

## AWARENESS AND SECOND LANGUAGE ACQUISITION

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### INTRODUCTION

One very active research tradition in the field of second language acquisition (SLA) attempts to establish causal relationships between environmental factors and learning. These include the type and quantity of input, instruction and feedback, and the interactional context of learning (Larsen-Freeman and Long 1991). A second very influential line of research and theory in SLA that came to fruition during the 1980s investigates the possible role of universal grammar (UG) in SLA (Eubank 1991b, White 1989). In the Chomskyan tradition, UG refers not to properties of language as the external object of learning but to innate properties of mind that direct the course of primary language acquisition. One question asked within this tradition has been whether or not second language learners still "have access" to UG, but it is assumed that UG principles are not accessible to learner awareness for any kind of conscious analysis of input. It is possible that SLA is the result of UG (a deep internal factor) acting upon input (an external factor), as proposed by White (1989), but what seems to be left out of such an account is the role of the learner's conscious mental processes. Which of the learner's cognitive abilities are engaged by input and interaction? What do learners gain from negotiation for meaning? What does it take to notice formal features of the input? How do learners understand the instruction they are given? What do they do with feedback? What are they curious about? What do they correctly figure out about the target language? What do they analyze incorrectly or remain confused about? Does any of this matter?

Early answers to several of these questions were proposed by Krashen (1985), who maintains that processing input for the comprehension of message meaning is necessary to convert input to acquired knowledge (the comprehensible input hypothesis), but that conscious knowledge of linguistic rules is irrelevant for acquisition, as is instruction (the non-interface hypothesis). However, in recent

years, there have been numerous criticisms of these hypotheses, accompanied by some dissatisfaction with the results of comprehension- and interaction-driven approaches to language teaching. One result of this dissatisfaction has been a renewed exploration of the cognitive requirements of learning, with a variety of terms surfacing, including "attention focussing" (van Lier 1991), "focus on form" and "focus on forms" (Long 1991; forthcoming a), "consciousness raising" (Rutherford 1987, Sharwood Smith 1981), "input enhancement" (Sharwood Smith 1991, White, Spada, Lightbown and Ranta 1991), "input processing" (VanPatten 1992, VanPatten and Cadierno in press), "preliminary intake" and "final intake" (Chaudron 1985), "uptake" (Allwright 1984, Slimani 1987; 1992), and "language awareness" (James and Garrett 1991).

Many of the issues raised are variations on the role that awareness plays in learning. This chapter focuses on a number of these issues concerning input processing in SLA that are related to general issues of consciousness and learning, and briefly reviews evidence from psychology and applied linguistics in turn. Controversies concerning the role of consciousness in behavior and learning rage in many other fields. While the debates cannot be reviewed in any detail for reasons of space, it is useful to note, in particular, the discussions in philosophy, neuroscience, and artificial intelligence.

Deeply held philosophical beliefs often color the positions taken by applied linguists concerning the possible role of consciousness in SLA. There is, for example, the widely held view that introspection is "notoriously unreliable" (a bit of an old chestnut, since all data need to be carefully evaluated with respect to reliability and validity) and that subjective experience is off-limits to science, a point of view that is part of the legacy of behaviorism but subscribed to by many who are not behaviorists in any other sense.

For neurosciences and artificial intelligence, the modern metaphor for the mind is that of a computer program implemented in the brain. The view is widely held that computational states give rise to subjectively experienced states of consciousness but that the latter have no effects of their own (Jackendoff 1987). The notion that consciousness and accompanying notions of an inner voice, self, or executive control center are all illusions has been popularized recently by Dennett (1991, Dennett and Kinsbourne 1992). Searle (1990), in contrast, argues that the computational metaphor is wrong and that the biggest mistake of contemporary cognitive science is an underestimation of the importance of consciousness—but this is a minority view. Connectionists call for radical revision of the computational metaphor and the replacement of symbolic processing by more brain-like computational architectures, but they continue to stress unconscious rather than conscious processes (Bechtel and Abrahamsen 1991).

Another barrier to progress in understanding the role of awareness in learning is terminological confusion and vagueness. McLaughlin (1990b) has argued that the terms "conscious" and "unconscious" have accumulated so many conflicting meanings that they are unusable and need to be replaced with clearly specified and testable constructs. The present reviewer agrees that these terms are multiply ambiguous and that clearer issues need to be formulated, but without abandoning the link to subjective experience.

In the review to follow, three major issues related to conscious and unconscious learning are addressed: incidental and intentional learning, attention and noticing, and implicit and explicit learning. While the dichotomy between conscious and unconscious learning may be too general and/or vague, the notion of awareness, as suggested by each of the three more specific topics, is crucial to language learning.

### INCIDENTAL AND INTENTIONAL LEARNING

#### 1. The issues

When one speaks of having learned something unconsciously, it often means that something was learned unintentionally, as a by-product of doing something else. Children acquire the grammar of their first language unconsciously in this sense, as a by-product of communication and socialization. Adult second language learners may want to learn grammar, or their teachers may want them to, but perhaps adult learning is also more effective when learners are concerned only with the communication of meaning.

#### 2. The evidence from psychology

Incidental learning (learning without intention) is considered commonplace, uncontroversial, and relatively easy to manipulate experimentally through appropriate task instructions. When engaging in some learning tasks, it doesn't matter at all whether someone intends to learn or not; what matters is how the task forces the material to be processed (Anderson 1985). However, when a task does not focus attention on what needs to be learned, then intentional learning is superior *if* the motivation to learn leads to the exercise of effective cognitive and metacognitive strategies (Pintrich 1989).

#### 3. The evidence from applied linguistics

Krashen (1989) has reviewed the evidence supporting incidental approaches to teaching spelling and vocabulary, arguing that extensive reading is as effective as focused study. However, it should be noted that intentional subjects do consistently better than incidental subjects in controlled studies. Hulstijn (1992) conducted experimental studies of the incidental learning of second

language vocabulary occurring in reading passages in order to provide support for a mental effort hypothesis, predicting that inferred word meanings are retained better than meanings given to the reader through the use of marginal glosses. Results indicated that inferred meanings were retained better, as predicted, but the multiple-choice inference procedure used in the experiment was found to be inherently error prone.

