Chapter 1

Implicit and Explicit Learning, Knowledge and Instruction

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Introduction

The distinctions relating to implicit/explicit learning and knowledge originated in cognitive psychology, so it is appropriate to begin our examination of them with reference to this field of enquiry. Cognitive psychologists distinguish implicit and explicit learning in two principal ways:

(1) Implicit learning proceeds without making demands on central attentional resources. As N. Ellis (2008: 125) puts it, ‘generalizations arise from conspiracies of memorized utterances collaborating in productive schematic linguistic productions’. Thus, the resulting knowledge is subsymbolic, reflecting statistical sensitivity to the structure of the learned material. In contrast, explicit learning typically involves memorizing a series of successive facts and thus makes heavy demands on working memory. As a result, it takes place consciously and results in knowledge that is symbolic in nature (i.e. it is represented in explicit form).

(2) In the case of implicit learning, learners remain unaware of the learning that has taken place, although it is evident in the behavioral responses they make. Thus, learners cannot verbalize what they have learned. In the case of explicit learning, learners are aware that they have learned something and can verbalize what they have learned.

The focus of research in cognitive psychology has been on whether implicit learning can take place, and, if it does, how it can best be explained. However, since Reber’s (1976) seminal study of implicit learning, there has been an ongoing debate about the validity of his ‘multiple learning systems’ view of human cognition. Many researchers dispute the existence of multiple systems and argue in favor of a single system that is capable of achieving different learning outcomes.

This controversy within cognitive psychology is very clearly evident in a collection of papers addressing the role of consciousness in learning (Jimenez, 2003). In the opening paper, Shanks (2003) critiqued the
research that used a technique known as ‘sequential reaction time’ to stake out the claim for multiple, differentiated learning systems. In studies using this technique, the time it takes for people to respond to an array of predictable visual information is compared to the time it takes when this array is suddenly disturbed. The claim here is that a difference in response times demonstrates that some learning must have taken place implicitly prior to the disturbance, even though the participants involved were unable to verbalize what they had learned. Shanks (2003: 38) argued that ‘previous research has failed to demonstrate convincingly that above-chance sequence knowledge can be accompanied by null awareness when the latter is indexed by objective measures such as recognition’. He concluded that there was no convincing evidence that implicit learning is functionally or neurally separate from explicit learning and that it was misguided to look for such dissociation. He advanced the alternative view that there is a single knowledge source that underlies performance and that apparent differences in performance are due to ‘subtle differences between the retrieval processes recruited by the tests’ (p. 36).

In contrast, other papers in the same collection argued strongly for distinguishing the two types of learning. Wallach and Lebiere (2003), for example, developed a strong argument for a dual learning system based on the central concepts of ACT-R cognitive architecture (Anderson & Lebiere, 1998). This proposes a hybrid learning system consisting of a permanent procedural memory and a permanent declarative memory. The former consists of condition-action rules called ‘productions’ that enable a certain action to be performed provided that specific conditions have been met. Such ‘productions’ operate automatically. Declarative knowledge consists of factual knowledge stored as chunks organized into schemas. It operates in a more controlled fashion and with awareness. Wallach and Lebiere claimed that these two ‘architectural mechanisms’ could account for implicit and explicit learning and, crucially, the interplay between the two systems. They went on to demonstrate how they can account for the findings of a number of previous studies of implicit/explicit learning. The ACT-R model has also proved influential in second language acquisition (SLA) studies (see, e.g. DeKeyser, 2007).

In the same collection, Hazeltine and Ivry (2003) mustered neuropsychological evidence to support the existence of distinct learning systems. They reviewed studies of the neural activity when people are engaged in sequence learning. They noted that although such activity has been observed in regions across the whole brain, differences in task conditions result in distinct sets of neural regions becoming activated. When the learning task is complex (i.e. involves dual-task conditions) and thus favors implicit learning mechanisms, the medial supplementary motor area, parietal regions and the basal ganglia are involved. In contrast,
when the task is simpler (i.e. involving single-task conditions), the prefrontal and premotor cortex are activated.

The controversy evident in cognitive psychology is mirrored in SLA. The clearest example of this can be found in the critique levelled against Krashen’s (1981) distinction between ‘acquisition’ (the subconscious internalization of grammatical rules that occurs as a result of comprehending input that is slightly beyond the learner’s current knowledge) and ‘learning’ (the conscious formulation of explicit rules of grammar). This was initially subjected to fierce criticism on the grounds that the distinction was not falsifiable. McLaughlin (1978: 21), for example, argued that Krashen failed to provide adequate definitions of what he meant by ‘subconscious’ and ‘conscious’ and ‘provided no way of independently determining whether a given process involves acquisition or learning’. However, McLaughlin’s distaste for the use of ‘conscious’ as a descriptor of the mental activity involved in L2 learning does not reflect mainstream thinking in either cognitive psychology or SLA. Schmidt (1990, 1994, 2001) has shown that consciousness is a useful construct if it can be carefully deconstructed into its several meanings. He distinguished consciousness in terms of intentionality (incidental versus intentional learning), attention (i.e. attended versus unattended learning), awareness (implicit versus explicit learning) and control (automatic versus controlled processing). Schmidt’s work has reinstated the value of ‘consciousness’ for understanding the nature of second language (L2) learning and has had enormous influence on SLA theories and research. It at once acknowledged that Krashen might be right in trying to distinguish implicit and explicit processes and at the same time highlighted the fact that Krashen’s initial distinction was simplistic (e.g. he failed to distinguish consciousness as intentionality, attention, awareness and control).

