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**CONSCIOUSNESS IN SECOND LANGUAGE
LEARNING**

AILA REVIEW

11

(1994)



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GUEST EDITORS' INTRODUCTION

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Theme

Questions concerning the role of consciousness in second language (L2) learning and learning in general are central to practical concerns in applied linguistics, including the appropriateness of grammar instruction techniques in language pedagogy ranging from attention focusing devices to decontextualized explanations of grammar, as well as to attempts to construct theories of second language acquisition (viz. the strong, weak and non-interface positions taken by various theorists). Questions concerning the role of conscious and unconscious processes in applied linguistics also connect to current discussions in experimental psychology, connectionist modeling, linguistics, and other disciplines of cognitive science, as well as philosophy. However, at the present time, formation of a coherent research program is hampered by terminological vagueness and confusion and lack of agreement on appropriate research paradigms.

Readership

Since questions concerning consciousness are central to practical as well as theoretical concerns, this issue of the AILA Review intends to raise the interest of three types of readers:

- (a) theorists, especially those working in the fields of linguistics and cognitive psychology;
- (b) empirical researchers investigating L2 learning in laboratory, classroom, or natural settings;
- (c) educationalists, especially those working in the field of foreign and second language pedagogy.

Processes of second and foreign language learning and teaching constitute a multifaceted and therefore multidisciplinary domain. Theorists, empirical researchers and educationalists must take notice of new developments in each others' work. The papers in this issue clearly show how each perspective alone does not provide a full account of second language learning: all authors give evidence of the need to combine insights from linguistics, cognitive psychology, and pedagogy and evaluate them against the results from empirical investigations based on data obtained in classroom as well as laboratory settings.

Procedure

Most of the papers in this issue (except those by van Lier and DeKeyser) originate from a symposium on consciousness in second language learning organized by Hulstijn and Schmidt in the framework of the 10th World Congress of the International Association of Applied Linguistics (AILA), held in August 1993 in Amsterdam. The purpose of the symposium as a whole (and this collection of papers) is to show the necessity of combining multiple perspectives on consciousness and explicit grammar teaching and showing to what extent new views can and should be put to the test, thus giving fresh input to a matter of great theoretical and practical importance.

We provided each of the contributors to the symposium and to this issue with the preliminary version of Schmidt's paper and asked them to address one or several of the seven questions to be mentioned below. Schmidt's paper aimed to serve as a terminological and theoretical framework for the remaining papers. We encouraged the contributors to comment on each others' preliminary papers and to include cross-references in the final versions of their texts. We believe that this procedure has led to a collection of papers offering a coherent conception of the

various aspects of consciousness in second language learning, not withstanding individual differences in focus and perspective.

The remainder of this introduction consists of a summary and discussion of the views raised by the contributors in response to our questions.

Question 1. Can the theoretical concepts relevant to understanding issues concerning the role of consciousness in L2 learning be standardized so that researchers in the field are speaking from a common understanding?

Following the advice of McLaughlin (1990) to avoid the ambiguous umbrella term "consciousness," Schmidt, in the opening paper proposes instead other terms to distinguish among the following four aspects of consciousness when discussing language learning processes: 1. Consciousness as intentionality. Here we are dealing with the distinction between intentional and incidental L2 learning. 2. Consciousness as attention. The basic claim here is that learning without some form of attention (or noticing or detection) is not possible. 3. Consciousness as awareness. The labels "explicit" and "implicit learning" are recommended to refer to learning on the basis of awareness at the point of learning (explicit learning) or without such awareness (implicit learning). In addition, it is emphasized that explicit and implicit learning (the process of learning) must be distinguished from explicit and implicit knowledge (products of learning) and explicit and implicit instruction (on the part of the teacher). 4. Consciousness as control. Although it could be argued that control and attention are the same from a theoretical perspective, it is useful to separate them to emphasize the contrast between input and output processing. Automatic, fluent output processing (speaking and writing) need not be and normally is not under full conscious control, though this is not by itself evidence for implicit learning (learning without awareness).

The other contributors to this issue all adopt Schmidt's fourfold distinction. DeKeyser adds that even after the adoption of Schmidt's distinctions, none of the dichotomies are perfectly clear-cut. DeKeyser points out, however, that these distinctions do help us avoid conflating different kinds of things, and they help us to avoid making overly simplistic and general claims for a single dissociation between only two kinds of cognitive mechanisms for L2 learning. Van Lier discusses additional uses of the term consciousness. He points out that the notion of consciousness should not be restricted to the intrapersonal, cognitive perspective but must be extended to an interpersonal, social perspective. This social perspective provides the framework within which experience can be organized, controlled, and evaluated. Consciousness and language are inextricably interconnected; the development of one goes hand in hand with the development of the other. This link with language is further illustrated with four features of "contingent interaction" in language classes, showing opportunities for increasing levels of symmetry in student-teacher interaction. This offers opportunities for awareness-raising work, necessary for students and teachers in taking charge of their educational activities, turning the classroom from a field of activity into a subject of inquiry and promoting deep and lasting changes in educational practices.

Question 2. How can these constructs be operationalized in laboratory-like settings, naturalistic settings, and classroom/pedagogical settings?

In their discussion of the operationalization of consciousness, most authors focus on attention or awareness. VanPatten takes a processing perspective on attention (attention as a processing resource) rather than a product orientation. He therefore advocates studying the effect of explicitly provided information on input processing rather than on output processing. In VanPatten's view, a question such as "Does explicit knowledge become implicit knowledge" is not the right question. A more useful focus is on the role of attention in turning input into intake, which requires that form and meaning in the input be connected. VanPatten proposes the following hypotheses: 1. Learners process meaning before form. 2. Before attending to non meaningful form, informational content must be processed without cost. (DeKeyser comments that, in principle, one could also argue that form must be processed before meaning can be processed.)

Harley reviews a number of classroom studies and points out that many of them did not specify

whether learning was intentional or incidental, what the focus of attention was, what the state of learner awareness was, or whether efforts were made to impose conscious control. Harley attempts a post-hoc analysis of these studies, using the definitions proposed by Schmidt, concluding that in general these studies show that some level of awareness is necessary for L2 learning even for young children learning a foreign language. For further research, Harley suggests that finer distinctions be made and that introspective methods be used to gain insight into the role of awareness at the point of learning.

DeKeyser also reviews a number of classroom studies, as well as some laboratory studies on the acquisition of artificial grammars, reaching the same conclusions as Harley. There is empirical evidence for the effectiveness of explicit learning. He points out that "no classroom studies have demonstrated a long-term effect of implicit learning in the sense of near-perfect rule-governed production." However, the problem with the operationalization of explicit learning through explicit teaching, as DeKeyser rightly observes, is that most studies do not use measurements that are sensitive enough to distinguish between explicit knowledge and implicit knowledge as the result of explicit learning. Hulstijn and DeGraaff point out in this respect that implicit knowledge is a theoretical construct, not directly assessable by means of language test; Fluent, automatic production, however, might be taken as the behavioral correlate of implicit knowledge.

Question 3. Is it useful to rethink the notions of "acquisition" and "learning" in terms of current psychological models?

None of the contributors to this issue adhere to a global definition of acquisition and learning as proposed by Krashen (1981, 1982), although VanPatten and Hulstijn and DeGraaff acknowledge that Krashen's distinction can be defended with pedagogical arguments. VanPatten points out an inconsistency in Krashen's definitions (Krashen, 1982: 1). Whereas acquisition is referred to as a process, learning is referred to as (conscious) knowledge. Furthermore, according to VanPatten, Krashen conflates the notions of context and purpose with those of process and product. All contributors appear to agree on Schmidt's proposal that the distinction between explicit and implicit learning offers a better conceptualization than the acquisition-learning distinction. The main reason is, as VanPatten, Ellis and Schmidt point out, that the explicit-implicit learning distinction does not conflate with associated notions (such as intentional-incidental learning, attention, explicit-implicit instruction, control, context and purpose), as the acquisition-learning distinction does.

Question 4. How relevant are connectionist models for understanding implicit learning?

Ellis advocates connectionist modeling for the investigation of L2 learning to the extent that L2 learning takes place implicitly. DeKeyser, following Rumelhart (1989), also states that implicit learning mechanisms, as implemented in connectionist models, are particularly efficient for the acquisition of probabilistic generalizations based on similarities to prototypes. Hulstijn and DeGraaff make a distinction between rule learning and item learning, referring to the role that connectionist models may play in explaining the latter type of learning (and perhaps even rule learning as well). We conclude that connectionist models are appropriate for modeling implicit learning but that the jury is still out concerning whether they are appropriate for modeling explicit learning or the interaction between explicit and implicit processes.

Question 5. What are the linguistic dimensions of the problem? What relationships exist between UG and conscious or unconscious learning? What relationships exist between conscious and the negative evidence issue?

All contributors appear to converge on the position that L2 learning can best be viewed from some kind of interface position. The research agenda for the near future then appears to dictate investigations into the question to what extent fluent, automatic use of L2 knowledge can be attained by implicit learning and to what extent by explicit learning and whether this may vary depending on which aspects of language are concerned. As Ellis points out, language learning is poorly defined because of its numerous facets. Some papers offer suggestions in this respect. Ellis, in his paper on vocabulary acquisition, offers evidence that formal (phonological, ortho-

graphic) features of vocabulary items can be acquired implicitly, because simple attention to the stimulus domain is sufficient for implicit induction of statistical regularities in the input, whereas meaning and the mediational aspects of vocabulary involve explicit learning processes. Schmidt, VanPatten, Harley, and Hulstijn and De Graaff all mention Schwartz's suggestion (1993) that grammar rules falling in the domain of UG can only be acquired implicitly (they "grow"), while most of the lexicon is explicitly learned. From this point of view, one might argue that providing learners with negative evidence in the form of feedback on errors may only be helpful for grammatical features that can be explicitly learned.

DeKeyser remarks that not all rules are created equal. He makes a distinction between categorical and probabilistic rules, hypothesizing that explicit learning is better than implicit learning for simple, categorical rules, whereas implicit learning is at least as good as explicit learning for prototype (probabilistic) rules. Hulstijn and De Graaff put forward hypotheses with respect to nine types of grammatical features, specifying the relative facilitating effect of explicit versus implicit learning. They also make an attempt to tackle the definition of easy versus hard rules without falling into the trap of circularity that arises if one defines easy and hard rules as early and late acquired rules and then claims that acquisition order is determined by rule complexity. Hulstijn and De Graaff try to define complexity solely in cognitive terms and further distinguish complexity from scope and reliability. Reliability is what DeKeyser calls probability and what elsewhere has sometimes been called clear versus fuzzy rules. Hulstijn and De Graaff argue that, other things being equal, explicit instruction has more effect in the case of complex rules than in the case of simple rules and that explicit instruction has more effect in the case of reliable, general regularities than in the case of unreliable, fuzzy ones. What appears to emerge here is a differentiated picture of L2 learning: it is neither a wholesale matter of implicit learning (as Krashen wants it) nor purely a matter of explicit learning. The task ahead is to find out for which grammatical aspects explicit learning can facilitate L2 acquisition. As Harley points out, it is also clear that linguistic criteria alone will not predict how useful metalinguistic information will be, since learner-based conditions on noticeability also apply.

Question 6. What research methods show the most promise for advancing our understanding of issues in this area?

Harley argues for a variety of methods, including quasi-experimental designs in classroom setting and the inclusion of self-reports in order to obtain insights concerning learning at the point of intake.

Some contributors raise objections against Reber-type studies in which subjects are shown letter strings derived from a finite state grammar, followed by assessment of the degree to which the rules underlying the strings are internalized. VanPatten argues that finite state grammars suffer from three critical deficiencies. They do not contain rules of movement or recursiveness, they do not include surface features such as agreement mapping, morphological forms, inflections or stress patterns, and they are devoid of referential and social meaning. Dismissing artificial language studies using letter strings derived from finite state grammars, however, does not mean that one should object to all artificial language learning studies. On the contrary, various authors view these studies as particularly suitable to address issues that can hardly be reliably investigated in cases of natural language learning. DeKeyser reports the results of a pilot study using Implexan, an artificial (created) linguistic system designed to include such features of natural languages as number, case and gender, with both categorical and probabilistic rules. Hulstijn and De Graaff mention several advantages of laboratory studies. The first is that the language can be brought under control of the researcher. This can be done by using a (partly) artificial language. Second, computers can be used to replace the teacher in order to control both input quantity and input quality, e.g. explicit versus implicit instruction of grammar rules. To obtain results that are both reliable and valid, they argue in favor of a twin approach, combining "artificial" with "natural" experiments.

The papers in this issue also illustrate some of the benefits that can be obtained when useful research paradigms are imported from other fields to the study of L2 acquisition. Artificial grammar learning studies, previously developed within experimental psychology, have now been adapted and used in several L2 learning studies. In addition to the standard L2 paradigm

of test - provide instructional treatment - retest, we also note the productive adaptation to L2 research by VanPatten of divided attention tasks, one of the two basic paradigms for psychological studies of attention (the other being the selective learning paradigm Ellis' use in L2 research of measures of repetition priming, an experimental research; has been the basis of most psychological studies of implicit memory.

Question 7. What are the consequences and implications of the growing recognition of consciousness in learning for L2 instruction?

One of the consequences of an increased appreciation of the role of consciousness in L2 learning for L2 instruction has already been mentioned: explicit instruction is more likely to facilitate L2 acquisition in the case of some features of language than in others. This is a moderate version of the interface position, according to which explicit knowledge can be instrumental in the acquisition of implicit knowledge. There also seems to be broad agreement among the contributors to this volume that the way in which instruction may work in L2 learning is through its role as a cognitive focusing device for learner attention, a position expressed here by VanPatten and Harley, and elsewhere by R. Ellis (1993). Explicit knowledge may also serve as what Terrell (1991) has called an "advance organizer" that aids the segmentation and comprehension of input, making more of the input available as intake. According to DeKeyser, it remains to be seen whether feedback on production errors, another form of explicit instruction, may also help learners notice certain formal features in the target language. Monitoring the products of the learner's own speaking and writing products from a formal perspective may feed back into the intake process and hence foster language acquisition, as has been suggested by Swain (1985). However, no agreement exists concerning the effects of monitoring production through error correction.

It should be emphasized that only modest implications for second and foreign language teaching can be drawn from the papers in this issue. As VanPatten points out, there is a when talking about the role of consciousness in second language learning that this will be interpreted as a reactionary call for a return to traditional language teaching methods, with decontextualized grammar explanations followed by intensive drill and an emphasis on error-free production. As Ellis points out in the conclusion to his review of vocabulary learning studies, language learning is a complex activity, and an effective learning environment must cater to all of its aspects. Naturalistic settings provide maximum opportunities for motivation, but explicit skills are necessary for deep elaborative processing of conceptual representations. Even if many controlled studies show an overall advantage for explicit over implicit instructional approaches (as shown by DeKeyser's review), Harley emphasizes that classroom based studies that speak directly to the relative merits of experimental instructional approaches and awareness-oriented approaches remain inconclusive. In addition, Van Lier reminds us of the dangers of taking an exclusively cognitive approach to the question of the role of consciousness in learning, as well as the limitations in taking a view of language that views L2 acquisition exclusively as grammar acquisition. It is probably not conclude that extreme exposure-only approaches to language learning are misguided in the light of research findings reported in this issue, but it would be misleading to claim that the research to date unambiguously supports any particular approach to syllabus design (e.g. grammar-based, notional-functional, task-based, learner-centered, experiential) or any specific language teaching method.

Concluding remarks

In organizing the Symposium and in collecting and editing subsequently the papers for this issue of the AILA Review, we set ourselves three main goals: - to bring some order to the terminology on issues of consciousness in second language learning; - to show that contributors with different backgrounds and working in different subdomains of second language learning can reach considerable consensus in the use of terminology and conceptual framework and use this conceptual framework to make the relevant extant literature more transparent; - to show how the various dimensions of consciousness can be used to lay out an agenda for future

research that is both theoretically and practically oriented.
We are confident that, thanks to the aid of the contributors to this issue, some progress in pursuit of these goals has been achieved.

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DECONSTRUCTING CONSCIOUSNESS IN SEARCH OF USEFUL DEFINITIONS FOR APPLIED LINGUISTICS

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Abstract

The "conscious" vs. "unconscious" controversy is a core issue in both second and foreign language pedagogy and applied linguistics theory, but at the present time there is no generally agreed upon set of constructs and terminology that unifies discussion. It is proposed in this paper that it is possible to standardize somewhat the theoretical concepts that are relevant to understanding the role of conscious and unconscious processes in language learning through reference to four rather different senses of consciousness that are common in everyday usage and surface in some way in technical terminology and as the theoretical issues in the study of learning: consciousness as intentionality (the intentional/incidental learning' contrast), consciousness as attention (focal attention and "noticing" vs. peripheral attention), consciousness as awareness (the contrasts between explicit/implicit learning and knowledge), and consciousness as control (controlled vs. automatic processing, automaticity, explicit/implicit memory). Avoiding the use of terms like conscious and unconscious as umbrella terms and specifying the precise contrasts (dichotomies or continua) at issue should help to unify discussion, enhance comparability across studies, and improve our understanding of what research results in the field may actually imply about learning. This approach does not solve the "problem" of consciousness simply by specifying clear constructs, since intentionality, attention, awareness and control all have a pronounced phenomenological feel to them. This may not necessarily be a problem, however, since there is reason to suspect (though not, of course, to assume) that consciousness as a subjective phenomenon and language learning may turn out in the end to be intimately connected.

1. Consciousness and applied linguistics theory and practice

The "conscious" versus "unconscious" controversy has always been a core issue in the field of second and foreign language pedagogy. Traditional methods such as grammar translation stress the importance of consciousness in learning. In the traditional view, the job of the teacher is to provide an analysis of the target language, as well as some of the differences between the target and native languages. The learner's task is to learn the rules provided and to practice their application by mapping meanings (often provided in the native language) onto the lexicon and structure of the target language. Conscious knowledge of morphological paradigms and syntactic rules is considered crucial, under the assumption is that such knowledge results eventually in the ability to use the language for communicative purposes (the strong interface position). Errors are considered symptomatic of ignorance, forgetting, lack of attention, or laziness. While defense of the traditional view has been rare in recent years, R. Ellis (1993) has recently recommended the use of grammatical consciousness-raising exercises (based on a structural curriculum) to foster explicit knowledge, to be used as a complement to a functional or task-based syllabus intended to promote implicit knowledge. Ellis' rationale for this combination is based on a weak interface position: explicit declarative knowledge cannot directly become implicit procedural knowledge, but can foster its development through "intake facilitation," causing learners to pay attention to formal features of the input and to notice the gap between these features and those of their interlanguage (Schmidt, 1990; Schmidt & Frota, 1986).

Other pedagogical approaches stress the role of unconscious processes in language learning almost exclusively. The "natural approach" of Krashen and Terrell (1983) is derived from Krashen's distinction between conscious learning and subconscious acquisition and the argument that there is no interface between the two. It follows that instruction should be based on motivated communicative interaction or other exposure to natural input and that rule explanation, drill, and error correction should be eschewed. "Communicative language teaching" (e.g. as promoted by the British Council around the world) is based primarily on educational principles rather than a fully articulated theory of learning, but also stresses the importance of learning through the practice of activities that approximate real communication as closely as possible, assuming that learners gain linguistic form by seeking situational meaning rather than by concentrating consciously on linguistic form.

Still other pedagogical methods embody a variety of intermediate positions. The audio-lingual method de-emphasizes the role of conscious learning by eliminating direct rule explanation (in principle if not always in practice), under the influence of the behaviorist dictum that awareness of stimulus-response contingencies is irrelevant to the establishment of the desired responses. However, audio-lingual methodology also derives from the belief that proficiency in a foreign language depends on the gradual internalization of structures that are produced with a great deal of conscious effort in the beginning stages, with spontaneous, unreflecting performance emerging as the end result of extensive drill. The "silent way" also avoids externally provided explanations of rules, while stressing the importance of internal awareness achieved when learners consciously engage with the target language.

Questions concerning the role of conscious and unconscious processes in second language learning are also central to theories of second language acquisition (viz. the strong, weak and non-interface positions taken by various theorists). Recent interest in these issues is evidenced by the proliferation of terms such as "focus on form" vs. "focus on forms" (Long, 1988), "consciousness raising" (Sharwood Smith, 1981; Rutherford, 1987), "input enhancement" (Sharwood Smith, 1991, 1993), "input processing" (VanPatten & Cadierno, 1993), "preliminary intake" and "final intake" (Chaudron, 1985), "uptake" (Allwright, 1984; Slimani, 1992), and "language awareness" (James and Garrett, 1991).

These pedagogical approaches and theoretical constructs in applied linguistics all draw upon notions of conscious and unconscious learning in some sense or another and also connect to current discussions of the role of conscious and unconscious processes in experimental psychology, connectionist modeling, linguistics, philosophy, and other disciplines of cognitive science. But no generally agreed upon sense of what is meant by labels such as "conscious" and "unconscious" or "subconscious" unifies the discussion. These terms are highly ambiguous in everyday language, and conflicts about the role of consciousness and learning in more theoretical discussions often reflect this vagueness and ambiguity, conflating distinct senses of "consciousness," sometimes asking questions involving one of them and answering with evidence appropriate to another (Pinker, 1992). It is tempting to recommend, therefore, that the entire issue of conscious vs. unconscious learning be sidestepped, seeking models and explanations couched in other terms. McLaughlin (1990a) suggests that "conscious" and "unconscious" are pre-scientific terms with too much surplus meaning to be useful and should be abandoned in favor of clearly defined empirical concepts that do not refer to subjective experience. Sharwood Smith, who earlier advocated a pedagogy of "consciousness raising" (1981), now prefers to talk instead of "input-salience-creation" or "input enhancement" (Sharwood Smith, 1991, 1993), safer terms that avoid the "vexed question" of what consciousness is.

Besides the problem of ambiguity, the recommendation to abandon discussion of the role of consciousness in language learning may also reflect broader philosophical beliefs, two of which are widely subscribed to. First, subjective experience is irreducibly a first person phenomenon, whereas progress in science always depends upon taking a third person perspective. As Dennett (1991) has put it, such facts as there may be about internal mental events can never be verified by objective methods and are not the data of science. This was of course the behaviorist view, but it is subscribed to by many who are not behaviorists. Second, although as individuals we may believe that our conscious intentions, thoughts, beliefs, and

attempts at problem solving are causal and determine our actions, the universe is entirely material and humans are no different in essence from other information processing machines. The computer is the dominant metaphor. In this view, subjective consciousness may be one output from the computational machine (no one has been able to specify how this comes about, though see Gazzaniga (1993) and O'Keefe (1985) for some interesting speculations), but consciousness itself is epiphenomenal. It does not cause anything else to happen. This view, often expressed as a rejection of Cartesian dualism, is widespread in philosophy, psychology, and artificial intelligence, and is articulately expressed in the psycholinguistic speculations of Jackendoff (1987).

2. The hall of mirrors problem

Reductionist and eliminativist approaches to the problem of consciousness in learning may work in the end, but only if it is possible to avoid what Harnad (1990, 1991) calls the fallacy of the "hermeneutic hall of mirrors," offering what appears to be a purely functional account but letting the phenomenological flavor slip in by the back door, without admitting or even realizing it. At the very least, the attempt to replace folk-psychological notions of consciousness with scientific, non-subjective terms requires, first, that the new terms are not simply synonyms for consciousness or derived from unanalyzed conceptions of what consciousness is (thus importing the ambiguities of "conscious" and "unconscious" into the new terminology) and, second, that there are agreed upon conceptions of what the new terms mean. At the present time, neither condition has been met in applied linguistics.

