findings from the study were discussed, and these are summarised here:

- 1) The explicit instructions of the inductive type used in this study did not differentially affect intake of the target structures.
- 2) The dictation treatment resulted in the greatest intake, the individual reconstruction treatment in the smallest.
- 3) The treatments of the type and length employed in this study were in many cases unable to affect acquisition of the target structures.
- 4) The explicit instructions did not differentially affect acquisition.
- 5) In most cases the three treatment types did not differentially affect acquisition.

- 6) In those cases where the treatments did have a differential effect, the reconstruction treatments resulted in greater acquisition. These were deemed more cognitively demanding as they a) involved the retention of relatively long texts, for b) a relatively long period of time (cf. N. Ellis 1996, 1997), and c) required the activation of long-term memory (cf. Craik & Lockhart, 1972).
- 7) The three treatments differentially affected intake and acquisition. The relatively easy dictation task led to high intake but less acquisition than the more demanding individual reconstruction task that led to low intake but greater acquisition. The collaborative reconstruction task was the most consistent of the three.

The result for 7) appears to corroborate research by Schneider, Healy, & Bourne (1998) who found that varying processing requirements affects acquisition. Activities that place a greater cognitive demand on learners lead to slower learning, but greater retention. In their study, one group of participants learned French words presented alongside their English translations that were grouped by content, others learned the words in a mixed order. Participants saw the words on a computer screen with their English translation in blocks of five. After that they saw the five French words in isolation and were asked to provide the English word. When they had correctly responded to all words on two trials, they saw all French words one at a time and were asked to provide the English translation. This final test was repeated one week later. A second experiment was similar except that participants were given a fixed number of trials (thus controlling for exposure, but not learning). Grouping of vocabulary items was found to be beneficial for initial learning, but performance was lower on the final test than for the group that had received

the mixed presentation. Another important effect was found for the similarity between the original learning condition and the test condition, with regards to the organisation of the vocabulary items; the more similar, the better performance on the posttest. They conclude: 'methods used to optimize acquisition of new materials are not necessarily those that will optimize later retention' (p. 78). The role that the amount of cognitive commitment on the part of the learners plays in engaging with tasks has been shown correlationally; tasks with greater cognitive demands (e.g. the individual reconstruction treatment over the dictation treatment) will result in greater learning.

CHAPTER ELEVEN

CONCLUSION

11.1 Introduction

This chapter begins with a summary of the results in section 11.2. In section 11.3 the theoretical implications, and in section 11.4 the implications for teaching are discussed. Next, section 11.5 discusses some of the limitations of the study and section 11.6 makes recommendations for future research.

11.2 Summary of the results

In the previous chapter the findings from the study were discussed and these are summarised here:

- 1) The explicit instructions of the inductive type used in this study did not differentially affect intake of the target structures.
- 2) The dictation treatment resulted in the greatest intake, the individual reconstruction treatment in the smallest.
- 3) The treatments of the type and length employed in this study were in many cases unable to affect acquisition of the target structures.
- 4) The explicit instructions did not differentially affect acquisition.
- 5) In most cases the three treatment types did not differentially affect acquisition.
- 6) In those cases where the treatments did have a differential effect, the reconstruction treatments resulted in greater acquisition. These were deemed more cognitively demanding as they a) involved the retention of relatively long texts,

for b) a relatively long period of time (cf. N. Ellis, 1996, 1997), and c) required the activation of long-term memory (cf. Craik & Lockhart, 1972).

- 7) The three treatments differentially affected intake and acquisition. The relatively easy dictation task led to high intake but less acquisition than the more demanding individual reconstruction task that led to low intake but greater acquisition. The collaborative reconstruction task was the most consistent of the three.

11.3 Theoretical implications

The single most conclusive result was that the inductive treatments used in this study under incidental learning conditions, in many cases did not facilitate acquisition. This result seems to go against claims made by those who have argued that *comprehensible* input is necessary and sufficient for acquisition to take place (Krashen, 1981, 1982). It is possible that either the input was not comprehensible or that there was not enough of it for learning to take place. However, performance on the treatment tasks was quite good and this would seem unlikely if participants had been unable to understand the input. As for the frequency of the target structure in the input, this was perhaps low compared with what might be available to learners over the course of months or years of language study and use (although for negative adverbs this is arguable). Nonetheless, the target structures were presented a total of 36 times over a period of three weeks. It appears that for the chosen structures, input only (as in the implicit treatments), or input with low-level explicit instructions (as in the explicit treatments), was not sufficient to affect a change in learners' interlanguage.

The results could also be due to the fact that the input did not contain any negative evidence. Participants were not given corrective feedback or examples of incorrect use of the target structures. As discussed in chapter eight, several researchers have pointed to the potential contribution of negative evidence to learning, for example by making learners “notice the gap” between the input and their own output, or through awareness-raising. These potential benefits were not available to participants in this study. However, as negative evidence was not included as a variable in the study, there is no evidence in support of its efficacy; there is only evidence of a lack of an effect for positive evidence.

Another finding from this study is that the explicit instructions did not facilitate intake or acquisition to a greater extent than the implicit instructions. At first sight this appears to contradict previous research that has found significant effects for explicit over implicit types of instruction (e.g. N.Ellis, 1993; DeKeyser, 1995; Robinson, 1996; Rosa & O’Neill, 1999). However, looking more closely at the type of explicit instruction used in those and other studies, two observations can be made: 1) in many cases the explicit condition involved some form of rule presentation, and 2) where more than one type of explicit instruction was used, the higher-level version always outperformed the lower-level version. As pointed out in chapter six, the type of explicit instruction used in this study was inductive, did not involve rule presentation or feedback, and did not ask participants to manipulate the input in any way. Instead, the instructions only asked participants to pay attention to the target structure and gave an example of it. This would come at the lower end of a continuum of different types of explicit instructions. A lack of an effect for such instructions is compatible with the previous research cited, and indeed

corroborates earlier reported findings (e.g. Robinson, 1996). It is worth pointing out that task completion, insofar as this could be ascertained through the verbal reports, was characterised by low levels of awareness. This applied to both participants in the implicit and the explicit conditions. It appears that the explicit instructions did not result in raising participants' awareness and thus did not result in any of the potential benefits of this kind of instruction (cf. Schmidt, 2001).

There was some evidence that the more cognitively demanding tasks were more successful in facilitating acquisition than the less demanding tasks. This sits well with theories of both general and second language learning. For example, levels of processing theory (Craik & Lockhart, 1972) claims that the more elaborate the processing that takes place, the more likely it is to result in learning. Although criticisms have been raised especially with regards to the definition of the required "levels" (e.g. Baddeley, 1990), other research investigating specific aspects or types of processing in isolation seems to point in the same direction. For example, positive effects have been found for length of processing time (e.g. Ericsson & Kintsch, 1995), the degree of rehearsal (e.g. N. Ellis, 1997), and verbalisation (e.g. N. Ellis & Sinclair, 1996).

The results of this study lend some support to the purported benefits of collaborative learning (cf. Lantolf, 2000); the collaborative reconstruction treatment did relatively better on both the treatments and the tests, in particular in comparison with the dictation treatment. However, it did not outperform the otherwise similar individual reconstruction

treatment and there is thus no evidence to show that collaborative learning is necessarily superior to individual learning.

11.4 Implications for teaching

The study reported here was experimental in nature and the results may thus be criticised for lacking ecological validity (Van Lier, 1996). However, the treatments consisted of tasks commonly used in language classrooms. A brief questionnaire (see appendix E), administered after the study was completed, revealed that all teachers who had students participating in the study had made use of similar tasks in the past. The experimental design allowed for the investigation of isolated task characteristics and the controlling of extraneous variables. The results may be of relevance to task designers and teachers in better understanding the potential contribution of various task types and their accompanying instructions to both immediate task performance and learning outcomes.

The first and most obvious point to repeat here, is that the tasks and instructions used in this study did not significantly impact on learning of the two chosen structures. The target structures, as most teachers will agree, are not readily acquired. Negative adverbs in particular are difficult for all but the most advanced learners. Adverb placement may be somewhat easier but is nonetheless challenging. L. White (1991) found that instruction on adverb placement including negative evidence of what is not possible in English only resulted in positive results on an immediate posttest. On a delayed posttest one year after the instruction took place, no effects were found anymore. Participants in the present study only received aural input on three occasions. Each time they listened to four short

passages and the total amount of exposure they received was thus small. The results of the study need to be seen in this light; more frequent or more prolonged exposure to less complex structures could have resulted in different findings. The type and amount of exposure in this study may give teachers a yardstick when deciding how much time to dedicate to structures such as those used here.

There was no differential effect for the explicit instructions on either intake or acquisition. In chapter eight it was suggested that different levels of explicit instruction differentially affect learning (cf. Norris & Ortega, 2000), and it could well be that the target structures in this study required a more explicit type of instruction in order to be taken in and acquired. It was also pointed out that in the case of structures such as adverb placement for which no similar restrictions for adverb position may exist in the learners' first language, negative evidence (either in the form of corrective feedback or through explicit presentation of what is *not* possible in the target language) may be necessary, or at least may be beneficial to learning.

More broadly, these findings call into question the usefulness of providing input only, with minimal pedagogic interventions, for the purpose of acquisition (i.e. *not* for the purpose of fluency, which is a different matter; cf. Allwright, 1984). It is important to note that the tasks used in this study were all memory-based; they required participants to remember and reproduce the input, but did not require or encourage any additional processing, for example through an instruction to compare sources of input, or to use the input to solve a (linguistic) problem. If such tasks do not contribute to learning then this

may indicate that a more direct pedagogic intervention is needed, at least where relatively complex structures are concerned.

A second observation was that, although there were few significant differences between the three treatment types, there was a trend showing an advantage for the individual and collaborative reconstruction treatments over the dictation treatment (and this was statistically confirmed in one case). It was suggested that this was a result of the greater cognitive demand placed on participants in these tasks. The treatments required a level of processing, particularly the activation of long-term memory, not needed for successful completion of the dictation treatment.

Another important observation was that there was no direct relationship between intake and acquisition. Tasks can affect intake in one way, and acquisition in another²⁰. For example, the dictation treatment resulted in relatively high intake scores, but little learning. The individual reconstruction treatment, on the other hand, resulted in little intake, but more learning. The implication for especially classroom teaching is that successful task performance can not be seen as an end in itself, but has to be related to ultimate learning outcomes. In evaluating 1) the effectiveness of specific tasks, and 2) performance of individual learners, teachers may want to be careful in making too much of immediate task performance. Of course, tasks that lead to successful performance may have their own advantages; they can be motivating for learners, they can facilitate classroom interaction, and they may not be as tiring as more demanding tasks. Teachers

²⁰ Although it was suggested in chapter seven that another possibility is that the chosen operationalisation of intake did not reveal the effects of some of the treatments; see section 11.5 below.

obviously need to consider a range of factors, but need to be aware that tasks that involve low levels of processing are less likely to have an effect on learning.

11.5 Limitations of the study

An issue which has been raised in the discussion of the various results chapters is that even though the amount of exposure participants received was the same, the length of time they took to complete the three different treatment types was not. The dictation treatment was generally completed in a shorter time than the individual reconstruction treatment, which in turn was completed in a shorter time than the collaborative reconstruction treatment. However, although the dictation treatment resulted in the highest intake scores of the three treatments, it resulted in the lowest acquisition. Similarly, the individual treatment resulted in the lowest intake, but in greater acquisition than the dictation treatment, and did not do worse than the collaborative treatment. There is no clear effect for amount of time-on-task. However, ideally this should have been controlled for.

A second issue is the lack of a separate control group. Norris & Ortega (2000) point out that 82% of all studies included in their meta-study did not include a true control group (i.e. 'wherein participants receive no treatment of any sort on the target structures' (p. 490) and warn that this makes interpretation of the results difficult. In the present study it was decided for practical reasons (see chapter six) to investigate performance on target items (for which participants had received input during the treatments, i.e. negative adverbs or adverb placement) and control items (for which they had not, i.e. the other

structure). The results of the study show that in many cases there was no significant difference in performance between the two, but scores for both did go up from pretest to posttests. With participants not receiving any input relating to the complex control structures (especially in the case of negative adverbs), this clearly points to a training effect. The lack of a difference between the target and control structures is further likely to be the result of a lack of an effect for the treatments on the target structures. Ideally, however, a separate control group should have been used.

Operationalisation of key concepts is crucial when investigating mental processes. At the same time it is notoriously difficult. In chapter three a wide range of existing definitions and operationalisations of intake were discussed. It was shown that there are significant differences in views of what constitutes intake and how it can be operationalised. In this study, immediate task performance was adopted as a measure of intake and verbal protocols were obtained to provide additional information on the participants' locus of attention during task completion. These methods were chosen over others, involving additional tasks, such as preference tests, as they are administered after exposure to the target structure and may not give an accurate picture of the intake process. Additional tasks also introduce another variable and can raise awareness of the target structures. However, there are limitations with the chosen measure. It is possible that although a task is performed poorly, the target structure is still detected and is available for further processing. This is particularly true for more demanding tasks, such as the individual reconstruction task. It was found that participants performed poorly on this task, most likely due to the fact that they had to retain relatively long texts for a relatively long

length of time. This made it less likely that they would be able to accurately supply it in their reconstruction of the texts. Although this is certainly a limitation, its gravity is somewhat attenuated by the fact that a full score did not require participants to accurately recall the adverbs; rather it was their position in the sentence (adverb placement), or the subject-verb inversion (negative adverbs), that mattered. Although participants in the individual reconstruction and collaborative reconstruction treatments may have been less likely to recall the longer passages compared with the dictation treatment, this was not the focus of the measurement. It was thought that the treatments would lead participants (and certainly those in the explicit group) to notice the operation of the target structure, and that over time a memory-based approach would be replaced with a rule-governed approach. Although not ideal, the chosen measure of intake was expected to be reasonably accurate. However, additional ways of investigating intake will need to continue to be developed in future.

In many cases the study did not reveal an effect for the treatments on acquisition of the target structures. This may in part have been due to the chosen method of measuring learning. Grammaticality judgement tests and their limitations have been discussed in chapter six. In addition, they have been shown to be a rather conservative measure of learning. Norris & Ortega (2000) write:

Thus, it is likely that effect sizes observed within any given study may be directly associated with the type of response required from learners on outcome measures, and associated interpretations of study findings should be tempered by the

realization that a different test type would likely have produced different results. [...] Both selected-response (e.g., multiple choice questions on verbal conjugation) and constrained constructed-response (e.g., suppliance of a correctly conjugated verb to complete the sentence) measures were noted to have average effect sizes between 0.38 and 0.91 standard deviation units higher than meta-linguistic judgments and free constructed response measures. (pp. 486-487)

In addition, there is the larger issue of the degree of compatibility between the learning task and the measurement of that learning, or more broadly the context during encoding and retrieval. Bransford, Franks, Morris & Stein (1979) refer to this as “transfer appropriateness”. In the present study, different types of measures were used for intake (a productive measure), for awareness (meta-talk produced during task performance), and learning (grammaticality judgements). These measures may not be optimally correlated. A productive measure such as reconstruction may result in changes in behaviour (e.g. a greater ability to retain the target structure, or faster performance), without affecting the ability to judge the grammaticality of the target structure. With hindsight perhaps more than one type of measure of learning should have been used, and at least one of these should have been more aligned with the chosen measure of intake. However, there were practical problems in doing this as the participants in the study were all enrolled in full-time language classes and there was very little room in their programme to complete the study. Administration of additional tests would have taken up too much time.