The importance of the implicit/explicit distinction for language learning (both first and second) was affirmed in the important collection of papers edited by Nick Ellis (1994). In his introduction, Ellis provided one of the clearest and most convincing statements of the distinction, which I provide in full:

Some things we just come able to do, like walking, recognizing happiness in others, knowing that ‘th’ is more common than ‘tg’ in written English, or making simple utterances in our native language. We have little insight into the nature of the processing involved – we learn to do them implicitly like swallows learn to fly. Other of our abilities depend on knowing how to do them, like multiplication, playing chess, speaking pig Latin, or using a computer programming language. We learn these abilities explicitly like aircraft designers learn aerodynamics. (Ellis, 1994: 1)
Ellis drew on research in both cognitive psychology and language learning to spell out what he saw as the issues facing researchers. What aspects of an L2 can be learned implicitly? What are the mechanisms of explicit learning available to the learner? How necessary is explicit knowledge for the acquisition of an L2? What is the relationship between explicit and implicit L2 knowledge? How best can instruction aid L2 acquisition? So, rather than dismissing the distinction between implicit and explicit learning/knowledge and taking the lead from Schmidt and Ellis, SLA researchers have focused on trying to identify the processes involved in the two types of learning, how they interact, and how they can be externally manipulated through instruction. Thus, while acknowledging that doubts still remain (especially in cognitive psychology) about the legitimacy of a dual learning system, I am going to assume that a distinction can be made between the implicit and explicit learning of an L2 and between implicit and explicit L2 knowledge.

Following Schmidt (1994: 20), I will further assume that implicit/explicit learning and implicit/explicit knowledge are ‘related but distinct concepts that need to be separated’. Whereas the former refers to the processes involved in learning, the latter concerns the products of learning. It is possible, for example, that learners will reflect on knowledge that they have acquired implicitly (i.e. without metalinguistic awareness) and thus, subsequently develop an explicit representation of it. Also, it is possible that explicit learning directed at one linguistic feature may result in the incidental implicit learning of some other feature (an issue addressed in Chapter 11). In the case of SLA (less so perhaps in cognitive psychology), implicit and explicit learning have been examined by reference to the kinds of knowledge that result from conditions designed to favor one or other type of learning. That is, there have been relatively few studies that have tried to explore the actual processes involved, although the use of introspective techniques (see, e.g. the account of Leow’s (1997) study below) offers a means of rectifying this gap. In general, studies have sought to infer the kind of learning that has taken place by examining the products of learning. For this reason, this book will focus on ‘knowledge’ rather than ‘learning’.

Schmidt also argued that learning needs to be distinguished from instruction. It does not follow, for instance, that implicit instruction results in implicit learning or, conversely, that explicit instruction leads to explicit learning. Teachers might hope for such a correlation, but learners have minds of their own and may follow their own inclinations, irrespective of the nature of the instruction they receive (Allwright, 1984). This book is also concerned with the relationship between forms of instruction that can be described as ‘implicit’ or ‘explicit’ and the acquisition of implicit/explicit L2 knowledge.
In the sections that follow, I will examine how SLA researchers have tackled the three distinctions: (1) implicit/explicit learning, (2) implicit/explicit knowledge and (3) implicit/explicit instruction. This provides a basis for considering the interface position (i.e. the nature of the relationship between implicit and explicit knowledge). Finally, I will provide an overview of the contents of the rest of the book.

**Implicit/Explicit L2 Learning**

As defined above, implicit language learning takes place without either intentionality or awareness. However, there is controversy as to whether any learning is possible without some degree of awareness. This raises the important question of what is meant by ‘awareness’. Schmidt (1994, 2001) distinguished two types of awareness: awareness as noticing (involving perception) and metalinguistic awareness (involving analysis). The former involves conscious attention to ‘surface elements’, whereas the latter involves awareness of the underlying abstract rule that governs particular linguistic phenomena. Schmidt argued that noticing typically involves at least some degree of awareness. Thus, from this perspective, there is no such thing as complete implicit learning and so a better definition of implicit language learning might be ‘learning without any metalinguistic awareness’. That is, the processes responsible for the integration of material into the learner’s interlanguage system and the restructuring this might entail take place autonomously and without conscious control. Other researchers (e.g. Williams, 2005), however, have argued that learning without awareness at the level of noticing is also possible. N. Ellis (2005: 306) has also claimed that ‘the vast majority of our cognitive processing is unconscious’. Thus, there is no consensual definition of implicit learning although all theorists would accept that it excludes metalinguistic awareness.

Explicit language learning is necessarily a conscious process and is generally intentional as well. It is conscious learning ‘where the individual makes and tests hypotheses in a search for structure’ (N. Ellis, 1994: 1). As Hulstijn (2002: 206) put it, ‘it is a conscious, deliberative process of concept formation and concept linking’.

The study of implicit and explicit learning in SLA draws heavily on cognitive psychology. The work of Reber (Reber, 1993; Reber et al., 1991) has been seminal in this respect. Reber and colleagues investigated the two types of learning by means of studies involving artificial languages, where groups of participants were either instructed to memorize a set of letter strings generated by the artificial language without the help of any feedback (the implicit learning condition) or to try to figure out the underlying rules of the same letter strings (the explicit learning condition). Following training, both groups completed a judgement test
that required them to decide if the strings of letters followed the same rules as the strings they saw during training. They were not forewarned that they would be tested in this way. The main findings of such studies were: (1) there was clear evidence of implicit learning; (2) there was no difference between the test scores of the implicit and explicit learning groups in the case of simple rules, but implicit learning proved more efficient for complex rules; and (3) the test scores of the explicit group demonstrated much greater individual variation than those of the implicit group, reflecting the fact that whereas analytical skills played a role in the former they did not in the latter. However, as we have already seen, the claim that implicit and explicit learning are dissociated has become a matter of controversy among cognitive psychologists. Also, disagreement exists regarding the nature of the knowledge that arises out of implicit learning, with some arguing that it consists of knowledge of fragments or exemplars, and others arguing that it is rule-based.

Much of the psychological research on implicit learning in language acquisition has followed Reber in employing artificial grammars. Rebuschat (2008), in his review of these studies, suggests that ‘the most important finding to emerge in recent years has been the observation that infants, children and adults can use statistical cues such as transitional probabilities to acquire different aspects of language, including the lexicon, phonology and syntax’. Rebuschat also identifies a number of problems with these studies – many of the studies did not include a measure of awareness, often learners were exposed to the artificial language under conditions that were far from incidental, and the grammars involved were of the phrase-structure rather than fine-state kind.