Consider first the possibility that alternative terms may be merely synonyms for consciousness, new ways of referring to aspects of subjective experience that have been ostensibly ruled out of consideration. For reasons of space, two examples will have to suffice: the distinction between controlled and automatic processing and the distinction between explicit and implicit knowledge.

Controlled and automatic processing, best known to the field of applied linguistics through the work of Shiffrin and Schneider (1977) in psychology and that of McLaughlin, Rossman, and MacLeod (1983) in applied linguistics, was first defined by Posner and Snyder (1975) as a contrast between processes that are under current conscious control and automatic activation processes that are the result of past learning. Shiffrin and Schneider (as well as McLaughlin et al.) explicitly deny any connection between the constructs of controlled and automatic processing and the conscious/unconscious distinction, but it is not clear that this divorce can be finalized. In attempting to provide an operational definition of the controlled/automatic distinction, Norman and Shallice (1986) point out that "automatic" is ambiguous and may refer to tasks executed without awareness, actions initiated without intent, the way in which attention may be drawn automatically to something, or tasks performed without interfering with other tasks. Three of these criteria refer to subjective experience. Only the last of them makes no reference to factors associated with ordinary notions of consciousness, and Schneider, Dumais, and Shiffrin (1984) point out that neither this criterion nor any other single criterion provides a necessary and sufficient basis for distinguishing the two types of processing.

With respect to the explicit/implicit distinction, Odlin (1986) recommends separating these concepts from the slippery notion of consciousness, but Bialystok (1981a), Sharwood Smith (1981), R. Ellis (1993), and Paradis (in press) all define explicit knowledge as conscious awareness of the formal properties of the target language, verbalizable on demand, contrasted with implicit knowledge, which is intuitive and cannot be introspected or reported. In applied linguistics, only Bialystok (1990, 1993, in press) really succeeds in separating these concepts from definitions based on consciousness, by relabeling the implicit/explicit contrast as a developmental continuum of language analysis and by making it clear that the central issue concerns the ways in which linguistic representations change in the course of development. The ability to articulate structural principles of organization may be one behavioral outcome of the highest level of analysis, but the extent to which representations

are analyzed –not their accessibility to consciousness– defines the continuum. In separating the notion of explicitness from that of consciousness, Bialystok's views are consistent with those of Chomsky (1980), Karmiloff-Smith (1986), and Clark (1991), all of whom emphasize the importance for native language acquisition of mental representations that are fully explicit but completely unconscious.

If we ask whether the terms that commonly replace discussions of consciousness in applied linguistics discourse are consistently defined in either theory or research methodology, the answer is also that they are not at the present time. Consider the concept of implicit learning. In psychology the basic contrast between explicit and implicit learning is usually seen as a contrast between learning on the basis of awareness (explicit learning) as opposed to implicit learning, learning without awareness (Schmidt, 1990). However, Hulstijn (1989) has; described implicit learning in terms of the context and mode of learning (e.g., picking up a second language in naturalistic situations without following a language course or consulting dictionaries) and has operationalized implicit learning experimentally as a treatment in which target structures are not explicitly explained by the experimenter during their presentation, equating explicit learning more with instruction than with learning per se. This is very different from the operationalization of the concepts of explicit and implicit learning by Reber (1989), who has carried out many experiments on the learning of miniature artificial grammars. In these experiments, a so-called explicit learning condition has meant neither that the underlying rules of the system are explained to subjects nor that they become aware of them during the course of learning, but rather that they are instructed to try to discover the underlying rules, in contrast to an implicit condition, in which learners are told to memorize examples. Since the subjects in such experiments almost never succeed in discovering the rules of the underlying grammar, Reber's definition of explicit learning does not entail having any conscious knowledge of the rules at all, whereas Hulstijn's operational definition does entail this. To the extent that the meanings of related concepts and labels are established partly by their contrasts with each other, it is also clear that such meanings are not consistent from writer to writer. Using a modification of Bialystok's distinction between the developmental dimensions of analysis (knowledge) and control (access to that knowledge), R. Ellis (1993) argues that explicit knowledge and declarative knowledge (which includes encyclopedic knowledge about the world plus episodic memory of one's past experiences) are not the same, nor are implicit knowledge and procedural knowledge (knowledge of how to do things) the same thing. In contrast, Paradis (in press) makes a primary distinction between explicit and implicit memory (assumed to be supported by two distinct neurofunctional systems), but uses terms such as explicit knowledge, metalinguistic knowledge, explicit memory, and declarative memory more or less interchangeably. These are viewed in contrast with another set of terms (implicit knowledge, implicit learning, implicit memory, procedural memory, implicit automatic processes), which are also used quite interchangeably, suggesting either that no important distinctions are to be made between knowledge and memory, explicit and declarative, or implicit and procedural, or at least that the different senses implied by the diversity of terms are inextricably linked.

My purpose so far has been only to show that problems of ambiguity and vagueness do not disappear when notorious slippery notions like conscious and consciousness are replaced with new notions, and that formation of a coherent research program continues to be hampered by terminological confusion. The definition of key constructs is important, because arguments concerning the role of consciousness in language learning may seem more plausible or even obvious depending on how these concepts are defined. For example, if one conceives of explicit knowledge as knowledge that is accessible to consciousness and can be articulated and implicit knowledge as knowledge that is not accessible to consciousness, then the answer to the question of whether learning can ever "become" acquisition may seem obvious. How could knowledge that is accessible to consciousness become inaccessible, unless forgetting is involved? (M. Long, personal communication) On the other hand, if one is concerned more with learning than knowledge and views explicit learning as learning triggered by awareness, then it much more plausible that the end stage of learning, automatic performance that does

not require the on-line mediation of explicit knowledge, may have been built upon a foundation of awareness-assisted processing in earlier stages of development.

3. Standardization of theoretical constructs

It is certainly possible to standardize somewhat the theoretical concepts that are relevant to understanding the role of conscious and unconscious processes in second and foreign language learning, so that researchers in the field speak from a common understanding. I propose that progress can be made if we follow the advice of McLaughlin to avoid using the terms "conscious" and "unconscious" as undifferentiated umbrella terms, specifying precisely the contrasts at issue. It is also important to be alert to the ways in which folk-psychological notions of consciousness continue to be reflected in these terms. An ideal set of terms would make multiple connections: to the subjective experience of language learners; to well established terminology in psychology, linguistics, philosophy, and other disciplines; to current concerns in second language acquisition theory; and to pedagogical theory and practice.

If we begin by considering what we ordinarily mean by the terms "conscious" and "unconscious" in everyday language, it is clear that there are several senses of consciousness that are only peripherally relevant to applied linguistics. One is the notion of state-consciousness (Lycan, 1987), the distinction between being awake, alert, and having mental states such as experiencing pains, perceiving the environment, and so on, as opposed to being unconscious as a result of a blow to the skull (there are intermediate states, such as fugue, dreaming, and hypnotic trances, as well as pathological conditions such as blind-sight that complicate the dichotomy). Other contrasts (dichotomies or continua) referred to by the terms "conscious" and "unconscious" are more applicable to language learning theory and practice, and four basic senses of consciousness are especially relevant: consciousness as intentionality, consciousness as a subjective state arising from the allocation of attention, consciousness as awareness, and consciousness as control. Each of these senses of consciousness is common in everyday use of the term; each also surfaces in some way in technical terminology and as a theoretical issue in the study of learning.

3.1. Consciousness as intentionality

Consciousness is commonly associated in common usage with aims, plans, desires, and deliberateness. One might apologize for an unintended offense by saying that it was done unconsciously, meaning without intent. In philosophical usage, the concept of intentionality is broader, referring not only to desires, but also to beliefs and other propositional attitudes. Philosophically, intentionality is related to the notion of creature-consciousness, the idea that people (and probably some higher animals) are capable of having desires, aims, beliefs, and so on, while stones, planets, and computers are not. Among philosophers, Searle (1983, 1990) has argued most vigorously for the essential connection between propositional attitudes and consciousness (and against the concept of in-principle inaccessible intentionality). Harder and Togeby (1993) have recently claimed that all computer simulations, including both classical serial architecture and more recent connectionist approaches, are inadequate with respect to understanding linguistic pragmatics, because understanding intentions is crucial to understanding pragmatics and machines do not have intentions. Dennett (1987) argues the opposite point of view, that the intentionality of consciousness is a myth and that there is no reason in principle why computers cannot be conscious.

In psychology and in applied linguistics, intentionality is treated in a much more narrow way, closer to ordinary usage. Bialystok (1981b) restricted the definition of the conscious strategy of "practice" to deliberate attempts by a learner to increase exposure to the language out of class, excluding practice in the classroom, over which the learner does not have voluntary control. Hatch (1983) argues that learners intend to learn to only to converse and interact and learn grammar in the process. Krashen also sees intentionality as an important part of the

contrast between voluntary learning and involuntary or unintended acquisition. Krashen and Terrell (1983) refer to the "great paradox of language teaching," the fact that language is best learned when it is being used to transmit messages, not when we are deliberately trying to learn it. Chomsky (1975) has pointed out that first language learners have no "reason" at all for acquiring language; we cannot choose to learn and cannot fail to learn under normal conditions.

In psychology, the contrast between intentional learning and nonintentional or incidental learning has been widely researched. There is no doubt that incidental learning does occur and is commonplace. It seems clear that incidental learning of languages is also commonplace, as when immigrants whose primary motivation is to communicate (not to master the grammar) succeed in internalizing many of the rules and structures of the target language. Krashen (1989) has reviewed the evidence supporting incidental approaches to the teaching of spelling and vocabulary, arguing that extensive reading is as effective as focused study, although intentional subjects generally do somewhat better than incidental subjects in controlled studies. Hulstijn (1992) conducted experimental studies of the incidental learning of second language vocabulary occurring in reading passages, finding clear evidence for incidental learning.

One key issue is whether or not the knowledge gained through incidental learning is represented mentally in a different fashion from knowledge gained through intentional approaches to learning. Evidence from psychological experiments generally suggests that it is not (McLaughlin, 1990a). Dienes, Broadbent, and Berry (1991) found no evidence for either distinct learning modes or different knowledge types in artificial grammar learning based on incidental vs. intentional instructions. However, various theorists in applied linguistics have argued that intentional and incidental learning do result in different knowledge types. Following Lamendella (1977), who proposed that meaning oriented acquisition involves subcortical structures, in particular those parts of the limbic system responsible for drives, desires and motivation, Paradis (in press) argues that incidental acquisition of grammar leads to an implicit competence that is used automatically, while deliberate learning leads only to explicit knowledge that is not available for automatic use.

Paradis' arguments (similar to those of Krashen) suggest that there may be a link between incidental learning and other senses in which learning can be said to be unconscious. However, the contrast between intentional and incidental learning remains conceptually distinct from other senses of conscious/unconscious learning, so it is necessary to be clear when this is the dimension being referred to.

Recommendation 1: It is recommended that "incidental learning" replace the use of the umbrella term "unconscious learning" when reporting learning without the intent to learn or the learning of one thing (e.g. grammar) when the learner's primary objective is to do something else (e.g. communicate). It is important not to assume without independent evidence that either the process or the product of such learning is unconscious in any other sense, e.g., that such learning is unaccompanied by attention or awareness or that the knowledge gained cannot be expressed.

3.2. Consciousness as attention

Consciousness is also commonly used in everyday situations to refer to subjective awareness of the objects of focal attention; this comes close to the concept of the flow of consciousness. At any particular time, there are many different environmental stimuli that impinge upon our senses, but we are only conscious of a few of these stimuli (perhaps only one at a time), as the focus on consciousness shifts from one object to another. Psychological theories suggest that consciousness is the product of an attention mechanism (Baars, 1988; Norman & Shallice, 1986; Posner & Rothbart, 1991). This mechanism is partly under voluntary control –we can force ourselves to attend to one stimulus rather than another for at least a short time– so there is a link between this sense of consciousness and the sense of consciousness as intention, but

attention is not completely under voluntary control (Van der Heijden, 1992). We become attend to and become aware of ("notice") many stimuli without intending to.

It is sometimes argued in applied linguistics that incidental learning, clearly possible, entails or equals unattended learning, which must therefore also be possible. Paradis (in press) speaks of the incidental acquisition of that on which attention is not focused (i.e. grammar). This is a somewhat misleading equation. The incidental learning of linguistic form could take place under any of the following conditions:

- (a) when the primary task requires that attention be allocated to language form, for example, when syntactic form must be processed to derive message meaning;
- (b) when the primary task does not deplete attentional resources and something about the relevant structure attracts a learner's attention, for example when one notices the odd spelling of a new vocabulary word; or
- (c) when the primary task does deplete all attentional resources, but unattended form enters long-term memory nevertheless.

Although unattended stimuli may have subtle but undeniable effects on humans (as in subliminal perception experiments), it is widely argued in psychology that learning without attention to what is to be learned (as hypothesized for condition e above) is impossible (Boakes, 1989; Kihlstrom, 1984; Nissen & Bullemer, 1987), or –in applied linguistics terms– that attention is necessary for the conversion of input to intake (Schmidt, 1990, 1993a, 1993b, in press; Scovel, 1991).

There have been some recent objections to this claim. Curran and Keele (1993) have reported a series of experiments supporting a nonattentive mode of learning sequential patterns through simple associative mechanisms. However, Curran and Keele do not argue that such nonattentive learning is especially powerful (previous experiments by Nissen and Bullemer, 1987, showed that similar but not quite identical patterns could not be learned without attention) and point out that

"when we refer to one form of learning as nonattentive, we do not wish to imply that no attention whatsoever is used on the primary task. Undoubtedly, subjects must in some sense attend to a visual stimulus in order to make a response. ... It is likely that the effect of the secondary task is to degrade attention to the relation between successive events, but whether attention is completely blocked is not crucial." (Curran & Keele, 1993, p. 190)

In other words, sequence learning in these experiments may represent condition (b) as indicated above, rather than condition (c).

Tomlin and Villa (1993) propose the limited resource metaphor of attention that is most familiar to applied linguists is inadequate for understanding the role of attention in language learning and that three components of attention must be recognized: alertness (related to the intention to learn), an overall, general readiness to deal with incoming stimuli; orientation, the specific aligning of attention on a stimulus, i.e. actually attending to a stimulus; and detection, the process which selects or engages a particular specific bit of information. In the model proposed by Tomlin and Villa, detection is necessary before other cognitive processing (storage in memory, hypothesis formation, etc.) can occur. This concept of detection is close (perhaps identical) to what has more traditionally been called focal attention. A key question is whether or not detection or focal attention necessarily entails conscious registration of the contents of focal attention, for example, not only hearing a grammatical marker, but "noticing" it, and whether such noticing is necessary for learning. Velmans (1991) argues that consciousness in this sense is epiphenomenal. Consciousness appears to be necessary in a variety of tasks because they require focal-attentive processing and if consciousness is absent, focal attention is absent. Tomlin and Villa argue that detection does not entail conscious registration of what is detected. Schmidt (1990, 1993a, 1993b) has argued that noticing is the necessary and sufficient condition for the conversion of input to intake for learning, on the grounds that all demonstrations of detection without conscious registration (blind-sight, subliminal perception) demonstrate only the processing of what is already known, not learning. However, given the fact that it may be impossible to agree upon an operational definition of noticing that will allow falsifiability of this hypothesis, it may be wiser to

replace zero-point claims (no learning without noticing) with a modified hypothesis that more noticing leads to more learning (Baars, 1988).

Recommendation 2: It is recommended that the term "learning without attention" be reserved for learning that can be shown to have taken place without any allocation of attention, voluntary or involuntary. "Peripheral attention" (in contrast to focal attention) and "unselective learning" (in contrast with "selective learning," Berry & Broadbent, 1984), and "learning under distraction" are all useful terms for referring to learning in which the primary focus of attention is elsewhere.

3.3. Consciousness as awareness

A third sense of consciousness, perhaps the most common in ordinary use as well as in psychological and philosophical discussion, is awareness. My desk dictionary defines the first sense of "conscious" as "having an awareness of one's own existence and environment," and defines "aware" as "conscious" or "cognizant."

One problem with this view of consciousness is that one needs to recognize different levels or types of awareness (Battista, 1978; Bowers, 1984; O'Keefe, 1985). For example, we are aware of at some level of all those environmental stimuli to which we attend, so some primary awareness is implied by the preceding discussion concerning the role of attention and noticing in learning. However, the issue of learning without awareness in both psychology and applied linguistics almost always refers to awareness at a higher level, such as awareness of a rule or generalization. In more philosophical discussions also, various commentators distinguish between a lower level consciousness, an "awareness of a string of immediate events that need not and probably does not spill over into the generalized, looking-before-and-after kind of consciousness with which we humans are so familiar" (Bickerton, in press), a type of consciousness probably shared with many organisms (Edelman, 1989), and a higher level of consciousness that includes the ability to know about one's self (self-consciousness) as well as to reason about the contents of primary consciousness, which may (or may not) be a uniquely human attribute (Bickerton, in press; Edelman, 1989; Pinker, 1992).

Within the behaviorist paradigm, the argument about learning without awareness was couched in terms of whether experimental subjects learned to make conditioned responses without any awareness of the relationship between response and reinforcer (in operant conditioning) or whether a stimulus can acquire some influence through association with some other important event even if the subject is never aware of the relationship between the two (in classical conditioning). Although several thorough reviews have concluded that there is no convincing evidence for conditioning without awareness in human subjects (Boakes, 1989; Brewer, 1974; Dawson & Schell, 1987), it is remarkable that this research has had little impact on common beliefs about conditioning. Boakes (1989) reports that many introductory textbooks to psychology continue to confidently assert that conditioning commonly occurs when subjects are not aware of what the experimenter is doing.

Within the cognitive paradigm, the work of Reber (1989, 1992) has been particularly influential. Reber's view is that learning the underlying rules of artificial grammars takes place without awareness and is accomplished without the aid of processes such as the formation and testing of conscious hypotheses (presumed blocked by instructions to simply memorize examples). Instead, an unconscious process of induction results in intuitive knowledge that exceeds what can be expressed by learners. This view is very close to what is commonly asserted in applied linguistics; second language learning is commonly believed to involve induction without awareness, and learners "know" more than they can express. White (1991) has reported the effects of instruction on the learning of adverb placement restrictions in English by native speakers of French, concluding (among other findings) that many students acquired unconscious knowledge of a difference between manner and frequency adverbs, a point not covered in instruction. Green and Hecht (1992) provide evidence that there is a dissociation between conscious rule knowledge and the ability to make grammaticality judgments even with respect to pedagogical rules that are not very abstract when

compared to theoretically grounded analyses and even under a liberal view of what constitutes a correct rule. Green and Hecht also found that some pedagogical rules were relatively easy to learn and apply, including those that referred to easily recognized categories and could be applied mechanically. Rules that were more difficult to learn but for which some intuitive knowledge could be demonstrated involved aspect or other subtle semantic distinctions and rules not governed by the immediate linguistic context. Paradis (in press) cites the case of the subjunctive in French as a paradigm case of implicit learning. A native speaking teacher of French untrained in linguistics, when asked why the subjunctive is used in a particular sentence, will probably reply that she hasn't the slightest idea, that it sounds right but that no reason or rule can be introspected.

One issue related to the role of awareness in learning that is less commonly investigated in psychology but that is particularly important to applied linguists concerns what Klein (1986) has called the matching problem and what others have called the process of "noticing the gap" (R. Ellis, 1993; Krashen, 1983; Schmidt & Frota, 1986). Klein argues that learners must try to compare their own output with that of others, and as soon as a learner is no longer able to detect any discrepancy between the two, learning is at an end. Klein argues that in order to solve the matching problem, learners must somehow step outside of themselves to attain a perspective on their own language performance. Awareness in this case also involves the question of negative evidence, particularly contentious in the field. Schmidt and Frota (1986) advanced the claim that for error correction to have any effect, learners must at least realize that they are being corrected, a condition often not met in natural interaction. Sharwood Smith (1991) argues that negative evidence that is noticed may destabilize the current grammar, but the detection of an anomaly does not lead automatically to a realignment of the internal grammar. White (1991) has reported evidence showing an effect for instruction, including a role for error correction, but this interpretation has been criticized by Schwartz and Gubala-Ryzak (1992), primarily on the basis of learnability theory, specifically, the doctrine that UG cannot make use of negative evidence. White (1992) agreed with this criticism to the extent that negative evidence in the original study probably did not engage GG at all, but did bring about other changes in learner performance. Tomasello and Herron (1989) have reported the results of several studies showing the effectiveness of a particular type of error correction technique and have advanced arguments for a cognitive comparison model of SLA, in which the most important language learning experiences are those in which it is possible for learners to compare and note discrepancies between their own language structures and those of native speakers. Beck and Eubank (1991) have criticized the study partly on methodological grounds and partly on the grounds of learnability arguments, to which Tomasello and Herron (1991) have responded that learnability arguments are restricted to GG-related aspects of language, which were not investigated in their study, and that –regardless of any logical arguments to the effect that negative evidence can not lead to learning- the subjects in their study who received negative feedback did learn.

Schwartz (1986, 1993) has claimed that Fodor's (1983) concept of modular, domain-specific input systems that are encapsulated (unaffected by conscious knowledge) supports Krashen's non-interface position (conscious learning and subconscious learning are unrelated: and that both the grammar of a language and the uses of language are acquired unconsciously. On the other hand, those few studies that have actually tried to investigate implicit learning of languages based on careful assessment of what learners are and are not aware of during the process of learning (Alanen, 1992; N. Ellis, 1993; Schmidt & Frota, 1986) have found little clear evidence for any implicit learning. Many claims about the unconscious learning of languages are open to challenge, either because the resulting knowledge is not as abstract as is assumed (assuming the psychological reality of theoretical accounts of competence when this has not been demonstrated) or because learners have more awareness than they are given credit for. However, it must be conceded that studies showing an advantage for explicit learning generally have not found a lasting effect for such learning. Controversy continues whether the effects of awareness on learning, especially awareness conveyed through formal instruction, are peripheral and fragile (Krashen, 1993) or more robust and long lasting (Lightbown & Pienemann, 1993).

Recommendation 3: "Explicit learning" and "implicit learning" are widely used in psychology to distinguish between learning on the basis of awareness at the point of learning and learning without such awareness and these terms can be usefully applied to discussions in applied linguistics. This requires that on-line learner awareness in the process of learning be assessed before claims of implicit learning are advanced.

Recommendation 4: Implicit and explicit learning and implicit and explicit knowledge are related but distinct concepts that need to be separated. The first set refers to the processes of learning, the second to the end-products of learning (or sometimes to knowledge that is innate and not learned at all).

Recommendation 5: Explicit learning also needs to be distinguished from explicit instruction, e.g. telling subjects the roles in experimental studies or teaching them about a language in classroom settings. One hopes that there is a relationship between what is taught and what is learned, but it is possible for learners to form conscious hypotheses about the target language without being told the roles or forming hypotheses that are different from the teacher's version of a role, as well as for learners to be taught a rule but not to understand it or be able to make any use of it in the process of learning.

Recommendation 6: Instructed learning needs to be further differentiated in order to distinguish between simple input enhancement techniques that make input more salient and more likely to be attended and explanation, the provision of explicit roles, paradigms, and the like.