Skehan (1992) proposes that attempts by adults to learn second languages incidentally through communicative interaction are only partially successful. Although such interaction has the potential to provide the necessary evidence for acquisition, the use of comprehension strategies and communication strategies motivated by communicative pressure or learner predispositions means that the analysis necessary for acquisition is avoided. Schmidt (1990) has proposed that deliberate attention to communicatively redundant grammatical forms is necessary for adult SLA<sup>1</sup> and has developed a speculative argument for why this does not appear to be so for first language acquisition.

### ATTENTION AND NOTICING

#### 1. The issues

While the intention to learn is not always crucial to learning, attention (voluntary or involuntary) to the material to be learned is. Attention has several major psychological functions. Most psychological models of memory hold that the allocation of attention is the necessary and sufficient condition for encoding a stimulus into long-term memory, and that efficient retrieval depends on both the quantity and the quality of attention at the time of encoding (Logan 1988). In SLA as well, the claim has been made frequently that attention to input is necessary for input to become intake that is available for further mental processing (Scovel 1991, van Lier 1991). Attention also controls access to conscious experience; when people pay attention to something, they become conscious of it (Baars 1988). If the attentional threshold for storage in memory and the threshold for conscious awareness could be shown to be the same, then it would follow that all learning must be accompanied by awareness. Schmidt (1990) has proposed that the subjective experience of "noticing" is the necessary and sufficient condition for the conversion of input to intake. A further extension of the noticing hypothesis is that what must be attended to and noticed is not just the input in a global sense but whatever features of the input are relevant for the target system (Schmidt in press); that is to say, in order to acquire phonology one must attend to phonology; in order to acquire pragmatics, one must notice both linguistic forms and the relevant contextual features. Both the "noticing" hypothesis and the notion of specific focus are controversial since there is a widespread belief that one can somehow "pick up" aspects of a language without making them the object of focal attention or being really aware of them. Equally

important questions concern the factors influencing attention and noticing: what do learners notice, and why?

## 2. The evidence from psychology

One reason for broad acceptance of the view that language can be picked up subconsciously, without fully attending to all details of the input stream, may be the popularization of the notion that subliminal perception is a powerful tool, one that can be exploited either negatively (covert mind control through subliminal advertising or satanic messages recorded backwards on musical sound tracks) or positively (through the use of subliminal self-help audio tapes). Psychologists who have investigated these issues find that such popular beliefs have no empirical support. Most reported incidents of subliminal advertising turn out to have been apocryphal. (The "eat popcorn/drink Coke" studies were the journalistic inventions of Norman Cousins, editor of the *Saturday Review*.) There is no evidence that such techniques would have any affect on viewers if used (Moore 1988). Most subliminal self-help tapes are fraudulent and do not contain any subliminal messages to begin with. Moreover, there is no support for the idea that subliminal messages can influence motivation or complex behavior in any case (Merikle 1988). Sleep-learning is equally unpromising as a potent technique waiting to be exploited for language learning (Bootzin, Kihlstrom and Schachter 1990).

This does not mean that there is no such thing as subliminal perception. A variety of subtle effects demonstrating the influence of information processed below the threshold of awareness can be demonstrated experimentally (Schmidt 1990). Unfortunately, psychologists have been unable to agree whether any of these effects constitute learning (as opposed to the activation of already very well learned material in memory), and it has proven remarkably difficult to find indisputable evidence about events near the threshold of conscious experience. Baars (1988) has suggested that the problems involved in answering zero-point questions (e.g., whether the attentional threshold for learning is identical to the threshold for conscious awareness) may be methodologically beyond us today. But he argues that this problem should not obscure the important and answerable question of whether more conscious involvement is needed to learn more information, the answer to which is clearly affirmative.

## 3. The evidence from applied linguistics

Schmidt (1990) discusses the evidence from his own learning of Portuguese (Schmidt and Frota 1986) in support of the hypothesis that intake is the subset of input that is attended to and noticed, finding an extremely close connection between his recorded noticings (diary entries) and what could be shown, through the analysis of tape-recorded interactions with native speakers, to have been learned. Altman (1990) reached different conclusions from a study of

her acquisition of Hebrew during five years of both formal instruction (700 hours) and naturalistic exposure. In her study, she compared a series of taped production tasks with introspective entries in her language learning diary, class notes, underlinings in newspapers, and marks she made in her dictionary whenever she looked up a word. She found that approximately half of all new Hebrew verbs appearing in her oral production could be traced to specific input, and that there was a clear effect for formal instruction. However, the source of half the new verbs could not be identified, suggesting to Altman that those items probably appeared in input without any special attention being allocated to them and that some input becomes intake subconsciously. But which is more impressive, failure to track down all sources of learning or the fact that so much lexical learning over such an extended period of time could be related to specific instances of noticing? In the Schmidt and Frota study as well, there was a less than perfect match between what was recorded as noticed and what was learned. The difficulty in interpreting such findings is that making a record in a diary requires not only noticing but also a higher level of self-awareness—awareness that one has noticed and needs to make a record of that noticing—which no theory claims as necessary for learning. It appears unlikely, therefore, that diary studies can resolve the zero-point problem.

More global arguments for the necessity of noticing and attention to linguistic form have been put forth by Long (forthcoming a), citing immersion results (Swain 1991), learnability arguments, and premature stabilization—failure to incorporate basic target language structures by adults with prolonged exposure to comprehensible input. Arguments summarized by Long that attention to linguistic form is beneficial, even if not necessary, include reviews showing a global benefit for instructed learning over purely naturalistic acquisition, studies of the effectiveness of focusing on specific structures (Doughty 1991, White 1991, White, Spada, Lightbown and Ranta 1991), and discourse studies showing limited occurrences of acquisition-enhancing negotiation sequences (Pica 1991; 1992).