In the case of SLA ‘the amount of L2 research narrowly focused on the implicit-explicit distinction is quite limited, not only in the number of studies, but also in duration and in scope of the learning target’ (DeKeyser, 2003: 336). The key issue (as in cognitive psychology) is whether implicit learning of an L2 (i.e. learning without conscious awareness) is possible. A number of studies have addressed this, including several that have examined the effects of enhanced input on language learning. In a series of studies, Williams examined whether learners are able to induce grammatical rules from exposure to input when their attention is focused on meaning (Williams, 1999, 2005; Williams & Lovatt, 2003). The studies showed that learning does take place, that the inductive learning of form (i.e. segmentation) is dissociable from the learning of the functions realized by the forms (i.e. distribution), that learner’ differences in phonological short-term memory influence the extent to which learners are successful in inductive learning, and that language background (i.e. whether learners have prior experience of learning languages) impacts even more
strongly on learning. However, Williams’ tests of learning (translation or grammaticality judgement tests) may have favored those learners who attempted to construct explicit rules during the training and thus cannot convincingly demonstrate that implicit learning took place. Indeed, Williams (1999: 38) noted that the learners in this study ‘had high levels of awareness of the product of learning’, although, as he pointed out, awareness of the product of learning does not necessarily imply that conscious analysis occurred while learning. What is needed to resolve this issue are studies that obtain information about the microprocesses involved in the training (learning) phase of such studies.

One study that has attempted this is Leow (1997). Leow asked beginner learners of L2 Spanish to think aloud as they completed a crossword that exposed them to a number of morphological forms. Learning was measured by means of a multiple choice recognition task and a fill-in-the-blank written production task. The think-aloud protocols were analysed qualitatively to establish to what extent the learners demonstrated meta-awareness in the form of hypothesis-testing and conscious rule-formation. Leow reported that the level of awareness learners demonstrated correlated both with their ability to recognize and produce correct target forms. This study, together with Leow’s (2000) follow-up study, demonstrated that online measures of meta-awareness are related to offline measures of learning, strongly suggesting that the learning that took place in these studies was explicit rather than implicit. DeKeyser (2003: 317), summarizing the results of a number of SLA studies concluded ‘there is very little hard evidence of learning without awareness’. However, N. Ellis (2005) has argued differently on the grounds that studies investigating frequency effects in L2 acquisition have shown that these effects can only be explained if it is assumed that learning without awareness is possible.

One of the problems of studies that have compared implicit and explicit learning is that the two types of learning have been operationa-lized and measured in very different ways. A number of studies have shown that learning of some kind, intended by the researcher to be implicit, does take place (Doughty, 1991; Shook, 1994; Gass et al., 2003), but whether or not the learners actually engaged in implicit learning is not demonstrated. Explicit learning is a lot easier to demonstrate – by asking learners to report what they have learned. A number of studies have sought to compare the relative effectiveness of implicit and explicit learning. The general finding is that explicit learning is more effective than implicit learning (N. Ellis, 1993; Rosa & O’Neill, 1999; Gass et al., 2003). No study has shown that implicit learning worked better than explicit learning. However, two studies found no difference between implicit and explicit learning (Doughty, 1991; Shook, 1994). There is also some evidence to suggest that explicit learning is more effective with
some linguistic features than others. Robinson (1996) reported that his explicit learners outperformed the implicit learners on a simple structure (subject-verb inversion), but not on a complex structure (pseudo-clefts). Gass et al. (2003) found that their focused condition (which involved explicit attention to form and meaning) proved more effective than the unfocused condition in the case of lexis than it did in the case of morphology or syntax.

Three studies investigated learners’ awareness of the structures they were learning. Rosa and O’Neill (1999) replicated Leow’s (1997) finding; learners who demonstrated high awareness during learning outperformed those with low awareness. N. Ellis and Robinson both tested the learners’ ability to verbalize the rule they had been learning, but with different results. N. Ellis (1993) found that the most explicit group in his study were able to verbalize the rule, whereas Robinson reported that very few learners in any of his conditions could, although where the simple rule was concerned, the most explicit group (the one receiving an explanation of the rule) outperformed the rest. Finally, Gass et al.’s study raises the possibility that learners’ level of proficiency may mediate the effects of explicit instruction; in this study, the focused condition proved most effective with the low-proficiency learners.

There is some evidence, therefore, of implicit L2 learning, but much clearer evidence of explicit learning. However, there are two reasons to reserve judgement. First, the treatments in the studies cited above were all of short duration, which arguably creates a bias against implicit learning. Second, the effects of the training were measured by the kinds of tests (e.g. grammaticality judgement tests) that were likely to favor explicit learning.

Implicit and Explicit L2 Knowledge

Before we consider the differences between implicit and explicit L2 knowledge, we need to examine what we mean by ‘linguistic knowledge’? There are, broadly speaking, two competing positions. The first, drawing on the work of Chomsky, claims that linguistic knowledge consists of knowledge of the features of a specific language, which are derived from impoverished input (positive evidence) with the help of Universal Grammar (UG). This view of language is innatist and mentalist in orientation, emphasising the contribution of a complex and biologically specified language module in the mind of the learner. The second position, drawing on connectionist theories of language learning, as advanced by cognitive psychologists such as Rumelhart and McClelland (1986), views linguistic knowledge as comprised of an elaborate network of nodes and internode connections of varying strengths that dictate the ease with which specific sequences or ‘rules’ can be accessed. According
to this view, then, learning is driven primarily by input and it is necessary to posit only a relatively simple cognitive mechanism (some kind of sensitive pattern detector) that is capable of responding both to positive evidence from the input and to negative evidence available through corrective feedback. These positions are generally presented as oppositional (see Gregg, 2003), but in one important respect, they are in agreement. Both the innatist and connectionist accounts of L2 learning view linguistic competence as consisting primarily of implicit L2 knowledge and see the goal of theory as explaining how this implicit knowledge is acquired. However, they differ in the importance that they attach to explicit knowledge, a point that I will return to later in this chapter.

In a series of articles (Ellis 1993, 1994, 2004, 2005), I have attempted to identify the criteria that can be used to distinguish implicit and explicit L2 knowledge. I will review these here.