11.6 Suggestions for further research

The results of the study highlight several points worthy of further investigation. One recommendation to be made is that a closer investigation be undertaken of the relationship between intake and acquisition of individual items. On theoretical grounds one would expect for items for which there is evidence that they have been acquired, there to also be evidence of intake (if an item is learned, it has to have been taken in). If no such relationship is found this could point to a problem with the chosen measure of intake. In addition, identifying items that have been taken in, but not acquired may help in pointing to specific attributes of such items that could affect the results (e.g. word length, frequency in the input). Similarly, the relationship between intake and degrees of awareness of individual items on the one hand, and acquisition on the other, needs to be investigated more fully. The effects of the level of awareness could be measured with the help of interviews or questionnaires administered after the study. These could be used to gauge the extent to which participants were aware of the purpose of the study, the target items, and their operation, and to what extent they found the tasks difficult, as a reflection of the cognitive demands of those tasks.

However, such research depends on the availability of an accurate measure of intake. As pointed out above, intake is a notoriously difficult concept to operationalise. Performance measures may not give a full picture of what is taken in and also have the disadvantage that successful task completion may not be dependent on intake (or on “intake for learning” in the words of Faerch & Kasper, 1980). Measures of intake administered after task completion may draw on other types of processing, not related to intake. Maybe neurolinguistic research (cf. Sato & Jacobs, 1992) can, in future, help to identify what

parts of the brain are activated during intake and perhaps also establish when in the input-to-learning process it takes place, thus allowing for more precise measures to be developed. Or perhaps intake remains to be one of those tantalisingly elusive phenomena, never to be isolated, and more useful at a conceptual than at a practical level.

Second, the explicit instructions used in the study did not have a differential effect on intake and acquisition. I suggested that this might have been because of the type of low-level explicit instructions used in the treatments. I also suggested that in order for the target structures to have been acquired, other, more direct types of explicit instructions, such as rule presentation, may be necessary. However, these suggestions are speculative as no other types of explicit instructions were investigated in the study. Future studies could compare the effects of the various instructional types on intake and acquisition of structures such as those used in the present study. Other studies (e.g. Robinson, 1996; Rosa & O'Neill, 1999) have contrasted implicit with explicit types of instruction, but less work has been done to compare more and less explicit types of instruction. Although Robinson looked at rule presentation and a rule-search instruction, he did not include the type of low-level explicit instruction used in this study.

Finally, it was also pointed out above that the study only included positive evidence and that the provision of negative evidence could have been beneficial. Many studies have investigated the effects of different types of corrective feedback (e.g. Lyster, 1998; Mackey & Philp, 1998; Oliver, 1995) and have shown that this can have beneficial effects on acquisition. In general, more explicit types of corrective feedback have been

found to be more successful. However, less is known about the relative effects of the various types of corrective feedback on intake and how this relates to acquisition. More work remains to be done.

LIST OF REFERENCES

- Alanen, R. (1995). Input enhancement and rule presentation in second language acquisition. In R. Schmidt (Ed.), Attention and Awareness in Foreign Language Learning (pp. 259-302). Honolulu: University of Hawai'i.
- Allen, H. B. (2000). Form-Meaning Connections and the French Causative: An Experiment in Processing Instruction. Studies in Second Language Acquisition, 22, 69-84.
- Allport, A. (1988). What concept of consciousness? In A. J. Marcel & E. Bisiach (Eds.), Consciousness in Contemporary Science. (pp. 159-181). London: Clarendon Press.
- Allport, A. (1989). Visual attention. In M. I. Posner (Ed.), Foundations of Cognitive Science (pp. 631-682). Cambridge, MA: MIT Press.
- Allport, A., Antonis, B., & Reynolds, P. (1972). On the division of attention. A disproof of the single channel hypothesis. Quarterly Journal of Experimental Psychology, 24, 225-235.
- Allwright, R. L. (1984). The importance of interaction in classroom language learning. Applied Linguistics, 5, 156-171.

- Anderson, J. R. (1982). Acquisition of cognitive skill. Psychological Review, 89(4), 369-406.
- Anderson, J. R. (1983). A spreading activation theory of memory. Journal of Verbal Learning and Verbal Behavior, 22, 261-295.
- Aston, G., & Burnard, L. (1998). The BNC handbook: Exploring the British National Corpus with SARA. Edinburgh: Edinburgh University Press.
- Atkinson, P., & Shiffrin, R. M. (1968). Human memory: A proposed system and its control processes. In K. W. Spence & J. T. Spence (Eds.), The Psychology of Learning and Motivation, Vol. 2. New York: Academic Press.
- Baddeley, A. (1986). Working Memory. New York: Oxford University Press.
- Baddeley, A. (1990). Human Memory. Theory and Practice. Hove: Lawrence Erlbaum.
- Baddeley, A. (1993). Working memory or working attention? In A. Baddeley & L. Weiskrantz (Eds.), Attention. Selection, Awareness and Control. A Tribute to Donald Broadbent. (pp. 152-170). Oxford: Oxford University Press.
- Baddeley, A., & Hitch, G. J. (1974). Working memory. The psychology of learning and motivation. In G. A. Bower (Ed.), The Psychology of Learning and Motivation, Vol. 8. New York: Academic Press.

- Baddeley, A., Thomson, N., & Buchanan, M. (1975). Word length and the structure of short-term memory. Journal of Verbal Learning and Verbal Behavior, *14*, 575-589.
- Bardovi-Harlig, K. (1987). Markedness and salience in second language acquisition. Language Learning, *37*, 385-407.
- Bechtel, W., & Abrahamsen, A. (1991). Connectionism and the Mind: An Introduction to Parallel Processing in Networks. Cambridge, Mass: Blackwell.
- Beebe, L. (1985). Input: choosing the right stuff. In S. M. Gass & C. Madden (Eds.), Input in Second Language Acquisition (pp. 404-414). Rowley, Mass.: Newbury House.
- Benson, P. (2001). Autonomy in Language Learning. Harlow: Longman.
- Berry, D. (1993). Implicit learning. In A. Baddeley & L. Weiskrantz (Eds.), Attention. Selection, Awareness and Control. (pp. 246-260). Oxford: Oxford University Press.
- Berry, D., & Broadbent, D. E. (1984). On the relationship between task performance and associated verbalizable knowledge. Quarterly Journal of Experimental Psychology, *36a*, 209-231.
- Bialystok, E. (1979). Explicit and Implicit judgements of L2 Grammaticality.

Language Learning, 29, 81-103.

Bialystok, E. (1982). On the relationship between knowing and using linguistic forms.

Applied Linguistics, 3(3), 181-206.

Bialystok, E. (1985). The compatibility of teaching and learning strategies. Applied

Linguistics, 6(3), 255-262.

Bialystok, E. (1990). The dangers of dichotomy. A reply to Hulstijn. Applied

Linguistics, 11(1), 46-51.

Bialystok, E. (1994). Representation and ways of knowing: Three issues in second

language acquisition. In N. C. Ellis (Ed.), Implicit and Explicit Learning of

Languages (pp. 549-569). San Diego, CA: Academic Press.

Bialystok, E., & Bouchard Ryan, E. (1985). Toward a definition of metalinguistic

skill. Merrill-Palmer Quarterly, 31(1), 229-251.

Bialystok, E., & Mitterer, J. (1987). Metalinguistic differences among three kinds of

readers. Journal of Education Psychology, 79(2), 147-153.

Birdsong, D. (1989). Metalinguistic Performance and Interlinguistic Competence.

New York: Springer.

Bley-Vroman, R. (1986). Hypothesis testing in second language acquisition theory.

Language Learning, 36, 353-376.

Bley-Vroman, R. (1989). What is the logical problem of foreign language learning? In S. M. Gass & J. Schachter (Eds.), Linguistic Perspectives on Second Language Acquisition (pp. 41-68). Cambridge: Cambridge University Press.

Bohannon, J. N. I., & Stanowicz, L. (1988). The issue of negative evidence: adult responses to children's language errors. Developmental Psychology, 24, 684-689.

Boulouffe, J. (1987). Intake as the locus of equilibration in language learning. Language Learning, 36(3), 245-276.

Bransford, J. D., Franks, J. J., Morris, C. D., & Stein, B. S. (1979). Some general constraints on learning and memory research. In L. S. Cermak & F. I. M. Craik (Eds.), Levels of Processing in Human Memory (pp. 331-354). Hillsdale: Lawrence Erlbaum.

Breen, M. (1987). Contemporary paradigms in syllabus design (parts 1 and 2). Language Teaching, 20(2 and 3), 91-92 and 157-174.

Breen, M. (1989). The evaluation cycle for language learning tasks. In R. K. Johnson (Ed.), The Second Language Curriculum (pp. 187-206). Cambridge: Cambridge University Press.

- Broadbent, D. E. (1958). Perception and Communication. New York: Pergamon press.
- Brookfield, S. (Ed.). (1985). Self-Directed Learning : From Theory to Practice. San Francisco: Jossey-Bass.
- Brooks, L. R., & Vokey, J. R. (1991). Abstract analogies and abstracted grammars: comments on Reber (1989) and Mathews, et al. (1989). Journal of Experimental Psychology: General, *120*, 316-323.
- Brown, J. D., & Rodgers, T. S. (2002). Doing Second Language Research. Oxford: Oxford University Press.
- Buckner, R. L. (2000). Dual effect theory of episodic encoding. In E. Tulving (Ed.), Memory, Consciousness, and the Brain. The Tallinn Conference (pp. 278-292). Philadelphia: Psychology Press.
- Buckner, R. L. & Tulving, E. T. (1995). Neuroimaging studies of memory: theory and recent PET results. In F. Boller & J. Grafman (Eds.), Handbook of Neuropsychology Vol. 10 (pp. 439-466). Amsterdam: Elsevier.
- Butler, L. T., & Berry, D. C. (2001). Implicit memory: intention and awareness revisited. TRENDS in Cognitive Sciences, *5*(5), 192-197.

- Bygate, M. (1996). Effects of task repetition: Appraising the developing language of learners. In J. Willis & M. Willis (Eds.), Challenge and Change in Language Teaching (pp. 136-146). Oxford: Heinemann.
- Bygate, M. (1999). Task as context for the framing, reframing, and unframing of language. System, 27, 33-48.
- Bygate, M., Skehan, P., & Swain, M. (2001). Introduction. In M. Bygate, P. Skehan & M. Swain (Eds.), Researching Pedagogic Tasks. Second Language Learning, Teaching and Testing (pp. 1-20). Harlow: Longman.
- Carlson, R. A., & Dulany, D. E. (1985). Conscious attention and abstraction in concept learning. Journal of Experimental Psychology: Learning, Memory, and Cognition, 11, 45-58.
- Carr, T. H., & Curran, T. (1994). Cognitive factors in learning about structured sequences: applications to syntax. Studies in Second Language Acquisition, 16, 205-203.
- Carrell, P. L. (1989). Metacognitive awareness and second language reading. The Modern Language Journal, 73, 121-134.
- Carrell, P. L. (1992). Awareness of text structure: effects on recall. Language Learning, 42(1), 1-20.

- Carroll, J. B. (1993). Human Cognitive Abilities. New York: Cambridge University Press.
- Carroll, S., & Swain, M. (1993). Explicit and implicit negative feedback: an empirical study of the learning of linguistic generalizations. Studies in Second Language Acquisition, 15, 357-386.
- Carroll, S. (2001). Input and Evidence. The Raw Material of Second Language Acquisition. Amsterdam/Philadelphia: John Benjamins.
- Cermak, L. S., & Craik, F. I. M. (Eds.). (1979). Levels of Processing in Human Memory. Hillsdale: Lawrence Erlbaum.
- Chaudron, C. (1983). Simplification of input: topic reinstatements and their effects on L2 learners' recognition and recall. TESOL Quarterly, 17, 437-458.
- Chaudron, C. (1985a). Intake: on models and methods for discovering learners' processing of input. Studies in Second Language Acquisition, 7, 1-14.
- Chaudron, C. (1985b). A method for examining the input/intake distinction. In S. M. Gass & C. Madden (Eds.), Input in Second Language Acquisition (pp. 285-300). Cambridge, Mass: Newbury House.
- Cheng, P. W. (1985). Restructuring versus automaticity: alternative accounts of skill acquisition. Psychological Review, 92(3), 414-423.

Chomsky, N. (1959). Review of "verbal behavior" by B.F.Skinner. Language, 35, 26-58.

Chomsky, N. (1965). Aspects of the Theory of Language. Cambridge: MIT Press.

Cohen, A. D. (1987). Using verbal reports in research on language learning. In C. Faerch & G. Kasper (Eds.), Introspection in Second Language Research (pp. 82-95). Clevedon, Avon: Multilingual Matters.

Cohen, A. D. (2000). Exploring strategies in test-taking: fine-tuning verbal reports from respondents. In G. Ekbatani & H. Pierson (Eds.), Learner-Directed Assessment in ESL (pp. 127-150). Mahwah: Lawrence Erlbaum.

Cohen, A. D., Ivry, R. I., & Keele, S. W. (1990). Attention and structure in sequence learning. Journal of Experimental Psychology: Learning, Memory and Cognition, 16, 17-30.

Cohen, J. (1997a). The earth is round ($r < .05$). In L. Harlow, S. Mulaik & J. Steiger (Eds.), What if there were no Significance Tests? (pp. 21-36). Mahwah: Lawrence Erlbaum.

Cohen, J. (1997b). Statistical Power Analysis for the Behavioral Sciences. New York: Academic Press.