There are a number of factors that are likely to influence what learners notice (see Schmidt 1990). Bardovi-Harlig (1987) found that ESL learners learned preposition stranding before pied-piping although the former is more typologically marked; she suggested that this might be because stranded prepositions are more frequent and perceptually salient. Sorace (1991) found that the linguistic intuitions of French L1 and English L1 near-native speakers of Italian concerning Italian unaccusativity could not be accounted for by a simple transfer strategy; rather, the propensity of learners to notice or fail to notice the occurrence of a given property in the L2 input seemed to be related to the status of the L1 with respect to that property. Several researchers have also investigated whether form and meaning are in competition for attention during input processing (Bransdorfer 1992, Mangubhai 1991, VanPatten 1990). VanPatten (1992) has proposed several hypotheses which summarize existing findings and frame issues



for future research, two of which are particularly relevant: 1) learners process input for meaning before processing it for form (e.g., lexical items have priority over grammatical morphology, and more meaningful morphology has priority over less meaningful morphology); 2) in order for learners to process form that is not meaningful, they must be able to process informational content at little or no cost to attentional resources.

Schmidt and Frota (1986) reported that the grammatical constructions noticed in conversational interaction were, for the most part, those that had been taught in a formal language class, suggesting that one valuable function of instruction is to increase the salience of target forms in subsequent input. Other grammatical forms noticed in input had not been taught in class, but they caught the learner's attention in interaction when faced with input that was not immediately comprehensible. (See White 1987 for arguments regarding the possible importance of incomprehensible input for SLA.) Fotos (1992) found that, in comparison with a control group, learners who developed explicit knowledge of a grammar point, either through formal instruction or through grammar consciousness-raising exercises, noticed significantly more instances of the target structure in communicative input one and two weeks after administration of the instruction.

Slimani (1987; 1992) has reported on a study in which thirteen Algerian university students in an intensive English language course completed individual "uptake recall charts" immediately after the conclusion of lessons that had been observed and audio-recorded. Uptake in this study was defined as the individual learners' claims regarding what had attracted their attention during the lesson and what they thought they had learned. Once "uptaken" items were identified, Slimani attempted to locate them within the interactive events of the lessons in which they occurred. She found that 89 percent of the items that the respondents claimed to have seen and learned during the lesson had been focused upon during instruction, given prominence by being, however briefly, the ostensible topic of conversation rather than simply a part of classroom discourse. This does not mean, however, that the focus of learner attention can be easily manipulated according to a predetermined instructional plan. First, many of the topicalized items that were noticed by students were not planned to be the target of instruction but arose during the joint construction of discourse by students and teacher. Second, many items that were topicalized by the teacher were not uptaken, with error corrections constituting the largest class of lost items. Third, learners were more likely to report uptake of items that were focused upon by their peers than those topicalized by the teacher. Fourth, uptake was highly idiosyncratic, with each learner apparently attending to a different subset of the items made available through topicalization. Fifth and finally, eleven percent of the uptaken items occurred as a part of classroom discourse without receiving any attention in the form of topicalization, providing further evidence for learner autonomy and internal criteria of relevance.

## IMPLICIT AND EXPLICIT LEARNING

### 1. The issues

A third sense in which SLA is commonly said to involve unconscious learning refers to the internalization of rules, schemata, or abstract principles without conscious understanding of them. "Understanding" is an important notion for this discussion and refers here to a higher level of awareness than "noticing" (which is being used in a more restricted sense than in ordinary discourse). Noticing is related to rehearsal within working memory and the transfer of information to long-term memory, to intake, and to item learning. Understanding is related to the organization of material in long term memory, to restructuring, and to system learning.

An example may clarify the intended relationship. If a native speaker says *It will take six weeks*, a nonnative speaker (NNS) might fail to notice the occurrence of the plural morpheme entirely (consciously perceiving only *six week*)—that is, understanding without noticing. Alternatively, the NNS might be aware that what was said was *six weeks* without having any idea why the *-s* is used or what it means—that is, noticing without understanding. Finally, suppose that an imaginary novice learner of English, having noticed *-s* attached to numerous nouns over a period of time, comes to realize that the *-s* frequently occurs with other textual and contextual indicators of plurality and is probably itself a marker of plurality. This learner then checks the tentative hypothesis against other data, decides that it is correct, and begins producing the form. The example is absurdly simple, and it may seem obvious that learners probably do become consciously aware of the function of the English plural morpheme through some such process of induction and hypothesis testing (unless the process is short-circuited by direct explanation), and that such awareness is very likely the foundation upon which both accurate use and intuitions about grammaticality are developed.

Chomsky (1969), however, pointed out early on that this kind of learning could account for only a small part of primary language acquisition. He argued that no native speaker has a level of explicit understanding that even begins to approximate the intricate and complex intuitive knowledge that people have of their language; the same is generally held to be true for SLA. Therefore, there must be similar processes of unconscious induction, abstraction, and reorganization that operate "off-line" (Bowerman 1987) and that account for much of acquisition. Further questions then arise. Are some rules best learned consciously and others best learned unconsciously? Is implicit learning limited to those aspects of language that are guided by UG, or is all true acquisition "subconscious" as Krashen would have it? Assuming there are two kinds of learning, explicit and implicit, do the resulting knowledge bases constitute independent and encapsulated data sets? Can the explicit/implicit contrast be tied



to the distinction between declarative and procedural knowledge? Is it irrelevant whether our imaginary learner ever realizes that -s means "plural"? Can learning "become" acquisition?

## 2. The evidence from psychology

A number of models of implicit learning have been proposed (N. Ellis forthcoming, Hayes and Broadbent 1988, Lewicki and Hill 1989), but the best known proposal is that of Reber (1989; 1992), based on a long series of experiments in which subjects have been exposed to strings of letters generated by an underlying rule system. There are many variations on the basic experimental paradigm, but subjects are typically given instructions either to try to discover the rules of the underlying grammar (intentional condition) or to memorize examples for a memory test (incidental condition). The acquisition phase is followed by a testing and transfer phase to assess what subjects have learned. In some experiments the testing phase has also included probing subjects' awareness in order to find out whether they could discover, and were able to verbalize, the underlying rules of the system. Generalizing across a large number of studies, the basic findings have been that subjects do become sensitive to underlying regularities in input through exposure to examples, as shown by the fact that they can characterize new strings as grammatical or ungrammatical. However, they are generally unable to verbalize the rules of the underlying grammar used by the experimenters to generate strings.