**Implicit knowledge is tacit and intuitive whereas explicit knowledge is conscious**

Thus, it is possible to talk about intuitive and conscious awareness of what is grammatical. For example, faced with a sentence like:

*The policeman explained Wong the law.*

a learner may know intuitively that there is something ungrammatical and may even be able to identify the part of the sentence where the error occurs, but may have no conscious awareness of the rule that is being broken. Such a learner has implicit but no explicit knowledge of the feature, dative alternation, in question. Another learner, however, may understand that the sentence is ungrammatical because the verb ‘explain’ cannot be followed by an indirect object without ‘to’. A third learner (a linguist perhaps) might know that dative verbs like ‘explain’ that are of Latin origin and verbs like ‘give’ that are of Anglo-Saxon origin perform differently.

**Implicit knowledge is procedural whereas explicit knowledge is declarative**

Implicit knowledge is ‘procedural’ in the sense conferred on this term in the ACT-R cognitive architecture mentioned above. For example, for past tense verbs, learners behave in accordance with a condition-action rule along the lines of ‘if the action to be referred to occurred in the past and is completed, then add -ed to the base form of a verb’. Explicit knowledge is comprised of facts about the L2. This is no different from encyclopedic knowledge of any other kind. I know, declaratively, that the Normans invaded England in 1066. Similarly, I know that verbs like ‘explain’ require an indirect object with ‘to’ and, further, that the indirect
object usually follows the direct object. These facts are only loosely connected; they do not constitute a ‘system’ in the same way that the implicit knowledge of proficient L2 users does.

L2 learners’ procedural rules may or may not be target-like while their declarative rules are often imprecise and inaccurate

The condition-action rules that learners construct as part of their implicit knowledge may or may not conform to the native speaker’s rules. SLA research has shown that learners typically manifest developmental sequences when they acquire implicit knowledge (see Ellis, 2008). For example, the condition-action rule for the past tense described above would lead to both correct forms (e.g. ‘jumped’) and also overgeneralized forms (e.g. ‘eated’). Such rules are continuously modified during learning. In the case of explicit knowledge, learners’ knowledge is often fuzzy. For example, a learner who responded to the ungrammatical sentence above (“The policeman explained Wong the law) with the comment ‘You can’t use a proper noun after ‘explain’’) clearly has some explicit understanding of what makes the sentence ungrammatical, but equally clearly does not have a very accurate notion. Sorace (1985) showed that much of learners’ explicit knowledge is imprecise, but also that it becomes better defined as proficiency increases.

Implicit knowledge is available through automatic processing whereas explicit knowledge is generally accessible only through controlled processing

The ‘procedures’ that comprise implicit knowledge can be easily and rapidly accessed in unplanned language use. In contrast, explicit knowledge exists as declarative facts that can only be accessed through the application of attentional processes. One of the widely commented-on uses of explicit knowledge is to edit or monitor production, a process that is only possible in those types of language use that allow learners sufficient time to access the relevant declarative facts. For this reason, explicit knowledge may not be readily available in spontaneous language use where there is little opportunity for careful online planning. It is possible, however, that some learners are able to automatize their explicit knowledge through practice and thus access it for rapid online processing in much the same way as they access implicit knowledge. DeKeyser (2003) suggests that automatized explicit knowledge can be considered ‘functionally equivalent’ to implicit knowledge. Hulstijn (2002: 211), however, is doubtful, arguing that although practice ‘may speed up the execution of algorithmic rules to some extent’, it is still necessary to distinguish the automatization of implicit and explicit knowledge and that what appears to be the automatization of explicit knowledge
through practice may in fact entail the separate development of implicit knowledge. N. Ellis (1994) suggests how this might come about; he proposes that sequences produced initially through the application of declarative rules can come to be performed automatically if they are sufficiently practised. That is, it is not the rules themselves that become implicit, but rather the sequences of language that the rules are used to construct.

Default L2 production relies on implicit knowledge, but difficulty in performing a language task may result in the learner attempting to exploit explicit knowledge

To borrow terms from sociocultural theory (see Lantolf, 2000), implicit knowledge can be viewed as knowledge that has been fully internalized by the learner (i.e. self-regulation has been achieved). In contrast, explicit knowledge can be viewed as a ‘tool’ that learners use to mediate performance and achieve self-control in linguistically demanding situations. Explicit knowledge manifests itself, for example, through the private speech that learners use to grapple with a problem. When learners are asked to make and justify grammaticality judgements in a think-aloud or dyadic problem-solving task, they typically try to access declarative information to help them do so, if they feel unable or lacking in confidence to make a judgement intuitively (R. Ellis, 1991; Goss et al., 1994).

Implicit knowledge is only evident in learners’ verbal behavior whereas explicit knowledge is verbalizable

Implicit knowledge cannot be described as it exists in the form of statistically weighted connections between memory nodes, and its regularities are only manifest in actual language use. This is why learners cannot explain their choice of implicit forms. In contrast, explicit knowledge exists as declarative facts that can be ‘stated’. It is important to recognize, however, that verbalizing a rule or feature need not entail the use of metalanguage. As James and Garrett (1992) pointed out, talking about language can be conducted in a ‘standard received language’ or a ‘nontechnical one’. Thus, the error in the double object sentence above might be explained nontechnically by saying ‘You can’t say “explain Wong”. You’ve got to say “to Wong” after “explain”’. Alternatively, the explanation might call on extensive metalanguage, for example, ‘In the case of dative alternation, there are some verbs like “explain” that require the indirect object to be realized as a prepositional phrase rather than as a noun phrase’. Although metalanguage is not an essential component of explicit knowledge, it would seem to be closely related.
There are limits on most learners’ ability to acquire implicit knowledge whereas most explicit knowledge is learnable

Implicit knowledge is clearly learnable, but there would appear to be age constraints on the ability of learners to fully learn an L2 implicitly given that very few learners achieve native speaker proficiency. There are incremental deficits in our ability to learn implicit knowledge as we age (Birdsong, 2006). In contrast, as Bialystok (1994: 566) pointed out, ‘explicit knowledge can be learned at any age’, and it is not perhaps until old age that learning deficits become apparent. The constraints that exist on learners’ ability to learn explicit facts about a language are of a different order, probably relating to individual differences in the analytical skills needed to memorise, induce or deduce them.