3.4. Consciousness as control

A fourth sense of consciousness that plays a role in discussion in applied linguistics is that of control. In everyday language, we are also more likely to say that we did something consciously when we have been effortfully involved in its execution. As White (1980) points out, when we suffer from "highway hypnosis," suddenly "coming to" after several minutes of apparently distracted driving, we commonly say that the spell of driving was done unconsciously because we cannot remember any details of the route traversed, nor can we remember any of our actions. Reason (1984) has described slips of action, errors that seem to happen either because attention is not switched back to a task at some critical decision point or because attention is directed to a routine activity when it would be better to leave the guidance of action on automatic pilot.

Learning a second language is in some respects like learning to drive a car; it has a skill aspect as well as a knowledge aspect. In the early stages, learners are often aware of using mental translation, trying to remember paradigms they have been taught in class, and painfully groping for words and structures to express their intentions. As learning progresses, there is a gradual shift to a stage in which more and more attention is devoted to what one wants to say, with the process of grammaticization becoming more and more automatic. Another aspect of control in language use is evident in code-switching. There are cases in which bilingual speakers control their choice of language (for example, switching to a different language when realizing that a party to a conversation does not understand the current language), but there are other times when learners have no conscious reason for speaking one language rather than another, do not control their switches, and are not even aware of which language they are speaking. This example illustrates that there is a certain amount of overlap between consciousness as control and consciousness as both attention and awareness. It could be argued that control and attention are the same from a theoretical perspective, and I choose to separate them here only to emphasize output processing, especially the question of fluency, rather than input processing as emphasized in the discussion of attention above.

In psychology, skill development is often discussed in terms of procedural knowledge, knowledge of how to do things, as opposed to declarative knowledge, knowledge of facts. One general characteristic of procedural knowledge is that it is seldom open to introspection. Another relevant contrast is that between implicit and explicit memory (Schachter, 1987), which also concerns performance factors rather than competence. Implicit memory refers to the influence on performance of consciously remembered prior experience; implicit memory refers to changes in behavior attributable to some event without conscious recollection of that event. As Reber (1989) has pointed out, demonstrations of the existence of implicit memory does not solve the problem of how such memory systems are established in the first place. The problem of voluntary control in language learning is also separable from the issues of both implicit learning and implicit knowledge. As Bialystok (1993) puts it, the development of knowledge (linguistic competence) is orthogonal to the development of access to that knowledge, even though, developmentally, progress along the two dimensions may happen in parallel. The problem of control in second language learning is essentially the problem of accounting for fluency. In psychology, relevant theories typically come under the rubric of automaticity (Schmidt, 1992).

There are many competing theories proposed to account for the development of automaticity, including the Shiffrin and Schneider (1977) theory of the development from controlled to automatic processing, Anderson's account of the mechanisms responsible for the transition from declarative to procedural knowledge (Anderson, 1983, 1989), the notion of restructuring (Cheng, 1985; McLaughlin, 1990b), recent proposals for the redefinition of automatic as retrieval from memory, in both instance (Logan, 1988) and strength (Schneider & Detweiler, 1988) versions, and chunking theories (Newell, 1990; Newell & Rosenbloom, 1981; Servan-Schreiber & Anderson, 1990). Many of these theories, but not all, posit that spontaneous performance derives from an earlier stage of consciously guided performance.

Recommendation 7: Spontaneous, fluent language performance is unconscious only in the sense that it is accomplished without the conscious retrieval of explicit knowledge that may have been used as an aid to production in earlier, novice stages of development. Automatic use is related to both the familiar notion of procedural knowledge and the psychological construct of "implicit memory" (Schachter, 1987; Ellis, this volume) but is not by itself evidence for implicit learning.

4. Conclusions

If researchers in applied linguistics can keep the distinctions suggested here in mind, the result should be increased clarity in the reporting of research results, as well as enhanced comparability across studies. It is important not to report a study as one of implicit learning, for example, if the learning task or treatment condition actually falls more precisely within the incidental/intentional contrast. Explicit learning should not be assumed simply because explicit instruction has been provided. Claims concerning implicit knowledge (or unconscious explicit knowledge) do not necessarily entail a claim of implicit learning, especially if innate knowledge is seen to be the source of such knowledge (for example, non-parameterized universals within the UG framework). Automatic procedural skill is, by itself, not evidence for either incidental or implicit learning.

The recommendations made here do not solve the hall of mirrors problem. For pragmatic reasons, researchers may choose to work with well defined instructional treatments that are relatively easy to control, such as attention-focusing tasks. However, learning takes place only within the learner, and we would be deceiving ourselves if we thought that talk about attentional systems, for example, solves the problem of subjectivity and eliminates the mind/body problem. Subjectively, there is something that it is like to have intentions, to pay attention, to notice, to become aware of a regularity of language, and to understand instruction (Hardcastle, 1993; Nagel, 1974, 1993). However, in spite of our positivistic inclinations, there is nothing to prevent applied linguistics researchers from taking a third-

person perspective on such first-person events. Psychologists do this all the time, when asking subjects what they think they have learned in an experiment or simply asking them to report what they remember from a stimulus list. The problem in applied linguistics has not been over reliance on first-person reports and data, but an almost total neglect of them. Finally, there is no reason to adopt, a priori, the epiphenomenalist stance. Assuming that consciousness is a late evolutionary development, it may be reasonable to assume that the primary processes of learning are those of the cognitive unconscious (Reber, 1992, 1993), but it is equally reasonable to wonder what functions are served by this evolutionary development. One answer that has been proposed is that consciousness is essential for learning (Baars, 1988; Block, 1991). Since language is also a late evolutionary development, there is reason enough to suspect (though not, of course, to assume) that consciousness and language learning may be intimately connected.

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EVALUATING THE ROLE OF CONSCIOUSNESS IN SECOND LANGUAGE ACQUISITION: TERMS, LINGUISTIC FEATURES & RESEARCH METHODOLOGY¹

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Abstract

In the present paper, I argue that much of the debate surrounding consciousness in SLA has to do with a confusion between process, product, context and purpose. I argue for a process-oriented approach to consciousness that focuses on how learners allocate attention during on-line processing of input. In addition, I evaluate the relative value of the research in cognitive psychology on the learning of finite state grammars and conclude that this line of research cannot elucidate the acquisition of natural languages. In a final section, I argue that research on attention (and therefore consciousness) should involve research paradigms that focus on comprehension and input processing. It is my position that with an appropriate definition of attention we can better understand what a learner pays attention to in the input and why. I end with a cautionary note about the term "conscious" and the potential for misinterpretation by researchers and practitioners.

Introduction

No concept raises more hackles in second language acquisition (SLA) circles than "consciousness." Indeed, McLaughlin (1990) has suggested that we abandon the concept altogether and work with other more definable (and hence, operationalizable) constructs. In the present paper, I will not debate conscious vs. subconscious processes in SLA but instead will suggest that we begin thinking about an operative construct based on "attention." It is my belief that significant advances can be made if (1) we have a clear definition of attention, (2) we do not confuse attention (a processing resource) with other constructs such as product, context or focus of attention, and (3) if we keep clear what we mean by "grammar." I will begin my comments by examining some terminology.

On Terminology and Definitions

The "problem of consciousness" (or better yet, the "debate" on consciousness) in SLA is in part a problem of terminology— and a large part of the problem in terminology lies in the confusion between process, product, context and focus or purpose. This debate has tended to revolve around the question "Can explicit (read "conscious") knowledge become implicit (read "subconscious") knowledge?" Framed slightly differently, the question is "Can declarative knowledge become procedural knowledge?" What is important to note in these questions is that the underlying conceptualization of language learning is one of skill-getting to skill-using. With its focus on production of the language, the profession has approached the "consciousness issue" as a problem in language output and has, in a sense, recast the old debate between behaviorism and cognitive code-learning theory. However, it is important to remember that current consensus in SLA circles is that the building up of a linguistic system

over time in a learner's head is a result not of output practice but instead of input processing and the accommodation of intake data (e.g., Sharwood Smith 1993, Van Patten 1994, White 1989, Larsen-Freeman & Long 1991). Simply put, learners "get grammar" by attending to comprehensible meaning-bearing input; they don't build a linguistic system up over time as a matter of oral practice. (This does not mean that output practice does not "push" learners to attend better to input, a position taken by Swain (1985) and elsewhere.)

If one takes an input-based approach to working out the issues in SLA, then the issue of consciousness moves from a product-oriented perspective to a process-oriented perspective. This alternation in perspective has already been suggested by Schmidt (1990) in his review of the literature on consciousness. Schmidt distinguishes between consciousness as awareness, as intention, and as knowledge. Of these three, only knowledge is a product-based approach to the issue of consciousness. Schmidt further divides awareness into three levels: perception, noticing, and understanding, each being associated with particular sets of on-line processes and varying degrees of consciousness. Thus, a focus on awareness is a shift to a process-based approach to consciousness. With these distinctions in mind, Schmidt is able to suggest six different questions related to consciousness and learning. The question he poses that I would like to highlight here is the following: "Is it possible to learn aspects of a second language that are not consciously noticed?" (p. 134) and the follow-up "must learners consciously pay attention?" (p. 134). These kinds of questions move us away from the product-oriented question "Does explicit knowledge become implicit knowledge?" and toward the process-oriented question "How do learners attend to input data?" In short, we are asking in what way the learner allocates attention during input processing and what the role of consciousness might be during this allocation of attention.

Following Ceci & Howe (1983), who in turn borrow from Posner & Snyder (1975), an operational definition of attention assumes some kind of consciousness in that the learner is either aware of the process or the product of attention. Because attention involves some degree of consciousness, it is also capacity robbing. The learner does not have some unlimited supply of attention but instead attention is somewhat fixed and limited. In this sense, a learner's attention would make it difficult to do other similar mental processing at the same time (Wickens 1984, Carpenter & Just 1993). Because of this limited capacity for processing, we can reframe the "consciousness issue" this way: What gets attended to in the input and what does not?

It should be clear that attention is not a product as are the referents for explicit knowledge and implicit knowledge. When framing the issue of consciousness as knowledge then we are focused on how the learner moves from one product to another. Attention, however, is a resource and is tied to processes. The distinction between processes and products is not a trivial one given that previous discussion of consciousness in SLA has confused process and product or conflated them. We can illustrate this by examining the terms acquisition and learning.

Acquisition and learning were terms originally used to describe different ways (read "processes") of internalizing the grammar of a non-native language. As stated by Krashen (1982)

The first way [to develop competence] is language acquisition, a process similar, if not identical, to the way children develop ability in their first language. Language acquisition is a subconscious process. . .The result of language acquisition, acquired competence, is also subconscious. . . (p. 10, italics added)

It is clear from this quote that Krashen distinguishes process from product when he says that the result (read "product") of language acquisition (read "process") is acquired competence.

Unfortunately, Krashen does not maintain this distinction in the next part of his discussion

The second way to develop competence in a second language is by language learning. We will use the term learning henceforth to refer to conscious knowledge of a second language... Some synonyms include formal knowledge of a language or explicit learning. (p. 10)

In this citation, Krashen equates learning with a product (i.e., conscious knowledge) such that acquisition = process but learning = product. Given Krashen's definition of acquisition above, we can assume that what should have been said about learning is that it is a conscious process and that the result of learning is a learned competence.

In actuality, Krashen's (pedagogically useful) distinction between learning and acquisition is not so much about processes as it is about context and purpose. If one traces the history of these two terms one can see that learning is reflective of particular classroom practices and outcomes while acquisition is not. What Krashen attempts to do is prescriptive; that is, get the non-classroom aspects of acquisition into the classroom. Thus, context of learning has played a role in the definitions of acquisition and learning. In addition, both terms are concerned with the focus of attention rather than attention itself: learning is concerned with a focus on form while acquisition is concerned with a focus on meaning or communication. Thus, differential focus has also played a role in the definitions of these terms.

It is in this conflation of process, product, context and focus (or purpose) that underlies the problem in understanding consciousness in SLA. For many if not most in SLA circles, consciousness has come to be synonymous with explanation, grammar practice, knowing the rules and drills. Subconsciousness, on the other hand, has come to be synonymous with input, communication, and communicative activities. The problem is confounded because of the widely popular terms explicit and implicit, e.g., explicit vs. implicit teaching, explicit vs. implicit knowledge, explicit vs. implicit learning. Explicit has come to be equated with conscious, grammar practice, knowing rules and so on, while implicit has come to be equated with input, communication, and so on.

But attention, at least theoretically, can stand apart from product, context and focus (or purpose). Given the operative definition of conscious attention offered earlier, one might engage conscious attention while focusing on meaning or form. One might engage conscious attention in or out of the classroom. In short, neither of the two foci of attention (meaning or form) any particular theoretical claim on the type of attention use during real time language processing; at least, not as long as we keep clear what we mean by "form" which is the point of the next section of this paper.

On Linguistic Items

One of the major unasked questions in the research on consciousness (and by extension explicit/implicit, learning/acquisition, and so on) is what we mean when we talk about the acquisition of grammar. Do we mean surface features or do we mean something else? Do we mean everything and anything, i.e., a feature of grammar is a feature of grammar is a feature of grammar? Not specifying what we mean by the term "grammar" leads to conflicting hypothesis which, in the final analysis, may not be conflicting at all but instead complementary.

First and foremost, we must be cautious in drawing conclusions from the research on cognitive psychology when it comes to attention and the acquisition of grammar. In the very experiments on consciousness and attention conducted in cognitive psychology, language is not even a focus of study. For example, in Kellogg (1980), subjects were asked to do multiplication problems while faces were flashed on a screen. Later, subjects were asked recall faces. Because so many subjects remembered faces, Kellogg concludes that subjects did not have to pay attention to them in order for these to make it into long term memory. One could rightly ask what this kind of experimentation has to do with the learning of languages, in particular morphology and syntax. And this is not an isolated case. The bulk of research on attention and consciousness is conducted with research designs that use faces, numbers, colors, shapes and other visual stimuli as principle design variables.

But there is research in which artificial linguistic systems are used to research attention and consciousness. Called "finite state grammars" these systems are used to generate letter strings which function as "sentences." These finite state grammars contain a set of "nodes"

connected by arrows coded with letters (e.g., X, Y, Z, S, T, V). The direction of the arrows depicts in what serial order the letters can be collocated. These finite state grammars are used to generate a series of letter strings which are then shown to subjects who are later surprised with a "grammaticality judgment" test to see if they have developed some kind of competence about the formulation of strings. (See, for example, the research in Reber 1976 and 1989, Reber, Allen & Regan 1985, Dulany, Carlson & Dewey 1984.)

One could rightly ask just how alike finite state grammars and naturally occurring grammars are. Are lettered strings generated by these grammars functionally equivalent to utterances generated by naturally occurring grammars? My argument is that they are not very much alike at all and that finite state grammars suffer from three critical deficiencies which render them non-language like and hence conclusions about language acquisition from these kinds of experiments are suspect. First, finite state grammars do not have rules of movement and therefore do not contain one of the fundamental aspects of syntax that learners of natural languages must acquire: movement and restrictions on movement. For example, a finite state grammar can generate the string XZTSU but it cannot generate UXZTS by movement of U from end to initial position. A natural language, such as Spanish can generate both ¿A dónde fuiste? (Where did you go?) and ¿Fuiste a dónde? (You went where?). Note also that natural languages have hierarchical structure, i.e., phrases, and not serial structure. Thus Spanish does not simply move the isolated item dónde in the above examples, it must move the prepositional phrase. In addition, finite state grammars cannot embed, thus, XZTSU[TSU] is not only impermissible it cannot even be generated. Natural languages do have embedding properties, e.g., ¿A dónde dijiste que fuiste? (Where did you say you went?)

But notice the concurrent problem. In the learning of a natural language, learners must learn how a language embeds, e.g., Is there an overt complementizer? Do I have to pied-pipe or can I strand a preposition? Can I move a WH element across an S node? Does the embedded clause require inversion of subject and verb? and so on. Thus, the acquisition of surface word order and strings with natural languages is something far more complex than that which can be generated by a finite state grammar.

A second major deficiency of finite state grammars is that they lack surface features. Z is always Z and S is always S. There is no z and no s and there is no Z and no S. Thus one does not need to learn a distinction between Z and z and Z, for example, nor Sand s and S. But in English there is walk and walks, John and John's, and there is some underlying relationship between screw, screwed and screwing but they are not interchangeable. In Spanish, there are some 44 possible forms of a given verb and there are four forms for the definite article. Thus, only el décimo Congreso Internacional (the Tenth World Congress) is permissible in Spanish and not la décima Congreso Intemacional nor el diez Congreso Intemacional. The point to be underscored is that not only must learners learn movement and restrictions on movement in natural languages, but they must also learn word classes, morphological form, phonological inflections, stress patterns, melodic contours, agreement mapping, and so on. Finite state grammars do not include these features and they are absent from the letter strings which form the "input sentences" that subjects are exposed to.

The third deficiency, and perhaps that which makes finite state grammars the most unlike natural languages, is that they are devoid of any referential or social meaning. Three of the fundamental properties of natural languages are that they are used for communicative purposes, they are used to regulate the social behavior of others, and they are used as instruments for other types of learning and cognitive processing of information. As such, natural language learning is a process of mapping form and meaning. Finite state grammars, on the other hand, do not generate strings that have any reference to some propositional content. XZTSU does not mean, for example, "Come over here my hair is on fire."

In short, finite state grammars lack the properties and functions of natural languages. Without these properties and functions, finite state grammars do not mimic natural languages in their most basic of senses and one is led to question whether exposure to letter strings and the subsequent "internalization of a set of rules" is anything akin to interaction with communicative input and the internalization of syntax, morphology, phonology or any other formal properties of a natural language. To be sure one could argue that the two endeavors

share some pattern-matching mechanism and thus are similar on that level of learning. However, pattern matching of a reduced and non-complex "syntax" cannot be the same as pattern matching of a complex, variational and communicatively oriented linguistic system.

To sum up, research from cognitive psychology related to attention and consciousness cannot speak to the issues of attention and consciousness in the acquisition of a natural language. The question of attention and consciousness in SLA must be investigated using the very languages that we teach and learn. But even this is not enough. As hinted above in the critique of finite state grammars, there are at least two aspects of language that we must differentiate: (1) movement rules and restrictions on them and (2) surface features (e.g., morphology).

With the general exception of investigations of UG, research in SLA and in language teaching that centers on the issues of attention and consciousness have not paid much attention on to the what of their investigations. There is evidence that perhaps different aspects of language are processed and stored differentially. In arguing that negative data and explicit instruction cannot have any direct effect on the functions of UG, Schwartz (1993) suggests that lexicon, syntax and morphology are learned differentially

The lexicon, however, is learned in a distinct manner from syntax. Indeed, lexical items must be learned. Aspects of syntax are not learned in this sense; they grow. . . p. 159)

and later

One of the areas of L2A that appears to show the highest amount of variability and the lowest degree of "success" is verbal conjugations (and nominal declensions). Consistent with the main idea in this paper, what this might be showing us is that [negative data] and explicit data have been effective in building [learned linguistic knowledge]-but not competence.

Extending this line of argumentation to attention and consciousness, one could well posit that some aspects of language are learnable via conscious attention and that others are not. Those that are not may be learnable only through subconscious processing after attention has taken place (i.e., restructuring and accommodation that happen in the developing system outside of awareness and after the initial intake phase) or they may simply never be learnable, period. To research the hypothesis that "learning cannot happen without awareness" unthinkingly lumps linguistic features together. A better hypothesis might be something like "The learning of morphology cannot happen without awareness" or "Restrictions on movement rules cannot be consciously learned and incorporated into the learner's developing system." It may very well be that the division between syntax and morphology or syntax and lexicon are not the best way to consider what we mean when talking about grammar. Other kinds of distinctions are certainly possible, for example, surface syntax and underlying syntax or so called "easy rules" and "hard rules". The point being made here is that research on consciousness and attention in SLA must be more precise about the kinds of hypotheses it makes. The selection of linguistic items for research must be considered in light of the various components of a grammar itself and the relationship of these components to UG. One should not make claims about the acquisition of grammar as though all grammatical features of language function in the same way and are learned in the same way.

On Methodology

As mentioned above, one of the fundamental features of language is that we can use it to communicate ideas, to regulate other person's behaviors and to organize information about the world we live in (i.e., to learn in a general sense). Current theoretical approaches to language teaching emphasize this meaning-based nature of language and, of course, non-classroom language acquisition naturally encompasses a fusion of language and its functions. This observation underscores an important point: if experimental research does not utilize a research paradigm in which the subject is engaged in getting meaning of some kind or another, then it is immediately suspect as having any implication for a more general theory of

SLA. Why make this claim? Simply because in natural language learning situations, learners must attend to more than one thing at a time during real-time input processing, thus engaging in connecting form and meaning. Such is not the case with finite grammars where all one need to do is keep track of whether X precedes or follows T. It never enters the subject's mind if X itself means anything and if so what it means or whether T modifies X and thus tells us more about X, and so on.

When we say that learners must attend to more than one thing at a time this suggests a number of things. First, learners must attend to what is being said and in fact, as I have argued elsewhere (Van Patten 1984, 1985, 1994) learners are driven to process referential meaning before anything else when involved in communicative exchanges. (Referential meaning refers to the relationship between concrete informational messages and their linguistic representations, e.g., "It's one o'clock" means that the big hand is on the twelve and the little hand is on the one.) This in turn implies that input processing is not a simple question of conscious attention to meaning and subconscious attention to form as some might suggest. If this were the case, we would not have orders of acquisition; subconscious attention would automatically focus on all features of language and acquisition would be nearly instantaneous for many features of grammar. We know that this is not the case. What is needed is a set of hypotheses about what learners attend to and why during the act of comprehension. These hypotheses must incorporate the relationship that exists between form and meaning as well as the limited capacity for processing. Within this line of thinking, I have offered a set of hypotheses about the acquisition of surface features of language using the operative construct of attention outlined in the first section of this paper. These hypotheses are:

H1. Learners process input for meaning before they process it for form.

H1a. Learners process content words in the input before anything else.

H1b. Learners prefer processing lexical items to grammatical items (e.g., morphological markings) for semantic information.

H1c. Learners prefer processing "more meaningful" morphology before "less or non-meaningful morphology."

H2. In order for learners to process form that is not meaningful, they must be able to process informational or communicative content at no or little cost to attention. (from Van Patten 1994)

I believe these hypotheses can lead us to fruitful investigations of how learners attend to surface features in input data and to make predictions about relative orders of acquisition. As demonstrated in Van Patten (1990), learners can attend to content words without subsequent loss of comprehension (predicted by H1a and H2) while attending to non-meaningful grammatical items results in a loss in comprehension (predicted by H2). In Musumeci (1989), it was found that learners attend to tense by focusing on lexical items (adverbs) and not verb morphology (predicted by H1b). Orders of acquisition can be predicted based on H1c (*ceteris paribus*) as I have argued elsewhere (see Van Patten 1984 and 1985).

Another point I would like to underscore here is that research on attention must be just that: research on attention. More often than not, attention is not directly researched in SLA circles; it is inferred based on some product of learning (read "linguistic output"). This is most evident in the research on so called explicit vs. implicit learning. Basically, this kind of research uses a paradigm that confuses focus or purpose of attention with type of attention. Scott (1989) for example compares the outcomes of two contexts and foci of teaching: explicit (explanation and practice of grammar) and implicit (exposure to comprehensible input). Using this paradigm she attempts to answer the question, "Which kind of teaching is better?" Note how in this type of paradigm one cannot address the issue of attention at all; one can only address the issue of purpose (or focus) of attention. As mentioned in the first section of this paper, the problem in this kind of research design is the conflation of consciousness and grammar practice on the one hand and subconsciousness and meaning on the other as though either context had a monopoly on a particular kind of attention.