Artificial grammar experiments do not demonstrate learning without attention, since exemplars are fully attended to, and attention is generally considered necessary for implicit learning (Hartman, Knopman and Nissen 1989), but the learning of such grammars can be considered unconscious in several senses. The experiments do demonstrate incidental learning because the judgments of subjects receiving rule-search or memorization instructions typically do not differ significantly (although some studies have found an advantage for memorization-instruction subjects and some for rule-search subjects). However, this finding is not the main point. The essence of the implicit learning position is that learning is believed to involve induction without awareness on the grounds that 1) hypothesis formation and testing are presumed to be blocked by the demands of the memorization condition, and 2) the knowledge acquired in such experiments is always richer and more sophisticated than what can be explicated (Reber 1989: 229). It is also claimed that the knowledge thus acquired is abstract.

Reber argues that the results of artificial grammar learning are reflective of processes that are general and universal in human learning, the foundation processes for the development of tacit knowledge of all kinds. Contrasting implicit learning with overt, conscious cognitive processes such as problem solving and decision making, implicit induction systems are considered evolutionarily older, more robust, and independent of IQ or other standard measures of

cognitive ability (Reber 1992). Implicit and explicit learning processes may interact, however. Reber reports that giving subjects precise information about the nature of the stimulus display early in training improved learning, possibly because it served to direct and focus their attention. Mathews, *et al.* (1989) report a number of experiments showing that implicit and explicit learning processes may interact positively and that each has strengths—explicit learning being superior when there are a limited number of variables and critical features are salient, implicit learning being superior for discovering non-salient covariation among a large number of variables.

The conclusion that artificial grammar learning and other implicit learning experiments demonstrate unconscious induction of abstract rules has always been, and continues to be, controversial. One approach taken by those who doubt the reality of implicit learning has been to try to demonstrate that the dissociation between performance and explicit knowledge of underlying regularities is less than claimed (Brooks and Vokey 1991, Dienes, Broadbent and Berry 1991, Joordens and Merikle 1992, Perruchet and Amorim 1992). They argue either that subjects know more than insensitive measures of awareness allow them to demonstrate or that their performance after training (typically better than random but far from perfect) does not require the assumption that the complex rules built into the stimulus have been internalized. A second trend in the current reanalysis of implicit learning consists of demonstrations that performance taken as evidence for unconscious abstraction can be accounted for by simpler forms of associative learning (Servan-Schreiber and Anderson 1990). If an emerging consensus can be identified, it is in support of connectionist and other memory-based models that emphasize the importance of specific knowledge of instances over abstractions (Greenwald 1992, Medin and Ross 1990, Perruchet and Pacteau 1990; 1991, Vokey and Brooks 1992).

### 3. The evidence from applied linguistics

Artificial grammars are not natural languages. However, the basic logic behind the claim that some or most L2 learning must be implicit is the same as for artificial grammar learning: 1) demonstrate that the underlying system of rules is complex and abstract; 2) demonstrate that exposure leads to reasonably effective learning, including the ability to generalize to new instances; and 3) assess learner awareness to establish lack of understanding of the underlying rules.

In the study of first language acquisition, it is sometimes assumed that step (3) is not only difficult but unnecessary; this is because the rules and representations underlying adult knowledge of human languages are so complex and abstract that it is unimaginable that they could be learned through the normal experience of children (Eubank 1991a). Attributing similarly abstract mental representations to L2 learners may also make it appear obvious that any induction must be unconscious. With respect to Spanish sentences such as *Ese es el chico*

*que* (PRO) *vino ayer* versus *Ese es el chico quien (t) vino ayer*, Liceras (1986) suggested that a second language learner "may not be able to decide whether it is PRO or a *wh*-phrase...that is moved to COMP in Spanish nonoblique relativization" (1986:85). Braidì (1988) has argued against this interpretation; Liceras assumes that a learner is making an abstract decision about categories derived from linguistic theory when there is little evidence that this interpretation is the best characterization of the problem. That is, learners may only be concerned with simple lexical selection (*que* or *quien*) and may be influenced by such mundane factors as the frequency of lexical items in input or transfer of relativization strategies from the L1. In a similar vein, O'Grady (1991) has argued that problems of understanding how learners interpret subjects as optional in Spanish or obligatory in English is unnecessarily mystified by the assumption that a decision is being made about the abstract *pro-drop* parameter.

The explicit/implicit contrast in SLA is often investigated with respect to teaching rather than learning—with reference to whether explicit grammar rules can be taught to learners. In a recent study, Doughty (1991) found that instruction was more effective than simple exposure, but that input enhancement techniques were more effective than providing explicit rules. The study is compatible with the idea that noticing is sufficient for learning (that understanding is not required), but it does not require such a conclusion because it is unclear whether any implicit learning occurred in the experiment. Learner awareness was not assessed, and it is possible that learners in the enhanced input condition may have formulated hypotheses which might (or might not) account for their performance. In another recent study (N. Ellis in press), exposure to instances of a natural language rule did not lead to implicit induction of the underlying rule system.

In those few cases when learner awareness has been assessed in SLA, the evidence has been somewhat mixed (Schmidt 1990). Explicit, fragmentary knowledge is sufficient to explain learner performance in many cases, but Green and Hecht (1992) provide evidence that there is a dissociation even with respect to pedagogical rules. In these cases, explicit statements of pedagogical rules did not match student learning even though these rules were not very abstract when compared to theoretically grounded analyses. This proved true even when a liberal view was taken of what constitutes a correct rule. Green and Hecht also found that some pedagogical rules were relatively easy to learn, including those that referred to easily recognized categories and could be applied mechanically. Rules that were more difficult to learn involved linguistic aspect or other subtle semantic distinctions and rules not governed by the immediate linguistic context.