The learner’s L2 implicit and explicit knowledge systems are distinct

An issue of considerable importance (and also controversy) is the extent to which a learner’s L2 implicit and L2 explicit systems are distinct. We have already seen that Krashen (1981) viewed the two types of knowledge as entirely separate. Paradis (1994: 397, 2004) also postulated that the two types of knowledge reside in neuranatomically distinct systems. Explicit memory is stored diffusely over large areas of the tertiary cortex and involves the limbic system; implicit memory is ‘linked to the cortical processors through which it was acquired’ and does not involve the limbic system. The two memory systems are also susceptible to selective impairment. Paradis cited evidence to suggest that bilinguals who have learnt the L2 formally (and therefore can be assumed to possess substantial explicit knowledge), may lose the ability to use their L1 in the case of aphasia while maintaining the ability to speak haltingly in the L2.

Further evidence of the separateness of the two types of knowledge can be found in research based on Ullman’s (2001) dual-mechanism model. Ullman argued that the brain is so organized as to support a mental model consisting of two largely separate systems – the lexicon and the grammar, each with distinct neural bases. He illustrated this model with reference to the processing of morphological forms such as regular and irregular past-tense verb forms. He proposed that procedural memory permits the computation of regular morphological features (e.g. V-ed) by concatenating the phonological forms of the base and an affix (e.g. walk + ed ? walked). In contrast, declarative memory handles irregular forms. Ullman (2001: 39) suggested that ‘for a given morphosyntactic configuration, both systems attempt to compute an appropriately complex form’, but that ‘if a form is found in memory (sang), the rule-based computation is inhibited’.
Other researchers (e.g. Dienes & Perner, 1999), however, have viewed the distinction between implicit and explicit knowledge as continuous rather than dichotomous. Some evidence for this comes from Ullman himself. Ullman acknowledged that language cannot be so neatly divided into ‘regular’ and ‘irregular’ forms; there are also ‘subregular’ forms (i.e. forms that manifest some degree of regularity without being entirely regular). A good example can be found in the plural forms of German nouns. The default, regular form is -s, but other forms are partially regular (e.g. the -(e)n plural form that occurs predominantly with feminine nouns). Bartke et al. (2005) found that differences in brain responses depended on whether the stimulus was a complete irregular or a subregular form and suggested that the dual-mechanism account proposed by Ullman may need to be modified to incorporate a third processing component to explain how the brain processes subregular forms.

The view I have advanced in Ellis (2004) is that where representation (but not language use) is concerned we would do better to view the two types of knowledge as dichotomous. Adopting a connectionist account of implicit linguistic knowledge as an elaborate interconnected network, it is not easy to see how knowledge as weighted content (i.e. as a set of neural pathways of greater and lesser strength) can be anything other than separate from knowledge of linguistic facts. This book is predicated on the claim that the two knowledge systems are dissociated.

**L2 performance utilizes a combination of implicit and explicit knowledge**

The problem in determining whether implicit and explicit knowledge stores are separate or linked rests in part, at least, on the problem of determining precisely how learners draw on their linguistic knowledge when performing different language tasks. As Bialystok (1982) pointed out, language use typically involves learners drawing on both systems to construct messages. Furthermore, it is possible that learners will have developed both implicit and explicit knowledge of the same linguistic feature. For example, a learner may have internalized ‘jumped’ as a single item in explicit memory, but may also have developed the procedure for affixing -ed to the base form of the verb in implicit memory – as suggested by Ullman. Thus, the neurological distinctiveness of the two systems will be difficult to detect from simply examining a learner’s linguistic behavior. This is a problem for the measurement of the two types of knowledge that will be considered in Chapter 2. The point at issue now is that irrespective of whether the two systems are psychologically and neurologically distinct, they will never be entirely distinct in performance.
The following is a summary of the main points that have emerged from this discussion of implicit and explicit L2 knowledge. These points constitute the assumptions that inform the contents of this book.

(1) Explicit knowledge appears phylogenetically and ontogenetically later than implicit knowledge and it involves different access mechanisms.

(2) Explicit knowledge is neurologically distinct from implicit knowledge.

(3) The question of whether the two types of knowledge are to be seen as dichotomous or continuous is a matter of controversy, but neurological evidence and current connectionist models of linguistic knowledge point to a dichotomy.

(4) The question of the separateness of the representation of the two types of knowledge is independent from the question of whether the processes of implicit and explicit learning are similar or different. This remains a controversial issue. It is likely, however, that learning processes and knowledge types are correlated to some degree at least.

(5) While there is controversy regarding the interface of explicit and implicit knowledge at the level of learning, there is wide acceptance that they interact at the level of performance.

A number of studies have examined learners’ implicit and explicit knowledge. These are considered in Chapter 2, where instruments designed to measure the two types of knowledge are described and validated.

**Implicit and Explicit Instruction**

The term ‘instruction’ implies an attempt to intervene in interlanguage development. Elsewhere, I have characterized language instruction in terms of ‘indirect’ and ‘direct’ intervention (Ellis, 2005). Indirect intervention aims ‘to create conditions where learners can learn experientially through learning how to communicate in the L2 (p. 713). It is best realized through a task-based syllabus. Instruction as direct intervention involves the pre-emptive specification of what it is that the learners are supposed to learn and, typically, draws on a structural syllabus.

Implicit and explicit instruction do not correlate exactly with this basic distinction, but can be mapped onto it. Implicit instruction is directed at enabling learners to infer rules without awareness. That is, it seeks to provide learners with experience of specific exemplars of a rule or pattern while they are not attempting to learn it (e.g. they are focused instead on meaning). As a result, they internalize the underlying rule/pattern without their attention being explicitly focused on it. Clearly,
then, indirect intervention is implicit in nature. But, it is also possible to envisage some types of direct intervention as being implicit. It is possible to determine a specific learning target (e.g. a grammatical structure), but to mask this from the learners so that they are not aware of the target. This type of implicit instruction involves creating a learning environment that is ‘enriched’ with the target feature, but without drawing learners’ explicit attention to it. This is exactly what happens in the treatment found in studies that have sought to investigate implicit learning. Explicit instruction involves ‘some sort of rule being thought about during the learning process’ (DeKeyser, 1995). In other words, learners are encouraged to develop metalinguistic awareness of the rule. This can be achieved deductively (i.e. by providing the learners with a grammatical description of the rule) or inductively (i.e. by assisting learners to discover the rule for themselves from data provided). Explicit instruction, therefore, necessarily constitutes direct intervention. The relationships between direct/indirect intervention and implicit/explicit instruction are shown in Figure 1.1.