But as Hulstijn (1989) implicitly suggests, explicit vs. implicit teaching strategies is not really the issue we should be concerned with. He adopts the position that "Implicit learning,

although not involving reflection on grammatical rules, still requires that the learner pay attention to the formal features of the language." (p. 49, emphasis added) and thus rejects the conflation of type of attention and focus of attention. But like Scott, he adopts the "incidental learning paradigm" to research the role of implicit learning. The problem with research designs based on incidental learning is, once again, that they do not illuminate attention. As its name suggests, incidental learning research can only tell us whether or not a learner can pick up something when focus of attention is directed to something else (c.f. Kellogg, above) and it does not tell us the nature of the attention nor how the attention was actually allocated during on-line processing.

We return then to the previous point: research on attention cannot be reduced to an either/or paradigm of focus on meaning vs. focus on form but must involve research involving a simultaneous focus on meaning and form. Comprehension, a process intricately bound up with acquisition, is a communicative act and as such experimentation on attention cannot lose sight of this. Anyone can process input for meaning or for form; the critical questions that research needs to address is if a learner can attend to form while attending to meaning when processing input, if so, what kind of form, and under what conditions this is and is not possible (see, for example, Van Patten 1990). Thus, my claim is that research on attention in SLA must be inextricably tied to research on comprehension. In this kind of research, subjects must attend to input for meaning, they must know that they are supposed to attend to meaning, and the task they perform must measure their comprehension in some way or another. Otherwise, research on attention will not be able to address a fundamental feature of SLA: the building up of a linguistic system that links form and meaning. The research will lack any connection to the real world.

One Final Point

It would be appropriate to review the construct of attention and underscore an important point before concluding. The construct of attention includes two features: (1) that the learner is aware of her attention and/or its product and (2) that attention is capacity robbing. It is the first feature of attention that needs to be singled out. Note that the learner may or may not be aware of the product; it is sufficient for the learner to be aware of her attention. Since product (knowledge) and the process (of being aware) are separable within the construction of attention, conscious attention does not automatically suggest explicit or declarative knowledge. In short, one can attend and yet not be aware of the product or not be able to fully articulate it. This is worthy of emphasis since so often in SLA research explicit knowledge (a product) is equated with consciousness.

For those who have difficulty with the idea that (conscious) attention can lead to something other than explicit knowledge, we can take an example from tennis to illustrate. Jane Doe plays a decent game of tennis but her backhand has always been weak. Recently, she decided to work on it. During volleying and practice, whenever the ball came toward her backhand, she kept her eye on the ball at all times. She made no conscious move in her body or arm, but she did focus her attention on the ball. By the end of the first session doing this, there was a marked improvement in her backhand, both in terms of number of connections with the ball and landing of the ball in the opposite player's court. Something has happened. She was not sure of what it is. Perhaps she places her feet differently. Perhaps her arm position has changed. Perhaps both. In short, she cannot tell you what has happened to her backhand. She can only tell you that she paid more attention to it during practice.

Now, let's imagine a language learning situation. Bob Smith is a learner of Spanish, a language that actively distinguishes between subjunctive and indicative mood through verbal inflection in the present and past tenses. He begins to notice subjunctive forms in others' speech. He attends to it. Soon, he begins to use it in his own speech, perhaps in reduced contexts, but nonetheless he is beginning to use it. If you ask him for a rule, he might make one up. But in actuality, he doesn't have a rule. All he knows is that he has begun to attend to the subjunctive and the context in which it occurs and it has somehow begun to enter his

linguistic system. He may or may not wind up with a native-like subjunctive rule system, but that is not the point. As in the case of Jane Doe's tennis backhand, Bob did not need to come up with a conscious rule; he only needed to pay attention.

These anecdotes illustrate that attention and explicit rule knowledge do not necessarily go hand in hand. This is a particularly significant point that researchers need to be clear on since instructors and curriculum designers may look to research for insights on language teaching. As mentioned several times in the present paper, applied linguists often confuse explicit knowledge with conscious attention. Thus, when a researcher says "conscious attention is necessary for acquisition of surface features of language" the immediate reaction of a particular type of instructor may be "See, I knew that grammar practice was important." The reaction of a different type of instructor might be "Uh, oh. Here come the anti-communicative people again." What both of these reactions fail to note is that attention is not equatable with explanation and type of practice. Attention is what the learner does in her brain when processing input, not what the instructor puts in front of her as facts and exercises.

It is quite possible that explicit knowledge can aid input processing in some way by acting as a focusing device for learner attention. This has been investigated in Van Patten & Cadierno (1993), Cadierno (1992), Van Patten & Sanz (in press). In all three studies the researchers sought not to teach explicit rules but to guide learners' processing of input strings. In the Van Patten & Cadierno study, for example, one group of learners was instructed to listen to word order and clitic object pronouns to make correct form-meaning mappings when processing input strings. They did not engage in any production of the language but instead worked through activities that can be called "structured input" (Van Patten, 1993). This "processing" group was compared to a traditional group that received grammar explanation plus drilling and some communicative output practice. Both groups were compared to a control group that did not receive any kind of treatment. The results were unequivocally clear: the "processing" group gained in comprehension and production abilities while the traditional group gained in production abilities only. Cadierno (1992) replicated the experiment with past tense verb inflections and obtained the same results. In Van Patten & Sanz (in press) the Van Patten & Cadierno study was partially replicated with different kinds of assessment tasks. Again the results were clear: the processing group made significant gains in both comprehension and production of the targeted items. What is interesting is that in all studies the processing group and the traditional group were both receiving a "focus on form" in their instruction, but the processing group was taught to attend to the input to get the grammar; subjects in this latter group did not produce or "practice" anything orally or in writing. In short, the processing group was assisted in building up an implicit knowledge of the language via intake facilitation; there was no attempt to make "explicit knowledge become implicit knowledge", yet interventionist instruction was present.

Aside from the actual results of these studies, what is interesting about them is the reaction they provoke when presented to practicing instructors. It is not unusual for someone in the audience to ask "So, you don't believe in explicit instruction or teaching grammar?" When we point out that the processing group was participating in explicit instruction, our response is met with perplexed looks. It seems that the connection between "conscious" and "grammar practice" and "knowing the rules" is so entrenched in many professionals' minds that the concept of "conscious attention" as something separable pushes the limits of their understanding. As researchers and theorists, we would do well to be advised of the potential for misinterpretation of the research on "conscious attention."

Conclusion

In this paper, I have argued for the following claims.

1. SLA research has confused process, product, context and purpose (or focus of attention) when talking about consciousness in SLA. We would do well to direct our efforts to understanding attention during input processing and the role that consciousness plays there.

2. We must be careful to distinguish what features of language we mean to include in our discussions of attention. Not all features of grammar are created equally and perhaps different processes are responsible for the internalization of different aspects of language.
3. Research paradigms involving attention should be comprehension-based and focus on input processing where both meaning and form are attended to. Explicit vs. implicit learning/teaching, incidental learning, and other research paradigms cannot speak to type of attention; they can only speak to either context or purpose.

Given the rather important status that input plays in discussions of SLA, research on attention during input processing should form a significant part of SLA research. After all, input is not much of a useful concept if we do not investigate what learners do with it.

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CONSCIOUSNESS IN SECOND LANGUAGE LEARNING: PSYCHOLOGICAL PERSPECTIVES ON THE ROLE OF CONSCIOUS PROCESSES IN VOCABULARY ACQUISITION

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Abstract

This article reviews research related to conscious and unconscious processes in L2 and L1 vocabulary acquisition. Firstly it presents a summary conceptual analysis of the different aspects of vocabulary acquisition. After demonstrating that most vocabulary acquisition typically comes as a result of incidental learning, it next considers three research areas: (i) the associations between vocabulary and academic intelligence, (ii) implicit memory, (iii) global amnesia. These diverse areas all reveal a dissociation whereby the recognition and production aspects of vocabulary learning rely on implicit learning, but meaning and mediational aspects of vocabulary heavily involve explicit, conscious learning processes. The operations of the input and output (I/O) lexical modules are briefly described, followed by an analysis of the explicit cognitive systems for mediation with semantics and conceptual systems. Finally the pedagogic implications of these findings are outlined.

Introduction

There are now many demonstrations of the dissociation between unconscious and conscious processes of learning. This division roughly parallels that between practical or tacit intelligence and academic or explicit intelligence. The research priority that necessarily follows from such distinctions is to determine which of human cognitive capabilities are acquired implicitly and which learned explicitly. This question is both of theoretical and practical pedagogic importance since teaching interventions are of less relevance to implicitly learned skills but are essential to explicitly learned ones.

Nowhere has the role of consciousness been more a matter of debate than in the realm of human language skills, both in native (L1) and second (L2) languages (Ellis, in press a). Radical swings in the history of L2 teaching methodologies reflect this schism (see Kelly, 1969 and R. Ellis, 1990 for reviews). Traditional 'Grammar-translation' methods emphasised study by literacy and translation and had an explicit bias with formal explanation of L2 rules and a deductive approach to learning. Come the Second World War the Behaviourist Zeitgeist in America led to Structural Approaches and Audiolingual methods which outlawed the teaching of metalinguistic rules and which regarded L2 as just another specific domain to be understood by general laws of learning - L2 acquisition involved discrimination and generalisation from structured examples by analogy not analysis, i.e. implicit, inductive learning through patterned practice. By the 1960s critics began to observe that these methods produce fluent but flawed speakers (e.g. "Audiolingual methods have been teaching speech but not language", Donaldson, 1971, p. 123) and explicit instruction of grammatical rules was reintroduced in the Cognitive Code Method, 'a modified, up-to-date translation theory' (Carroll, 1966, p. 102), which held that perception and awareness of L2 rules precede their use. In the 1970s and 80s the pendulum swung back to Naturalistic methods (Krashen, 1982, 1985). Krashen's underlying theory, the Input Hypothesis, is a non-interface position in that it posits that adults can subconsciously acquire languages and they can consciously learn about language. But in this view learning cannot be converted into acquisition; subconscious

acquisition dominates in L2 performance, and conscious learning is used only as a Monitor, i.e. as an editor to correct output after it has been initiated by the acquired system. Thus in Krashen's Monitor theory implicit acquisition of L2 is the essential aim of instructional programmes. Currently the pendulum is yet again in swing: in the light of analyses of the disappointing abilities of graduates from 'grammar-free' foreign language (FL) programmes (Gomes da Torre, 1985) there are new calls for a return to explicit methods (Kingman + Cox Reports for English, 1988, 1989; James, 1986).

Such swings in educational practice make it clear that there is no simple answer to the question of whether language acquisition reflects conscious or unconscious processes. There are two major causes of this continuing contention. The first is the 'slipperiness' of the term 'consciousness' both in its constitutive definitions and in their operationalisations (McLaughlin, 1990; Schmidt, this volume). The second is that 'language learning' is equally poorly defined, mainly because of its numerous facets. Researchers really need to be clear in what they are talking about with regard both consciousness and language, hence this symposium whose aim is a theoretical overhaul of our concepts in effort after clarity and standardisation.

Our particular difficulties in these respects are far from unique. As Sigmund Freud

(1915) wrote:

"The view is often defended that sciences should be built up on clear and sharply defined basal concepts. In actual fact no science, not even the most exact, begins with such definitions. The true beginning of scientific activity consists rather in describing phenomena and then in proceeding to group, classify and correlate them.... It is only after more searching investigation of the field in question that we are able to formulate with increased clarity the scientific concepts underlying it, and progressively so to modify these concepts so that they become widely applicable and at the same time consistent logically. Then indeed, it may be time to immure them in definitions."

However, perhaps now, after several decades of work relating to these matters, it is time to try to clean house, to clarify our definitions thus to begin the resolution of the particular issue of the role of consciousness in language acquisition.

In his useful introductory paper Schmidt provides an analysis of constitutive definitions of 'consciousness'. He makes a number of recommendations towards standardization of use of theoretical terms. While we might quibble with the minutiae of his analyses, his general argument is both sound and wide-ranging, and we should consider his counsel if only because he has had the temerity to attempt the task. His suggestions are as follows:

Incidental learning (Consciousness as intentionality) should be used to refer to describe situations where individuals learn without intent to learn, or when individuals learn one thing when their primary objective was to do something else. In the past this has often been referred to as unconscious learning. Schmidt adds the rider that it is important not to assume without independent evidence that either the process or the product of such learning is unconscious in any other sense.

Learning without attention (Consciousness as the product of attention) should be reserved for learning that can be shown to have taken place without any allocation of attention, voluntary or involuntary.

Explicit learning (Consciousness as awareness) is to be used when the learner has online awareness, formulating and testing conscious hypotheses in the course of learning. Implicit learning describes when learning takes place in the absence of these processes; it is an unconscious process of induction resulting in intuitive knowledge that exceeds what can be expressed by learners.

Explicit instruction (instructed learning) should be reserved for situations where subjects

are told about or taught rules in experimental studies or in the classroom.

Explicit memory (Consciousness as control) refers to situations where recall involves a conscious process of remembering a prior episodic experience. In contrast, implicit memory is where there is facilitation of the processing of a stimulus as a function of a recent encounter

with the same stimulus but where the subject at no point has to consciously recall the prior event.

I will therefore adopt these terms in reviewing research concerning the involvement of conscious processes in one small area of language learning, that of vocabulary acquisition. I have chosen this because its small size might make it a more tractable problem. Even so, at first sight even this better definable area is still far from resolved with respect to the involvement of unconscious and conscious processes. However, I will demonstrate that with precise notions of the different aspects of vocabulary acquisition we can, to use Freud's terms, 'group, classify and correlate them', and that when we do a clear picture emerges. I will argue that vocabulary acquisition as a whole reflects both conscious and unconscious processes, but that there is a sharp dissociation whereby the recognition and production aspects of vocabulary learning rely on unconscious processes, whereas meaning and mediational aspects of vocabulary heavily involve explicit, conscious learning processes.

Space restrictions limit the amount of supporting detail that I can present here, a more complete treatment is given in Ellis (in press b).

Current applied linguistic theories of vocabulary acquisition range from 'unconscious' positions to those which hold that learners should be explicitly taught large amounts of vocabulary. Krashen (1989) exemplifies the unconscious position. His Input Hypothesis assumes that we acquire language by understanding messages and the following quotation demonstrates that he holds it to be unconscious in all of Schmidt's respects [added in square brackets]: "language is subconsciously acquired - while you are acquiring, you don't know you are acquiring [implicit learning] your conscious focus is on the message, not form [learning without attention]. Thus, the acquisition process is identical to what had been termed 'incidental learning.' [incidental learning] Also acquired knowledge is represented subconsciously in the brain - it is what Chomsky has termed 'tacit knowledge'. [intuitive knowledge & implicit memory]" (Krashen, 1989, p. 440). At the other extreme there is a history of attempts to collate lists of a core vocabulary which teachers are recommended to use to decide which words and meanings should be taught first (e.g. West's 1953 General Service List of 2,000 words) [explicit instruction]. In parallel there have been developments of a wide diversity of methods for explicit [intentional, attentive, explicit] vocabulary learning instruction (see Carter, 1987; Nation, 1987 for reviews).

What is the language practitioner to make of all of this? How can both of these positions be tenable? Does vocabulary come naturally and unconsciously or must it be taught and learned? Or else, what are the aspects of vocabulary that are amenable to instruction and study?

What is it to learn a word?

What is it to learn a new word? Minimally we must recognise it as a word and enter it into our mental lexicon. But there are several lexicons specialised for different channels of Input/Output (I/O). To understand speech the auditory input lexicon must categorise a novel sound pattern (which will be variable across speakers, dialects, etc.) to read the word the visual input lexicon must learn to recognise a new orthographic pattern (or, in an alphabetic language, learn to exploit grapheme-phoneme correspondences in order to access the phonology and hence match the word in the auditory input lexicon) to say the word the speech output lexicon must tune a motor programme for its pronunciation; to write it the spelling output lexicon must have a specification for its orthographic sequence. We must learn its syntactic properties. We must learn its place in lexical structure: its relations with other words. We must learn its semantic properties, its referential properties, and its roles in determining entailments. We must learn the conceptual underpinnings that determine its place in our entire conceptual system. Finally we must learn the mapping of these I/O specifications to the semantic and conceptual meanings.

The source of vocabulary

We have not been explicitly instructed in the vast majority of the vocabulary that we know, nor indeed have we looked up these words in dictionaries - most vocabulary is learned from context (Sternberg, 1987).

Saragi, Nation & Meister (1978) asked adults to read Anthony Burgess' novel, "A Clockwork Orange". This contains a number of novel words from a Russian-based slang called nadsat. There are 241 nadsat words in the novel and they are repeated on average 15 times. The subjects were simply asked to read the book (which crucially did not contain a dictionary of these words). A few days after finishing they were given a surprise test covering 90 nadsat words. Considerable vocabulary acquisition had taken place - subjects had picked up some 45 new words simply by reading a novel.

People who read more know more vocabulary. This relationship between print exposure and vocabulary appears to be causal in that it holds even when intelligence is controlled (Stanovich & Cunningham, 1992).

There is thus no doubt that reading affords vocabulary acquisition. It is an ideal medium for it. Moderate-to-low-frequency words - precisely those words that differentiate between individuals of high and low vocabulary size - appear much more often in common reading matter than they do in common speech. And there is opportunity for the reader to study the context, to form hypotheses at leisure and cross validate them, to have time to infer meanings. The word is frozen in time on the page, whereas in speech it passes ephemerally.

However, without further experimentation it is impossible to resolve whether this vocabulary acquisition from context reflects implicit learning, incidental learning, or even explicit learning without explicit instruction. Contra Krashen (1989), it does not follow that vocabulary has been subconsciously acquired from the fact that we have not been taught the vast majority of the words that we know. That we have not been taught vocabulary does not entail that we have not taught ourselves. It is quite possible, e.g., that there is some benefit to vocabulary acquisition from the learner (i) noticing novel vocabulary, (ii) selectively attending to it, and using a variety of strategies to try (iii) to infer its meaning from the context and (iv) to consolidate the memory for that new word.

Studies of vocabulary acquisition from reading demonstrate that neither dictionary look-up nor explicit instruction is necessary for vocabulary acquisition. The remainder of this paper analyses the degree of involvement of conscious learning processes in different aspects of vocabulary acquisition.

In brief, the evidence that will be presented for unconscious processes in the acquisition of I/O (receptive/productive) aspects of vocabulary includes:

- Child first language vocabulary development is essentially ubiquitous (following the frequency distribution of implicit learning systems).
- Child first language vocabulary development is relatively insensitive of 'academic intelligence' (it does not correlate with explicit learning abilities).
- Read vocabulary is so well preserved in dementia that it is taken as an index of premorbid IQ (in loss it thus behaves like implicit memory abilities).
- Repetition priming effects in lexical decision and word identification tasks demonstrate implicit vocabulary I/O activation (implicit memory).
- Priming studies show that I/O lexical modules for bilingual individuals are independent (like modularised implicit memory systems).
- Amnesics who are deficient at explicit memory abilities show normal lexical priming effects for both old and new lexical items (implicit memory).
- Effects of word regularity and the proportions of 'friends and enemies' demonstrate implicit acquisition of grapheme-<->phoneme correspondences and spelling patterns for processing written vocabulary (implicit learning).

- Spoken word production is like other motor skills in that it is affected by frequency and statistical regularities in the subcomponent phonotactic sequences (implicit learning).
- Analyses of effects of exercise, practice, frequency of use, and life-span practice show that vocabulary acquisition, like implicitly-acquired skills, conforms to the power law of learning (implicit learning and implicit memory).
- Connectionist (Parallel Distributed Processing) modelling is a medium for investigating implicit learning in humans. Such models of conceptual, vocabulary, morphology, and reading and spelling acquisition can reproduce to a remarkable degree the characteristics of people learning language - behaviours previously assumed to be characteristic of rule-governed systems even though the connectionist nets do not contain explicit rules (implicit learning).

The evidence that will be presented for conscious processes in the acquisition of meaning aspects of vocabulary includes:

- When people are assessed for their understanding of vocabulary there are high correlations between academic IQ and, respectively, reading ability and adult breadth of vocabulary (correlations with explicit learning and memory abilities)
- Free recall studies show that conceptual systems for vocabulary in bilinguals are interdependent (like explicit memory influenced by a wide range of conscious, cognitive factors).
- The difficulty human amnesics (who demonstrate normal implicit memory in the absence of explicit, episodic memories) have in acquiring vocabulary-concept pairings (explicit memory).
- Explicit memory for words is affected by Depth of Processing (explicit memory).
- The effectiveness of explicit, deep processing, mediational strategies (semantic and imagery elaboration) in vocabulary learning (explicit learning and memory).
- The effectiveness on vocabulary acquisition of training in such metacognitive strategies word-analysis or inferring meanings from contexts (explicit learning and memory).

Vocabulary and intelligence

We can assess the degree of involvement of conscious learning processes in vocabulary acquisition by considering the distribution of this variable in the population and its correlation with 'intelligence' (since intelligence tests have been developed to primarily measure explicit; conscious learning abilities). Because implicit learning is a more basic form of learning it shows a different population distribution: evolutionarily older systems display less variation than new ones. Consider the innate skill of walking - just about everyone on the globe learns to do it at roughly the same time and moves through the same motor milestones on the way. Its ubiquity supportive evidence for it being an implicitly learned skill which the brain is pre-programmed to acquire and refine. Chomsky used the same argument to support the idea that language is an independent faculty separate from non-linguistic cognitive abilities: "As far as we know, the development of human mental capacity is largely determined by our inner biological nature. Now in the case of a natural capacity like language, it just happens, the way you learn to walk. In other words language is not really something you learn. Acquisition of language is something that happens to you; it's not something that you do. Language learning is something like undergoing puberty. You don't learn to do it; you don't do it because you see other people doing it; you are designed to do it at a certain time." (Chomsky, 1988, pp. 173-174).

Notwithstanding wide variation in intelligence, just about everyone learns to talk their L1. Lenneberg (1967, pp.156-157) suggests that children with non-verbal IQs as low as 30 (i.e. more than 99.99% of people) can still complete the single word stage of language. If we are simply interested in vocabulary aspects of language acquisition, there is plenty of

evidence that the input/output of vocabulary is relatively independent of intelligence. Thus, for example, children severely mentally retarded as a result of hydrocephalus, may talk excessively with impressive vocabularies, even though their speech lacks content (Taylor, 1959; Hadenius, Hagberg, Hyttäs-Bensch & Sjögren, 1962; Ingram & Naughton, 1962; Cromer, 1991 for review). Hadenius et al. coined the term 'cocktail-party syndrome' for the condition since there was a "peculiar contrast between a good ability to learn words and to talk, and not knowing what they are talking about" (p. 118).

In contrast with mere I/O, when the criterion of vocabulary knowledge additionally involves the understanding of words, i.e. the mapping between lexical, semantic and conceptual domains, then there are, of course, strong correlations between academic intelligence and vocabulary size. Learning disabled children produce particularly low scores on the Vocabulary sub test of the WISC-R (The Wechsler Intelligence Scale for Children) where children have to demonstrate an understanding of words by defining them (Kaufman, 1979). At ages between 6 and sixteen, WISC-R vocabulary scaled scores correlate an impressive 0.69 with full scale Stanford-Binet IQ (Wechsler, 1976). Mill-Hill Vocabulary Test scale scores correlate with Raven's Matrices ('non-verbal') IQ 0.60 in people under 30 years old (Table SPM I, Raven, Court & Raven, 1983). W AIS-R vocabulary scaled scores reliably correlate at greater than 0.80 levels with full scale W AIS-R IQ (Wechsler, 1981).