Assuming that clear and indisputable cases of implicit learning in SLA can be established, connectionist simulations offer one model of how implicit learning can take place without the induction of abstract rules, either conscious or unconscious. However, networks such as the one used by Sokolik and Smith

(1992) for modeling the learning of French gender take a remarkably long time to learn. Human learners who are put through essentially the same training procedure as that used in the computer simulation learn faster. Learners also indicate that they are aware of using a stateable strategy of focusing on noun endings to determine gender (M. Sokolik, personal communication, March 1992), suggesting that attention focusing and attempts to formulate hypotheses may facilitate the operation of the essentially passive, bottom-up operation of a connectionist network (Loritz 1991).

### TEACHING AND CONSCIOUSNESS-RAISING

The debate concerning whether and how grammar should be taught is as old as the language teaching profession and may never reach any definitive conclusion, but the issues sketched in this chapter have stimulated discussion along two lines. The first of these derives from the hypothesis that target language forms will not be acquired unless they are noticed, and one important way that instruction works is by increasing the salience of target language forms in input so that they are more likely to be noticed by learners. This argument has been put forth in slightly different versions by many SLA theorists in recent years (R. Ellis 1990; 1992, Long 1991; forthcoming a, Rutherford 1987, Schmidt 1990, Schmidt and Frota 1986, Sharwood Smith 1991, Terrell 1991, VanPatten and Cadierno in press) and has now achieved the status of conventional wisdom, providing part of the rationale for a general reassessment of input-oriented approaches to language teaching.

The second main line of current discussion is related to the development of task-based language teaching and involves the kinds of tasks that may be desirable given considerations of awareness and learning as well as the kinds of syllabuses in which they should be embedded. Loschky and Bley-Vroman (1990), for example, recommend the construction of closed communicative tasks that cannot be completed successfully unless the target grammatical knowledge is attended to. They also favor comprehension over production tasks, and stress the importance of feedback. VanPatten and Cadierno (in press) emphasize the use of tasks that contribute directly to the development of input processing skills. Fotos and Ellis (1991) advocate the use of communicative grammar tasks that can raise the learner's consciousness about the grammatical properties of the L2 while simultaneously producing the kinds of interactional adjustments that are held to be facilitative of acquisition.

R. Ellis (1992) suggests that considerations of consciousness-raising justify a return to a structural syllabus (a list of linguistic items arranged in the order in which they are to be taught) as long as it is understood that this cannot serve as a complete course. Ellis would use grammar discovery tasks to help learners gain cognitive understanding of grammar, complemented by plentiful opportunities for communicative activities to develop implicit knowledge. Long

(1991; forthcoming a; forthcoming b) rejects both any kind of structural syllabus and any attention to linguistic forms out of context. Instead, he advocates a task-based syllabus in which tasks are not designed with any specific linguistic focus, but teach a content (biology, mathematics, automobile repair, geography) and attempt to make the learners' "noticing" of language arise incidentally, triggered by the interaction of learners with tasks.

## CONCLUSIONS

The relationship between awareness and learning is a major topic in experimental psychology and a favorite concern of philosophers and cognitive scientists, which is not surprising given that there are few questions that engage human curiosity as persistently as those that concern the operations of our own minds. In applied linguistics as well, these are persistent questions, partly because of their importance for pedagogy. Interest in the questions reviewed here briefly is likely to continue in both psychology and applied linguistics, and increasing attention to psycholinguistic issues in SLA should lead to more informed discussion. Two new journals which appeared in 1992 will provide increased dissemination of relevant research. *Consciousness and Cognition* (Academic Press) intends to serve as an interdisciplinary forum for discussion of the major theoretical and empirical issues of consciousness, including relations between awareness and attention, tools for the assessment of awareness, and the neuroelectric correlates of awareness and decision-making. The goal of *Language Awareness* (Multilingual Matters) is to disseminate work exploring the role of explicit knowledge about language in the language learning process and how such knowledge can be mediated by teachers.

An argument has been presented in this chapter that understanding the role of consciousness in language learning requires keeping three issues clearly separate: the question of learning incidentally, without intention (easily demonstrated); that of learning subliminally, without attention or noticing (probably impossible); and that of learning implicitly, without awareness at the level of understanding (the current evidence justifies a cautious affirmative). It is also important to operationalize concepts such as intention, noticing, and awareness in both experimental and pedagogical settings, recognizing that the major issue in resolving problems of awareness and learning in psychology has been lack of consensus as to what constitutes an adequate measure of awareness (Joordens and Merikle 1992).

For this reason, many researchers prefer to avoid difficult issues about mental states and processes entirely, focusing on external factors and experimental treatments (Sharwood Smith 1991), studying, for example, instructions (external) as opposed to intentions (internal), input enhancement (external) as opposed to noticing (internal), grammar explanation (external) as opposed to understanding (internal). The problem with this external approach is that the treatment may not



have the intended affect. Learners may look for rules even when told not to, fail to notice highlighted words in a text, fail to understand grammar explanations, or fail to see how such explanations apply. Learners may also notice target language features that have not been made artificially salient and may form accurate or inaccurate hypotheses in the absence of instruction, or as alternatives to instruction that is not understood. When the experimental treatment and the learner's mental state do not coincide, it is surely the latter that influences the course of acquisition (van Lier 1991), so there is no choice but to continue to approach these questions from both external and internal perspectives, giving equal attention to experimental treatment and the assessment of learner awareness.

### NOTES

1. Recent literature on intentional learning in SLA has typically appeared under the rubric of learner strategies, reviewed elsewhere in this volume.

### ANNOTATED BIBLIOGRAPHY

- Doughty, C. 1991. Second language instruction does make a difference: Evidence from an empirical study of relativization. *Studies in Second Language Acquisition*. 13.431-469.

Doughty reports on an experiment investigating the learning of English relative clauses within the context of a computer-assisted reading lesson. Twenty ESL learners were randomly assigned to one of three treatments: a rule-oriented treatment, including explicit rule statements and on-screen sentence manipulation; a meaning-oriented treatment, including highlighting and capitalization of target forms; and a control group (exposure only). Results indicated that increasing the salience of target forms was as successful as providing explicit metalinguistic descriptions in fostering acquisition of relative clause structures. The meaning-oriented group outperformed both the rule-oriented and control group in comprehension of the texts read during the experiment, suggesting a dual advantage for the instructional technique of focusing learners attention on linguistic forms in context.