- Cohen, N. J., & Squire, L. R. (1980). Preserved learning and retention of pattern-analyzing skill in amnesia: dissociation of "knowing how" and "knowing that". Science, *210*, 207-209.
- Corder, S. P. (1967). The significance of learners' errors. International Review of Applied Linguistics, *5*, 161-169.
- Council of Europe (1996). A Common European Framework of Reference for Languages. Strassbourg: Council of Europe.
- Cowan, N. (1988). Evolving conceptions of memory storage, selective attention, and their mutual constraints within the human information processing system. Psychological Bulletin, *104*, 163-191.
- Cowan, N. (1993). Activation, attention, and short-term memory. Memory & Cognition, *21*(2), 162-167.
- Cowan, N. (1995). Attention and Memory. An Integrated Framework. Oxford: Oxford University Press.
- Craik, F. I. M., & Lockhart, R. S. (1972). Levels of processing : a framework for memory research. Journal of Verbal Learning and Verbal Behavior, *11*, 671-683.
- Craik, F. I. M., & Tulving, E. (1975). Depth of processing and the retention of words

in episodic memory. Journal of Experimental Psychology: General, 104(3), 268-294.

Crutcher, R. J. (1990). The Role of Mediation in Knowledge Acquisition and Retention: Learning Foreign Vocabulary Using the Keyword Method (Tech report no. 90-10). Boulder: University of Colorado.

Cummins, J. (1983). Language proficiency and academic achievement. In J. Oller (Ed.), Issues in Language Testing Research. Rowley: Newbury House.

Curran, T., & Keele, S. W. (1993). Attentional and nonattentional forms of sequence learning. Journal of Experimental Psychology: Learning, Memory, and Cognition, 19(431-469).

De Bot, K. (1992). A Bilingual Processing Model: Levelt's 'Speaking' Model Adapted. Applied Linguistics, 13, 1-24.

De Bot, K. (1996). Language attrition. In P. Nelde & W. Wölck (Eds.), Handbuch Sprach Kontakt. Berlin: Mouton de Gruyter.

Decoo, W. (1996). The induction-deduction opposition: Ambiguities and complexities of the didactic reality. International Review of Applied Linguistics, 34, 95-118.

Deese, J. (1984). Thought into Speech: the Psychology of Language. Englewood

Cliffs: Prentice Hall.

DeGraaff, R. (1997). The eXperanto experiment: effects of explicit instruction on second language acquisition. Studies in Second Language Acquisition, 19(2), 249-276.

DeKeyser, R. M. (1994). Implicit and explicit learning of L2 grammar: A pilot study. TESOL Quarterly, 28, 188-194.

DeKeyser, R. M. (1995). Learning second language grammar rules. An experiment with a miniature linguistic system. Studies in Second Language Acquisition, 17, 379-401.

DeKeyser, R. M. (1997). Beyond explicit rule learning. Automatizing second language morphosyntax. Studies in Second Language Acquisition, 19, 195-221.

DeKeyser, R. M. (1998). Beyond focus on form: cognitive perspectives on learning and practicing second language grammar. In C. Doughty & J. Williams (Eds.), Focus on Form in Classroom Second Language Acquisition (pp. 42-63). Cambridge: Cambridge University Press.

DeKeyser, R. M. (2001). Automaticity and automatization. In P. Robinson (Ed.), Cognition and Second Language Instruction (pp. 125-151). Cambridge: Cambridge University Press.

DeKeyser, R. M. (2003). Implicit and explicit learning. In C. Doughty & M. H. Long (Eds.), Handbook of Second Language Acquisition (pp. 318-348). Oxford: Blackwell.

DeKeyser, R. M., Salaberry, R., Robinson, P., & Harrington, M. (2002). What gets processed in processing instruction? A commentary on Bill VanPatten's "Processing instruction: an update". Language Learning, 52(4), 805-823.

DeKeyser, R. M., & Sokalski, K. J. (1996). The differential role of comprehension and production practice. Language Learning, 46(4), 613-642.

DeSchepper, B., & Treisman, A. (1996). Visual memory for novel shapes: implicit coding without attention. Journal of Experimental Psychology: Learning, Memory and Cognition, 22, 27-47.

Deutsch, J., & Deutsch, D. (1963). Attention: Some theoretical considerations. Psychological Review, 70, 80-90.

Dienes, Z., Broadbent, D. E., & Berry, D. (1991). Implicit and explicit knowledge bases in artificial grammar learning. Journal of Experimental Psychology: Learning, Memory and Cognition, 17, 875-887.

Doughty, C. (1991). Second language instruction does make a difference. Evidence from an empirical study of SL relativization. Studies in Second Language Acquisition, 13, 431-469.

Dulany, D. E., Carlson, R. A., & Dewey, G. I. (1984). A case of syntactical learning and judgment: how conscious and how abstract? Journal of Experimental Psychology: General, *113*, 541-555.

Dulany, D. E., Carlson, R. A., & Dewey, G. I. (1985). On consciousness in syntactic learning and judgment: a reply to Reber, Allen, and Regan. Journal of Experimental Psychology: General, *114*, 25-32.

Edufind Grammar (n.d.). Retrieved May 1, 2005, from <http://www.edufind.com/english/grammar/ADVERBS7.cfm>

Ellis, N. (1993). Rules and instances in foreign language learning: interactions of explicit and implicit knowledge. European Journal of Cognitive Psychology, *5*(3), 289-318.

Ellis, N. C. (Ed.) (1994). Implicit and Explicit Learning of Languages. London: Academic Press.

Ellis, N. C. (1996). Sequencing in SLA. Phonological memory, chunking, and points of order. Studies in Second Language Acquisition, *18*, 91-126.

Ellis, N. C. (2001). Memory for language. In P. Robinson (Ed.), Cognition and Second Language Instruction (pp. 33-68). Cambridge: Cambridge University Press.

- Ellis, N. C. (2002a). Frequency effects in language processing. Studies in Second Language Acquisition, 24(2), 143-188.
- Ellis, N. C. (2002b). Reflections on frequency effects in language processing. Studies in Second Language Acquisition, 24(2), 297-339.
- Ellis, N. C. (2003). Constructions, chunking, and connectionism: the emergence of second language structure. In C. Doughty & M. H. Long (Eds.), The Handbook of Second Language Acquisition (pp. 63-103). Oxford: Blackwell.
- Ellis, N. C., & Beaton, A. (1993). Factors affecting the learning of foreign language vocabulary: imagery keyword mediators and phonological short-term memory. Quarterly Journal of Experimental Psychology, 46a, 533-558.
- Ellis, N. C., & Schmidt, R. (1997). Morphology and longer distance dependencies. Laboratory research illuminating the A in SLA. Studies in Second Language Acquisition, 19, 145-171.
- Ellis, N. C., & Sinclair, B. (1996). Working memory in the acquisition of vocabulary and syntax: putting language in good order. The Quarterly Journal of Experimental Psychology, 49a, 234-249.
- Ellis, R. (1991a). Grammaticality judgments and second language acquisition. Studies in Second Language Acquisition, 13, 161-186.

- Ellis, R. (1991b). Grammar teaching practice or consciousness-raising? In R. Ellis (Ed.), Second Language Acquisition and Second Language Pedagogy (pp. 232-241). Clevedon, Avon: Multilingual Matters.
- Ellis, R. (1993). The structural syllabus and second language acquisition. TESOL Quarterly, 27, 91-112.
- Ellis, R. (1994). The Study of Second Language Acquisition. Oxford: Oxford University Press.
- Ellis, R. (1995). Interpretation tasks for grammar teaching. TESOL Quarterly, 29(1), 87-103.
- Ellis, R. (1995). Modified input and the acquisition of word meaning. Applied Linguistics, 16, 409-441.
- Ellis, R. (2000). Task-based research and language pedagogy. Language Teaching Research, 4(3), 193-220.
- Ellis, R. (2001). Non-reciprocal tasks, comprehension and second language acquisition. In M. Bygate, P. Skehan & M. Swain (Eds.), Researching Pedagogic Tasks. Second Language Learning, Teaching and Testing. Harlow: Longman.

- Ellis, R. (2003). Task-based Language Learning and Teaching. Oxford: Oxford University Press.
- Ellis, R. (2004). The definition and measurement of L2 explicit knowledge. Language Learning, 54(2), 227-275.
- Ellis, R. (2005). Measuring implicit and explicit knowledge of a second language: a psychometric study. Studies in Second Language Acquisition.
- Ellis, R., & He, X. (1999). The roles of modified input and output in the incidental acquisition of word meanings. Studies in Second Language Acquisition, 21, 285-301.
- Ellis, R., & Heimbach, R. (1997). Bugs and birds: children's acquisition of second language vocabulary through interaction. System, 44, 449-491.
- Ericsson, K. A. & Kintsch, W. (1995). Long-term working memory. Psychological Review, 102(2), 211-245.
- Ericsson, K., & Simon, H. (1980). Verbal reports as data. Psychological Review, 87, 215-251.
- Ericsson, K., & Simon, H. (1987). Verbal reports on thinking. In C. Faerch & G. Kasper (Eds.), Introspection in Second Language Research (pp. 24-54). Clevedon, Avon: Multilingual Matters.

- Ericsson, K., & Simon, H. (1993). Protocol Analysis: Verbal Reports as Data (2nd ed.). Boston: MIT Press.
- Erlam, R. (2003). Evaluating the relative effectiveness of structured input instruction and output-based instruction in foreign language learning: results from an experimental study. Studies in Second Language Acquisition, 25, 559-582.
- Erlam, R. (2003). The effectiveness of deductive and inductive instruction on the acquisition of direct object pronouns in French as a second language. Modern Language Journal, 87, 242-260.
- Eysenck, M. W. (1982). Incidental learning and orienting tasks. In C. R. Puff (Ed.), Handbook of Research Methods in Human Memory and Cognition (pp. 197-228). New York: Academic Press.
- Eysenck, M. W., & Keane, T. (2000). Cognitive Psychology: A Student's Handbook. Hove: Psychology Press.
- Faerch, C., Haastrup, K., & Phillipson, R. (1984). Learner Language and Language Learning. Clevedon, Avon: Multilingual Matters.
- Faerch, C., & Kasper, G. (1980). Processes and strategies in foreign language learning and communication. Interlanguage Studies Bulletin, 5, 47-118.
- Farrar, M. J. (1992). Negative evidence and grammatical morpheme acquisition.

Developmental Psychology, 28(1), 90-98.

Foster, P., & Skehan, P. (1999). The influence of source of planning and focus of planning on task-based performance. Language Teaching research, 3(3), 215-247.

Fotos, S. S. (1993). Consciousness raising and noticing through focus on form: grammar task performance versus formal instruction. Applied Linguistics, 14(4), 385-407.

Fotos, S. S. (1994). Integrating grammar instruction and communicative language use through grammar consciousness-raising tasks. TESOL Quarterly, 28, 323-351.

Fotos, S. S., & Ellis, R. (1991). Communicating about grammar: a task-based approach. TESOL Quarterly, 25(4), 46-69.

Frodesen, J. (1991). Grammar in writing. In M. Celce-Murcia (Ed.), Teaching English as a Second or Foreign Language. Boston: Heinle & Heinle.

Gass, S. (1988). Integrating research areas: a framework for second language studies. Applied Linguistics, 9, 198-217.

Gass, S. M. (1991). Grammatical instruction, selective attention, and learning. In R. Phillipson, E. Kellerman, L. Selinker, M. Sharwood Smith & M. Swain (Eds.), Foreign/second Language Pedagogy. Clevedon, Avon: Multilingual Matters.

- Gass, S. M. (1994). The reliability of second-language grammaticality judgments. In E. E. Tarone, S. M. Gass & A. D. Cohen (Eds.), Second-language Grammaticality Judgments (pp. 304-321). Hillsdale: Lawrence Erlbaum.
- Gass, S. M. (1997). Input, Interaction, and the Second Language Learner. Mahwah: Lawrence Erlbaum.
- Gass, S. M. (2003). Input and interaction. In C. Doughty & M. H. Long (Eds.), Handbook of Second Language Acquisition. Oxford: Blackwell.
- Gass, S. M., Sorace, A., & Selinker, L. (1999). Second Language Learning Data Analysis (2nd ed.). Mahwah, N.J.: L. Erlbaum Associates.
- Gass, S. M., Svetics, I., & Lemelin, S. (2003). Differential effects of attention. Language Learning, 53(3), 497-545.
- Gass, S. M., & Varonis, E. (1994). Input, interaction and second language production. Studies in Second Language Acquisition, 16, 283-302.
- Gathercole, S. E., & Thorn, A., S. (1998). Phonological short-term memory and foreign language learning. In A. F. Healy & L. E. J. Bourne (Eds.), Foreign Language Learning. Psycholinguistic Studies on Training and Retention (pp. 141-158). Mahwah: Lawrence Erlbaum.

- Gazzaniga, M. S., Ivry, R. I., & Mangun, G. R. (Eds.). (1998). Fundamentals of Cognitive Neuroscience. The Biology of the Mind. New York: Norton.
- Goldschneider, J. M., & DeKeyser, R. M. (2001). Explaining the "natural order of L2 morpheme acquisition" in English: a meta-analysis of multiple determinants. Language Learning, 51(1), 1-50.
- Gopher, D. (1992). The skill of attentional control: Acquisition and execution of attention strategies. In D. E. Meyer & S. Kornblum (Eds.), Attention and Performance XIV: Synergies in Experimental Psychology, Artificial Intelligence, and Cognitive Neuroscience (pp. 299-322). Cambridge, Mass: MIT Press.
- Graf, P. (1994). Explicit and implicit memory: a decade of research. Attention and Performance 15, 681-696.
- Graf, P., & Mandler, G. (1984). Activation makes words more accessible, but not necessarily more retrievable. Journal of Verbal Learning and Verbal Behavior, 23, 553-568.
- Graf, P., & Schacter, D. L. (1985). Implicit and explicit memory for new associations in normal and amnesic subjects. Journal of Experimental Psychology: Learning, Memory, & Cognition, 11, 501-518.
- Gregg, K. R. (1984). Krashen's Monitor and Occam's razor. Applied Linguistics, 5(2),

79-100.

- Gregg, K. R. (2001). Learnability and second language acquisition theory. In P. Robinson (Ed.), Cognition and Second Language Instruction (pp. 152-182). Cambridge: Cambridge University Press.
- Hall, J. K. (2002). Methods for Teaching Foreign Languages. Creating Communities of Learners in the Classroom. Englewood Cliffs: Prentice Hall.
- Han, Y. (2000). Grammaticality judgment tests: How reliable and valid are they? Applied Language Learning, *11*(1), 177-204.
- Han, Y., & Ellis, R. (1998). Implicit knowledge, explicit knowledge and general language proficiency. Language Teaching Research, *2*(1), 1-23.
- Han, Z. (2002). A study of the impact of recasts on tense consistency in L2 output. TESOL Quarterly, *36*(4), 543-572.
- Hanson, C., & Hirst, W. (1988). Frequency encoding of token and type information. Journal of Experimental Psychology: Learning, Memory and Cognition, *14*, 289-297.
- Harrington, M. (2001). Sentence processing. In P. Robinson (Ed.), Cognition and Second Language Instruction (pp. 91-124). Cambridge: Cambridge University Press.