Housen and Pierrard (2006) provide a more elaborate definition of the two types of instruction in terms of a number of differentiating characteristics, as shown in Table 1.1.

This account of implicit and explicit instruction distinguishes different types of the two kinds of instruction. Implicit instruction can take the form of task-based teaching where any attention to linguistic form arises naturally out of the way the tasks are performed. In this case, attention to form is primarily reactive in nature. However, it can also be proactive, as when tasks are designed to elicit the use of a specific linguistic target, and performance of the task naturally creates opportunities for experiencing the target feature. Explicit instruction can also be reactive or proactive. Reactive explicit instruction occurs when teachers provide explicit or metalinguistic corrective feedback on learner’s errors in the use of the target feature. Proactive explicit instruction occurs when the teacher offers a metalinguistic explanation of the target rule prior to any practice activities (direct proactive) or when the teacher invites learners

![Figure 1.1 Types of language instruction](image-url)
to discover the rule for themselves from data provided (indirect proactive).

It should be noted, however, that the terms explicit and implicit instruction can only be defined from a perspective external to the learner, i.e. the teacher’s, material writer’s or course designer’s perspective. In contrast, the terms implicit/explicit learning refer to the learner’s perspective. There is no necessary correlation between the two pairs of terms (Batstone, 2002). For example, the teacher may provide the learners with an explicit explanation of the use of the English definite and indefinite articles but, assuming that this explanation is provided through the medium of the L2 and that the learner is not motivated to attend to the teacher’s explanation, the learner may end up acquiring implicitly and incidentally a number of lexical or grammatical items that happen to figure in the teacher’s explanation. In other words, a learner can always elect to respond to what the teacher says as ‘input’ rather than as ‘information’. In such a case, explicit instruction can result in implicit learning as a result of the incidental noticing of instances of language. Equally, in the case of direct intervention involving implicit instruction, learners may work out what the target of the instruction is and seek to make their understanding of it explicit. Thus, it does not follow that implicit instruction always results in implicit learning or that explicit instruction necessarily leads to explicit learning. It should also be noted that the aim of explicit instruction is not just to develop explicit knowledge but also, ultimately, implicit knowledge as well.

Table 1.1 Implicit and explicit instruction (Housen & Pierrard, 2006: 10)

<table>
<thead>
<tr>
<th>Implicit FFI</th>
<th>Explicit FFI</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Attracts attention to target form</td>
<td>• Directs attention to target form</td>
</tr>
<tr>
<td>• Is delivered spontaneously (e.g. in an otherwise communication-oriented activity)</td>
<td>• Is predetermined and planned (e.g. as the main focus and goal of a teaching activity)</td>
</tr>
<tr>
<td>• Is unobtrusive (minimal interruption of communication of meaning)</td>
<td>• Is obtrusive (interruption of communicative meaning)</td>
</tr>
<tr>
<td>• Presents target forms in context</td>
<td>• Presents target forms in isolation</td>
</tr>
<tr>
<td>• Makes no use of metalanguage</td>
<td>• Uses metalinguistic terminology (e.g. rule explanation)</td>
</tr>
<tr>
<td>• Encourages free use of the target form</td>
<td>• Involves controlled practice of target form</td>
</tr>
</tbody>
</table>
Given that the distinction between implicit and explicit instruction is not straightforward, it is not surprising to find that they have been operationalized in very different ways. Norris and Ortega (2000) conducted a meta-analysis of studies that had investigated the effects of the two types of instruction. They classified as implicit instruction studies where the treatment consisted of either enriched input (i.e. input that had been seeded with the target structure and which learners were asked to process for comprehension) or as a set of sentences containing the target feature which learners were simply asked to memorize. In the case of studies classified as explicit instruction, some of the treatments consisted solely of metalinguistic explanation while others also included production practice. A couple of examples of studies that have compared the relative effects of the two types of instruction on learning will illustrate the differences involved.

Doughty (1991) (in the study briefly considered earlier) compared the effects of ‘meaning-oriented instruction’ and ‘rule-oriented instruction’ on the acquisition of relative clauses by 20 intermediate-level ESL students from different language backgrounds. The materials consisted of computer-presented reading passages, specially written to contain examples of clauses where the direct object had been relativized. All the subjects skimmed the texts first. The meaning-orientated group received support in the form of lexical and semantic rephrasing and sentence clarification strategies (i.e. input enhancement). The rule-orientated group received instruction in the form of explicit rule statements and onscreen sentence manipulation. A control group simply read the text again. In this study then, implicit instruction was of the reactive kind, while the explicit instruction was of the direct proactive kind.

In Robinson (1996) there were four instructional conditions: (1) an implicit condition, which involved asking learners to remember sentences containing the target structures; (2) an incidental condition consisting of exposure to sentences containing the target structure in a meaning-centered task; (3) a rule-search condition involving identifying the rules; and (4) an instructed condition where written explanations of rules were provided. In terms of the definitions of implicit instruction above, both conditions (1) and (2) can be considered ‘implicit’ of the proactive kind, while conditions (3) and (4) are explicit, (3) involving direct explicit instruction and (4) indirect. Clearly, Robinson’s operationalizations of implicit and explicit instruction differ considerably from those of Doughty.

It is not surprising, then, to find considerable differences in the results obtained by studies that have compared implicit and explicit instruction. These differences are reflected in Doughty’s and Robinson’s studies. Doughty reported that the meaning-orientated group and the rule-orientated group both outperformed the control group in their
ability to relativize, but that there was no difference between the two experimental groups. Robinson, however, reported no differences in the scores on a grammaticality judgement test between his (1) and (2) conditions (both of which I classified as implicit). However, condition (3) (which I classified as direct explicit) outperformed the other three conditions, including condition (4) (which I classified as indirect explicit).