- Ellis, N. In press. Rules and instances in foreign language learning: Interactions of explicit and implicit knowledge. *European Journal of Cognitive Psychology*.

This study assesses the results of three treatments for teaching Welsh soft-mutation rules through computer-assisted instruction: "natural" learners saw randomly ordered instances, "grammar" learners first



learned rules, and "structure" learners saw the rules applied to instances. Analysis of 71,000 learning trials demonstrated that 1) natural learners quickly achieved competence on the specific instances to which they were exposed but showed little or no implicit learning of the underlying system; 2) grammar learners took many trials to learn the rules and often failed to apply them in practice; and 3) structured learners learned slowest but were the only ones to abstract a functional schema for soft-mutations, acquiring the ability both to formulate the rules explicitly and to succeed on well-formedness judgments when presented with new instances.

Fotos, S. and R. Ellis. 1991. Communicating about grammar: A task-based approach. *TESOL Quarterly*. 25.605-628.

Fotos and Ellis investigated the performance of Japanese learners of English on their knowledge of English dative constructions, comparing pre- and post-treatment scores on a grammatical judgment test of two groups, one of which was given a traditional, teacher-fronted grammar lesson, the other of which had carried out an interactive task leading to explicit knowledge of the rules. Results lend some support to the idea that grammar discovery tasks do lead to both increased L2 knowledge and improved communication interaction.

Green, P. S. and K. Hecht. 1992. Implicit and explicit grammar: An empirical study. *Applied Linguistics*. 13.168-184.

A sample of 300 German learners of English and a control group of native speakers were asked to correct twelve common errors and state the rules that were violated. Results indicated that if pupils had a correct rule available, they could produce a correction in nearly every case, suggesting a link between rule knowledge and performance. However, formal grammar teaching did not guarantee that learners would learn the rules that were taught, and learners produced many corrections even when they could not articulate the rules or gave incorrect rules.

Hulstijn, J. 1989. Implicit and incidental second language learning: Experiments in the processing of natural and partly artificial input. In H. W. Dechert and M. Raupach (eds.) *Interlingual processes*. Tübingen: Gunter Narr Verlag. 49-73.

Two experiments provide evidence for the claim that attention to form at input encoding is a sufficient condition for learning structural elements of language, but they offer only modest and inconclusive evidence that exclusive attention to meaning inhibits the acquisition of structure.

- Sharwood Smith, M. 1991. Speaking to many minds: On the relevance of different types of language information for the L2 learner. *Second Language Research*. 7.118-132.

Sharwood Smith relates input enhancement to learnability theory, the modularity principle, and the distinction between positive and negative evidence. Positive evidence that is noticed becomes intake and positive evidence that is not noticed does not become intake. The outcome for negative evidence that is flagged (through the explicit identification of incorrect forms) is less clear. It may destabilize the current grammar, a prerequisite for further development, but the detection of an anomaly does not lead automatically to a realignment of the internal grammar.

- Sokolik, M. E. and M. E. Smith. 1992. Assignment of gender to French nouns in primary and secondary language: A connectionist model. *Second Language Research*. 8.39-58.

This study describes a computer-based connectionist network that learned to identify the gender of a set of French nouns and to generalize to new examples. Gender acquisition in French was previously identified as a likely case of implicit learning (Schmidt 1990) because no rules for distinguishing gender classes are taught to children, adult native speakers cannot formulate coherent or consistent rules, and the "rules" of gender assignment are more like fuzzy regularities than categorical rules in any case. Sokolik and Smith propose that connectionist networks are especially appropriate for modeling implicit learning in SLA.

- VanPatten, B. and T. Cadierno. In press. SLA as input processing: A role for instruction. *Modern Language Journal*.

VanPatten and Cadierno report an L2 Spanish study comparing instruction focusing on input processing (practice in the interpretation of OVS strings when the O consists of a full noun and when it consists of a clitic object pronoun), traditional output-oriented instruction (explanation plus oral practice), and a control group. Subjects receiving processing instruction did better than the other two groups on a comprehension task and as well as the group receiving traditional instruction on a production task.

- 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 studied the effects of instruction, including negative evidence, on the learning of adverb placement restrictions by L1 French learners of English. Results indicated that instruction had the desired effect in the

short run but disappeared when subjects were retested a year later. Hypotheses related to parameter setting, predicting implicit learning of a cluster of properties once one had been learned, were not supported. White reports that many students acquired unconscious knowledge of a difference between manner and frequency adverbs, but the claim is suspect because no attempts were made to assess carefully what the children in the study were aware of or what they might have noticed to trigger such awareness.

### UNANNOTATED BIBLIOGRAPHY

- Allwright, R. L. 1984. Why don't learners learn what teachers teach? The interaction hypothesis. In D. M. Singleton and D. G. Little (eds.) *Language learning in formal and informal contexts*. Dublin: IRAAL. 3-18.
- Altman, R. 1990. Accounting for successful vocabulary development through learner introspection. Paper presented at the AILA Ninth World Congress of Applied Linguistics. Thessaloniki, Greece, April 1990.
- Anderson, J. R. 1985. *Cognitive psychology and its implications*, 3rd ed. New York: Freeman.
- Baars, B. J. 1988. *A cognitive theory of consciousness*. Cambridge: Cambridge University Press.
- Bardovi-Harlig, K. 1987. Markedness and salience in second language acquisition. *Language Learning*. 37.385-407.
- Bechtel, W. and A. Abrahamsen. 1991. *Connectionism and the mind: An introduction to parallel processing in networks*. Oxford: Basil Blackwell.
- Bootzin, R. R., J. K. Kihlstrom and D. L. Schachter (eds.) 1990. *Sleep and cognition*. Washington, DC: American Psychological Association.
- Bowerman, M. 1987. Commentary: Mechanisms of language acquisition. In B. MacWhinney (ed.) *Mechanisms of language acquisition*. Hillsdale, NJ: Lawrence Erlbaum. 443-466.
- Braidi, S. M. 1988. Review of J. Liceras, *Linguistic theory and second language acquisition: The Spanish nonnative grammar of English speakers*. *Applied Psycholinguistics*. 9.428-433.
- Bransdorfer, R. 1992. Testing the role of communicative value in input processing. Paper presented at the annual meeting of the American Association for Applied Linguistics. Seattle, WA, March 1992.
- Brookes, L. R. and J. R. Vokey. 1991. Abstract analogies and abstracted grammars: Comments on Reber (1989) and Mathews, et al. (1989). *Journal of Experimental Psychology: General*. 120.316-323.
- Cadierno, T. 1992. Input processing in SLA: An experiment in explicit instruction. Paper presented at the annual meeting of the American Association for Applied Linguistics. Seattle, WA, March 1992.