- Hatch, E. (1978a). Acquisition of syntax in a second language. In J. C. Richards (Ed.), Understanding Second and Foreign Language Learning: Issues and Approaches (pp. 34-69). Rowley: Newbury House.
- Hatch, E. (1978b). Discourse analysis and second language acquisition. In E. Hatch (Ed.), Second Language Acquisition: A Book of Readings (pp. 401-435). Rowley: Newbury House.
- Hatch, E. (1983). Simplified input and second language acquisition. In J. R. Anderson (Ed.), Pidginization and Creolization as Language Acquisition (pp. 64-87). Rowley: Newbury House.
- Hewitt, J., & Scardamalia, M. (1998). Design principles for the support of distributed processes. Educational Psychology Review, 10(1), 75-96.
- Holender, D. (1986). Semantic activation without conscious identification in dichotic listening, parafoveal vision, and visual masking: a survey and appraisal. Behavioral & Brain sciences, 9, 1-66.
- Holland, J. D., Holyoak, K. J., Nisbett, R. E., & Thagard, P. R. (1987). Induction. Processes of Inference, Learning, and Discovery. Cambridge, Mass: MIT Press.
- Howard, D. V., & Howard, J. H. (1992). Adult age differences in the rate of learning serial patterns: Evidence from direct and indirect tests. Psychology

and Ageing, 7, 232-241.

Hu, G. (2002). Psychological constraints on the utility of metalinguistic knowledge in second language production. Studies in Second Language Acquisition, 24, 347-386.

Hulstijn, J. H. (1989). Implicit and incidental second language learning: experiments in the process of natural and partly artificial input. In H. W. Dechert & M. Raupach (Eds.), Interlingual Processes (pp. 49-73). Ubingen: G. Narr.

Hulstijn, J. H. (1990). A comparison between the information processing and the analysis/control approaches to language learning. Applied Linguistics, 11(1), 30-45.

Hulstijn, J. H. (2001). Intentional and incidental second language vocabulary learning: a reappraisal of elaboration, rehearsal and automaticity. In P. Robinson (Ed.), Cognition and Second Language Instruction (pp. 258-286). Cambridge: Cambridge University Press.

Hulstijn, J. H., & Hulstijn, W. (1984). Grammatical errors as a function of processing constraints and explicit knowledge. Language Learning, 34, 23-43.

Izumi, S. (2002). Output, input enhancement, and the noticing hypothesis. Studies in Second Language Acquisition, 24, 541-577.

- Izumi, S. (2003). Comprehension and production processes in second language learning: in search of the psycholinguistic rationale of the noticing hypothesis. Applied Linguistics, 24(2), 168-196.
- Izumi, S., & Bigelow, M. (2000). Does output promote noticing and second language acquisition? TESOL Quarterly, 34(2), 239-278.
- Izumi, S., Bigelow, M., Fujiwara, M., & Fearnow, S. (1999). Testing the output hypothesis: effects of output on noticing and second language acquisition. Studies in Second Language Acquisition, 21, 421-452.
- Jackendoff, R., S. (1972). Semantic Interpretation in Generative Grammar. Cambridge, Mass: MIT Press.
- James, W. (1890). Principles of Psychology, Vol. 1. New York: Holt.
- Jenkins, J. (1979). Four points to remember: a tetrahedral model of memory experiments. In L. S. Cermak & f. I. M. Craik (Eds.), Levels of Processing and Human Memory. Hillsdale: Erlbaum.
- Kahneman, D. (1973). Attention and Effort. Englewood Cliffs: Prentice Hall.
- Kahneman, D., & Treisman, A. (1984). Changing views of attention and automaticity. In R. Parasuraman & D. R. Davies (Eds.), Varieties of Attention (pp. 29-61). Orlando: Academic Press.

Kiany, G. R., & Shiramiry, E. (2002). The effect of frequent dictation on the listening comprehension ability of elementary efl learners. TESL Canada Journal, 20(1), 57-63.

Krashen, S. (1978). Adult second language acquisition and learning: a review of theory and practice. In R. Gingras (Ed.), Second Language Acquisition and Foreign Language Teaching. Washington DC: Center for Applied Linguistics.

Krashen, S. (1981). Second Language Acquisition and Second Language Learning. Oxford: Pergamon Press.

Krashen, S. (1982). Principles and Practice in Second Language Acquisition. Oxford: Pergamon Press.

Krashen, S. D. (1985). The Input Hypothesis. London: Longman.

Kumaravadivelu, B. (1994). Intake factors and intake processes in adult language learning. Applied Language Learning, 5(1), 33-71.

Lado, R. (1961). Language Testing : the Construction and Use of Foreign Language Tests. A Teacher's Book. London: Longman.

Lantolf, J. P. (Ed.). (2000). Sociocultural Theory and Second Language Learning. Oxford: Oxford University Press.

- Lantolf, J. P., & Appel, G. (Eds.). (1994). Vygotskian Approaches to Second Language Research. Norwood, N.J.: Ablex.
- Lee, J. F. (2002). The incidental acquisition of Spanish. Future tense morphology through reading in a second language. Studies in Second Language Acquisition, 24, 55-80.
- Leow, R. P. (1993). To simplify or not to simplify. Studies in Second Language Acquisition, 15, 333-355.
- Leow, R. P. (1995). Modality and intake in second language acquisition. Studies in Second Language Acquisition, 17, 79-89.
- Leow, R. P. (1998a). The effects of amount and type of exposure on adult learners' L2 development in SLA. Modern Language Journal, 82, 49-68.
- Leow, R. P. (1998b). Toward operationalizing the process of attention in second language acquisition: evidence for Tomlin and Villa's (1994) fine-grained analysis of attention. Applied Psycholinguistics, 19, 133-159.
- Leow, R. P. (2001a). Attention, awareness and foreign language behavior. Language Learning, 51(supplement 1), 113-153.
- Leow, R. P. (2001b). Do learners notice enhanced forms while interacting with the

- L2? An online and offline study of the role of written input enhancement in L2 reading. Hispania, 84(496-509).
- Leow, R. P. (2002). Models, attention, and awareness in SLA. A response to Simard and Wong's "Alertness, Orientation, and Detection: The Conceptualization of Attentional Functions in SLA" (SSLA, 23, 103-124). Studies in Second Language Acquisition, 24, 113-119.
- Levy, J., & Pashler, H. (2001). Is dual-task slowing instruction dependent? Journal of Experimental Psychology: Human Perception and Performance, 27(4), 862-869.
- Logan, G. D. (1985). On the ability to inhibit simple thoughts and actions: II. stop-signal studies of repetition priming. Journal of Experimental Psychology: Learning, Memory, and Cognition, 9, 585-606.
- Logan, G. D. (1988). Toward an instance theory of automatization. Psychological Review, 95, 492-527.
- Logie, R. H. (1995). Visuospatial Working Memory. Hove: Lawrence Erlbaum.
- Long, M. H. (1981). Input, interaction, and second language acquisition. In H. Winitz (Ed.), Native Language and Foreign Language Acquisition (Vol. 379, pp. 259-278): Annals of the New York Academy of Sciences.

- Long, M. H. (1983). Native speaker/non-native-speaker conversation and the negotiation of comprehensible input. Applied Linguistics, 4(2), 126-141.
- Long, M. H. (1991). Focus on form: a design feature in language teaching methodology. In K. De Bot, R. Ginsberg & C. Kramsch (Eds.), Foreign Language Research in Cross-cultural Perspective (pp. 39-52). Amsterdam: John Benjamins.
- Long, M. H. (1996). The role of the linguistic environment in second language acquisition. In W. Ritchie & T. Bhatia (Eds.), Handbook of Research on Second Language Acquisition. New York: Academic Press.
- Long, M. H., & Crookes, G. (1992). Three approaches to task-based syllabus design. TESOL Quarterly, 26, 27-56.
- Long, M. H., & Robinson, P. (1998). Focus on form. Theory, research, and practice. In C. Doughty & J. Williams (Eds.), Focus on Form in Classroom Second Language Acquisition (pp. 15-41). Cambridge: Cambridge University Press.
- Loschky, L., & Bley-Vroman. (1993). Grammar and task-based methodology. In G. Crookes & S. M. Gass (Eds.), Tasks and Language Learning. Clevedon, Avon: Multilingual Matters.
- Lynch, T., & Maclean, J. (2001). 'A case of exercising': effects of immediate task repetition on learners' performance. In M. Bygate, P. Skehan & M. Swain

(Eds.), Researching Pedagogic Tasks. Second Language Learning, Teaching and Testing (pp. 141-166). Harlow: Longman.

Lyster, R. (1998). Recasts, repetition, and ambiguity in L2 classroom discourse. Studies in Second Language Acquisition, 20, 51-81.

Mackey, A. (1999). Input, interaction and second language development. Studies in Second Language Acquisition, 21, 557-581.

Mackey, A., Oliver, R., & Leeman, J. (2003). Interactional input and the incorporation of feedback: an exploration of NS-NNS and NNS-NNS adult and child dyads. Language Learning, 53(1), 35-66.

Mackey, A., & Philp, J. (1998). Conversational interaction and second language development. Recasts, responses, and red herrings? Modern Language Journal, 82, 338-356.

MacWhinney, B. (1997). Implicit and explicit processes: Commentary. Studies in Second Language Acquisition, 13, 277-281.

MacWhinney, B. (2001a). The competition model: the input, the context, and the brain. In P. Robinson (Ed.), Cognition and Second Language Instruction. Cambridge: Cambridge University Press.

MacWhinney, B. (2001b). Lexicalist connectionism. In P. Broeder & J. Murre (Eds.), Models of language acquisition. Inductive & deductive approaches (pp. 9-32).

Oxford: Oxford University Press.

MacWhinney, B., & Bates, E. (1989). The Crosslinguistic Study of Sentence Processing. Cambridge: Cambridge University Press.

McClelland, J., Rumelhart, D., & Hinton, G. (1986). The appeal of parallel distributed processing. In D. e. a. Rumelhart (Ed.), Parallel Distributed Processing, Vol. 1.

McLaughlin, B. (1978). The monitor model: some methodological considerations. Language and Society, 7, 183-213.

McLaughlin, B. (1987). Theories of Second Language Learning. London: Edward Arnold.

McLaughlin, B., & Heredia, R. (1996). Information-processing approaches to research on second language acquisition and use. In W. Ritchie & T. Bhatia (Eds.), Handbook of Second Language Acquisition (pp. 213-228). San Diego, CA: Academic Press.

McLaughlin, B., Rossman, T., & McLeod, B. (1983). Second language learning: an information-processing perspective. Language Learning, 33, 135-158.

Meyer, D. E., & Kieras, D. E. (1997a). EPIC - a computational theory of executive cognitive processes and multiple-task performance: Part 1. Accounts of

psychological refractory-period phenomena. Psychological Review, 104, 3-65.

Meyer, D. E., & Kieras, D. E. (1997b). EPIC - a computational theory of executive cognitive processes and multiple-task performance: Part 2. Accounts of psychological refractory-period phenomena. Psychological Review, 104, 749-791.

Miller, G. A. (1956). The magical number seven, plus or minus two: some limits on our capacity for processing information. Psychological Review, 63, 81-97.

Miyake, A., & Friedman, N. P. (1998). Individual differences in second language proficiency: working memory as language aptitude. In A. F. Healy & L. E. J. Bourne (Eds.), Foreign Language Learning. Psycholinguistic Studies on Training and Retention (pp. 339-364). Mahwah: Lawrence Erlbaum.

Morris, C. D., Bransford, J., & Franks, J. J. (1977). Levels of processing versus transfer appropriate processing. Journal of Verbal Learning and Verbal Behavior, 16, 519-533.

Morris, S. (1983). Dictation - a technique in need of appraisal. ELT Journal, 37(2), 121-126.

Nation, I. S. P. (1984). Vocabulary Lists: Words, Affixes and Suffixes. Wellington: Victoria University of Wellington.

- Nation, I. S. P. (1996). Vocabulary Lists. Wellington: Victoria University of Wellington, English Language Institute.
- Neisser, U. (1976). Cognition and Reality. San Francisco: Freeman.
- Neumann, O. (1987). Beyond capacity: a functional view of attention. In H. Heuer & A. Sanders (Eds.), Perspectives on Perception and Action: Current Approaches (pp. 227-267). Berlin: Springer.
- Nissen, M. J., & Bullemer, P. (1987). Attentional requirements of learning: evidence from performance measures. Cognitive Psychology, *19*, 1-32.
- Norman, D. A., & Shallice, T. (1986). Attention to action: willed and automatic control of behaviour. In R. J. Davidson, G. E. Schwartz & D. Shapiro (Eds.), Consciousness and Self-regulation, Vol 4. (pp. 1-18). New York: Plenum Press.
- Norris, J. M., & Ortega, L. (2000). Effectiveness of L2 Instruction: A Research Synthesis and Quantitative Meta-analysis. Language Learning, *50*(3), 417-528.
- Nunan, D. (1989). Designing Tasks for the Communicative Classroom. Cambridge: Cambridge University Press.
- Ohta, A. S. (2001). Second Language Acquisition Processes in the Classroom Setting. Learning Japanese. Mahwah: Erlbaum.

- Oliver, R. (1995). Negative feedback in child NS-NNS conversation. Studies in Second Language Acquisition, 17, 459-481.
- Oller, J. (1971). Dictation as a device for testing foreign language proficiency. English Language Teaching, 25, 254-259.
- Oxford, R. (1997). Cooperative learning, collaborative learning, and interaction: Three communicative strands in the language classroom. Modern Language Journal, 81, 443-457.
- Paradis, M. (1994). Neurolinguistic aspects of implicit and explicit memory: Implications for bilingualism. In N. C. Ellis (Ed.), Implicit and Explicit Learning of Language (pp. 393-419). London: Academic Press.
- Perruchet, P., & Pacteau, C. (1990). Synthetic grammar learning: implicit rule abstraction or explicit fragmentary knowledge? Journal of Experimental Psychology: General, 119(3), 264-275.
- Pica, T. (1988). Interlanguage adjustments as an outcome of NS-NNS negotiated interaction. Language Learning, 38, 45-73.
- Pica, T. (1994). Research on negotiation: what does it reveal about second language learning, conditions, processes, outcomes? Language Learning, 44, 493-527.

Pienemann, M. (1984). Psychological constraints on the teachability of languages. Studies in Second Language Acquisition, 6, 186-214.

Pienemann, M. (1985). Learnability and syllabus construction. In K. Hyltenstam & M. Pienemann (Eds.), Modelling and Assessing Second Language Development (pp. 23-76). Clevedon, Avon: Multilingual Matters.