Taken together, these studies clearly reveal different, separable components of vocabulary acquisition. I/O processing neither correlates highly with cognitive mediational components nor with intelligence, yet these latter two abilities 'are inextricably interrelated.

Priming studies of monolingual implicit and explicit memory systems

Word recognition and word naming are faster if you have recognised or named that word within the last day. This occurs whether you explicitly remember having read the word before or not, and thus it demonstrates implicit memory - the tuning of the lexicon by experience. This is the basis of the main technique for studying implicit memory, repetition priming, i.e. facilitation of the processing of a stimulus as a function of a recent encounter with the same stimulus. Repetition priming has been observed on a variety of tasks that do not make explicit reference to a prior study episode - the subject at no point has to consciously recall the prior event. The tests most commonly used in priming research are lexical decision, word identification, and word stem completion. On the lexical decision task subjects have to rapidly decide whether a particular letter string is a word (e.g. watch) or not (e.g. wetch) priming is reflected by a decreased latency in the making of a lexical decision on the second presentation of a letter string relative to the first. The word identification test measures the minimum exposure necessary for correct recognition of the word. Priming is indexed here by a lower minimum exposure for repeated words. On word completion tasks, subjects are given a word stem (e.g. tab for table) and are instructed to complete it with the first appropriate word that comes to mind. Here, priming is reflected by an enhanced tendency to complete test' items with words exposed on a prior study list.

Perhaps the clearest evidence for the separation of implicit I/O lexical systems from semantic aspects of vocabulary comes from the interaction of depth of processing and the types of operation that we ask subjects to do with words. I will review later the many demonstrations that led Craik and Lockhart to propose a Depth of Processing theory of learning and memory whereby the more subjects analyse material semantically and the more they elaborate upon its meaning, the better they will recall it in long-term tests of explicit memory (recognition and recall tasks). Jacoby and Dallas (1981) showed subjects a list of familiar words and had them perform either a study task that required elaborative processing (e.g. answering questions about the meaning of the target word) or a shallow study task that did not require elaborative processing (e.g. deciding whether or not the target word contained a particular letter). Explicit memory for the words was subsequently tested by yes/no recognition and implicit memory was assessed by savings in word identification tests. Recognition performance was higher

following elaborative study than non-elaborative study. However, implicit memory was unaffected by the study manipulation: priming effects on word identification performance were about the same following the elaborative and non-elaborative tasks. Graf, Mandler and Haden (1982) report a similar pattern of results by using free recall as an index of explicit memory and stem completion as a measure of implicit memory. Taken together, experiments of this type (see Schacter, 1987 for review) clearly demonstrate that word identification operates according to implicit memory principles - it is affected by mere exposure and the frequency thereof. But explicit memory for words is clearly affected by the depth of processing and the degree to which subjects analyse their meaning.

Priming studies of bilingual implicit and explicit memory systems

The same dissociation can be found in the contrast between studies of implicit and explicit memory in bilinguals (Durgunoglu and Roediger, 1987; Heredia & McLaughlin, 1992). Concern over the organisation of the bilingual brain has a long history: Is there a single memory store for both languages (the interdependence or compound model) or a separate store for each (the independence or coordinate model)? The interdependence model assumes that items or concepts are stored in the bilingual's memory in the form of language-free concepts with a single conceptual or semantic representation subserving the two lexical entries. Evidence for the interdependence model typically comes from tests of explicit memory tasks, e.g. free recall experiments where exposure to the same concept in different languages is additive. The independence model contends that bilinguals' memory is organised with one memory for each language, with information in one language not readily available to the other system. Evidence for the independence view typically comes from implicit memory tasks such as word identification or stem completion tasks (e.g. Kirsner, in press; Kirsner, Smith, Lockhart, King & Jain, 1984). Kolers in 1966 suggested a resolution to this debate, a compromise whereby bilinguals have neither separate nor shared memories: some information is restricted to the language of encoding while some is accessible to both linguistic systems. He has been proved correct in the light of subsequent evidence.

Durgunoglu and Roediger (1987) investigated implicit and explicit memory in bilingual subjects. Subjects saw words twice either in (a) English, (b) Spanish, or (c) once in both languages. They saw other words in (d) English and Spanish and also had to generate images of their referents, or (e) saw the same word twice in Spanish and generated the English equivalent in writing. These latter two conditions require more elaboration and a greater depth of processing. Explicit memory for the words was tested with free recall, implicit memory with word-fragment completion in English. In free recall (i) the language studied was unimportant, and (ii) elaborations such as generating a translation or forming an image of the referent facilitated recall. In word-fragment completion (i) if the study language matched the test language fragment completion rates were significantly higher than the rate for non-studied control items; if the study language did not match the test language the fragment completion rates did not differ from the non-studied items, and (ii) elaboration during study did not improve word-fragment completion rates.

These results again emphasise the distinctions between implicit, data driven I/O modules which are language specific, and an explicit, conceptually driven cognitive system which supports the semantics and concepts which both languages describe. In bilinguals, implicit memory systems are independent, but there is one compound explicit memory for the conceptual representations for words in their two languages.

Evidence from global amnesia

Further evidence for the dissociations between explicit and implicit learning comes from studies of global amnesic patients (e.g. Korsakoff's syndrome) who, as a result of hippocampal, limbic system, or basal forebrain lesions, show normal implicit learning yet

total anterograde amnesia for explicit and episodic memories (Strauss, Weingartner & Thompson, 1985 see Schacter, 1987 for review) The perennial anecdotal evidence for this comes from Claparede (1911) who reported that he once shook hands with a female Korsakoff patient while concealing a pin in his band. This caused the patient some pain, and when he returned a few minutes later and offered his band again, she refused to shake it. Her avoidance continued, even though she could give no explanation of why she was avoiding him. In this case implicit learning (behaviour which is changed as a result of a previous encounter) is preserved in the absence of any conscious, explicit recollection of the event. Anterograde amnesia can inform us about the normal processes of vocabulary acquisition.

The first experimental investigations of a patient (H.M.) with severe and selective anterograde amnesia were conducted by Milner (Scoville & Milner, 1957; Milner, 1966). H.M. had intractable epileptic seizures which were finally treated by surgery which involved bilateral resection of the medial temporal lobes and ablation of the anterior two thirds of the hippocampal complex, the uncus, the amygdala and the hippocampal gyrus. Unfortunately damage to these limbic structures (found naturally in Korsakoff's syndrome which can result from chronic alcoholism) causes profound amnesia (Dudai 1989; Squire, 1992).

H.M. like other pure cases of anterograde amnesia had normal recall of events that occurred before his brain damage and his short-term memory was normal. His prior semantic knowledge, including that of vocabulary and concepts, was preserved as was evidenced by his continued high IQ and his lack of symptoms of language disability. But he had no memory for episodes that occurred after the operation. Experimental demonstrations of his severe learning difficulties included: (i) his failure when presented with twelve faces and asked to select those that he had seen from a larger array after a delay of only 90 seconds filled with a distractor task, (ii) he was unable to learn a sequence of digits or light flashes that was longer than his short-term memory span despite repeated presentations, (iii) he failed on detailed recall of a complex drawing. Such findings are now taken as diagnostic of cases of anterograde amnesia.

Memory for a recent event can be expressed explicitly, as conscious recollection, or implicitly, as a facilitation of test performance without conscious recollection. Surprisingly, while amnesics such as H.M. show a severe deficit in explicit memory, they can learn implicitly, as evidenced by practice effects. They show normal classical conditioning; they can acquire motor skills such as mirror drawing as fast and as well as normal individuals; they show good perceptual learning (e.g., reading text in a mirror) and they show normal performance on tests of priming which are taken to indicate normal implicit memory abilities (Kirsner, in press; Schacter, 1987; McCarthy & Warrington, 1990).

So what does study of amnesia tell us about vocabulary acquisition and use? If amnesia is properly characterised as a deficiency in retrieval dependent on conscious voluntary procedures (explicit memory) while automatic procedures (implicit memory) are preserved (Schacter, 1987), then their successes at using and learning vocabulary inform us about the degree to which vocabulary learning is implicit. So what can they do in these respects?

Lexical access

1. Amnesics retain prior learned vocabulary and concepts and can access them normally.

They have no difficulty on vocabulary or naming tests, and their reaction times have been shown to be quite normal on word-retrieval tasks (Meudell, Mayes, & Neary, 1981).

2. They show normal facilitation in repetition priming experiments involving pre-existing memory representations such as common words or linguistic idioms

Warrington & Weiskrantz (1982) demonstrated that amnesics showed effects of repetition in naming, category identification (e.g., object/animal), and generation of opposites (e.g. black/white). Subjects were presented with target words and asked to respond as quickly as possible. On a second presentation of the same stimuli in these tasks, the reaction times of both the amnesics and the control subjects were faster, therefore showing facilitation.

Thus the recognition of pre-existing vocabulary and the access of known spoken or written word forms for expression relies upon automatic, implicit processes.

Learning new lexical units or word forms

3. Amnesics cannot explicitly recall new nonwords.
They cannot even explicitly recall words.

4. Amnesics sometimes show implicit memory for novel words.

The evidence on this is mixed. In the priming experiments described above, amnesics showed normal priming for items with pre-existing unitary memory representations such as common words which they would have known before trauma. What about priming for nonwords that do not have any pre-existing representations as units in memory? If they show priming here it would demonstrate that recognition units at least for the word forms (i.e. logogens) are automatically set up for novel vocabulary as implicit memories which simply result from experience.

Squire (1992) reviews evidence of priming in amnesics which involves the acquisition of new information:

(i) Speeded perception of a novel visual shape is a laboratory analogue of learning a new script or a new ideogram (e.g. a new Kanji). Normal subjects and amnesic patients improve their ability to reproduce novel line patterns independently of their ability to recognise these patterns as having been presented previously (Musen & Squire, in press; Musen & Treisman, 1990). Gabrieli, Milberg, Keane and Corkin (1990) also show that H.M. exhibits this effect. Normal and amnesic subjects exhibit priming of unfamiliar visual objects, again independent of recognition memory performance (Schacter, Cooper, & Delaney, 1990).

(ii) One laboratory parallel of learning the visual form of new word in a known script is reading nonwords (of course, this task ignores any semantic aspects of vocabulary). Amnesic patients show normal practice effects in the acquisition of reading skill for regularly repeating nonwords (Musen & Squire, 1991).

It therefore appears that the implicit learning capabilities of amnesic patients are sufficient to allow new pattern recognition networks to be established for the visual forms of new language, whether this involves a new script or new words in a known script. Both of these tasks also involve output modules - written copying of new shapes, spoken production of new words. Given that amnesics show a wide range of implicit learning of new motor routines, it seems likely that they show similar facilitation in their language output modules. However, it must be remembered that all of this implicit learning occurs in the absence of any explicit recall of the words.

Accessing known conceptual associations

5. Amnesics show normal explicit learning of word pairs that are highly related.

Winocur and Weiskrantz (1976) showed that while amnesics' paired associate learning of unrelated word pairs was severely deficient, their performance on semantically highly related word pairs (chair-bench, wealth-fortune, etc.) was normal. They can make use of prior semantic associations in explicit learning but, as will be demonstrated below, they cannot explicitly learn new associations.

6. Amnesics show normal repetition priming effects of already known highly related paired associates.

Gardner, Boller, Moreines, and Butters (1973) showed Korsakoff's amnesics and controls a categorised word list. When subjects were later given category cues and asked to state the

first category member that came to mind in a free association task, both amnesics and controls showed equivalent amounts of priming. Similar confirmation of priming of prior relations comes from Schacter (1985) where amnesic patients showed normal levels of priming after studying a list of common idioms (e.g. sour-grapes) and then writing down the first word that came to mind on being given the stimulus word (sour- ?).

It seems therefore that implicit processes are sufficient to allow activation of pre-existing semantic associations. Furthermore, at least to a degree, amnesics' normal implicit input module activation, their normal implicit access of prior semantic mediations, and their normal implicit output module activation can allow near normal performance on explicit recall of highly related word pairs (though their performance rapidly deteriorates as the semantic associations of the two words becomes less strong - see Schacter, 1985).

Learning new conceptual associations

7. Amnesics are severely deficient at explicit recall of new pairs of associated words.

HM scored zero on this when the test required him to explicitly generate the second word of a previously studied pair when he was presented at test with the first. Generally, verbal paired associate learning of this type is very hard for amnesics even if they already know the words in question but are being asked to form a new association between them.

To the extent to which vocabulary acquisition is learning of this type (e.g. that aardvark - isan - armadil, 'what's an aardvark?'), then this deficit in amnesia tells us that this type of vocabulary acquisition is explicit. Recognition or recall of new semantic associations requires explicit memory.

8. Amnesics do not seem able to implicitly acquire novel semantic associations.

The semantic priming experiments discussed in 6 above involved implicit activation of pre-existing memory associations between highly related word pairs. What about the priming of novel word associations, a laboratory analogue of implicit learning of new meaning relations? Again, the evidence on this issue is mixed.

There were some early claims for normal priming of novel associations in amnesics. Moscovitch, Winocur and McLachlan (1986) assessed this with a task involving reading degraded pairs of unrelated words and observed normal priming of novel associations in amnesics. Schacter and Graf (1986) found that some amnesic patients - those with relatively mild memory disorders - showed normal implicit memory for a new association between unrelated words (e.g. study bell-cradle, test bell-cra?), whereas severely amnesic patients did not show such implicit memory for new associations. However, Squire's (1992) review concludes that later studies (e.g. Cermak, Bleich, & Blackford, 1988; Mayes & Gooding, 1989; Shinamura & Squire, 1989) demonstrate that amnesics do not exhibit this effect reliably.

Moscovitch et al. (1986) suggested that memory impaired patients could establish novel associations in a single trial on the basis of results from procedures where novel word pairs were presented one at a time, the subjects were asked to read as quickly as possible either (i) the same words that had already been presented, (ii) a new set of words pairs, or (iii) the old words presented in a recombined fashion in new pairs. The evidence that an association had been made between the word pairs was that the recombined word pairs were read more slowly than the repeated pairs. However, the effect was small and has proved difficult to replicate. In a recent improved study by Musen & Squire (1990) recombined word pairs were read just as quickly as old word pairs suggesting that the priming effects were at an input lexical level rather than a declarative associative one.

The weight of the evidence is that amnesics' implicit learning is not sufficient to allow new associations between two semantically unrelated words and Squire (1992) suggests that

subjects may need to access a link: between the two words that was formed declaratively (explicitly) at the time of study in order to do this.

Combining an of these aspects: amnesics' learning of new L1 concepts and their labels

Several studies have addressed amnesics' learning of new labelled concepts. Gabrieli, Cohen and Corkin (1983, 1988) have shown that H.M. and a small group of other amnesic patients were unable to learn by means of rote repetition the meaning of ten English words that they did not know before.

However, amnesics can be taught new vocabulary by means of a clever technique of vanishing cues which capitalises of their preserved implicit learning abilities. Glisky, Schacter and Tulving (1986) taught amnesics a substantial amount of novel computer vocabulary by this method which is a variant of priming procedures. At the start the patient was presented with a definition (e.g. 'to store a program') and the name of the command that enables that to happen ('SAVE'). On the next trial the definition was repeated, but only the first letter of the command (as in stem-completion tasks) was presented. If the patient could not answer, a second letter was presented, and so on until a correct response occurred. On the next trial the definition was presented again, alongside a fragment of the command containing one less letter than that needed for successful recall on the previous trial; thus, if a subject had been successful with sav-, he or she would see sa- on the next trial. Such learning was, of course, slow compared to controls, and acquisitions were relatively inflexible. But nonetheless, the results were impressive in that all the patients were able to learn the appropriate commands for 15 different definitions without any cues being available. Similarly Dopkins, Kovner, and Goldmeyer (1990) have shown that Korsakoff amnesics could acquire a conceptual interpretation of a new colour name ('bice') but their conceptual information did not reach the same level of abstraction as that of controls and moreover it was not integrated with the rest of their colour knowledge.

Consider vocabulary learning, like paired-associate learning and other typical associative learning tasks using explicit instructions to memorise. These results suggest that amnesic patients with hippocampal damage may eventually be able to acquire new associations, by means of numerous repetitions, as in the development of a habit. But this is far from normal learning. Their rate of learning is grossly slow in comparison with normal subjects and the acquired knowledge is abnormal in other respects as well. For example, even after the knowledge is acquired, it is still relatively inflexible, i.e., accessible only when exactly the same cues are presented that were used during training. For amnesics -it really is akin to parrot fashion learning - the patients have learned to produce a response, not to retrieve items from memory. Typically they can speak new vocabulary in the same way that a parrot can. By contrast, normal subjects learn quickly because they can apply a totally different strategy to the learning of new conceptual links. They can quickly memorise because they have an explicit, cognitive system of learning new associations which involves hippocampal and other limbic brain structures.

Conclusions

What can we conclude about vocabulary acquisition from studies of amnesics who seem to retain implicit, automatic systems of learning in the absence of explicit, declarative learning?

1. They show normal implicit learning of the perceptual aspects of novel word forms. Thus input modules for recognising novel word forms are tuned by experience and therein new pattern recognition units (input logogens) develop simply, implicitly, and automatically as a result of frequency of exposure. (Of course, in all of these studies the learners have paid attention to the stimuli, there is no evidence here for learning without awareness).
2. They show normal implicit learning of new motor habits and the motor aspects of novel word forms that are necessary for language production. Thus output modules for producing

novel word forms are similarly tuned by experience and new pattern recognition units therein (output logogens) also develop simply, implicitly, and automatically as a result of practice.

3. They are severely deficient at developing new conceptual information, at making new semantic links. In-between the implicit modules for receiving and producing language there is a conceptual system which operates according to cognitive principles, not those of habit. Vocabulary acquisition is as much concerned with meanings as it is word forms, and explicit learning is involved in acquiring and processing meanings.

What has been preserved in amnesia are the various, special purpose, relatively inflexible memory systems that permit one to behave differently as a result of experience, although usually only gradually over many trials. These deal with the abstraction of statistical regularities in the world (for perceiving new word forms) and our own behaviour (for producing new word forms). But amnesics' brain lesions do not produce loss of awareness without impairing some domain of information processing; they are unable to learn by means of the explicit cognitive system which is concerned with word meanings and which links input and output modules.

Neuroanatomical aspects of explicit, episodic, cross-modal memories in vocabulary representation

What of the neuroanatomy of all of this? Is it possible to bridge linguistic, cognitive and neuropsychological evidence and theory at an anatomical level of analysis? The following tentative speculations are at least consistent with current knowledge of brain function.

Mishkin & Appenzeller (1990) and Squire (1992) review research on the role of circuits involving the limbic system and structures linked to it (the hippocampus, amygdala, diencephalon [thalamus and mamillary bodies], prefrontal cortex, and basal forebrain) in the formation of long term memories in monkeys. These are the same structures which are damaged in cases of human amnesia. Animals with normal occipital and infero-temporal lobes but damaged hippocampus and amygdala can perceive visual patterns normally, but had impaired long-term episodic memories for visual stimuli. Furthermore, damage to these structures resulted in a global anterograde amnesia - these animals were equally impaired on touch recognition. Damage to the limbic system leaves old memories largely intact but prevents the normal development of explicit memory for new information. Thus it appears that while the occipital and inferotemporal lobes might subservise perception and be the locus of pre-existing LT visual memories, the subcortical memory circuits must engage in a feedback whereby after a processed sensory stimulus activates the hippocampus (and possibly the amygdala), the memory circuits play back on the sensory area, strengthening and so perhaps storing the neural representation of the sensory event that has just taken place. The amygdala is a kind of crossroads in the brain with extensive connections with all the sensory systems in the cortex and also deeper into the brain to the hypothalamus which is thought to be the source of emotional responses. Monkeys with amygdala damage cannot form LT cross-modal memories - they cannot for example learn to relate the touch of an object with its sight. Because they are also slow in learning to relate an object to reward. Mishkin & Appenzeller suggest that the amygdala allows association between stimuli and their emotional associations.

The conceptual meaning of a word is a conspiracy of perceptual memory traces. Think on the word 'Grandmother'. In so doing you awaken (whether consciously or not) your memories of all of the times you saw her, you heard her voice, you felt the touch of her hand and smelt her characteristic perfume. You remember the happy times and the sad. Conceptual meanings draw on rich cross-modal associations. Damage to the limbic structures which subservise these processes may thus deny the formation of these conceptual associations. This damage also prevents the formation of explicit LT memories between the perception of a word and the perceptual memories of its co-occurring referent.

The implicit language modules and their role in vocabulary acquisition

I/O modules are domain specific - e.g. visual word perception is not primed by prior listening. When automatized they are 'informationally encapsulated' (Fodor, 1983) - there are no top-down influences on the operation of input modules, and they are cognitively impenetrable we have no conscious inklings into how they operate. They work automatically - e.g., as evidenced by the Stroop effect it is hard not to read a word (Stroop, 1935). Typically they are acquired by means of implicit learning: the underlying structure of a complex stimulus environment is acquired by a process which takes place naturally, simply and without conscious operations. Simple attention to the stimulus domain of words suffices for implicit learning mechanisms to induce statistical or systematic regularities in this input environment. And so our lexical systems become tuned to regularities in orthography (letter units and sequential letter probabilities), to regularities in phonology (phonemes and phonotactic sequences), to regular patterns of grapheme-phoneme and phoneme-correspondences, to high frequency words over low frequency ones, etc. And input modules recognise, and output modules produce, high frequency patterns faster as a result. The "golden rule of sensorimotor learning is much repetition" (Seibert, 1927, p. 309) - the more patterns are repeated, the more frequent they are, the better they are acquired. This is the sort of learning that connectionist models do very well, and frequency, recency, and regularity are the driving forces which tune such systems (Gasser, 1990; McLelland & Rumelhart, 1986; Broeder & Plunket, in press).

If we test vocabulary knowledge by tasks like lexical decision or word naming, which fairly cleanly tap I/O modules, then words which have a high frequency in the language, i.e. words which have had considerable life-span practice, are processed concomitantly faster. Kirsner & Speelman (in press) and Kirsner (in press) propose a life-span practice model to explain these frequency effects whereby lexical performance in children and adults, both in L1 and L2, can be explained simply by reference to the power law of learning which Anderson (1982) uses to explain the relationships between practice and performance in the acquisition of cognitive skills generally, be they of sensory or motor nature. In so doing Kirsner is proposing that these lexical effects can be adequately explained in terms of general principles of implicit learning and skill acquisition without recourse to specifically 'lexical models'.

So it is practice that makes perfect in the input and output modules and these effects are clearly seen at both word and intra-word levels. Ellis (in press, b) further considers these effects of practice on statistical regularities specific to particular I/O modules.

The explicit conceptual system and its role in vocabulary acquisition

This section will demonstrate that, in contrast to the I/Os of vocabulary acquisition, explicit learning processes are essential for acquiring the semantic and conceptual aspects of vocabulary. In 1932 Bartlett, one of the founders of modern psychology, stated that "memory is an effort after meaning". A more recent statement of this theme is the Levels of Processing framework of Craik and Lockhart (1972). In this model information can be encoded in multiple forms: e.g. in terms of semantic, phonemic, or visual features; in terms of verbal associates, or as an image. Information processing moves from a sensory level of analysis, through pattern recognition to semantic enrichment. Craik and Lockhart suggest that "memory trace persistence is a function of depth of analysis, with deeper levels of analysis associated with more elaborate, longer lasting, and stronger traces" (Craik and Lockhart, 1972, p. 675). Levels of Processing holds that shallow processing like oral rehearsal does not lead to long-term retention but deep processing, whereby semantic associations are accessed and elaborated, does.