Overall, Norris and Ortega (2000) found that explicit instruction was more effective than implicit instruction in their meta-analysis. They reported an effect size for 29 implicit treatments of $d = 0.54$ and $d = 1.13$ for the 69 explicit treatments. Cohen (1988) considered effect sizes larger than .8 as ‘large’, sizes between .5 and .8 as ‘medium’, between .2 and .5 as ‘small’ and less than .2 as negligible. On this basis, the effect size for implicit instruction is ‘medium’ whereas that for explicit instruction is ‘large’, suggesting an advantage for explicit instruction. However, as might be expected, there was considerable variance from study to study, reflected in the relatively large standard deviations for the effect sizes (i.e. 0.86 in the case of the implicit treatments and 0.93 in the case of the explicit treatments).

There is also another problem with these studies. Many of the studies that investigated the relative effectiveness of implicit and explicit instruction relied on methods of measuring acquisition that favored explicit instruction. Norris and Ortega distinguished four types of measure: (1) metalinguistic judgement, (2) selected response, (3) constrained constructed response and (4) free constructed response. The first three are likely to allow learners to utilize their explicit knowledge of the target structures and thus can be thought to favor explicit instruction. (4), on the other hand, is more likely to tap implicit knowledge. Only 16% of the total studies in their meta-analysis included free constructed response measures. An inspection of the results for these measures indicates a slight advantage for implicit forms of instruction.

The problem of how to measure L2 acquisition is the focus of this book. Arguably, little progress can be made in investigating the effects of implicit and explicit instruction until we have valid measures of implicit and explicit knowledge. In Part 2 of this book, we report a series of studies designed to validate measures of these two types of knowledge.

**The Interface Issue**

The distinctions that we have now considered are all relevant to what has become known as the ‘interface issue’. This concerns the extent to which implicit knowledge interfaces with explicit knowledge. The interface issue addresses a number of questions: to what extent and in what ways are implicit and explicit learning related? Does explicit knowledge convert into or facilitate the acquisition of implicit
knowledge? Does explicit instruction result in the acquisition of implicit as well as explicit knowledge? These are key questions of both theoretical importance for SLA and practical importance for language pedagogy.

Three very different answers to the interface question have been offered; (1) the noninterface position, (2) the strong interface position and (3) the weak interface position. I will briefly consider each of these.

**The noninterface position**

This draws on research that shows that implicit and explicit L2 knowledge involve different acquisitional mechanisms (Krashen, 1981; Hulstijn, 2002), are stored in different parts of the brain (Paradis, 1994) and are accessed for performance by means of different processes, automatic versus controlled (R. Ellis, 1993). In its pure form, this position rejects both the possibility of explicit knowledge transforming directly into implicit knowledge and the possibility of implicit knowledge becoming explicit. However, in a weaker form of the noninterface position, the possibility of implicit knowledge transforming into explicit is recognized through the process of conscious reflection on and analysis of output generated by means of implicit knowledge (Bialystok, 1994).

**The strong interface position**

In contrast, the strong interface position claims that not only can explicit knowledge be derived from implicit knowledge, but also that explicit knowledge can be converted into implicit knowledge through practice. That is, learners can first learn a rule as a declarative fact and, then, by dint of practising the use of this rule, can convert it into an implicit representation, although this need not entail (initially, at least) the loss of the original explicit representation. The interface position was first formally advanced by Sharwood Smith (1981) and has subsequently been promoted by DeKeyser (1998, 2007). Differences exist, however, regarding the nature of the ‘practice’ that is required to effect the transformation, in particular whether this can be mechanical or needs to be communicative in nature.

**The weak interface position**

The weak interface position exists in three versions, all of which acknowledge the possibility of explicit knowledge becoming implicit, but posit some limitation on when or how this can take place. One version posits that explicit knowledge can convert into implicit knowledge through practice, but only if the learner is developmentally ready to acquire the linguistic form. This version draws on notions of ‘learnability’ in accordance with attested developmental sequences in L2 acquisition (e.g. Pienemann, 1989). The second version sees explicit
knowledge as contributing indirectly to the acquisition of implicit knowledge by promoting some of the processes believed to be responsible. N. Ellis (1994: 16), for example, suggests that ‘declarative rules can have “top-down” influences on perception’, in particular by making relevant features salient, thus enabling learners to ‘notice’ them and to ‘notice the gap’ between the input and their existing linguistic competence. Such a position suggests that implicit and explicit learning processes work together in L2 acquisition and that they are dynamic, taking place consciously but transiently with enduring effects on implicit knowledge (N. Ellis, 2008). This is also the view that I have promoted in a series of publications (e.g. Ellis, 1993, 1994). According to the third version, learners can use their explicit knowledge to produce output that then serves as ‘auto-input’ to their implicit learning mechanisms (Schmidt & Frota, 1986; Sharwood Smith, 1981).

Neurolinguistic studies lend some support to the interface positions. Lee (2004: 67), for example, suggested that neuroanatomy allows for an interface between declarative and procedural memory:

When (the learner) utters a sentence that violates the rule, his or her declarative memory may send a signal indicating that the utterance is wrong. This signal may prevent the formation of connections among neurons that could have represented the incorrect rule. On the other hand, when the speaker executes a correct sentence, this information aligns with that of declarative memory, and the connection that represents the sentence or the rule involved in the sentence may become stronger.

Lee’s account appears to lend support to both a strong interface position (i.e. declarative memory can convert into procedural memory) and a weak interface position (i.e. declarative memory can help adjust the neural circuits in which procedural memory is housed). Other neuroscientific researchers, however, have rejected the possibility of a strong interface and emphasized the weak interface position. Paradis (2004) is adamant that explicit knowledge does not convert into implicit knowledge; acquisition may commence with an explicit rule (controlled processing) but subsequently, the learner acquires implicit computational procedures involving automatic processing. He proposed that metalinguistic knowledge can assist the development of implicit competence, but only indirectly through focusing attention on the items that need to be practised and through monitoring. Crowell (2004) also argued that declarative knowledge is not converted into procedural knowledge, but rather the two types of knowledge are learnt and stored separately and when activated involve different neural loops. Crowell (2004: 101) commented ‘what would appear on the behavioral level to be a “conversion” is, in actuality, probably a strengthening of connections
in the non-declarative loop that is sometimes accompanied by weakening of connections in the declarative loop.