Pienemann, M. (1988). Developmental dynamics in L1 and L2 acquisition: processability theory and generative entrenchment. Bilingualism: Language and Cognition, 1, 1-20.

Pienemann, M. (1989). Is Language Teachable? Psycholinguistic Experiments and Hypotheses. Applied Linguistics, 10(1), 52-79.

Pienemann, M. (1998). Language Processing and Second-Language Development: Processability Theory. Amsterdam: John Benjamins.

Pinker, S. (1989). Resolving a learnability paradox in the acquisition of the verb lexicon. In M. L. Rice & R. L. Schiefelbusch (Eds.), The Teachability of Language. Baltimore: Paul H. Brookes.

Plunket, K., & Elman, J. L. (1997). Exercises in Rethinking Innateness. Cambridge, Mass: MIT Press.

Posner, M. I., & Petersen, S. E. (1990). The attention system of the human brain.

Annual Review of Neuroscience, 13, 25-42.

Posner, M. I., & Rothbart, M. K. (1991). Attentional mechanisms and conscious experience. In A. D. Milner & M. D. Rugg (Eds.), The Neuropsychology of Consciousness (pp. 91-111). London: Academic Press.

Pothos, E. M., & Bailey, T. M. (2000). The role of similarity in artificial grammar learning. Journal of Experimental Psychology: Learning, Memory and Cognition, 26(4), 847-862.

Prabhu, N. S. (1987). Second Language Pedagogy. Oxford: Oxford University Press.

Radwan, A. A. (2005). The effectiveness of explicit attention to form in language learning. System, 33, 69-87.

Reber, A. S. (1967). Implicit learning of artificial grammars. Journal of Verbal Learning and Verbal Behavior, 7, 317-327.

Reber, A. S. (1969). Transfer of syntactic structure in synthetic languages. Journal of Experimental Psychology, 81, 115-119.

Reber, A. S. (1976). Implicit learning of artificial grammars. Journal of Experimental Psychology: Human Learning and Memory, 2, 88-94.

Reber, A. S. (1989). Implicit learning and tacit knowledge. Journal of Experimental

Psychology: General, 114, 17-24.

Reber, A.S. (1992) An evolutionary context for the cognitive unconscious.

Philosophical Psychology, 5, 33-51.

Reber, A. S. (1993). Implicit Learning and Tacit Knowledge. Oxford: Clarendon Press.

Relard, F. (1976). Etude des formes interrogatives en francais chez les enfants de trois ans. Etudes de Linguistique Appliquée, 2, 98-110.

Redington, M., & Chater, N. (1996). Transfer in artificial grammar learning: a reevaluation. Journal of Experimental Psychology: General, 125(2), 123-138.

Richardson-Klavehn, A., Benjamin Clarke, A. J. , & Gardiner, J. M. (1999). Conjoint dissociations reveal involuntary “perceptual” priming from generating at study. Consciousness and Cognition, 8, 271-284.

Robinson, P. (1995). Attention, memory and the "noticing" hypothesis. Language Learning, 45(2), 283-331.

Robinson, P. (1996). Learning simple and complex second language rules under implicit, incidental, rule-search, and instructed conditions. Studies in Second Language Acquisition, 18, 27-67.

- Robinson, P. (1997). Generalizability and automaticity of second language learning under implicit, incidental, enhanced, and instructed conditions. Studies in Second Language Acquisition, *19*, 223-247.
- Robinson, P. (2001). Task complexity, cognitive resources, and syllabus design: a triadic framework for examining task influences on SLA. In P. Robinson (Ed.), Cognition and Second Language Instruction (pp. 287-318). Cambridge: Cambridge University Press.
- Robinson, P. (2003). Attention and memory during SLA. In C. Doughty & M. H. Long (Eds.), The Handbook of Second Language Acquisition (pp. 631-678). Oxford: Blackwell.
- Robinson, P., & Ha, M. (1993). Instance theory and second language rule learning under explicit conditions. Studies in Second Language Acquisition, *15*, 412-438.
- Roediger, H. L. (2000). Why retrieval is the key process in understanding human memory. In E. Tulving (Ed.), Memory, Consciousness, and the Brain. The Tallinn Conference (pp. 52-75). Philadelphia: Psychology Press.
- Rosa, E., & O'Neill, M. D. (1999). Explicitness, intake, and the issue of awareness. Another piece to the puzzle. Studies in Second Language Acquisition, *21*(4), 511-556.
- Rutherford, W., & Sharwood Smith, M. (1985). Consciousness-raising and universal

- grammar. Applied Linguistics, 6(3), 274-282.
- Salaberry, M. (1997). The role of input and output practice in second language acquisition. Canadian Modern Language Review, 53, 422-451.
- Sanders, A. (1998). Elements of Human Performance. Mahwah: Lawrence Erlbaum.
- Sanz, C., & Morgan-Short, K. (2004). Positive evidence versus explicit rule presentation and explicit negative feedback: a computer-assisted study. Language Learning, 54(1), 35-78.
- Sato, E., & Jacobs, B. (1992). From input to intake: towards a brain-based perspective of selective attention. Issues in Applied Linguistics, 3(2), 267-293.
- Sawyer, J. O., & Silver, S. K. (1972). Dictation in language learning. In H. B. Allen & R. N. Campbell (Eds.), Teaching English as a Second Language (pp. 223-229). San Francisco: McGraw-Hill.
- Scarcella, R., & Crookall, D. (1990). Simulation, gaming and language acquisition. In D. Crookall & R. Oxford (Eds.), Simulation, Gaming and Second Language Learning (pp. 223-230). Boston: Heinle & Heinle.
- Schachter, J. (1986). Three approaches to the study of input. Language Learning, 36(2), 211-225.

- Schacter, D. L. (1987). Implicit memory: history and current status. Journal of Experimental Psychology: Learning, Memory and Cognition, *13*, 501-518.
- Schacter, D. L. (1989). Intention, awareness, and implicit memory: the retrieval intentionality criterion. In S. Lewandowsky, J. C. Dunn, & K. Kirsner (Eds.), Implicit Memory: Theoretical Issues (pp. 47-65). Mahwah: Lawrence Erlbaum.
- Schacter, J., & Tulving, E. (1982). Memory, amnesia and the episodic-semantic distinction. In R. L. Isaacson & N. E. Spear (Eds.), The Expression of Knowledge (pp. 33-65). New York: Plenum Press.
- Schmidt, R. (1990). The role of consciousness in second language learning. Applied Linguistics, *11*(2), 129-159.
- Schmidt, R. (1992). Psychological mechanisms underlying second language fluency. Studies in Second Language Acquisition, *14*, 357-385.
- Schmidt, R. (1993). Awareness and second language acquisition. Annual Review of Applied Linguistics, *13*, 206-226.
- Schmidt, R. (1994). Implicit learning and the cognitive unconscious: of artificial grammars and SLA. In N. Ellis (Ed.), Implicit and Explicit Learning of Languages (pp. 165-210). San Diego, CA: Academic Press.

- Schmidt, R. (1994). Deconstructing consciousness in search of useful definitions for applied linguistics. AILA Review, *11*, 11-26.
- Schmidt, R. (Ed.) (1995). Attention and Awareness in Foreign Language Learning. Manoa: University of Hawai'i.
- Schmidt, R. (2001). Attention. In P. Robinson (Ed.), Cognition and Second Language Instruction (pp. 3-32). Cambridge: Cambridge University Press.
- Schmidt, R. W., & Frota, S. N. (1986). Developing basic conversational ability in a second language: a case study of an adult learner of Portuguese. In R. Day (Ed.), Talking to Learn: Conversation in Second Language Acquisition (pp. 237-326). Rowley, Mass.: Newbury House.
- Schneider, V. I., Healy, A. F., & Bourne, L. E. Jr. (1998). Contextual interference in foreign language vocabulary acquisition and retention. In A. F. Healy & L. E. Jr. Bourne (Eds.), Foreign Language Learning. Psycholinguistic Studies on Training and Retention (pp. 77-90). Mahwah: Lawrence Erlbaum.
- Schneider, V. I., & Shiffrin, R. M. (1977). Controlled and automatic human information processing: 1. Detection, search, and attention. Psychological Review, *84*, 1-66.
- Schumacher, E. H., et al. (1997, November). Virtually perfect time sharing in dual-task performance. 38th conference annual meeting of the Psychonomic Society: Philadelphia, PA.

- Schwartz, B. D. (1993). On explicit and negative data effecting and affecting competence and linguistic behavior. Studies in Second Language Acquisition, 15, 147-163.
- Seliger, H. W. (1983). The language learner as a linguist: of metaphors and realities. Applied Linguistics, 4, 179-191.
- Shanks, D. R., & St. John, M. F. (1994). Characteristics of dissociable human systems. Behavioral & Brain Sciences, 17, 367-447.
- Sharwood Smith, M. (1986). Comprehension versus acquisition: two ways of processing input. Applied Linguistics, 7(3), 239-256.
- Shiffrin, R. M., & Schneider, W. (1977). Controlled and automatic human information processing II: perceptual learning, automatic attending, and a general theory. Psychological Review, 84, 127-190.
- Shiffrin, R. M., & Schneider, W. (1984). Automatic and controlled processing revisited. Psychological Review, 91(2), 269-276.
- Shook, D. J. (1994). FL/L2 reading, grammatical information, and the input-to-intake phenomenon. Applied Language Learning, 5(2), 57-93.
- Shortreed, I. (1993). Variation in foreign language talk: the effects of task and

proficiency. In G. Crookes & S. Gass (Eds.), Tasks and Language Learning: Integrating Theory and Practice. Clevedon: Multilingual Matters.

Simard, D., & Wong, W. (2001). Alertness, orientation, and detection. The conceptualization of attentional functions in SLA. Studies in Second Language Acquisition, 23, 103-124.

Skehan, P. (1989). Individual differences in Second-language Learning. London: E. Arnold.

Skehan, P. (1996). A framework for the implementation of task-based instruction. Applied Linguistics, 17, 38-62.

Skehan, P. (1998). A Cognitive Approach to Language Learning. Oxford: Oxford University Press.

Skehan, P., & Foster, P. (2001). Cognition and tasks. In P. Robinson (Ed.), Cognition and Second Language Instruction (pp. 183-205). Cambridge: Cambridge University Press.

Sorace, A. (1985). Metalinguistic knowledge and language use in acquisition-poor environments. Applied Linguistics, 6, 239-254.

Sorace, A. (1996). The use of acceptability judgments in second language acquisition research. In W. Ritchie & T. Bhatia (Eds.), Handbook of Second Language

Acquisition (pp. 375-409). San Diego, CA: Academic Press.

Sorace, A. (2000). Measuring development and ultimate attainment in non-native grammars. SILT, 11, 264-274.

Stansfield, C. (1985). A history of dictation in foreign language teaching and testing. Modern Language Journal, 69(2), 121-128.

Stratman, J. F., & Hamp-Lyons, L. (1994). Reactivity in concurrent think-aloud protocols. In P. Smagorinsky (Ed.), Speaking About Writing: Reflections on Research Methodology (pp. 89-112). Thousand Oaks: Sage.

Swain, M. (1985). Communicative competence: some roles of comprehensible input and comprehensible output in its development. In S. M. Gass & C. Madden (Eds.), Input in Second Language Acquisition (pp. 235-253). Rowley, Mass.: Newbury House.

Swain, M. (1988). Manipulating and complementing content teaching to maximize second language learning. TESL Canada Journal, 6, 68-83

Swain, M. (1998). Focus on form through conscious reflection. In C. Doughty & J. Williams (Eds.), Focus on Form in Classroom Second Language Acquisition (pp. 64-81). Cambridge: Cambridge University Press.

Swain, M., & Lapkin, S. (1995). Problems in output and the cognitive processing they

generate: a step towards second language learning. Applied Linguistics, 16, 371-391.

Swain, M., & Lapkin, S. (1998). Interaction and second language learning: Two adolescent French immersion students working together. Modern Language Journal, 82, 320-337.

Swain, M., & Lapkin, S. (2001). Focus on form through collaborative dialogue: exploring task effects. In M. Bygate, P. Skehan & M. Swain (Eds.), Researching Pedagogic Tasks. Second Language Learning, Teaching and Testing (pp. 99-118). Harlow: Longman.

Swan, M. (1998). Practical English Usage. Oxford: Oxford University Press.

Swanson-Owens, D., & Newell, G. E. (1994). Using intervention protocols to study the effects of instructional scaffolding on writing and learning. In P. Smagorinsky (Ed.), Speaking About Writing: Reflections on Research Methodology (pp. 141-162). Thousand Oaks: Sage.

Tarone, E. E. (1985). Variability in interlanguage use: a study of style-shifting in morphology and syntax. Language Learning, 35, 373-403.

Tharp, R. G., & Gallimore, R. (1988). Rousing Minds to Life: Teaching, Learning, and Schooling in Social Context. Cambridge: Cambridge University Press.

The online American heritage grammar resource (n.d.). Retrieved May 1, 2005, from <http://www.bartleby.com/64/C001/030.html>

Thornbury, S. (1997). Reconstruction: tasks that promote 'noticing'. ELT Journal, *51*(4), 326-335.

Tomlin, R., & Villa, V. (1994). Attention in cognitive science and second language acquisition. Studies in Second Language Acquisition, *16*, 183-203.

Trahey, M. (1996). Positive evidence and preemption in second language acquisition: some long-term effects. Second Language Research, *12*(2), 111-139.

Trahey, M., & White, L. (1993). Positive evidence and preemption in the second language classroom. Studies in Second Language Acquisition, *15*, 181-204.

Treisman, A. (1964). Selective attention in man. British Medical Bulletin, *20*, 12-26.

Truscott, J. (1998). Noticing in second language acquisition: a critical review. Second Language Research, *14*(2), 103-135.

Tukey, J. W. (1991). The philosophy of multiple comparisons. Statistical Science, *6*, 100-116.

Tulving, E. (1972). Episodic and semantic memory. In E. Tulving & W. Donaldson (Eds.), Organization of Memory. New York: Academic Press.

Tulving, E. (1993). Varieties of consciousness and levels of awareness in memory. In A. Baddeley & L. Weiskrantz (Eds.), Attention, Selection, Awareness & Control. A tribute to Donald Broadbent. (pp. 283-299). Oxford: Oxford University Press.

Van Lier, L. (1988). The Classroom and the Language Learner: Ethnography and Second-language Classroom Research. Harlow: Longman.

Van Lier, L. (1996). Interaction in the Language Curriculum: Awareness, Autonomy and Authenticity. London: Longman.

VanPatten, B. (1985). The acquisition of ser and estar by adult learners of Spanish: a preliminary investigation of transitional stages of competence. Hispania, 68, 399-406.