Bower and Winzenz (1970) confirmed the usefulness of the two deep strategies of semantic and imagery mediation. Subjects learned to associate 15 arbitrary pairs of words (e.g. horse-cello) under one of four conditions: (i) Repetition: they were asked to verbally rehearse each pair, (ii) Sentence Reading: subjects saw each pair of words in a simple

sentence, and were told to read it and use it to associate the two critical words, (iii) Sentence Generation: subjects were shown each pair of words and asked to construct and say aloud a meaningful sentence relating the two words, (iv) Imagery: subjects were asked to visualise a mental picture or image in which the two referents were in some kind of vivid interaction. The mean recall results in each condition were as follows: Repetition 5.6, Sentence Reading 8.2, Sentence Generation 11.5, Imagery 13.1.

Deep processing mediational strategies are thus highly effective in long-term L1 learning. They are equally useful in L2 vocabulary learning:

Imagery mediation using keyword methods

Atkinson and Raugh (1975) compared learning of FL vocabulary by means of keyword mnemonics with a control condition in which subjects used their own strategies. Keyword condition subjects were presented with a Russian word and its English translation together with a word or phrase in English that sounded like the Russian word. For example, the Russian word for battleship is linkór. American subjects were asked to use the word Lincoln, called the keyword, to help them remember this. Subjects who had used the keyword method learned substantially more English translations of Russian words than the control group and that this advantage was maintained up to six weeks later.

In this method the first stage of recalling the meaning of a foreign word involves the subject remembering the native keyword which sounds like the foreign word. The second stage involves accessing an interactive image containing the referent of the keyword and 'seeing' the object with which it is associated (this is the equivalent of the Imagery mediation condition of Bower & Winzenz, 1970). By naming this object the learner accesses the native translation.

Although it is a highly effective technique (see Levin & Presley, 1985 for review), it does have some limitations: (i) it is of little use with abstract vocabulary and keywords of low imageability, (ii) it is much less effective in productive vocabulary learning than in learning to comprehend the L2 (Ellis & Beaton, 1993 a, b) because imagery association in the keyword technique allows retrieval of the keyword which is merely an approximation to the L2 form. The technique does not have any in-built 'mnemonic tricks' to help spelling or pronunciation. For effective productive vocabulary learning the keyword technique must be complemented with repetitive practice at producing the L2 word forms. In sum, imagery mediation does not contribute to the lexical productive aspects of L2, but it does forge L1-L2 linkages.

Semantic mediation

(a) Using keywords

Sometimes FL words just remind us of the native word, a factor which usually stems from the languages' common origins or from language borrowing. Thus the German Hund (dog) may be more easily retained than the French chien because of its etymological and sound similarity with the English hound. Such reminding, whether based on orthography, phonology, etymology or 'borrowing' (e.g. 'le hot-dog') typically facilitates the learning of that FL word.

If the reminding is not naturally there, one can create it using keywords and semantic rather than imagery mediation. By simply remembering the keyword and the native word in a mediating sentence it is possible to derive the translation (the equivalent of the Sentence Generation condition of Bower & Winzenz, 1970).

(b) Deep Processing and Elaboration

Beck, McKeown, and Omanson (1987) advocate that learners focus on the meaning of the new word and that they should act upon this meaning in a way that is considered integrative in relation to already existing semantic systems. They are thus urging students to be, in Craik and Lockhart's terms, deep processors. Crow and Quigley (1985) evaluated the effectiveness for ESL students of several such semantic processing strategies (such as the 'semantic field')

approach where subjects manipulated synonyms along with the target words in meaningful sentences) and found them to be superior to 'traditional methods' over long time periods.

It can be advantageous to combine any of these aspects of (a) use of keyword reminders and (b) elaborative processing. Brown and Perry (1991) contrasted three methods of instruction for Arabic students' learning of English vocabulary. The keyword condition involved, presenting the new word, its definition, and a keyword, and learners were given practice in making interactive images; the semantic condition presented the new word, its definition, two examples of the word's use in sentences, and a question which they were required to answer using the new word; the keyword-semantic condition involved any of these aspects. A delayed testing over a week later demonstrated that the combined keyword-semantic strategy increased retention above the other conditions.

Metalinguistic strategies for inferencing

Sternberg (1987) presents a thorough analysis of learning vocabulary from context. He identified three basic subprocesses: selective encoding (separating relevant from irrelevant information for the purposes of formulating a definition), selective combination (combining relevant cues into a workable definition), and selective comparison (relating new information to old information already stored in memory). He categorised the types of available cue and the following moderating variables: (i) the number of occurrences of the unknown word, (ii) the variability of contexts in which multiple occurrences of the unknown word appear, (iii) the importance of the unknown word to understanding the context in which it is embedded, (iv) the helpfulness of the surrounding context in understanding the meaning of the unknown word (e.g. an equivalence cue such as 'an ing is a low-lying pasture' is most effective, a spatial cue such as 'the cows grazed the ing in the shadows of the surrounding mountains' is more effective than a temporal cue such as 'at dawn the cows grazed the ing' for a spatial concept, etc.), (v) the density of unknown words (too high a proportion of unknown words will thwart attempts to infer meaning). Subjects trained in use of these moderating variables or given practice in the processes of inferencing from context showed marked gains over control subjects in vocabulary acquisition from texts in a pretest-posttest design similar to the Clockwork Orange studies mentioned above.

Not only does such training promote inferencing from context, but also this active derivation of meaning [explicit learning] makes the vocabulary more memorable. Thus Hulstijn (1992) provides experimental support for a Levels of Processing hypothesis of vocabulary acquisition whereby inferred word meanings were retained better than those given to the reader through the use of marginal glosses.

Interim summary

Taking these results together it is clear that it truly matters what learners do in order to acquire the meaning of a new word. Successful learners use sophisticated metacognitive knowledge to choose suitable cognitive explicit learning strategies appropriate to the task of vocabulary acquisition. These include: inferring word meanings from context, semantic or imagery mediation between the FL word (or a keyword approximation) and the L1 translation, and deep processing for elaboration of the new word with existing knowledge.

Conclusions

Learners must acquire the I/O of new vocabulary: the pronunciation elements and their compounds in the tongue as well as the graphemes and their patterns of orthographic combination in the script. There are specialised modules, the input and output lexicons, which acquire the word forms and regularities of the surface form of language by implicit learning processes. Like other sensory or motor skin systems, these modules do so automatically and

they are tuned by practice - by frequency, recency, and regularity. To the extent that vocabulary acquisition is learning these surface forms of language then vocabulary acquisition is an implicitly acquired skill. In saying this I am not denying that the tunings of these systems cannot be guided by practice governed by explicit knowledge. In the same way that verbal declarative knowledge can coach the learner driver (Cease off the accelerator, down with the clutch, etc.), so it can the learner speller ('i before e except after c...'). In the early stages of any skill we use conscious declarative knowledge on the way to automatization. But essentially we learn to drive by driving itself, just as we learn to spell on the job of spelling or speak by speaking. In the main, these aspects of vocabulary acquisition reflect incidental learning.

However, the function of words is meaning and reference. And the mapping of I/O to semantic and conceptual representations is a cognitive mediation dependent upon explicit learning processes. It is heavily affected by depth of processing and elaborative integration with semantic and conceptual knowledge. Metacognitively sophisticated language learners excel because they have cognitive strategies for explicitly inferring the meanings of words, for enmeshing them in the meaning networks of other words and concepts and imagery representations, and mapping the surface forms to these rich meaning representations. To the extent that vocabulary acquisition is about meaning, it is an explicit learning process.

For any learning environment to be effective it must cater to an of these aspects. The I/O systems are tuned by practice, so the programme must encourage this as much as possible. There is little doubt that naturalistic settings provide maximum opportunity for exposure and motivation.. Reading provides an ideal environment for the implicit acquisition of orthography, and also, in individuals tutored in metacognitive and cognitive skills for inferring meanings from contexts, explicit acquisition of meanings. But many are the times when we have discovered a word's meaning, either from text or from a dictionary, only for it to fade from our memory. Explicit, deep, elaborative processing concerning semantic and conceptual/imaginal representations prevents this. Learners can usefully be taught explicit skills in inferencing from context and in memorising the meanings of vocabulary.

Acknowledgements

I thank the following people for useful comments on an earlier draft of this paper: Gordon Brown, Andrew Mayes, Barry McLaughlin, Paul Meara, Bill O'Donnell, Elisabeth Service, Mark Williams. A willingness to comment does not imply endorsement.

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APPEALING TO CONSCIOUSNESS IN THE L2 CLASSROOM¹

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Abstract

In this paper it is argued that a multifaceted view of consciousness in terms of concepts such as attention, awareness, intentionality and control (Schmidt, this volume), provides a revealing perspective on existing findings in second language classrooms and some promising directions for further research. Discussion of a number of current instructional issues is framed in light of these concepts, which are then applied to an analysis of some empirical studies of the effects of instruction among young second language learners in Canadian schools. Such studies are seen to provide growing support for the view that some level of awareness is necessary for second language learning, and that even children exposed to a substantial amount of message-oriented second language input can benefit from age-appropriate metalinguistic information.

Introduction

It is by now abundantly clear that the role of consciousness in second language learning is not one global question but several related ones, which need to be disentangled if we are to make progress in understanding how this learning takes place. In his writings on the topic, Schmidt (1990, 1993a, b) has provided a valuable basis for further investigation in terms of concepts such as attention, awareness, intentionality, and control. The focus of this paper is on classroom settings for second language learning, where the learners have little or no outside-class exposure to the target language concerned. It is argued that a multidimensional view of consciousness provides us with a revealing perspective on existing classroom findings, and some promising directions for further research. In the first part of this paper, I discuss the relevance of these various concepts of consciousness to a wide range of instructional issues. I then apply these concepts in interpreting some existing studies of the effects of instruction on second language learning.

Concepts of consciousness and instructional issues

It is well known that the relationship between teaching and learning is indirect, affected by a host of intervening variables. Thus, if an instructional experiment that makes an appeal to learners' consciousness fails to achieve its intended learning outcome, there may be room for a variety of interpretations: was the instruction unsuccessful because it was in principle not useful for language learning, or because of some other unmet condition for success? Conversely, where such instruction achieves its learning goals, which factor, or more likely, cluster of factors, can be identified as leading to this desired result? Our understanding of these issues depends on our ability to specify the relevant variables and sort out the complex interactions involved.

¹ Paper presented at the Symposium on the Role of Consciousness in Second Language Learning, AILA, Amsterdam, August 13, 1993. I am grateful to Merrill Swain for comments on a previous version of this paper.

Attention

Attention is one such variable that is generally viewed as being of key importance for learning of any kind. Allocation of at least some of the learner's attention to specific features of the exposure language can be seen as a necessary condition for second language learning to proceed (Schmidt 1993a). Attentional capacity, however, is known to be a limited resource, and more than one contentious issue in second language teaching has to do with this psychological constraint. Do limitations on processing capacity affect the relative learnability of certain aspects of syntax, and thus determine their teachability (that is, the order and timing of particular instructional focuses), as Pienemann (1984, 1989) has proposed? More broadly, can learners attend simultaneously to meaning and form? Or as a way of relieving the attentional load, should instruction emphasize first the one and then the other, and if so, which should be the main initial emphasis (Van Patten 1990)? Limited capacity is not the only attentional consideration of relevance to the form-meaning issue. Studies among children in the L1 have shown that they readily identify interest as one of the prime conditions for attending to any learning task (Miller 1985), and affect in general is of recognized relevance to attention too (e.g., van Lier 1991). In second language instruction, a need for learners to be occupied with "interesting and relevant messages" in an affectively supportive environment is one of the arguments for a 'natural', experiential teaching approach stressing comprehension of meaning without focus on form, an approach which Krashen (e.g. 1984, 1985) has endorsed for children and adults alike. How far this approach can go in fostering classroom-based L2 learning is an issue to which I will want to return.

Awareness

According to Schmidt (1993a: 4), attention controls access to conscious awareness and gives rise to the subjective experience of noticing which is "the necessary and sufficient condition for the conversion of input to intake" in second language learning. Whether noticing is necessarily a conscious event is controversial, as Schmidt concedes. He proposes 'availability for self-report' at or near the time noticing occurs as the defining criterion, while acknowledging that memory and the availability of metalanguage for describing its occurrence may make the consciousness of the noticing experience hard to verify. Whether or not noticing can be firmly pinned down as the 'zero-point' (Baars 1988) of conscious awareness in second language learning, there is no question that an important function of instruction is to enable this experience to take place. Just as there are conditions on attention, however, so there are on the ability to notice target language features. Mediating factors that have been proposed include the individual learner's prior knowledge and skill, as well as task demands, frequency, and perceptual salience in the exposure language (Gass 1988; Schmidt 1990). These variables may be highly complex in themselves. Under prior knowledge, for example, Gass (1988: 202) subsumes "knowledge of the native language, knowledge of other languages, existing knowledge of the second language, world knowledge, (and) language universals". The complexity is daunting for would-be classroom researchers, not least because of all the potential interactions among the relevant factors involved. Yet in order to interpret the outcomes of second language instruction, we are bound to take account of these.

Even if we agree that noticing is a necessary and sufficient condition for second language intake, we are still left with a major language teaching issue to grapple with: namely, whether a higher level of conscious awareness facilitates language learning, and if so, how this awareness is usefully promoted by teaching. For example, can instruction aimed at awareness in the sense of understanding (Schmidt 1993a: 8) assist L2 learners to systematize their mental representations of the language intake? Can it help them with the restructuring (McLaughlin 1990) aspect of their system-building? Is it perhaps even necessary, in some circumstances, to prompt metalinguistic awareness of what is not possible in the L2 so that a learner will notice the difference between some aspect of his or her interlanguage system and the one that characterizes use of the target language by a native speaker? Different positions have been taken on these

issues. Bley-Vroman (1986) and White (e.g. 1989), for example, have hypothesized that negative evidence in the form of correction may be necessary to prompt L2 learners to retreat from an L1-based over-generalization that is not ruled out by exposure to positive L2 data alone. In contrast, Schwartz (1993, see also Zobl 1993) referring to L1 acquisition and Fodor's (1983) modular view of language as an informationally encapsulated system of knowledge, argues that only 'primary linguistic data' in the form of target language utterances can be used by the (L2) learner for the purpose of grammar-building, though negative data and metalinguistic information may be useful for item-learning of a lexical nature.

Yet another position is advanced by Ellis (1993a, b) who argues that explicit knowledge prompted by grammar instruction can facilitate learners' intake, serving as an advance organizer but not feeding directly into the implicit knowledge system unless the learner is developmentally ready for it. For Ellis, explicit knowledge is a conscious representation which is "not the same as 'articulated knowledge' (i.e. spoken or written accounts of that knowledge)" (Ellis 1993a: 93).

The debate on the utility of different kinds of data to the L2 learner is clouded by uncertainty from both an 'inside' and an 'outside' perspective. Should the learner's internal mental representation of linguistic knowledge be viewed as a continuum from lower to higher levels of analysis as Bialystok (e.g. 1992) has argued, or alternatively, is there a clear qualitative distinction to be made between linguistic knowledge of the L2 and 'metaknowledge', as Sharwood Smith (1993) has proposed, or between explicit and implicit knowledge in the sense that Ellis has described? From the external perspective, there is corresponding uncertainty as to where one draws the line between positive and negative data, and between primary linguistic data and information of a more explicit kind. Clearly we need more precise operationalizations of some of these concepts in any further research on the role of awareness in second language learning.

In instruction, there is a wide range of analytic, code-focused teaching techniques (Harley 1993) that may be used as either positive or negative 'input enhancement' (Sharwood Smith 1991; White, Spada, Lightbown and Ranta 1991) for the purpose of raising learners' awareness. These may involve little or no use of metalinguistic abstractions, and yet still not be in keeping with the kind of primary linguistic data that is available to L1 learners. Written language input, for example, is usually available in the L2 classroom, providing a potentially important awareness-raising source of information that for L1 learners may come only after they have demonstrated ability to use the relevant features. Thus an important instructional issue is not just whether learners can make use of metalinguistic information in the form of rules and corrections provided by teachers, but whether awareness is differentially stimulated, for example, by oral or written language, by reference, or not, to the L1 and other languages, by single or multiple sensory modes, by task focus on language or on content, by timing, by different social arrangements, by formal or functional activities involving a focus on L2 input or reflection on output, etc. (For discussion of some of these issues, see for example, Cumming 1990; Long 1991; Stern 1992; Harley 1993; Van Patten and Cadierno 1993; Swain in press). In a recent article, Swain, for example, argues in favour of awareness-oriented instruction involving collaborative learning activities where students "reflect together on their own output, reprocessing and modifying it as their collective knowledge permits." Whatever choices are made, it is clear that none will be suitable for all purposes and for all learners, and that more research is needed to specify the conditions under which different awareness-oriented instructional techniques may be most beneficial.

In considering the place in the L2 classroom of metalinguistic information about the second language, a further issue concerns the content of such pedagogical rules as well as the form that they take. Schwartz (1993) offers one kind of prediction: that items, but not syntactic generalizations, can be explicitly taught. Garrett (1986) proposes an approach to metalinguistic discussion that focuses on the relationship between meaning and form. Green and Hecht (1992:

180) see explicit pedagogical rules and linguistic exercises as most useful for "straightforward, mechanically governed linguistic categories" while "explanations" provided in the context of communicative activities focused on meaning may be better for teaching "hard rules" involving semantic categories such as aspect. Extrapolating from Odlin (1986) and the Competition Model of language use (e.g., Mac Whinney and Bates 1989), another argument might be that the usefulness of metalinguistic information depends on the prototypicality or cue-validity of the exemplars used to demonstrate the category concerned. In considering rule content, the question of the completeness and accuracy of any given pedagogical rule is a further issue that cannot be ignored (e.g., Berman 1979). Moreover, to add to the complexity of the choices that have to be made, it is clear that linguistic criteria alone are inadequate to predict how useful the metalinguistic information will be. The learner-based conditions on noticeability referred to earlier will doubtless apply at higher levels of awareness too, including, for example, prior knowledge with respect to the terminology to be used.

The preceding discussion, though far from complete, provides some indication of the many pedagogical issues that are involved in any classroom study of the role of awareness in second language learning. Indeed, it seems that much of the discussion about the role of consciousness in classroom L2 learning has centred on this aspect of the consciousness question. There are nonetheless additional issues that arise with respect to the further concepts of intentionality and control, which I will now touch on briefly.

Intentionality

The incidental-intentional dimension of consciousness as applied to second language learning relates to the distinction often made between use of the language for some further purpose, where learning may occur as a byproduct of communication, and deliberate study of aspects of the language code in an effort to master them (Schmidt 1990, 1993a, b). This dimension of consciousness is thus clearly related to the choice between experiential and analytic teaching approaches in the second language classroom. Given that children appear to be primarily incidental learners of the L1, and that adults can also learn L2 features incidentally (Hulstijn 1992), an important question is whether there is any advantage to intentional learning at all, and "thus to classroom activities in which learners are directed to deliberately pay attention to specific language features. If so, it is likely that this teaching strategy will be more useful among older L2 learners than among children who, as Schmidt (1990: 145) has pointed out, appear less able to voluntarily pay selective attention to features of a learning task. This age-related issue in second language teaching is thus relevant to the question of task demands. Are the inherent task demands of a learning activity more crucial for children in enabling them to attend to relevant L2 features than they are for older learners who may be better able to pay selective attention to those features based simply on task instructions, even if the inherent demands of the task concerned do not force them to do so (Hulstijn 1989)?

The volitional as well as the effortful aspect of intentional learning raises the additional issue of whether L2 instruction that makes a strong appeal to intentionality is likely to make for greater individual differences than an approach that allows for more incidental learning. Alternatively, it might be argued that incidental learning, if it occurs without implicit or explicit instructional guidance, could make heavier demands on individual learners' prior knowledge and skill, leading instead to greater diversity of outcomes than an intentionally-oriented instructional approach that is designed to preorganize the language data and the learning tasks. Whether different instructional approaches lead to more or less diversity in student outcomes is clearly an important classroom issue in need of further research.

Control

The concept of control relates primarily to the learner's skill in activating knowledge of the language for comprehension and production (Bialystok 1992; see also Sharwood Smith 1993;

chmidt 1993b). The activation of new knowledge in on-line language processing may at first involve conscious mental effort, and an important pedagogical issue is how to facilitate the transition from such highly controlled processing to the point of relative automaticity. Different kinds of tasks may be seen to place different kinds of processing demands on the learner, hence another related instructional issue is how to match the processing requirements of different kinds of tasks not only with the learners' level of skill, but also with the learning goals concerned. This issue is highly relevant, for example, in assessing the effects of language instruction: learners who are adept at responding to written multiple-choice items in single sentence contexts, may nonetheless be incapable of fluent use of the L2 in conversation.

While it is clear that language teaching should avoid placing undue processing demands on learners, it may be that the application of some mental effort is facilitative in language learning, as is suggested for example by Tomasello and Herron (1988, 1989) in their studies of different approaches to error correction. A teaching approach which makes few control demands on the L2 learner is not necessarily conducive to continued L2 progress (see also Swain 1985).

Finally, while relative automaticity is seen as the desirable outcome of at least some kinds of learning, it appears that once learning reaches this stage, it may become less accessible to conscious control and thus resistant to change (McLaughlin, Ross and McLeod 1983). Hence, in language teaching, the oft-cited concern about fossilized errors that are seen as impervious to correction (e.g. Higgs and Clifford 1982). The stage of learning at which negative feedback may, or may not, be useful is a question that is intimately connected to the concept of control.

Empirical classroom research

The preceding discussion will, I hope, have shown that there are numerous instructional issues that are more clearly framed in terms of a multifaceted, rather than a unidimensional, view of the role of consciousness in second language learning, and that there is a whole range of relevant instructional variables that come into play. It has to be recognized that existing studies of the effects of classroom instruction on second language learning have not, in general, tried to assess what learners are actually attending to, the state of their awareness, the intentionality of their learning, or their efforts to impose conscious control (see, however, Slimani 1989; Manghubai 1991). These will be important features of any further such research, alongside the need to define clearly both the linguistic content of the instructional treatment and the pedagogical procedures employed.

In the remainder of this paper, I propose to undertake a brief post hoc analysis of some existing classroom research in the light of some of the many issues I have raised. Of necessity, this analysis will have to be selective. I will be referring mainly to research conducted in Canada, and in particular to two second language programs in Canadian schools, both of which place a major emphasis on experiential language use: namely, early French immersion, where English-speaking children across their school career receive a substantial portion of their subject matter instruction in their L2, French, and intensive English for French-speaking children who receive five months of full-day communicative activities in English at grades 5 or 6. While this section will thus be based primarily on classroom learning by children, I will have occasion to refer to some studies of older learners too.

Experiential instructional approaches

The question of how far an experiential teaching approach can go in enabling classroom-based learners to notice specific aspects of the target language system is one that requires consideration of the various dimensions of consciousness outlined above. Studies of the second language development of children in French immersion programs show that this content-oriented instructional approach which provides substantial exposure to contextualized language use, and

which emphasizes interesting, substantive subject matter themes, is sufficient to enable these young classroom learners to notice certain key aspects of the target French language system. What they take in can be seen to reflect the conditions on noticeability that have been specified. The children's productive repertoire in French has been found to consist mainly of phonologically salient, high frequency lexical items, along with syntactic patterns that are generally congruent with the L1 (see e.g. Harley 1992). This lexically-oriented learning can be seen to be well tuned to the task demands of their subject-matter learning where the most pressing need is for global comprehension and for the expression of meaning in context.