The different positions all have their adherents and have been the topic of much argument in the SLA literature. However, the evidence for them is largely indirect (e.g. cases of aphasia). They have not been subjected to empirical enquiry. One reason for this is the lack of agreed instruments for ascertaining whether what learners have learned as a result of instruction or exposure consists of implicit or explicit knowledge, or, of course, some amalgam of the two. Again, then, the importance of developing valid measures of the two types of knowledge is shown. No resolution of the interface question is possible until these are available.

**Outline of the Book**

The book is in five parts. Part 1 consists of this chapter, the purpose of which is to introduce readers to the key constructs of implicit/explicit learning, knowledge and instruction.

Part 2 contains four chapters, all of which address how to measure implicit and explicit knowledge. Chapter 2 (Rod Ellis) examines a number of studies that have attempted to measure implicit and explicit knowledge and then goes on to identify a set of criteria for operationalizing the distinction between the two types. It reports a study that investigated whether instruments based on the criteria were able to provide relatively separate measures of the two types of knowledge. Subsequent chapters in this section examine each of the instruments in greater detail. Chapter 3 (Rosemary Erlam) describes the development of the oral elicited imitation test, presenting a rationale for why elicited imitation was chosen as a means of accessing implicit language knowledge. Chapter 4 (Shawn Loewen) explores the construct validity of grammaticality judgement tests by examining the responses of both L1 and L2 English speakers to the test when administered in a timed and untimed condition. Chapter 5 (Catherine Elder) investigates the test of metalinguistic knowledge by forming a series of hypotheses regarding the nature of metalinguistic knowledge and then putting these hypotheses to the test, using data gathered in the context of trialling this instrument on a diverse population of L2 learners.

The purpose of the four chapters in Part 3 is to make use of the instruments for measuring implicit and explicit knowledge to examine a number of issues in SLA and teacher education. Chapter 6 (Rod Ellis) addresses the intriguing possibility that what constitutes grammatical complexity in terms of explicit knowledge may be very different from what constitutes complexity as implicit knowledge. It provides evidence to suggest that this is, in fact, the case and also that the notion of
‘acquisitional sequences’ applies only to implicit knowledge. Chapter 7 (Catherine Elder and Rod Ellis) asks to what extent the distinction between implicit and explicit L2 knowledge can account for proficiency as measured by standard tests such as TOEFL and IELTS. It suggests that, in fact, these tests seem to draw heavily on learners’ explicit knowledge. Chapter 8 (Jenefer Philp), using a statistical technique known as cluster analysis, examines whether different types of learners can be distinguished in terms of the two types of knowledge (e.g. are there learners whose knowledge is predominantly implicit or explicit?) and also whether such variables as age and instructional experience can account for the differences in knowledge profiles. Chapter 9 (Erlam, Philp and Elder) investigates to what extent trainee teachers possess metalinguistic knowledge of English grammar. Three groups of trainee teachers were examined – a group of 94 highly proficient L2 learners of English from Malaysia enrolled in a Foundation program for preservice teachers, a group of TESOL teacher trainees in New Zealand and a similar group in Canada. These chapters demonstrate that the availability of instruments providing measures of implicit and explicit knowledge allows for a new perspective on a variety of current issues.

Part 4 examines the role that form-focused instruction plays in L2 acquisition. A major criticism of much of the research in this area of SLA is that it has failed to distinguish clearly between implicit and explicit knowledge in the way that acquisition is measured – as noted earlier in this chapter. Chapter 10 (Erlam, Loewen and Philp) examines whether output- and input-based instruction impacts on implicit language knowledge. This is an important question because strong claims have been made about the efficacy of input-based instruction (e.g. VanPatten, 1996, 2004) but, to date, there is little evidence that it benefits the acquisition of implicit knowledge (i.e. acquisition has typically been measured in controlled tests that favor explicit knowledge). Chapter 10 (Loewen, Erlam and Ellis) investigates the effects of instruction as ‘enriched input’ on learners’ acquisition of third person -s. In this study, the learners’ attention was focused on another grammatical feature (the use of the indefinite article for generic reference), so any acquisition of third person -s would be incidental. Again, acquisition was operationalized as both implicit and explicit knowledge. Chapter 12 (Reinders and Ellis) also investigated the effects of enriched input on acquisition. In this case, however, it compared the effects of enriched input alone with enriched input combined with a request for the learners to pay specific attention to the exemplars of the two structures that were the target of the instruction. This study used a timed and an untimed grammaticality judgement test to examine the effects of the instruction on the acquisition of implicit and explicit knowledge. The final chapter in this part of the book (Chapter 13 by Ellis, Loewen and Erlam) reports a study that
compared the relative effects of implicit and explicit corrective feedback on L2 learners’ acquisition of regular past tense. It found that explicit feedback seemed to have an effect on the development of learners’ implicit as well as their explicit knowledge. The studies reported in this part demonstrate the value of using separate measures of implicit and explicit knowledge in research investigating form-focused instruction.

The final part of the book (Part 5) contains a single chapter (Chapter 14). In it, Ellis reviews the main issues discussed in previous chapters and the findings of the empirical research that they reported. It also discusses the limitations of the research and identifies areas for further study.

**Conclusion**

While acknowledging that the implicit/explicit distinctions are not without controversy, this book is predicated on the assumption that they are real, evidenced-based and useful. As N. Ellis (2008: 120) puts it:

we know that implicit and explicit learning are distinct processes, that humans have separate implicit and explicit memory systems, that there are different types of knowledge of and about language, that these are stored in different areas of the brain, and that different educational experiences generate different type of knowledge.

This book is an exploration of these differences as they apply to L2 acquisition.