VanPatten, B. (1990). Attending to form and content in the input: an experiment in consciousness. Studies in Second Language Acquisition, 12, 287-301.

VanPatten, B. (1994). Evaluating the role of consciousness in second language acquisition: terms, linguistic features & research methodology. AILA Review, 11, 27-36.

VanPatten, B. (1996). Input Processing and Grammar Instruction in Second Language Acquisition. Norwood: Ablex Publishing Corporation.

VanPatten, B. (2002a). Processing instruction: an update. Language Learning, 52(4), 755-803.

VanPatten, B. (2002b). Processing the content of input-processing and processing instruction research: a response to DeKeyser, Salaberry, Robinson, and Harrington. Language Learning, 52(4), 825-831.

VanPatten, B., & Cadierno, T. (1993). Explicit instruction and input processing. Studies in Second Language Acquisition, 15, 225 to 243.

Varonis, E., & Gass, S. M. (1985). Non-native/non-native conversations: a model for the negotiation of meaning. Applied Linguistics, 6, 71-90.

Vokey, J. R., & Brooks, L. R. (1992). Salience of items knowledge in learning artificial grammars. Journal of Experimental Psychology: Learning, Memory and Cognition, 18, 328-344.

Von Wright, J. M., Anderson, K., & Stenman, U. (1975). Generalisation of conditioned GSR's in dichotic listening. In P. M. Rabbitt & S. Dornic (Eds.), Attention and Performance V. London: Academic Press.

Vygotsky, L. (1978). Mind in Society: the Development of Higher Psychological Processes. Cambridge, MA: Harvard University Press.

Wajnryb, R. (1988). The dictogloss method of language teaching: A text-based,

communicative approach to grammar. English Teaching Forum, 35-38.

Wajnryb, R. (1990). Grammar Dictation. Oxford: Oxford University Press.

Welford, A. T. (1952). The "psychological refractory period" and the timing of high speed performance - a review and a theory. British Journal of Psychology, 43, 2-19.

White, J. (1998). Getting the learners' attention: a typographical input enhancement study. In C. Doughty & J. Williams (Eds.), Focus on Form in Classroom Second Language Acquisition (pp. 85-113). Cambridge: Cambridge University Press.

White, L. (1984). Against comprehensible input: the input hypothesis and the development of second-language competence. Applied Linguistics, 8, 95-110.

White, L. (1989a). Universal Grammar and Second Language Acquisition. Amsterdam: John Benjamins.

White, L. (1989b). The adjacency condition on case assignment: do L2 learners observe the Subset Principle? In S. M. Gass & J. Schachter (Eds.), Linguistic Perspectives on Second Language Acquisition. Cambridge: Cambridge University Press.

White, L. (1991). Adverb placement in second language acquisition: some effects of

- positive and negative evidence in the classroom. Second Language Research, 7, 133-161.
- White, L. (1991). Argument structure in second language acquisition. Journal of French Language Studies, 1, 189-207.
- Wickens, C. (1984). Processing resources in attention. In R. Parasuraman & D. R. Davies (Eds.), Varieties of Attention (pp. 63-102). New York: Academic Press.
- Wickens, C. (1989). Attention and skilled performance. In D. Holding (Ed.), Human Skills. New York: John Wiley.
- Williams, J. (1999). Memory, attention, and inductive learning. Studies in Second Language Acquisition, 21(1), 1-48.
- Willingham, D. B., & Goedert-Eschman, K. (1999). The relation between implicit and explicit learning: Evidence for parallel development. Psychological Science, 10, 531-534.
- Willis, J. (1996). A Framework for Task-based Learning. Harlow: Addison Wesley Longman.
- Winne, P. H., & Hadwin, A. F. (1998). Studying as self-regulated learning. In D. Hacker, J. J. Dunlosky & A. C. Graesser (Eds.), Metacognition in Educational

Theory and Practice. Mahwah: Lawrence Erlbaum.

Winter, B., & Reber, A. S. (1994). Implicit learning and the acquisition of natural languages. In N. C. Ellis (Ed.), Implicit and Explicit Learning of Languages (pp. 114-145). London: Academic Press.

Zimmerman, B. J., & Schunk, D. H. (2001). Self-regulated Learning and Academic Achievement. Theoretical Perspectives. (2nd ed.). Mahwah: Lawrence Erlbaum.

Zobl, H. (1985). Grammars in search of input and intake. In S. M. Gass & C. Madden (Eds.), Input in Second Language Acquisition (pp. 32-44). Cambridge, Mass: Newbury House.

APPENDICES

APPENDIX A: ETHICS FORMS

Participant information sheet

Title: The effectiveness of second language learning.

To: Student Participant

My name is Hayo Reinders. I am a doctoral student in the Department of Applied Language Studies and Linguistics at the University of Auckland. I am doing research for my PhD into the way people learn a second language such as English. I am specifically looking at how we can make such learning more successful and efficient.

You are invited to be part of my research. I would be grateful for any help you can give me. You will be asked to take a short language test of about 30 minutes. Most students will then be asked to come back the following 5 weeks, one time per week. Some students may be asked to do a test that records their voice.

The study is anonymous. The information I gather will be kept confidential by me, the researcher, and your name will not be used. You don't have to participate in this research and if you choose not to, this will not affect your study in any way. If you agree to take part in the research, could you please sign the Consent Form and then

return it to me. You may withdraw yourself or any information traceable to you at any time up to three months after signing this form without giving a reason.

Thank you very much for your help in making this study possible. If you have any other

questions or want to know more about the research please phone, or write to me at:

English Language Self Access Centre

The University of Auckland

Private Bag 92019

Auckland

Tel: (09) 373-7599 ext 82134

Fax : 308-5360

e-mail: h.reinders@auckland.ac.nz

The Head of Department is:

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For any queries regarding ethical concerns please contact: The Chair, The University of Auckland Human Subjects Ethics Committee, The University of Auckland,

Research Office - Office of the Vice Chancellor, Private Bag 92019, Auckland.

Tel.3737599 ext 87830

APPROVED BY THE UNIVERSITY OF AUCKLAND HUMAN SUBJECTS

ETHICS COMMITTEE on 13 March 2003 for a period of 1 year and 3 months, from

March 2003

Reference 2003/025

CONSENT FORM

This consent form will be held for a period of six years

Title: The effectiveness of second language learning

Researcher: Hayo Reinders

I have been given and have understood an explanation of this research project. I also understand that there will be five language tests and that during some of the tests I may be asked to record my voice on the computer. I have had an opportunity to ask questions and have them answered.

I understand that I may withdraw myself or any information traceable to me at any time up to three months after signing this form without giving a reason.

- I agree to participate in this research.
- I do / do not agree to participate in a task that may require me to record my voice on the computer (please circle).

Signed:

Name:

(Please print clearly)

Date:

APPROVED BY THE UNIVERSITY OF AUCKLAND HUMAN SUBJECTS

ETHICS COMMITTEE

on 13 March 2003 for a period of 1 year and 3 months, from March 2003

Reference 2003/025

APPENDIX B

PILOT STUDY RESULTS

NB: it is important to bear in mind that the treatment scores below mean different things for the different treatments. For example, for the reading comprehension treatment indicates participants' performance on the content questions (which did not refer back to sentences containing the target structure), whereas for the dictation treatment there are two scores, one for participants' answers to the (primed) questions and one for their performance on the dictation task.

N1= 21 (posttest 1)			
N2 = 13 (posttest 2)		M	SD
Listening Comprehension	pretest gjt	35%	8%
N1= 7 and n2=5			
	pretest jst	20%	16%
	Treatment	50%	12%
	Intake	34%	20%
	posttest 1 gjt	34%	22%
	posttest 1 jst	12%	17%
	posttest 2 gjt	61%	22%
	posttest 2 jst	27%	27%
Reading Comprehension	pretest gjt	39%	13%
N1= 6 and N2=3			
	pretest jst	9%	12%

	Treatment	70%	26%
	Intake	38%	21%
	posttest 1 gjt	43%	24%
	posttest 1 jst	19%	31%
	posttest 2 gjt	52%	26%
	posttest 2 jst	49%	27%
Dictation N1=2 and N2=2	pretest gjt	40%	28%
	pretest jst	44%	5%
	Treatment a	75%	7%
	Treatment b	10%	14%
	Intake	50%	0%
	posttest 1 gjt	66%	4%
	posttest 1 jst	16%	6%
	posttest 2 gjt	60%	5%
	posttest 2 jst	74%	9%
Imitation N1=3 and N2=2	pretest gjt	44%	15%
	pretest jst	44%	19%
	Treatment	60%	53%
	Intake	57%	31%
	posttest 1 gjt	46%	24%
	posttest 1 jst	47%	48%
	posttest 2 gjt	63%	18%
	posttest 2 jst	67%	47%
Control N1=3 and N2=2	pretest gjt	22%	10%
	pretest jst	20%	13%

posttest 1 gjt	47%	9%
posttest 1 jst	22%	22%
posttest 2 gjt	53%	4%
posttest 2 jst	50%	4%

APPENDIX C

ITEMS USED IN THE MAIN STUDY

The following is a list of all negative adverbs used in the tests and treatments, including the number of times they occur (all items on the tests occur 3 times, once each on the pretest, the posttest, and the delayed posttest).

Tests	Treatments
Seldom has	Seldom has 3
Seldom do	Seldom do 4
Seldom did	Seldom did 3
Seldom can	Seldom can 2
Not only is	Not only is 3
Not only do	Not only do 3
Not only was	Not only was 3
Not only did	Not only did 3
No sooner do	No sooner do 3
No sooner was	No sooner was 3
No sooner is	No sooner is 2
Tests only	Treatments only
Never has	No sooner does
Never was	No sooner had 3

Never would	
Never had	
In no way did	
In no way does	
In no way is	
In no way could	
No sooner had	

The following is a list of all the adverb placement items used in tests and treatments, including the number of times they occur (all items on the tests occur 3 times, once each on the pretest, the posttest, and the delayed posttest).

Tests	Treatments
Quickly	Quickly 3
Urgently	Urgently
Quietly	Quietly
Immediately	Immediately
Clearly	Clearly
Definitely	Definitely
Regularly	Regularly
Efficiently	Efficiently
Easily	Easily 3
Frequently	Frequently 3

Carefully	Carefully 3
Slowly	Slowly 3
Tests only	Treatment only
Eagerly	Politely
Patiently	Fluently
Positively	Freely
Unexpectedly	Desperately
Sincerely	Really 3
Angrily	Evenly
Suddenly	Accidentally
Poorly	Constantly
	Secretly
	Violently
	Wisely
	Cautiously

APPENDIX D

BACKGROUND QUESTIONNAIRE

- 1) What is your first name?
- 2) What is your family name?
- 3) Which country do you come from?
- 4) What is your mother tongue (i.e. your first language)?
- 5) How old were you when you first started to learn English?
- 6) Altogether, how many months or years have you lived in a country where English is widely spoken (including New Zealand) ?
- 7) At the moment, which language do you use the most every day?
- 8) How many months or years have you studied English at school?
- 9) What was the instruction in English that you received at school like?
 - A) Mainly formal (i.e. most of the time was spent studying grammar)
 - B) Mainly informal (i.e. most the time was spent communicating in English)

C) A mixture of formal and informal

10) How many weeks will you study at <name of school>?

APPENDIX E

TEACHER QUESTIONNAIRE

Dear Teacher,

Thank you very much for your help in encouraging and reminding your students to help with the research. I really appreciate it. I would now like to ask your help in answering the following questions.

As part of my research I focus on students' acquisition of adverbs. For students from your class, the focus was on adverb placement, such as in the following sentence:

Auckland urgently needs a second motorway. (*Auckland needs urgently a second motorway)

The question I would like to ask you is:

Did you explicitly cover this grammar point in class at any time in February or the first week of March?

Yes / No

If yes, how? (e.g. by giving students a rule, by making them practise, etc)

Is this grammar point covered in the course materials you use? If so, what is the name of the book/material? Has this section already been covered in class?

And finally, students were asked to do one of three tasks:

1. A dictation task where they listened to a short text twice, the second time bit by bit and were asked to type in what they heard.
2. An individual reconstruction task where students listened to a text as a whole twice, were allowed to take notes, and then had to reconstruct the text.
3. A collaborative reconstruction task, similar to number 2 but whereby two students worked together in reconstructing the text.

Are these tasks similar to some of the types of tasks students do in class? (I am trying to verify if these tasks are fairly natural to classroom learners of English)

Please email me back on this address (h.reinders@auckland.ac.nz).

Thank you so much for your answers. If you have any questions about the above, or would like to talk to me about your answers, please ring me on 3737599 ext 82131.

APPENDIX F

SAMPLE TRANSCRIPTION

The texts below are a transcription of the recording made of a pair of participants doing the collaborative reconstruction treatment. Their target structure was negative adverbs. Participants first listened in silence to the recording and then worked together on reconstructing the texts. This particular recording was made during the first treatment and includes all four passages. (S1 = Student one, S2 = Student two, R = Researcher).

Passage 1

S1 Okay tell me

S2 NZ use, uses

S1 yeah NZ uses water in lakes

S2 and river

S1 okay okay. NZ uses the water in lake and

S2 river

S1 rivers okay

S2 to create

S1 to create energy

S2 energy

S1 or no electricity

S2 uhuh

S1 electricity. But this year, something, she said this year the river was low

S2 uh

S1 but I'm not sure exactly what

S2 huh?

S1 it's about rain

S2 ahhh

S1 but this year okay dot dot dot. Okay Seldom

S2 seldom

S1 has the water level and

S2 in

S1 in lake

S2 in lake

S1 was low

S2 maybe low

S1 yeah but it is a verb....was low as previous years maybe. I'm sure that the word is not previous but it's a word like that to say the older years, maybe the other years. Do you have another word?

S2 No idea

S1 Okay, the other years, okay

S2 Not only

S1 not only if there a great need of energy

S2 need more

S1 rain

S2 rain

S1 more rain...but also oh yeah another form of energy. I'm quite sure she told another forms of energy. Yes using an

S2 doesn't

S1 no do does use yeah

S2 does use?

S1 yeah I think it is used to use to use

S2 not doesn't

S1 yeah but you have to write does not doesn't... does use natural gas this is likely to run out okay

S2 doesn't, no you're right doesn't natural gas

S1 natural gas

S2 gas

S1 but ...I'm listening

S2 this is...

S1 this is like when out this is likely

S2 likely

S1 don't ask me what that means

S2 <laughs>

S1 <laughs> I don't know, I don't understand the situation, but it sounds better to run out and

S2 and and? <laughs>

S1 what did you write this part?

S2 I don't know

S1 I don't. You wrote not me. We don't have time to write the keywords it's too short a time to write keywords so we don't have the [...]

R are you finished?