- Chaudron, C. 1985. Intake: On models and methods for discovering learners' processing of input. *Studies in Second Language Acquisition*. 7.1-14.
- Chomsky, N. 1969. Linguistics and philosophy. In S. Hook (ed.) *Language and philosophy*. New York: New York University Press. 51-94.
- Dennett, D. C. 1991. *Consciousness explained*. Boston: Little, Brown and Company.
- \_\_\_\_\_ and M. Kinsbourne. 1992. Time and the observer: The where and when of consciousness in the brain. *Behavioral and Brain Sciences*. 15.183-247.
- Dienes, Z., D. Broadbent and D. Berry. 1991. Implicit and explicit knowledge bases in artificial grammar learning. *Journal of Experimental Psychology: Learning, Memory, and Cognition*. 17.875-887.
- Ellis, N. Forthcoming. *Implicit and explicit factors in second language learning: Interdisciplinary perspectives*. London: Academic Press.
- Ellis, R. 1990. *Instructed second language acquisition*. Oxford: Blackwell.
- \_\_\_\_\_ 1992. Consciousness-raising, second language acquisition and the structural syllabus. Paper presented at the 26th Annual TESOL Convention. Vancouver, BC, March 1992.
- Eubank, L. 1991a. Introduction. In L. Eubank (ed.) *Point counterpoint: Universal grammar in the second language*. Amsterdam: John Benjamins. 1-48.
- \_\_\_\_\_ (ed.) 1991b. *Point counterpoint: Universal grammar in the second language*. Amsterdam: John Benjamins.
- Fotos, S. 1992. Consciousness raising: Grammar task performance versus formal instruction. Paper presented at the 26th Annual TESOL Convention. Vancouver, BC, March 1992.
- Greenwald, A. G. 1992. New look 3: Unconscious cognition reclaimed. *American Psychologist*. 47.766-779.
- Hartman, M., D. S. Knopman and M. J. Nissen. 1989. Implicit learning of new verbal associations. *Journal of Experimental Psychology: Learning, Memory, and Cognition*. 15.1070-1082.
- Hayes, N. A. and D. E. Broadbent. 1988. Two modes of learning for interactive tasks. *Cognition*. 28.249-276.
- Hulstijn, J. 1992. Retention of inferred and given word meanings: Experiments in incidental vocabulary learning. In P. Arnaud and H. Béjoint (eds.) *Vocabulary and applied linguistics*. London: Macmillan. 113-125.
- Jackendoff, R. 1987. *Consciousness and the computational mind*. Cambridge, MA: MIT Press.
- James, C. and P. P. Garrett (eds.) 1991. *Language awareness in the classroom*. London: Longman.
- Joordens, S. and P. M. Merikle. 1992. False recognition and perception without awareness. *Memory and Cognition*. 20.151-159.
- Krashen, S. D. 1985. *The input hypothesis*. London: Longman.
- \_\_\_\_\_ 1989. We acquire vocabulary and spelling by reading: Additional evidence for the input hypothesis. *Modern Language Journal*. 73.440-464.

- Larsen-Freeman, D. and M. Long. 1991. *An introduction to second language acquisition research*. Essex, UK: Longman.
- Lewicki, P. and T. Hill. 1989. On the status of nonconscious processes in human cognition: Comment on Reber. *Journal of Experimental Psychology: General*. 118.239-241.
- Liceras, J. 1986. *Linguistic theory and second language acquisition: The Spanish nonnative grammar of English speakers*. Tübingen: Gunter Narr.
- Logan, G. D. 1988. Toward an instance theory of automatization. *Psychological Review*. 95.492-527.
- Long, M. H. 1991. Focus on form: A design feature in language teaching. In K. deBot, R. B. Ginsberg and C. Kramsch (eds.) *Foreign language research in cross-cultural perspective*. Amsterdam: Benjamins. 39-52.
- \_\_\_\_\_. Forthcoming a. The role of the linguistic environment in second language acquisition. In W. Ritchie and T. Bhatia (eds.) *Handbook of research on language acquisition. Volume 2: Second language acquisition*. New York: Academic Press.
- \_\_\_\_\_. Forthcoming b. *Task-based language teaching*. Oxford: Basil Blackwell.
- Loritz, D. L. 1991. Cerebral and cerebellar models of language learning. *Applied Linguistics*. 12.298-318.
- Loschky, L. and R. Bley-Vroman. 1990. Creating structure based communication tasks for second language development. *University of Hawaii Working Papers in ESL*. 9.161-212.
- Mangubhai, F. 1991. The processing behaviors of adult second language learners and their relationship to second language proficiency. *Applied Linguistics*. 12.268-298.
- Mathews, R. C., R. R. Buss, W. B. Stanley, W. B. Blanchard-Fields, J. R. Cho and B. Druhan. 1989. Role of implicit and explicit processes in learning from examples: A synergistic effect. *Journal of Experimental Psychology: Learning, Memory, and Cognition*. 15.1083-1100.
- McLaughlin, B. 1987. *Theories of second language learning*. London: Edward Arnold.
- \_\_\_\_\_. 1990a. Restructuring. *Applied Linguistics*. 11.113-128.
- \_\_\_\_\_. 1990b. "Conscious" versus "unconscious" learning. *TESOL Quarterly*. 24.617-634.
- Medin, D. L. and B. H. Ross. 1990. The specific character of abstract thought: Categorization, problem solving, and induction. In R. J. Sternberg (ed.) *Advances in the psychology of human intelligence*, Volume 5. Hillsdale, NJ: Lawrence Erlbaum. 189-224.
- Merikle, P. M. 1988. Subliminal auditory messages: An evaluation. *Psychology and Marketing*. 5.355-372.
- Moore, T. E. (ed.) 1988. *Subliminal influences in marketing*. [Special issue of *Psychology and Marketing*. 5.4.]
- Morgan, J. L., R. P. Meier and E. L. Newport. 1987. Structural packaging in the input to language learning: Contributions of prosodic and