Less salient morphosyntactic features of the target system, incongruent with the L1 and/or not crucial for comprehension or for getting meaning across may fail to become intake however. For example, while immersion students as early as grade 1 demonstrate in their spontaneous speech that they have noticed that French, like English, has a determiner system (Radford 1990), several years may pass before they provide evidence of having noticed that French nouns have grammatical gender, which is most consistently reflected in definite and indefinite articles. Lack of task demands for attending to grammatical gender when the primary focus is on meaning, lack of phonological salience of the relevant alternations in unstressed articles, and lack of learner expectations based on prior L1 knowledge are among the factors that can be seen to be conspiring to prevent these learners from noticing crucial cues to the gender of French nouns. Recent test data obtained at the grade 2 level confirm that even when primed by means of instructions in the context of a simple decontextualized task, some grade 2 children fail to notice the phonological distinction between masculine and feminine articles. The fact, however, that there are individual differences in the students' mastery of such formal features of the L2 suggests that some are more skillful than others at dividing their attention between meaning and form.

The L2 learning that occurs among young children in early French immersion appears to involve little or no deliberate intention to learn specific language features. Their language learning can be seen as characteristically incidental, occurring as a byproduct of communication and thus unconscious in this sense. The incidental-intentional dimension provides an interesting age-related perspective on the largely shared non-native features of their interlanguage production which may persist over time. Exposure to the interlanguage talk of peers has frequently been cited as a reason for this second language classroom phenomenon, not only in French immersion but also in the intensive English program in Quebec (Lightbown 1992a) and in classes with large congregations of Chinese-speaking children learning English in the United States (Wong Fillmore 1992). It is perhaps significant that these observations refer to elementary school children in a classroom-based learning environment, rather than to classroom learners who begin their L2 exposure at a later age and who are often described as learning at a 'faster rate' (Krashen, Long and Scarcella 1979). Referring to psychological experiments by Ceci and Howe (1982), Schmidt (1990) suggests that the incidental L2 learning of children is characterized by a more open awareness of the environment than is that of older learners. Thus it may be the case that in this type of second language classroom environment, children attend involuntarily as much to the language of peers as to their teachers, while older learners are more capable of voluntary, selective attention to more authoritative samples of L2 input. It may be noted that Schmidt (1990: 145) proposes a very different implication of the same psychological findings, suggesting, namely, that children who have less control over the 'spotlight of attention', are unable to avoid noticing communicatively less important grammatical features, and that this accounts for findings showing that children do better than adults in L2 learning. In the kind of classroom environment with which we are concerned, it appears, however, that they do not necessarily notice such grammatical features.

While intentional learning may be of some advantage to older learners, the perceived effort may serve as a deterrent too. Relatively few students, for example, enter late immersion programs in adolescence, and for those who do, anecdotal reports suggest that success depends on willingness to devote considerable energy to the task of language learning. Thus these students may be a rather special 'intentionally-oriented' sample of second language learners. That intentional

learning could also be a significant factor in accounting for individual differences among older second language learners is suggested by a recent classroom study of vocabulary learning among adults. Sanaoui (1992) found that those learners who voluntarily engaged in structured vocabulary learning activities beyond the classroom were those who were most successful in retaining vocabulary that was taught inside the classroom.

The concept of control provides a further useful perspective on some French immersion findings. The oft-noted discrepancy between their outstanding global comprehension and their less distinguished production skills may be related not only to the question of linguistic knowledge but also to the fewer opportunities individual students have to develop control of their production (see e.g., Swain and Carroll 1987, for findings concerning production opportunities).

Awareness-oriented instruction

The experiential approach to language teaching that is dominant in early French immersion can be seen to be directed at a minimal level of conscious awareness by the learner, and the same would appear to apply to much of the instruction that occurs in the intensive English program for French speaking children in Quebec (Lightbown 1992a). In recent years, a number of studies have been conducted in both these programs to determine whether the incorporation of additional awareness-oriented instructional measures can enhance the students' learning in those areas of the target language system where non-native patterns of use have been found.

In French immersion, three quasi-experimental studies have been conducted at grades 6 to 8 involving the teaching of aspectual distinctions in French verbs (Harley 1989), conditional verb forms and functions (Day and Shapson 1991), and sociolinguistic distinctions in register with a focus on second person forms (Lyster 1993). In the intensive English program, observational and quasi-experimental studies have focused at the grade 5 and 6 levels on the presentative "There is..." (Lightbown and Spada 1990; Lightbown 1992b), adverb placement (White 1991; Trahey and White 1993), and question formation (White, Spada, Lightbown and Ranta 1991; Spada and Lightbown 1993). These studies in French immersion and intensive English have all shown at least some advantage for the type of instruction concerned, and most have indicated long-term maintenance of the learning involved, implying that linguistically focused L2 instruction may be of benefit even for children and for a range of different kinds of linguistic features.

The adverb placement studies conducted in the context of the intensive English program speak directly to the issue of whether positive input enhancement in the simple form of increased frequency is as effective, or more effective than awareness training involving use of language exercises and corrective feedback. The results of these studies are, however, somewhat inconclusive. What the grade 5 learners in these studies were to learn was that in English, unlike French, adverbs are permitted between subject and verb, but not between verb and object. This difference between the two languages is seen in terms of Universal Grammar as an aspect of the verb-raising parameter, set differently in English and French. In the first study (White 1991), which involved awareness training over a two-week period, the students did learn that adverbs could go between subject and verb and not after the verb, and this learning was found to be maintained in post-testing five weeks later. There were two problems, however. The learners were rejecting adverbs after the verb not only before objects but before prepositional phrases where they are permitted in English. Furthermore, one year after the study, the students were found to have forgotten what they had learned. These findings were interpreted by Schwartz and Gubala-Ryzak (1992) to mean that the awareness instruction had not affected the learners' internalized language system at all, but engaged only a conscious, encyclopedic type of knowledge that was in principle not useful for grammar-building. The argument rests on the unnaturalness of rejecting all adverbs in post-verbal position and on the claim that internalized linguistic knowledge would not be forgotten.

Alternative interpretations are possible. It may be, for example, that certain necessary conditions for learning failed to obtain: for example, the students may have rejected all postverbal adverbs because they were (deliberately in this instance) exposed to incomplete information about post-verbal use of adverbs in English; and they may have forgotten what they had learned because the instruction was not sufficiently oriented to learners' communicative needs and because adverbs were subsequently of extremely low frequency in the classroom context (Lightbown 1992a), leaving insufficient room for development of control. What the forgetting problem highlights from a methodological perspective, however, is the importance in any instructional study of including long-term follow-up assessment of the learning that occurred.

In the second study of adverb placement, Trahey and White (1993) investigated the effect of simply increasing the frequency of adverbs for a two-week period, in what could be regarded as a minimal instructional intervention aimed at promoting 'noticing'. In this instance, the learners demonstrated a dramatic increase in the use of adverbs pre-verbally, but they apparently failed to notice that adverbs could not be placed between verb and object. Trahey and White do not argue as they might have (see e.g., White 1989), that positive evidence was in principle not enough to enable learners to notice the gap between their interlanguage and the target language system, but that more time may have been needed for completion of the parameter-resetting process involved.

The whole question of whether, for grammar-building purposes, L2 learners can make use of information about the language, and not just primary linguistic data, can be examined in relation to other instructional studies in the intensive English and French immersion programs. A certain amount of formulaic item-learning may have been characteristic of the studies of question formation in intensive English (White et al. 1991; Spada and Lightbown 1993), where a long-term growth effect was found for focused instruction with corrective feedback on how to ask questions. However, there is also evidence that students were generalizing their knowledge to new linguistic contexts (Spada and Lightbown 1993), hence it appears that the instruction concerned was indeed relevant for grammar-building too. The same can be said for the immersion studies of aspect (Harley 1989) and the conditional (Day and Shapson 1991), where the emphasis was not just on the relevant verb forms but on their semantic functions. These two studies both showed some positive effects for the instruction, and like the question formation studies in intensive English, led to long-term continued improvement in the learning concerned.² Similarly, Lyster's (1993) sociolinguistic study which focused on second person forms was not aimed at teaching these as an inventory of items, since they were already familiar to students, but on teaching the complex pragmatic conditions on their use in communication – thus not grammar-building in a narrow sense, but not item-learning either. This study showed a long-term positive effect for the experimental treatment. The overall results of these studies, then, indicate that classroom instruction appealing to learners' awareness can have a long-term positive effect on system-learning. It should also be noted that some of the linguistic 'rules' that were the focus of instruction were of the fuzzy, more 'difficult' kind (e.g., aspect). The positive results of these studies suggest that awareness-oriented instruction is useful in such instances, and not only for simple, 'easy' rules (cf. Green and Hecht 1992).

Of course classroom instruction appealing to metalinguistic awareness is not necessarily directed at system-learning. Fotos and Ellis (1991), for example, conducted a classroom study of adult EFL learners in Japan where a metalinguistic activity appears to have favoured

² The unexpected discovery in the studies by Harley (1989) and Day and Shapson (1991) that one or more of the comparison classes were also receiving relevant focused instruction has to be taken into account in interpreting certain findings of no difference between experimental and comparison classes, and the same applies to the most recent of the question formation studies in the intensive English program too (Spada and Lightbown 1993). These studies demonstrate the importance not only of long-term follow-up testing, but of including a comparison group at all stages of the testing, and of monitoring classroom practice in both experimental and comparison groups in order to interpret the findings.

consolidation of item learning rather than rule-generalization, and indeed the testing in this study did not assess the learners' ability to generalize their learning. In contrast, a laboratory study with adult ESL learners in Toronto conducted by Carroll and Swain (1993), and dealing with the same syntactic domain (i.e. dative alternation), was explicitly concerned with whether the instruction would result in generalization of learning to newly encountered verbs. Learners who received explicit metalinguistic feedback on their errors, in the form of a semantic or phonological rule for dative alternation, were most successful at generalizing their learning to new verbs and at maintaining this learning one week later; at the same time, three other kinds of negative input, which did not provide the learners with a metalinguistic rule, were also more useful than no feedback in promoting generalization of learning. The authors caution, however, that the study did not examine longterm retention and that the experimental conditions under which the subjects were operating might not be generalizable to other types of learning context. In an earlier laboratory study involving the nominal suffixes -age and -ment in French, Carroll, Swain and Roberge (1992) found item-learning but not system-learning among adult Englishspeaking learners. Contributing factors here may have been that, in this case, the relevant generalization involved a substantial number of exceptions, and that no explicit metalinguistic feedback condition was provided to guide learners to the relevant 'fuzzy' rule. Alternatively, this may be a case where many more items have to be learned qua items before generalization can occur.

In sum, complementary studies in classroom and laboratory settings will continue to be needed to determine the relative usefulness of different kinds of awareness-oriented instruction to the second language learner, seen in relation to different linguistic domains. What is now also needed is further investigation, from the learners' perspective, of what level of conscious awareness the relevant focused instruction actually produces. In all cases, the studies in the intensive English and French immersion programs involved a variety of instructional procedures and learning activities as, of course, is appropriate and desirable in any classroom context. However, this makes it difficult to pinpoint any specific aspect of the instruction as crucial to the development of the learners' understanding. There are nonetheless some hints as to more, and less, effective instructional techniques. In a study of one teacher's remarkable success in promoting use of presentative "There is..." instead of the characteristic "You have a..." among intensive English students, Lightbown and Spada (1990; see also Lightbown 1992b), found that the teacher was effectively using drama and humour to get students' attention; in the study of aspect in French immersion (Harley 1989), teachers reported that illustrating contrasting sentences was the most useful and interesting activity for making students "conscious" of the distinction between progressive and completive aspect. On the other hand, classroom observation in this study showed that one production activity had 'misfired' in the sense that task demands were not stringent enough to ensure that learners actually used the relevant verb distinctions. In their study of question formation, Spada and Lightbown (1993) examined different levels of explicitness in the corrective feedback techniques of different teachers and concluded that different techniques may be appropriate depending on the learners' prior knowledge or stage of development, with more explicit techniques appropriate at an early stage and more implicit being sufficient later on. In short, these studies provide indications that there are many subtle variations in instructional procedures as well as timing decisions that can make a difference to the development of learner awareness and which appear to be relevant in promoting learning. One of the implications for further research thus would seem to be the need to make finer distinctions in the classroom comparisons we make.

Conclusions

Instructional studies such as those reviewed above are providing growing support for the view that some level of awareness is necessary for second language learning, and suggest that even children may benefit from age-appropriate metalinguistic information that is aimed at a relatively high level of understanding. What is now needed is an emphasis in classroom experiments not

only on the 'outside' characteristics of the language content, the observed classroom procedures, and the longterm learning outcomes, but also on the 'inside' perspective of the learners involved and what they report themselves to be aware of (cf. Schmidt 1993a). Beyond the awareness issue, the refinement of the notion of consciousness in terms of the concepts of attention, intentionality, and control points to further issues for investigation that relate less closely to linguistic issues per se, but that are crucially important in promoting the classroombased learning of a second language.

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LANGUAGE AWARENESS, CONTINGENCY, AND INTERACTION¹

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Abstract

As part of language awareness raising, teachers can study the ways in which they interact with their students, and their students with each other. It is widely believed that social interaction can have a decisive impact on the language learning process, and it is important to find out what aspects of interaction, and what kinds of interaction, might be most conducive to learning. This paper looks at possibilities for teacher research in this area, and proposes that a particularly important element in the learning process is contingent interaction. Several features of contingency are illustrated, and their importance for language learning is discussed.

Introduction

The question of consciousness in educational processes is usually discussed from the perspective of intrapersonal cognitive and affective processes such as attention to form, the learning of explicit rules, or metalinguistic knowledge. The intrapersonal (or individual) perspective is clearly a central problem in the study of language acquisition, both first and second, and it is addressed in most of the papers in this collection. In this paper, however, I will add a more interpersonal perspective, one which argues that consciousness is important for the work of both teachers and learners, in the organic sense of organizing, controlling and evaluating experience. In this sense consciousness is crucial in all rational and social action, including pedagogical action. Through conscious participation in interpersonal processes the learner allocates appropriate levels of attention and investment of energy, and directs this attention and energy where it is most beneficial for learning. Consciousness in this sense is an organic relationship to and with the world, which is necessary for the development of self-regulation and authenticity, true goals of education in a democratic society.

I will focus on classroom interaction as a locus of this consciousness and suggest that an awareness of practices and options in classroom interaction can be of great assistance to students and teachers alike in taking charge of their own educational activities in critical and proactive ways. Such awareness-raising work, which turns the classroom from a field of activity into a subject of inquiry², can promote deep and lasting changes in educational practices.

Reforms and innovations in education have often tended to be uncertain at best, in spite of the best intentions and commitment of all involved. Perhaps, instead of 'thinking big' and promoting wholesale change, as we usually do, it may be beneficial for a change to 'think small', and try to transform education from the bottom up. Traditional theoretical thinking, which assumes the centrality of causes, effects, and generalizations, is inappropriate for this kind of practice-based work. Rather, I suggest that the chances for meaningful change can be enhanced if the detailed study of interaction looks towards chaos (or complexity) theory.

¹ This is a substantially revised version of a paper first published in the Thames Valley University Working Papers in English Language Teaching, Vol.2, 1993. I thank: the staff at TVU for providing such a stimulating and pleasant atmosphere to work in.

² I borrow these words from Kozulin (1990:18), who uses them to describe Vygotsky's approach to psychology.

According to this theory, minute changes in input can bring about tremendous changes in output. This is known as the 'butterfly effect': a butterfly stirring the air today in Peking can transform storm systems next month in New York (Gleick, 1987; Lewin 1993). As an example, at any point in teacher-student discourse, the student can be encouraged to think and act with independence and creativity, or be discouraged from doing so. The former type of discourse may quickly lead to an increase in autonomy and intrinsic motivation. Roberts et al. (1992) speak of students 'tuning in' as a key feature of success in further-education classes (adult education classes in Great Britain). Such tuning in (or engagement, intrinsic motivation, etc.) is interactionally achieved, and teachers and students alike can benefit from studying their own practices to see how they can enhance the learning quality of their time together.

In this paper I first describe the role of consciousness in pedagogical processes, and then discuss the various kinds of interaction that are available to teachers and students, with suggestions about their potential learning value. Finally, it is proposed that consciousness raising about their interaction is one of the most powerful elements in teachers' professional development.

The role of consciousness in language learning

Vygotsky defined consciousness as "the objectively observable organization of behavior that is imposed on humans through participation in sociocultural practices" (Wertsch, 1985, p. 187). The emphasis here is on the organizational role, and the social origin, of consciousness. In Vygotsky's view, consciousness constitutes the highest level of mental activity. It has two subcomponents: intellect and affect (this view is echoed in Humphrey, 1992, and is a tribute to Vygotsky's extraordinary insight). These two sub-components of consciousness are dynamically interconnected, transforming one another constantly. Consciousness, then, organizes human activity - socio-cognitive activity, in Vygotsky's scheme - through intellectual and affective processes. Note that we may or may not "be conscious" of these activities of consciousness, in the sense of meta-cognition. Another definition by Vygotsky, of consciousness as "an awareness of the activity of the mind" is thus a special type of consciousness, a meta-consciousness in effect.³

Consciousness in the dynamic and organic sense of Vygotsky's first definition clearly has a crucial place in language learning. In it, intellectual (e.g., memory) and affective (e.g., the emotional value assigned to an action) processes are responsible for the organization of learning. What sets these processes in motion? In Vygotsky's view, sociocultural activity in the zone of proximal development (ZPD), the innate attention-focussing preferences of the child, and (increasingly) the autonomous, self-regulated actor himself or herself.

Consciousness, thus defined, has several practical implications for the teacher in the class room:

1. It is important to find the appropriate social interaction to allow learning to take place.

We should seek, be prepared to stimulate, and guide natural attention-focussing tendencies in the students, since they are likely to be in the ZPD.

2. We must educate the students to make their own decisions increasingly, and in order to do that we must make sure that they know what they are doing. Eventually they are best served by being able to regulate their own language learning.

Initially the teacher acts as the student's "vicarious consciousness" (Bruner, 1986, p. 72) but gradually, by a process of scaffolding, increasing responsibility and autonomy are handed over to the student, the teacher remaining "forever on the growing edge of [the student's] competence" (ibid: 77).⁴

³ According to Wertsch 1985, Russian has two words for consciousness reflecting the two different meanings shown here.

⁴ Work in Zone of Proximal Development., and the process of scaffolding, are similar to Krashen's notion of comprehensible input at $i + 1$ (1991). However, comprehending (which can be accomplished in many different ways and in many degrees) is only one of a number of possible ways of gaining access to relevant language material. Overall, a better term would be 'participatable input.'

The second view of consciousness we will consider is that of Csikszentmihalyi, in his work on the notion of flow (Csikszentmihalyi, 1990). In his view consciousness, although the result of biological processes, is self-directed, i.e., has developed the ability to override its genetic instructions and to set its own independent course of action (1990, p. 24). Csikszentmihalyi's functional description of consciousness is worth quoting in full:

The function of consciousness is to represent information about what is happening outside and inside the organism in such a way that it can be evaluated and acted upon by the body. In this sense, it functions as a clearinghouse for sensations, perceptions, feelings, and ideas, establishing priorities among all the diverse information. Without consciousness we would still "know" what is going on, but we would have to react to it in a reflexive, instinctive way. With consciousness, we can deliberately weigh what the senses tell us, and respond accordingly. And we can also invent information that did not exist before: it is because we have consciousness that we can daydream, make up lies, and write beautiful poems and scientific theories. (1990, p. 24).

Consciousness, then, means the organizing, controlling, and evaluating of experience. Without it, we might still be able to respond appropriately to the environment, but it would be more like the leaf of a plant which moves in the direction of sunlight. It is clear that the bulk of human learning, being the complex and protracted activity that it is, can only be accomplished by a consciously acting person.

A third consideration is the close relationship between consciousness and language. According to Vygotsky,

To become conscious of a mental operation means to transfer it from the plane of action to that of language, i.e., to recreate it in the imagination so that it can be expressed in words. (1962, p. 88).

Similarly, the neuroscientist Ernst Pöppel has defined as conscious "only those psychological events that are communicable" (1988, p. 171). Without language, and without social interaction, it is doubtful that consciousness, in the human-organic sense in which I am using the term, could exist at all. This does not mean that language causes consciousness to come about, or that consciousness causes language to come about, but that both are inextricably connected, like two sides of a coin. Further, one might say that the growth of language means the growth of consciousness as well, and that learning equals the acquisition of consciousness.

My final point concerns the issue of definition and definability itself. This has three aspects: demarcation, unitariness, and phenomenology. C.S. Lewis aptly called the word conscious (together with the related word conscience) "a simmering pot of meanings" (1960, p. 196). We may not be able to distinguish the various meanings of consciousness, awareness, attention, and so on, with sharp clarity, but this should not prevent us from having a meaningful discussion of the various processes involved. As Edmund Burke observed:

Though no man can draw a strake between the confines of day and night, still light and darkness are on the whole tolerably distinct. (quoted in Stubbs, 1982, p. 144).

Secondly, we should not expect a complex phenomenon like consciousness to be confined to only one clearly definable meaning or function. As Wittgenstein remarked of the word 'think':

It is not to be expected of this word that it should have a unified employment; we should rather expect the opposite (quoted in Armstrong & Malcolm, 1984, p. 69).

Finally, a natural-scientific or causal perspective may never get us closer to what consciousness really means in human terms. Instead, a phenomenological perspective may be necessary which, regardless of what neural or experimental evidence tells us, assigns a central place in our existence to consciousness. To use an analogy made by Vygotsky, we all know perfectly well that the earth turns around the sun, but this scientific fact is powerless to change the human perception of sunrise and sunset (Kozulin, 1990, p. 89).

To sum up, we must study language learning from the perspective that conscious involvement is essential for language learning, but this conscious involvement cannot be limited to explicit grammatical study, knowledge of rules, or attention to form (nor need it exclude such foci, of course). The next section will give the reader some ideas to think about, and some avenues for further exploration. My main aim is to prevent simplistic conclusions one way or another.

Interaction

I now return to the three practical implications of consciousness (and consciousness-raising) mentioned on page 3. They might be summarized in the following three terms: social interaction, natural learning processes, and self-regulation. I would like to argue that these are three aspects of one single theme: language learning, not in a causal sense (of "x causes y"), but more like the relationship that holds in the "scissors-paper-rock" game that children play: scissors cut paper, paper wraps rock, rock beats scissors, a relationship in which causality plays no meaningful role.⁵ If we replace the verbs in the game with the verb "enhance" in our case (social interaction enhances natural learning processes, natural learning processes enhance self-regulation, and self-regulation enhances social interaction), then we have a mutually enhancing, reinforcing relationship between the three concepts which preserves the organic nature of the learning process.

To begin with interaction, it is a well-attested observation that it, particularly verbal interaction, is central to education. "Schools are language-saturated institutions," Harold Rosen has said (1969, p. 119). As Dick Allwright put it: "... interaction is the process whereby everything that happens in the classroom gets to happen the way it does. Let us make the most of it." (1984, p. 169). Now there are many kinds of interaction, in classrooms and out. We can suppose that some kinds might be more conducive than others. In the organic view of consciousness that I have outlined above, the kinds of interaction that rely on and promote such consciousness will be most conducive to learning. Which ones are they, and how can we implant them in our educational practices?