S1 I don't know the end so I can guess
S2 other [...]
S1 okay, we're finished
R okay, right

Passage 2

S2 some students
S1 some students okay
S2 don't have
S1 have
S2 study habits
S1 good , good study habits maybe okay. because of this
S2 because of this
S1 they are not success
S2 seldom
S1 seldom
S2 until last
S1 yeah I have the same [...] just until the last moment. Right. No sooner
S2 no sooner
S1 no sooner
S2 they
S1 realise that the exams are coming up but
S2 too late
S1 but it's too late. Okay. The university. Ah okay, not only they spend. I [...]
this one..time

or money
S2 time
S1 the university
S2 the university has special
S1 courses for students like this, uhuh,
S2 become
S1 to become better learner or to help them to become better students no better
learners

Passage 3

S1 right. I first came to NZ neuf ...no nine years ago. Right?
S2 yes. No sooner
S1 no sooner I arrived I knew I, I love it. Okay. That, than
S2 I
S1 than I arrived I knew I I love it. Not only the weather beautiful but the people
were also friendly
S2 very friendly
S1 very friendly, right. I think
S2 I am very lucky...to...
S1 to live here
S2 to live here
S1 and there something we finish by (?). Seldom people
S2 no idea
S1 such a chance, okay. I hope to stay here for the rest of my life.
S2 yeah.

Passage 4

S1 two reasons is very important for nz and its

S2 economy

S1 economy

S2 this year

S1 this year

S2 ... people

S1 ...I was focused on the first sentence and so I didn't really understand ...this

year so this

year and all countries. Not only

S2 the war

S1 the war in Iraq

S2 Iraq

S1 but also the world economy is bad

S2 is not

S1 is not good, okay. No sooner

S2 sooner

S1 war in Iraq...over was over? They talk about sars became

S2 big problem

S1 sars became

S2 a

S1 big problem.

S2 this

S1 this results a drop of visitors or visits?

S2 I don't

S1 of 20%. And seldom

S2 seldom country

S1 oh okay, maybe it's not seldom or several country

S2 several?

S1 maybe several countries has such problems before

APPENDIX G: TREATMENT INSTRUCTIONS AND TEXTS

Below are 1) the a) implicit and b) explicit instructions for the treatments as given to participants in the c) negative adverbs and d) adverb placement groups, 2) the texts used for the three different treatments in the a) collaborative and individual reconstruction and b) the dictation treatments.

Instructions

<p><i>Instructions – dictation implicit</i></p>	<p>You are asked to do a number of listening tasks which will help you with your listening comprehension.</p> <p>In this task you will listen to some short passages. First, you will hear each passage entirely. Next you will hear the passage again, but this time bit by bit. Type out each bit exactly as you hear it. You will now have a chance to practise this.</p>
<p><i>Instructions – dictation explicit adverb placement</i></p>	<p>You are asked to do a number of listening tasks which will help you with your listening comprehension.</p> <p>In this task you will listen to some short passages. Listen carefully to the place of the adverbs in the passage. Listen carefully and pay attention to where the adverb is placed in each sentence. For example, in this sentence ‘He sent the letter electronically’ the adverb is ‘electronically’ and it comes at the end of the sentence. First, you will hear each passage entirely. Next you will hear the</p>

	<p>passage again, but this time bit by bit. Type out each bit exactly as you hear it. You will now have a chance to practise this.</p>
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<p>Instructions – dictation explicit negative adverbs</p>	<p>You are asked to do a number of listening tasks which will help you with your listening comprehension.</p> <p>In this task you will listen to some short passages. Listen carefully and pay attention to where the auxiliary verb comes in each sentence. For example in the sentence ‘Rarely has so much rain fallen in such a short time’ the auxiliary is ‘has’ and it comes before the subject of the sentence ‘so much rain’. First, you will hear each passage entirely. Next you will hear the passage again, but this time bit by bit. Type out each bit exactly as you hear it. You will now have a chance to practise this.</p>
<p><i>Instructions - individual reconstruction implicit</i></p>	<p>You are asked to do a number of listening tasks which will help you with your listening comprehension.</p> <p>You will listen to a passage twice. While you listen you can make notes about what you hear. After that, type the passage exactly as you heard it.</p> <p>We are interested in what you say to yourself as you work on this task. To do this we will ask you to TALK ALOUD when you try to remember and type in the passage. What I mean by talk aloud is that I want you to say out loud <i>everything</i> that you say to yourself silently. Just act as if you are alone in the room speaking to yourself. If you are silent for any length of time I will remind you to keep talking aloud.</p>

	<p>You will now have a chance to practise this.</p>
<p><i>Instructions - individual reconstruction explicit adverb placement</i></p>	<p>You are asked to do a number of listening tasks which will help you with your listening comprehension.</p> <p>You will listen to a passage twice. Listen carefully and pay attention to where the adverb is placed in each sentence. For example, in this sentence ‘He sent the letter electronically’ the adverb is ‘electronically’ and it comes at the end of the sentence. While you listen you can make notes about what you hear. After that, type the passage exactly as you heard it.</p> <p>We are interested in what you say to yourself as you work on this task. To do this we will ask you to TALK ALOUD when you try to remember and type in the passage. What I mean by talk aloud is that I want you to say out loud <i>everything</i> that you say to yourself silently. Just act as if you are alone in the room speaking to yourself. If you are silent for any length of time I will remind you to keep talking aloud.</p> <p>You will now have a chance to practise this.</p>

<p><i>Instructions - individual reconstruction explicit negative adverbs</i></p>	<p>You are asked to do a number of listening tasks which will help you with your listening comprehension.</p> <p>You will listen to a passage twice. Listen carefully and pay attention to where the auxiliary verb comes in each sentence. For example in the sentence ‘Rarely has so much rain fallen in such a short time’ the auxiliary is ‘has’ and it comes before the subject of the sentence ‘so much rain’. While you listen you can make notes about what you hear. After that, type the passage exactly as you heard it.</p> <p>We are interested in what you say to yourself as you work on this task. To do this we will ask you to TALK ALOUD when you try to remember and type in the passage. What I mean by talk aloud is that I want you to say out loud <i>everything</i> that you say to yourself silently. Just act as if you are alone in the room speaking to yourself. If you are silent for any length of time I will remind you to keep talking aloud.</p> <p>You will now have a chance to practise this.</p>
<p><i>Instructions - collaborative reconstruction</i></p>	<p>You are asked to do a number of listening tasks which will help you with your listening comprehension.</p>

<i>implicit</i>	<p>In this task you will listen to a passage twice. While you listen you can make notes about what you hear. After that, together with your partner type out the passage exactly as you heard it. Talk with your partner and help each other to write out the passage. You will now have a chance to practise this.</p>
<p><i>Instructions - collaborative reconstruction explicit adverb placement</i></p>	<p>You are asked to do a number of listening tasks which will help you with your listening comprehension.</p> <p>In this task you will listen to a passage twice. Listen carefully to the place of the adverbs in the passage. Listen carefully and pay attention to where the adverb is placed in each sentence. For example, in this sentence ‘He sent the letter electronically’ the adverb is ‘electronically’ and it comes at the end of the sentence.</p> <p>While you listen you can make notes about what you hear. After that, together with your partner type out the passage exactly as you heard it. Talk with your partner and help each other to write out the passage. You will now have a chance to practise this.</p>
<p><i>Instructions - collaborative reconstruction explicit negative adverbs</i></p>	<p>You are asked to do a number of listening tasks which will help you with your listening comprehension.</p> <p>In this task you will listen to a passage twice. Listen carefully and pay attention to where the auxiliary verb comes in each sentence.</p>

	<p>For example in the sentence ‘Rarely has so much rain fallen in such a short time’ the auxiliary is ‘has’ and it comes before the subject of the sentence ‘so much rain’.</p> <p>While you listen you can make notes about what you hear. After that, together with your partner type out the passage exactly as you heard it. Talk with your partner and help each other to write out the passage. You will now have a chance to practise this.</p>
--	---

Treatment texts – Adverb Placement

(‘wk’ indicates the week number; 1 for the first treatment, 2 for the second which was administered one week later, 3 for the final treatment in the third week. There were four texts on each occasion, numbered 1-4).

AP wk 1 – 1	<p>I first came to New Zealand 9 years ago. I quickly got to know many people. Everybody was very kind to me. At first my English was not very good. But people listened carefully to what I said. And if they didn’t understand me they politely asked me to repeat what I said. I soon felt at home.</p>
AP wk 1 – 2	<p>Some people are very good at learning to speak a new language. They learn new languages very easily. And if they spend enough time they can learn to speak a language fluently. Maybe it is</p>

	<p>because they are not afraid to make mistakes. They freely say what they want and soon make new friends. This way, they get a lot of practice.</p>
AP wk 1 – 3	<p>I frequently talk to my friends in China. Most of them want to travel to New Zealand to work or study. They desperately want me to help them practise their English. I sometimes help them on the phone. We talk in English and I correct their errors. I can hear that they are slowly improving their English. I hope they visit us soon.</p>
AP wk 1 – 4	<p>New Zealand is having an energy problem. Last year it rained less than usual. The country urgently needs more rain to fill the lakes. This water is then used to create energy. The problem is that even if it rains a lot the lakes don't immediately fill with water. The energy problem is not over yet. Everyone really wants the government to do something about it.</p>
AP wk 2 – 1	<p>The sun in New Zealand is very bright. Therefore you can quickly get sunburned. People have to protect themselves by frequently putting on a cream. It is important to spread it out evenly over your whole body. Also, wear a large hat and stay out of the sun during the hot hours.</p>
AP wk 2 – 2	<p>Yesterday my friend and I went to the cinema. We bought two cheap tickets but they accidentally gave us the best seats. We</p>

	<p>could have easily kept them but my friend was honest enough to tell them. They were amazed that anyone would be so honest.</p> <p>Then they really surprised us by giving us the tickets.</p>
AP wk 2 – 3	<p>Many students constantly use mobile phones these days. Some even secretly use them during lectures. They carefully try to hide their phones but people notice anyway. They disturb the other students a lot. Mobile phones should be forbidden at university.</p> <p>Students who use them anyway should pay a fine.</p>
AP wk 2 – 4	<p>The war in Iraq has cost many lives. Both sides violently attacked each other. Those who could, wisely made the decision to leave.</p> <p>Others couldn't leave at all. Now the Americans are slowly starting to leave the country. Let's hope there will be no more wars in the future.</p>
AP wk 3 – 1	<p>Last year, New Zealand businesses didn't do very well. So this year, they clearly need to make some changes. For one thing, they definitely need to lower their prices as the New Zealand dollar is very high, making their products expensive. They are really hoping for a weaker dollar.</p>
AP wk 3 – 2	<p>Some students don't have good study habits. Because of this they are not successful at university. Many of them work hard and spend their time quietly behind their desks. But this does not mean that they do their work efficiently. Many of them don't plan their</p>

	<p>work ahead of time. Many also read their books very slowly. It is important to know how to study best.</p>
AP wk 3 – 3	<p>This year fewer visitors came to New Zealand. People used to travel to other countries easily. But this year many people cautiously make the decision to travel. They are afraid because of the war. They prefer to stay at home or travel in their own country. They carefully choose which countries to visit. Maybe more people will visit New Zealand again next year.</p>
AP wk 3 – 4	<p>Every student has to know how to use a computer nowadays. Students regularly need to type in their essays and print them out. Often they also have to use a computer during exams. This can be difficult for students who can't type their texts quickly. Some take a typing course. This way they frequently improve their exam scores.</p>

Treatment texts – Negative Adverbs

NA wk 1 – 1	<p>New Zealand uses the water in lakes and rivers to create electricity, but this year it has rained less than in other years.</p> <p>Seldom has the water level in the lakes been as low as it is now.</p> <p>Not only is there a great need for more rain but also for other forms of energy. New Zealand does use natural gas but this is</p>
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	likely to run out in a few years. No sooner does there seem to be a solution than other problems arise.
NA wk 1 – 2	Some students don't have good study habits. Because of this they are not successful at university. Seldom do they plan ahead and they leave all the work until the last moment. No sooner do they realise that the exams are coming up than it is too late. Not only do they spend too little time on their studies but they are also not efficient. The university has a special course for students like this to help them become better learners.
NA wk 1 – 3	I first came to New Zealand nine years ago. No sooner had I arrived than I knew I loved the place. Not only was the weather beautiful but the people were also very friendly. I think I am very lucky to live here now. Seldom do people get such a chance. I hope to stay here for the rest of my life.
NA wk 1 – 4	Tourism is very important for New Zealand and its economy. But this year fewer people came to our country. Not only did the war in Iraq scare travellers but also the world economy is not good. And no sooner was the war in Iraq over than SARS became a big problem. This resulted in a drop of visitors of about 20%. Seldom did the country face such problems before.
NA wk 2 – 1	Every student has to know how to use a computer nowadays. Not only do students need to type in all their essays but sometimes also

	<p>do their exams on the computer. This can lead to problems for students who can't type fast enough. Seldom can they finish the exams on time. Some take a typing course. No sooner do they finish the course than their grades go up.</p>
NA wk 2 – 2	<p>The sun in New Zealand is very bright. Not only is it easy to get sunburned, but it is also easy to get skin disease. Seldom do people protect themselves enough. The best thing to do is to use lots of sunscreen. People should check how many hours it works for. No sooner is the time up than people should put more on. Also, people should always wear a hat in the sun.</p>
NA wk 2 – 3	<p>Exports are very important for the New Zealand economy. But last year was a bad one. Not only was the economy bad but the New Zealand dollar was also high. Few products were sold. However, no sooner had the value of the dollar decreased than more meat and wool were sold. Seldom has the economy improved in such a short time. Let's hope it stays like this.</p>
NA wk 2 – 4	<p>Early this year there was a lot of talk about the war in Iraq. Not only did many people feel that war was unnecessary, but they also felt that it was wrong. Others felt that it was the right thing to do. Seldom did so many people disagree with each other. No sooner was the war over than many people started to disagree about what should happen next. The problems are not over yet.</p>

NA wk 3 – 1	<p>Some people are very good at learning to speak a new language. Not only do they learn the language fast, but they also learn it well. Maybe it's because they are not shy about speaking to strangers. No sooner do they arrive in a new country than they make new friends. And seldom do they feel uncomfortable about making mistakes. This way they get a lot of practice.</p>
NA wk 3 – 2	<p>I go to the movies every weekend. Not only is it relaxing but it is also good fun. Yesterday I saw a great movie. No sooner was it over than I wanted to see it again. And I did see it again the next day. Seldom did I see a movie twice in such a short time. I think I will go and watch it again some time.</p>
NA wk 3 – 3	<p>Last summer I visited China for the first time. It was a great trip. Not only was the food fantastic but the temples and palaces were also beautiful. The people were very friendly. No sooner had I arrived than a nice family invited me to have tea with them. Seldom can you find such friendliness in western countries. I hope to go back soon.</p>
NA wk 3 – 4	<p>Seldom has the mobile phone been so popular among students. Some even take their phone to university. No sooner is the class over than they start calling each other again. Last week some</p>

	<p>students were found calling during the lecture. Not only did they irritate the lecturer but also the other students. I think it should be forbidden.</p>
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Treatment texts – Adverb Placement Dictation

Below follow the treatment texts as administered in the dictation treatment.