- morphological marking of phrases to the acquisition of language.  
*Cognitive Psychology*. 19.498-550.
- O'Grady, W. 1991. Language acquisition and the "pro-drop" phenomenon: A response to Hilles. In L. Eubank (ed.) *Point counterpoint: Universal grammar in the second language*. Amsterdam: John Benjamins. 339-349.
- Perruchet, P. and M-A. Amorim. 1992. Conscious knowledge and changes in performance in sequence learning: Evidence against dissociation. *Journal of Experimental Psychology: Learning, Memory, and Cognition*. 18.785-800.
- \_\_\_\_\_ and C. Pacteau. 1990. Synthetic grammar learning: Implicit rule abstraction or explicit fragmentary knowledge. *Journal of Experimental Psychology: General*. 119.264-275.
- \_\_\_\_\_ 1991. Implicit acquisition of abstract knowledge about artificial grammar: Some methodological and conceptual issues. *Journal of Experimental Psychology: General*. 120.112-116.
- Pica, T. 1991. Do second language learners need negotiation? *Penn Working Papers in Educational Linguistics*. 7.1-35.
- \_\_\_\_\_ 1992. The textual outcomes of native speaker-non-native speaker negotiation: What do they reveal about second language learning? In C. Kramsch and S. McConnell-Ginet (eds.) *Text and context: Cross-disciplinary perspectives on language study*. Lexington, MA: D.C. Heath. 198-237.
- Pintrich, P. 1989. The dynamic interplay of student motivation and cognition in the college classroom. In M. Maehr and C. Ames (eds.) *Motivation enhancing environments*. Orlando: Academic Press. 117-160. [Advances in motivation and achievement, Volume 6.]
- Reber, A. 1989. Implicit learning and tacit knowledge. *Journal of Experimental Psychology: General*. 118.219-235.
- \_\_\_\_\_ 1992. The cognitive unconscious: An evolutionary perspective. *Consciousness and Cognition*, 1.93-133.
- Rutherford, W. 1987. *Second language grammar: Learning and teaching*. London: Longman.
- Schmidt, R. 1990. The role of consciousness in second language learning. *Applied Linguistics*. 11.129-158.
- \_\_\_\_\_ In press. Consciousness, learning, and interlanguage pragmatics. In G. Kasper and S. Blum-Kulka (eds.) *Interlanguage pragmatics*. Oxford: Oxford University Press.
- \_\_\_\_\_ and S. N. Frota. 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*. Rowley, MA: Newbury House. 237-326.
- Scovel, T. 1991. Attention, apperception, awareness, and acquisition. Paper given at the Thai TESOL Eleventh Annual Convention. Bangkok, January 1991.



- Searle, J. R. 1990. Consciousness, explanatory inversion, and cognitive science. *Behavioral and Brain Sciences*. 13.585-596.
- Servan-Schreiber, E. and J. R. Anderson. 1990. Learning artificial grammars with competitive chunking. *Journal of Experimental Psychology: Learning, Memory, and Cognition*. 16.592-608.
- Sharwood Smith, M. 1981. Consciousness raising and the second language learner. *Applied Linguistics*. 2.159-168.
- Skehan, P. 1992. Second language acquisition strategies and task-based learning. *Thames Valley University Working Papers in English Language Teaching*. 1.178-208.
- Slimani, A. 1987. The teaching-learning relationship: Learning opportunities and learning outcomes. Lancaster, UK: Lancaster University. Ph.D. diss.
- \_\_\_\_\_. 1992. Evaluation of classroom interaction. In J. C. Alderson and A. Beretta (eds.) *Evaluating second language education*. Cambridge: Cambridge University Press. 197-220.
- Sorace, A. 1991. Incomplete vs divergent representations of unaccusativity in non-native grammars of Italian. Paper presented at the Second Language Research Forum. Los Angeles, March 1991.
- Swain, M. 1991. French immersion and its offshoots: Getting two for one. In B. F. Freed (ed.) *Foreign language acquisition research and the classroom*. Lexington, MA: D.C. Heath. 91-103.
- Tarone, E. 1989. Accounting for style shifting in interlanguage. In S. Gass, C. Madden, D. Preston and L. Selinker (eds.) *Variation in second language acquisition. Psycholinguistic issues*. Clevedon, Avon: Multilingual Matters. 13-21.
- Terrell, T. D. 1991. The role of grammar instruction in a communicative approach. *Modern Language Journal*. 75.52-63.
- van Lier, L. 1991. Inside the classroom: Learning processes and teaching procedures. *Applied Language Learning*. 2.29-68.
- VanPatten, B. 1990. Attending to content and form in the input: An experiment in consciousness. *Studies in Second Language Acquisition*. 12.287-301.
- \_\_\_\_\_. 1992. Input processing and second language acquisition. Paper delivered at the annual conference of the American Association for Applied Linguistics. Seattle, WA, February 1992.
- Vokey, J. R. and L. R. Brooks. 1992. Salience of item knowledge in learning artificial grammars. *Journal of Experimental Psychology: Learning, Memory and Cognition*. 18.328-344.
- White, L. 1987. Against comprehensible input: The input hypothesis and the development of second language competence. *Applied Linguistics*. 8.95-110.
- \_\_\_\_\_. 1989. *Universal grammar and second language acquisition*. Amsterdam: John Benjamins.
- \_\_\_\_\_, N. Spada, P. M. Lightbown and L. Ranta. 1991. Input enhancement and L2 question formation. *Applied Linguistics*. 12.416-432.