AP wk 1 – 1	<p>I first came to New Zealand nine years ago.</p> <p>I quickly got to know many people.</p> <p>Everybody was very kind to me.</p> <p>At first my English was not very good.</p> <p>But people listened carefully to what I said.</p> <p>And if they didn't understand me</p> <p>they politely asked me to repeat what I said.</p> <p>I soon felt at home.</p>
AP wk 1 – 2	<p>Some people are very good</p> <p>at learning to speak a new language.</p> <p>They learn new languages very easily.</p> <p>And if they spend enough time</p> <p>they can learn to speak a language fluently.</p> <p>Maybe it is because they are</p> <p>not afraid to make mistakes.</p> <p>They freely say what they want</p> <p>and soon make new friends.</p>

	<p>This way, they get a lot of practice.</p>
AP wk 1 – 3	<p>I frequently talk to my friends in China.</p> <p>Most of them want to travel to New Zealand to work or study.</p> <p>They desperately want me to help them practise their English.</p> <p>I sometimes help them on the phone.</p> <p>We talk in English and I correct their errors.</p> <p>I can hear that they are slowly improving their English.</p> <p>I hope they visit us soon.</p>
AP wk 1 – 4	<p>New Zealand is having an energy problem.</p> <p>Last year it rained less than usual.</p> <p>The country urgently needs more rain to fill the lakes.</p> <p>This water is then used to create energy.</p> <p>The problem is that even if it rains a lot the lakes don't immediately fill with water.</p> <p>The energy problem is not over yet.</p> <p>Everyone really wants the government to do something about it.</p>
AP wk 2 – 1	<p>The sun in New Zealand is very bright.</p>

	<p>Therefore you can quickly get sunburned.</p> <p>People have to protect themselves by frequently putting on a cream.</p> <p>It is important to spread it out evenly over your whole body.</p> <p>Also, wear a large hat and stay out of the sun during the hot hours.</p>
AP wk 2 – 2	<p>Yesterday my friend and I went to the cinema.</p> <p>We bought two cheap tickets but they accidentally gave us the best seats.</p> <p>We could have easily kept them but my friend was honest enough to tell them.</p> <p>They were amazed that anyone would be so honest. Then they really surprised us by giving us the tickets.</p>
AP wk 2 – 3	<p>Many students constantly use mobile phones these days.</p> <p>Some even secretly use them during lectures.</p> <p>They carefully try to hide their phones but people notice anyway.</p> <p>They disturb the other students a lot.</p> <p>Mobile phones should be forbidden at university. Students who use them anyway should pay a fine.</p>
AP wk 2 – 4	<p>The war in Iraq has cost many lives.</p>

	<p>Both sides violently attacked each other.</p> <p>Those who could, wisely made the decision to leave.</p> <p>Others couldn't leave at all.</p> <p>Now the Americans are slowly starting to leave the country.</p> <p>Let's hope there will be no more wars in the future.</p>
AP wk 3 – 1	<p>Last year, New Zealand businesses didn't do very well.</p> <p>So this year, they clearly need to make some changes.</p> <p>For one thing, they definitely need to lower their prices as the New Zealand dollar is very high, making their products expensive.</p> <p>They are really hoping for a weaker dollar.</p>
AP wk 3 – 2	<p>Some students don't have good study habits.</p> <p>Because of this they are not successful at university.</p> <p>Many of them work hard and spend their time quietly behind their desks.</p> <p>But this does not mean that they do their work efficiently.</p> <p>Many of them don't plan their work ahead of time.</p> <p>Many also read their books very slowly.</p>

	<p>It is important to know how to study best.</p>
<p>AP wk 3 – 3</p>	<p>This year fewer visitors came to New Zealand.</p> <p>People used to travel to other countries easily.</p> <p>But this year many people cautiously make the decision to travel.</p> <p>They are afraid because of the war.</p> <p>They prefer to stay at home or travel in their own country.</p> <p>They carefully choose which countries to visit.</p> <p>Maybe more people will visit New Zealand again next year.</p>
<p>AP wk 3 – 4</p>	<p>Every student has to know how to use a computer nowadays.</p> <p>Students regularly need to type in their essays and print them out.</p> <p>Often they also have to use a computer during exams.</p> <p>This can be difficult for students who can't type their texts quickly.</p> <p>Some take a typing course.</p> <p>This way they frequently improve their exam scores.</p>

Treatment texts – Negative Adverbs Dictation

NA wk 1 – 1	<p>New Zealand uses the water in lakes and rivers to create electricity, but this year it has rained less than in other years.</p> <p>Seldom has the water level in the lakes been as low as it is now.</p> <p>Not only is there a great need for more rain but also for other forms of energy.</p> <p>New Zealand does use natural gas but this is likely to run out in a few years.</p> <p>No sooner does there seem to be a solution than other problems arise.</p>
NA wk 1 – 2	<p>Some students don't have good study habits. Because of this they are not successful at university.</p> <p>Seldom do they plan ahead and they leave all the work until the last moment.</p> <p>No sooner do they realise that the exams are coming up than it is too late.</p> <p>Not only do they spend too little time on their studies but they are also not efficient.</p> <p>The university has a special course for students like this to help them become better learners.</p>

NA wk 1 – 3	<p>I first came to New Zealand 9 years ago.</p> <p>No sooner had I arrived than I knew I loved the place.</p> <p>Not only was the weather beautiful but the people were also very friendly.</p> <p>I think I am very lucky to live here now.</p> <p>Seldom do people get such a chance.</p> <p>I hope to stay here for the rest of my life.</p>
NA wk 1 – 4	<p>Tourism is very important for New Zealand and its economy.</p> <p>But this year fewer people came to our country.</p> <p>Not only did the war in Iraq scare travelers but also the world economy is not good.</p> <p>And no sooner was the war in Iraq over than SARS became a big problem.</p> <p>This resulted in a drop of visitors of about 20%.</p> <p>Seldom did the country face such problems before.</p>
NA wk 2 – 1	<p>Every student has to know how to use a computer nowadays.</p> <p>Not only do students need to type in all their essays but sometimes also do their exams on the computer.</p> <p>This can lead to problems for students</p>

	<p>who can't type fast enough.</p> <p>Seldom can they finish the exams on time.</p> <p>Some take a typing course.</p> <p>No sooner do they finish the course than their grades go up.</p>
NA wk 2 – 2	<p>The sun in New Zealand is very bright.</p> <p>Not only is it easy to get sunburned, but it is also easy to get skin disease.</p> <p>Seldom do people protect themselves enough.</p> <p>The best thing to do is to use lots of sunscreen.</p> <p>People should check how many hours it works for.</p> <p>No sooner is the time up than people should put more on.</p> <p>Also, people should always wear a hat in the sun.</p>
NA wk 2 – 3	<p>Exports are very important for the New Zealand economy.</p> <p>But last year was a bad one.</p> <p>Not only was the economy bad but the New Zealand dollar was also high.</p> <p>Few products were sold.</p> <p>However, no sooner had the value of the dollar decreased than more meat and wool were sold.</p> <p>Seldom has the economy improved in such a short time.</p> <p>Let's hope it stays like this.</p>

NA wk 2 – 4	<p>Early this year there was a lot of talk about the war in Iraq.</p> <p>Not only did many people feel that war was unnecessary, but they also felt that it was wrong.</p> <p>Others felt that it was the right thing to do.</p> <p>Seldom did so many people disagree with each other.</p> <p>No sooner was the war over than many people started to disagree about what should happen next.</p> <p>The problems are not over yet.</p>
NA wk 3 – 1	<p>Some people are very good at learning to speak a new language.</p> <p>Not only do they learn the language fast, but they also learn it well.</p> <p>Maybe it's because they are not shy about speaking to strangers.</p> <p>No sooner do they arrive in a new country than they make new friends.</p> <p>And seldom do they feel uncomfortable about making mistakes.</p> <p>This way they get a lot of practice.</p>
NA wk 3 – 2	<p>I go to the movies every weekend.</p> <p>Not only is it relaxing but it is also good fun.</p>

	<p>Yesterday I saw a great movie.</p> <p>No sooner was it over than I wanted to see it again.</p> <p>And I did see it again the next day.</p> <p>Seldom did I see a movie twice in such a short time.</p> <p>I think I will go and watch it again some time.</p>
NA wk 3 – 3	<p>Last summer I visited China for the first time.</p> <p>It was a great trip.</p> <p>Not only was the food fantastic but the temples and palaces were also beautiful.</p> <p>The people were very friendly.</p> <p>No sooner had I arrived than a nice family invited me to have tea with them.</p> <p>Seldom can you find such friendliness in western countries.</p> <p>I hope to go back soon.</p>
NA wk 3 – 4	<p>Seldom has the mobile phone been so popular among students.</p> <p>Some even take their phone to university.</p> <p>No sooner is the class over than they start calling each other again.</p> <p>Last week some students were found calling during the lecture.</p>

	<p>Not only did they irritate the lecturer but also the other students. I think it should be forbidden.</p>
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APPENDIX H: INSTRUCTIONS AND ITEMS FOR THE GRAMMATICALITY
JUDGEMENT TESTS

Below are 1) instructions for the a) timed and b) untimed grammaticality judgement tests, and 2) the items for the a) timed and b) untimed tests.

Instructions for the timed test:

You will read some sentences.

Decide if each sentence is grammatically correct or incorrect.

You will have a little time to answer each question. Therefore you need to respond very quickly.

You will now have the chance to practise on 10 sample sentences.

If the sentence is correct, press the 'Enter' key. If incorrect, press the left-hand 'Shift' key.

Start

Instructions for the untimed test:

You will read some sentences.

Decide if each sentence is grammatically correct or incorrect.

After you answer each question, you will be asked how sure you are that your answer is correct. If you are totally certain, you write '100%' in the box. If you are not certain, you will write down a score between 0% and 99 % to indicate your level of certainty. 0% would mean you are not certain at all.

Finally, you will be asked how you made your decision, by using a 'rule' or because it 'felt right'. Here are some examples:

Practice sentences (used for both the timed and the untimed tests)

1. I am believing your story.
2. His father is a doctor.
3. My teacher made me to work hard.
4. He is marrying the girl next door.
5. Moon was shining brightly.
6. My father gave me some advices.
7. She has never been to America.
8. Tomorrow I will go shopping.

This was followed by the following instructions for the timed test:

Now you will proceed to the first part of the test.

Remember you will need to answer as quickly as possible because you will only have a little time

And the following instructions for the untimed test:

You can take as much time as you need for each item.

Once you have completed an item, you will NOT be able to go back and change your answer.

Items for the timed tests

The same items were used for the pretest, the posttest and the delayed posttest. Each time the items were presented in a different order.

1. Thousands of people were eagerly awaiting him.
2. People look negative at politicians.
3. The teacher answered patiently all her questions.
4. It is very important to see positively things.
5. Seldom can most people go on vacation more than once a year.
6. Not only last year was very warm but it was also very dry.
7. We need to urgent find a solution to our money problem.
8. Never anyone has said such a thing in public before.
9. The student followed the teacher unwilling.
10. In no way did I ever doubt what he said.
11. Last week I won unexpectedly the first prize at rugby.
12. Not only is traveling expensive but it is sometimes dangerous too.
13. My father loves sincerely my mother.
14. No sooner men do see a beautiful woman than they lose their minds.
15. When he fell he got injured very bad on my final exam.
16. In no way he looks like his father.

17. He spoke so quickly that nobody understood him.
18. When we came out of the restaurant a man suddenly came up to us.
19. Auckland needs urgently a second motorway.
20. No sooner was he home than he was called back to the office.
21. Seldom I meet anyone interesting people in bars.
22. Never was I so glad to see my parents.
23. I visit my family in Europe frequently.
24. Not only do students have to come to every class but they must also be on time.
25. He always works very efficient.
26. The waiter asked us polite to move to another table.
27. No sooner the lecture is over than students go home.
28. He asked quietly her to leave the church.
29. Seldom did anyone change history the way he did.
30. In the mountains you have to walk very carefully.
31. Never I would do anything to harm her.
32. Students have to do efficiently their work to succeed.
33. In no way is he a person to trust.
34. During the war many people were attacked violent.
35. No sooner he had fallen asleep than a strange noise woke him up.
36. He spends too easily his money.
37. We entered the empty house cautious.
38. In no way I could mistake him for anyone else.
39. He completed his studies successful.
40. You need to see regularly a dentist.
41. Never had anyone managed to escape from that prison.

42. The government will raise definitely taxes next year.
43. We drove very slowly to enjoy the beautiful views.
44. Not only did he come too late, but he also forgot to bring a present.
45. The minister angrily asked the reporter to leave.
46. He has learned English for three years but still speaks it very poorly.
47. He always pronounces every word clearly.
48. Seldom anyone has heard him say nice things in public.
49. After the war people returned home immediately.
50. My brother and I often see things different.

Items for the untimed tests

The same items were used for the pretest, the posttest and the delayed posttest. Each time the items were presented in a different order.

1. Not only last year was very warm but it was also very dry.
2. Thousands of people were eagerly awaiting him.
3. Seldom can most people go on vacation more than once a year.
4. The teacher answered patiently all her questions.
5. We need to urgent find a solution to our money problems.
6. Never anyone has said such a thing in public before.
7. The student followed the teacher unwilling.
8. In no way did I ever doubt what he said.
9. Last week I won unexpectedly the first prize at rugby.
10. Not only is traveling expensive but it is sometimes dangerous too.
11. My father loves sincerely my mother.

12. People look negative at politicians.
13. No sooner men do see a beautiful woman than they lose their minds.
14. I did very bad on my final exam.
15. It is very important to see positively things.
16. In no way he looks like his father.
17. He spoke so quickly that nobody understood him.
18. When we came out of the restaurant a man suddenly came up to us.
19. Auckland needs urgently a second motorway.
20. No sooner was he home than he was called back to the office.
21. Seldom I meet anyone interesting people in bars.
22. Never was I so glad to see my parents.
23. I visit my family in Europe frequently.
24. Not only do students have to come to every class but they must also be on time.
25. He always works very efficient.
26. The waiter asked us polite to move to another table.
27. No sooner the lecture is over than students go home.
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33. In no way is he a person to trust.
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37. We cautious entered the empty house.
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50. My brother and I often see things different.