To answer these questions we need detailed information on different kinds of classroom interaction and on interaction in other settings, particularly conversation. We need to isolate those characteristics of interaction which provide opportunities for learning, and then see how they are embodied in the different kinds of interaction that we can identify.

Recitation and the IRF exchange

Education, including language education, has long been accused of inadequate use of the main tool of educational transmission: language. Criticism in this respect has taken a variety of forms, from Bourdieu and Passeron's (1977) professor who is compelled, by the forces of the institution, to "theatrical monologue," to a condemnation of the "ubiquitous recitation script" by

⁵ For readers who are not familiar with the game, the two players simultaneously make one of three gestures: scissors (index and middle finger spread out), paper (flat hand outstretched), or rock (fist). Since scissors beat paper, paper beats rock, and rock beats scissors, there is a winner every time, or a draw when both players use the same gesture. Usually the game is played three times to determine who wins. I use the game here as a prime example of a system which is not organized in a linear causal way.

Tharp and Gallimore (1988), in which teachers ask rote questions to obtain routine answers from their students.

In second and foreign language classes there has further been the issue of teachers using 'teacherese,' a particular form of foreigner talk which, in its endeavour to make language comprehensible to the students and to serve as a correct model, exposes students to a type of language which they will not encounter in real life, and which therefore does not prepare them for everyday language production and interpretation.

Further, interaction between teachers and students has been characterized by frequent correction of errors and pontification about points of language form, and this has served to distance classroom language even more from other contexts of use.

Proposals for richer language use in classrooms have been frequent and diverse, reflected in such terms as responsive teaching, instructional conversation, dialogic model, exploratory teaching, pedagogical tact and transformation (Eisner, 1991; Shuy, 1991; Tharp & Gallimore, 1988; van Manen, 1991; Wells, 1993). A change in patterns of interaction is also an integral part of a number of recommendations of critical pedagogy (Aronowitz & Giroux, 1991; Darder, 1991), which builds on the work of Paulo Freire (1972).

One of the most characteristic patterns of teacher-student dialogue is the so-called IRF (initiation, response, feedback) exchange, well-known from the work of the Birmingham school of discourse analysis (Sinclair & Coulthard, 1975). Below is a simple example of such an exchange (author's data):

T	What does he have to do? Plug it in	(I)
S	Plug it in	(R)
T	Plug it in ... ok.	(F)

The IRF exchange, which is usually the format in which recitation, and more generally the transmission of information in dialogic ways, occurs, tends to be regarded as a prime example of a teacher-controlled situation in which students have little opportunity to show initiative or creativity in their contributions (though see Eisner, 1991; Wells, 1993; for some qualifications; see also van Lier, forthcoming). By way of quick overview, the main characteristics of the IRF exchange are as follows;

- 1) It is three turns long.
- 2) The first and the third turn are produced by the teacher, the second one by the student.
- 3) The exchange is started and ended by the teacher.
- 4) The student's turn is sandwiched between two teacher's turns, and is often brief and elliptical in nature.
- 5) The first teacher's turn is designed to elicit some kind of verbal response from a student. The teacher often already knows the answer (is 'primary knower').
- 6) The second teacher's turn (the third turn in the exchange) is some kind of comment on the second turn, or on the 'fit' between the second and the first.
- 7) It is often clear from the third turn whether or not the teacher was interested in the message contained in the response, or merely in the form of the answer, or in seeing if the student knew the answer or not.
- 8) If the exchange is part of a series, as is often the case, there is behind the series a plan and a direction determined by the teacher. The teacher 'leads' the students.

IRF questioning, especially when it goes beyond the mere routine forms implied in the recitation script and probes into students' rational processes, resembles the Socratic dialogue made famous in Plato's work. At its best, it might therefore be seen as producing high-level cognitive work. However, one might object that it can only draw from the students that which they already know (indeed, that is exactly Plato's point in such dialogues as the Meno), but does not lead to the construction of new knowledge or higher forms of learning (Shuy, 1991). In order for such higher forms of learning to be brought about, it is necessary to break out of the IRF pattern (e.g., into responsive or exploratory modes of interaction).

In language classrooms one might raise some further objections as well. The IRF exchange, as noted above, tends to produce brief, often highly elliptical answers. To the extent,

therefore, that students benefit from producing linguistically rich language, the IRF exchange would seem counterproductive. Furthermore, the IRF exchange employs a locked turn-taking system with predictable slots, and therefore does not induce the deep processing and close monitoring that more contingent forms of interaction bring about. Most importantly, from our perspective of interaction as allowing the growth of consciousness, the IRF does not encourage initiative, self-regulation, creativity and choice.

For these reasons (and possible additional ones as well) it is advisable to study other options for pedagogical interaction and monitor their learning potential. The least constrained and most open-ended form of social interaction we know is the conversation, and in the following section I will briefly summarize its main features.

Conversation

Conversation is characterized by a high degree of orientation towards communicative symmetry (Luckman, 1990; Linell & Luckman, 1991; van Lier, 1992). As Luckman puts it, conversation is

characterized by a tendency toward intrinsic (communicative) equality of the participants - typically under conditions of relatively weak social-structural (institutionalized) constraints upon the communicative situation (unless, exceptionally, communicative equality itself is institutionalized), as well as by multimodality and polyfunctionality of the communicative process (1990, p. 58).

Three things are important here, particularly as far as an exploration of conversation-for-education is concerned: first, a tendency towards communicative equality, second, a relative dissociation of conversation from institutional constraints, and third, multimodality and multifunctionality. We do well to note right away that all three characteristics go against the grain of traditional education:

- a) relations in education are inherently unequal between administrators and teachers, and between teachers and students;
- b) the very existence of the institution of education, the school, demands that educational processes are constrained by its rules, purposes, and procedures;
- c) the success of institutionalized education is measured by goals and objectives, ways and means of achieving them, enshrined in curricula, syllabuses, and textbooks, and evaluation procedures designed to establish and maintain standardized norms. In such a climate, efficiency, linearity and singularity of modality and function are likely to be valued over plurality and multifunctionality;
- d) teaching efficiency is often equated with careful planning, and with skillful execution of planned lessons. Conversation, by definition, is unplanned and therefore completely incompatible with traditional perceptions of efficiency.

The introduction of conversation is thus in itself a profoundly subversive act which cannot be expected to be easy or uncontroversial.⁶ The reader may remember that I recommended interactional change as a promising avenue for innovation, drawing support from chaos theory. To try this out and monitor its effects requires a clear understanding of what conversation is, and how it is distinguished from other kinds of interaction, such as the IRF exchange or recitation.

Conversation is generally regarded as the central and most basic form of language use in social life. Thus, Levelt (1989, p. 29) calls it "the most primordial and universal setting for speech ... the canonical setting for speech in all human societies." In a similar vein, Atkinson & Heritage, echoing the ethno methodologists Sacks, Schegloff & Jefferson (1974), accord to conversation a "bedrock" status in relation to other types of speech, and call it "... the most

⁶Bourdieu and Passeron's professor, whom I mentioned before, is condemned by the context to "theatrical monologue," since any effort to set up dialogue would "immediately turn into fiction or farce" (1977:109).

pervasively used mode of interaction in social life and the form within which ... language is first acquired, ... also it consists of the fullest matrix of socially organized communicative practices and procedures" (1984, pp. 12-13). Roger Schank even equates intelligence with performance in conversation, since "conversation is reminding," and intelligence is the ability "to be reminded" (1990, p. 17).

Vygotsky provides some clues as to why conversation might have such a preferential status among types of interaction:

In conversation, every sentence is prompted by a motive. Desire or need lead to request, question to answer, bewilderment to explanation. The changing motives of the interlocutors determine at every moment the turn oral speech will take. It does not have to be consciously directed - the dynamic situation takes care of that.

(Vygotsky, 1962, p. 99)

In this quote, we note how utterances are interconnected, how conversation is intrinsically motivated (compare Sacks et al.'s observation that conversation provides "an intrinsic motivation for listening", 1974, p. 43), how conversations are locally assembled rather than planned in advance, and how a conversation has a dynamism all its own. If we add to this the positive affect generally associated with it, it becomes clear why conversation should be important in our social life or in learning.

Against this enumeration of the advantages of conversation must be set the everyday opinion that conversing is almost synonymous with 'doing nothing.' We converse when we are goofing off, when we have a break, before we get down to serious business, and so on. Conversation would therefore seem to be very much a frivolous, relaxation-oriented sort of activity, something done in between important things. This perception certainly pertains in classrooms, where conversations may happen in spite of lessons plans, but hardly ever because of them (since, as noted above, conversations are not planned). Therefore, upon witnessing a conversation in a lesson, a supervisor or principal observing (say, for contract renewal) might well regard this as a digression from the academic business at hand or as a lack of management skill. The claim that conversation has pedagogical value must therefore be carefully substantiated and eloquently promoted.

In an earlier paper (van Lier, 1989) I proposed the following basic characteristics of conversation:

- 1. Face - to - face interaction (which means that telephone conversations, computer forum conversations, and so on, are derived forms, with their own specific structural characteristics);
- 2. Local assembly, i.e., not planned in advance (however, it can, and often does, contain planned elements, such as a request, or a proposal);
- 3. Unpredictability of sequence and outcome;
- 4. Potentially equal distribution of rights and duties in talk; and
- 5. Reactive and mutual contingency (Jones & Gerard, 1967).

My current view is that the essential dynamism of conversation (the sorts of things captured in Vygotsky's statement quoted above) depends on various kinds of contingency that operate in the interaction. Specifically, the notion of contingency collapses points 2-5 above into one phenomenon, leaving point 1 as a range of factors relating principally to perceptual access.

A detailed analysis of conversation, and an adaptation of conversational interaction for

pedagogical purposes, thus involves an examination of the phenomenon of contingency. My

claim is that contingency lies at the core of the Vygotskian socio-cognitive interface, and that consciousness-raising about interactional processes in the classroom is therefore of central importance in teacher education.

Contingency

The word contingency is a janus-faced one, just like the words sanction and host, harboring meanings which appear contradictory to one another. I will trace the outlines of the concept in the briefest of terms. Dictionaries define contingent as likely (but not certain) to happen, and as dependent on (or linked to) something else. The two key features are uncertainty and relatedness, and the concept thus combines elements of unpredictability (new-ness, the unexpected) and predictability (known-ness, the familiar). This dual aspect of contingency is related closely to such linguistic phenomena as indexicality (Peirce, 1940), the given-new contract, topic-comment structure, and focussing (Brown & Yule, 1983). Further, if speech involves the creation of relevance (Sperber & Wilson, 1986)⁷, then interaction can be seen as contingency management, in the sense that key tasks in interaction involve relating and projecting speech actions through signalling and interpreting intentions.

We can trace contingency back to C.S. Peirce, whose concept of indexicality expresses the relatedness aspect of contingency. Indices, on Peirce's account, focus the attention, and connect one thing to another thing. In interaction, words are connected to intentions, utterances forge relations between speaker's mind and hearer's mind, and text is connected to context (Peirce, 1940, pp. 98-119). Two contingently related utterances are unintelligible except in terms of their relation to one another, like two moving hands in a handshake.

We can further build on Parsons's theory of action, in which intersubjectivity is established by means of a doubly contingent process of reaching understanding between two free actors (Parsons, 1937; Habermas, 1987). Both Peirce's notion of indexicality and Parsons's notion of intersubjectivity are part of the foundation of ethnomethodology (see, e.g., Garfinkel's "common understandings", 1967; Garfinkel & Sacks's "practical actions", 1970; and Schegloff's "conditional relevance", 1972). Conversation analysis, as one branch of ethnomethodology, is instrumental in revealing the contingent properties of everyday talk (see Atkinson & Heritage, 1984[~] for some clear examples; it is worth noting that their title, *Structures of social action*, overtly points to Parsons's similarly titled book).

Finally, in Jones and Gerard, conversation is characterized by mutual and reactive contingency, both of which are symmetrical. Interestingly, teaching is cited as an example of asymmetrical contingency (1967; see also van Lier, 1989).

In order to learn, a person must be active, and the activity must be partly familiar and partly new, so that attention can be focussed on useful changes and knowledge can be increased. In everyday life, neither the totally familiar nor the totally new are likely to be noticed. Learning takes place when the new is embedded in the familiar, so that risks and security are in balance

(Trevarthen & Marwick, 1986).⁸

Conversation, or any language use which plays with contingencies (storytelling, for example), can therefore be expected to be the most stimulating environment for learning. In the next section we briefly look at the potential occurrence of contingency in classroom interaction.

Contingency in classroom interaction

It is probably wishful thinking to expect that classroom interaction (which is institutionally mandated interaction) could ever be entirely conversational. Nor is it at all certain that this would be a good thing in terms of pedagogical efficiency. As we saw above, the relationship between teacher and learner is an inherently unequal one, and all parties engaged in the educational enterprise expect this and in most cases demand it: the teacher is an expert in ensuring that students learn.

⁷As Roger Schank observes, "As long as a listener responds to what we have said with a relevant comment, we can be quite forgiving" (1990: 18).

⁸As Trevarthen and Marwick note, "all infants over three months enjoy ... a 'risky' but partly successful engagement of action and emotion with a recognized and trusted partner" (1986:293).

This does not mean that conversational interaction is at all times impossible. Even the highly regimented lessons recorded by Sinclair & Coulthard (1975) have episodes (usually student-initiated) in which conversation momentarily replaces the more common recitation patterns. Many lessons include such spontaneous moments of conversation, perhaps in the way that any work context can also be interspersed with chat. However, as I pointed out above, such chat is usually regarded as light relief rather than part of the work, and the same tends to be true in lessons (except that, in language lessons, it might be more justifiable than elsewhere to consider conversation an integral part of the work).

Piaget once said that "discussion is possible only among equals" (1932, p.390). It is quite common to assume the same of conversation in general, so that teacher-learner conversation would be intrinsically impossible. However, we can resolve this problem by making a clear and systematic distinction between equality and symmetry (Luckman, 1990; Linell & Luckmann, 1991; van Lier, 1992). Equality refers to factors extrinsic to the talk, such as status, age, role, and other social and societal factors that decide one person has more power, is "more important" (or more knowledgeable, wiser, richer, and so on) than another. Symmetry refers purely to matters relating to the talk and the interaction itself. In terms of the characteristics of conversation I listed above, symmetry refers to equal distribution of right and duties in talk. More precisely, interaction is conversational to the extent that it is oriented towards symmetrical contributions. As Luckmann (1990) rightly points out, complete symmetry is never possible. Indeed, whenever one person is speaking another person has to wait, and in that sense there is constant asymmetry. But conversation tries to balance and equalize those asymmetries.

Conversational teaching, or pedagogical interaction characterized by contingency, depends on the possibility of achieving interactional symmetry among unequal participants. The following classroom extracts provide some examples of greater or lesser degrees of contingency:

(1) (author's data)

An ESL class. Making a list of countable/uncountable nouns on the blackboard.

1 T Countable and uncountable, very good. Nouns. All of them are nouns ...
 Okay. We need one person to help. Uh, Y? Can you help me? You come right here ... you'll be the writer ... the chief writer. Please ... think of some things that go on each side ... countable and uncountable nouns ... that you remember ... K, can you give us an example?

2 L Uh, countable ... tea ...

3 T Okay, tea, good. Write it down.

4 L Wine.

5 T What did you say? I'm sorry, I didn't hear you.

6 L Wine

7 T Wine. Okay. Some more things. R, can you think of one? On this side maybe?

8 L Students.

9 T Students. Very good. Okay...

(2)

(van Lier 1998, o. 153)

L2 is male, L6 female; throughout the lesson they engage in much mutual joking.

1 L2 'Which' – a person or things

2 T yes .. yea which dog is yours ... okay? Which baby is yours ... okay?

3/4 LL [yes/ya

[m:

5 L2 I don't have a baby

6 LL ((loud laughter))

7 T Are you sure?

8 LL ((loud laughter))

9 L6 I don't know ((teasingly))

10 LL ((laughter))

11 L2 o::h ((mock consternation))

(3) (author's data)

1 L1 Can you fo- can you follow any conversation? Any people?
2 L2 Sometime yes but ah... many times I can't
3 L1 [hm::
4 L1 And what about you?
5 L3 The same but depend of (who) the conversation, no?
6 L2 Yah
7 L3 Or the point, because sometimes is point very very easy, but the:: depend
of the theme
8 L1 [si:m]
9 L3 Theme
10 L1 [si:m]
11 L2 The topic
12 L1 [si:m] ah! [si:m] ah yes [si:m] ... yeah yes=
13 L2 [((chuckle)) ((unint)) topic
= yes [si:m] tee- aitch- ((spells)) ... theme ... theme
14 L3 [yes
15 L2 [yeah
16 L3 Yeah theme
17 L2 Okay ... next thing

In the first extract it is clear who dominates the interaction, in other words, who is "in charge." The inequality between teacher and students is matched by various kinds of asymmetry (in turn taking, amount of talk, questioning, and so on), and the result is a reduced contingency between utterances. This is particularly noticeable in the student responses which do not include verbal links to preceding or following utterances, but merely fill slots prepared by the teacher and determined by the design of the activity.

The second extract begins in a similar way, with a student offering a rule for a relative pronoun, and the teacher accepting it and giving examples. Then, however, the class breaks out of the recitation format (conversation "erupts", we might say), and an example by the teacher is exploited for some banter among the students. It is interesting to consider the possibility (we shall never know for sure, of course, but we may suspect) that the teacher "planted" the example of the baby to get the students going, to encourage a conversational episode. Indeed, the lesson in question contains frequent examples of such switching between more formal "lesson talk" to highly informal conversation. It is easy to see how, from turn 3 onwards, progression is fast, unpredictable, and turns are tightly interwoven, each one firmly anchored to the preceding one and holding out expectations (creating possibilities, raising exciting options) for the next one. It is clear that partaking in such a conversational interchange requires conversational vigilance to a degree not possible in the more plodding and stodgy format of extract 1.

It is not easy to find examples of conversational interaction between teacher and students which yet appears to be oriented towards learning and teaching, and it is no coincidence that my third example is taken from a group discussion among language learners. We see in this extract a high degree of contingency between all turns while students struggle to express their opinions and understand those of their peers. Note that the extract includes a teaching sequence, but also note how this is seamlessly integrated in the discussion. L2 and L3 "teach" L1 the word theme at the behest of L1 (they do not offer to teach, but are invited to teach, a distinction which may be quite important), without disturbing the symmetry of the discussion.⁹

⁹See Keppler and Luckman on the structure of "conversational teaching" (1991).

From transmission to transformation

Education is not a matter of choosing and then imposing one way of interacting, or a single mode of discourse (whether conversational or recitational). Rather, it is a continuous studying and monitoring of the entire array of ways of talking and interacting, and finding effective and enabling ways to speak to the right person at the right time for the right reasons (where "right" is defined by our basic principles and values, such as educational equity and student autonomy). In this section I attempt to present an integrated and dynamic overview of the primary modes of discourse available in education.

To address the varieties of social interaction for the purpose of examining their learning power, I broadly distinguish four types of pedagogical interaction, as follows:

1. **Transmission:** the delivery of information or directives from one person (the knower) to another or others, in a one-way, monologic format. Typical exponents are lectures, sermons, recipes in a cook book, drills and commands. In classrooms, this is the typical monologic lecture format, and the prototypical "banking model" described by Freire (1972).

2. **Recitation:** the elicitation of information, and the enlargement of common knowledge, by means of questions and answers, where all the questions are asked by one person (the knower), and all the answers are given by the others (e.g., students). Commonly, the plan and the direction of the discourse are determined by, and familiar to, the questioner rather than the questioned. Students are "led" in a certain direction by the questioner.

3. **Transaction:** information exchange by means of a two-way process, where the direction of the discourse, and the relevance of contributions, the time table of events, etc., are jointly determined by all participants. Group discussions, business negotiations, information exchange tasks, and various kinds of discussions, are typical examples. In classrooms, most cooperative learning falls in this category. However, even though talk tends to be contingent, symmetrical, and at times conversational, there is usually an externally imposed structure and agenda, which group members are not free to transform.

4. **Transformation:** jointly managed talk that has the potential to change learning situations, role relationships, educational purposes and procedures. Here it is no longer the case that one person, the teacher, has the agenda, and the students have no option but to follow it. Rather, the agenda is shaped by all participants, and educational reality may be transformed. Participants' contributions are self-determined or produced in response to others' requests.

The model presented here, with its four levels of pedagogical action, and range of continua, borrows elements from several descriptions of critical pedagogy, e.g., Leithwood's curriculum orientations (1986), and Berlak & Berlak's dilemmas (1981). I must emphasize, however, that this is not intended as a clear-cut or neat category system, rather, it serves as a map of pedagogical options. Nor am I suggesting that only one level of action, say transformation, is sufficient to propel an educational enterprise. I would expect that there is need for all four levels, at different times, and for different purposes. However, I do think (and see Shor, 1992 for a similar perspective) that level 4 is crucial and has hitherto been neglected.

A further caveat against taking the four pedagogical modalities as discrete action types is the consideration that many pedagogical activities will turn out to be hybrid ones, in which aspects of different modalities are dynamically interwoven in the discourse. In many cases such hybrid interaction types, much like Bakhtin's double-voiced dialogue (Bakhtin, 1981¹⁰), will prove to be the most powerful and creative ones. One may think, as examples, of the pedagogical power of story telling and playing games.

These reservations aside, as one moves along a continuum. (or rather, various continua, see van Lier, forthcoming) from transmission towards transformation, opportunities for learning are likely to be enhanced in a number of ways. Conversational, exploratory, responsive and

¹⁰Double-voiced dialogue is "simultaneously authoritative and internally persuasive" (Bakhtin 1981:342). Internally persuasive discourse orients towards other participants' discourse; the internally persuasive word is "half ours and half someone else's" (1981:345). Double-voiced discourse allows the teacher to remain authoritative without becoming authoritarian. In other words, by being contingent it allows for symmetry without false assumptions of equality.

contingent ways of interacting engage the students' attention and motivation, and draw upon intellectual as well as affective resources, thus promoting conscious learning in the organic sense, and the development of self-regulation.

Conclusion: Implications for teacher development

In critical pedagogy teachers examine the foundations of their own professional goals and activities, and relate them to those of their students and society in general. Critical awareness leads to critical knowledge, and this in turn is a prerequisite of critical action.

Dialogic processes are central in critical pedagogy, as they are in any form of reflective teaching, or indeed in the types of research - e.g., action research and collaborative research which are increasingly part of a teacher's professional aspirations.

I have focussed on one aspect of these dialogic processes, but one which is presumably central in the pedagogical situation: the interaction in the classroom between teacher and students. I have refrained from presenting one type of interaction, say, instructional conversation, as a sort of panacea for improvements in teaching. Rather, I have described an entire menu of interactional options, although I have made specific suggestions as to which kinds I feel are of most value for learning.

I have related interaction to consciousness and consciousness raising in two ways: first, to argue that the growth and increasing control of consciousness in an organic sense is intimately linked to processes of social interaction, and second, that teachers can work on their own professional development by monitoring and closely studying their own interactions with their students.

How can this be done? Very often, as e.g., van Manen recommends in his excellent book *The tact of teaching* (1991), merely becoming aware of and reflecting on the power of the pedagogical moment, the encounter between teacher and student, leads to a more thoughtful approach to teaching. But there are other practical actions that can be taken, ranging from a mutual arrangement of peer coaching between two teachers, where one observes the other with certain agreed features in mind, to recording and transcribing lessons or activities (Nunan, 1989; Allwright & Bailey, 1991). In teacher development courses and seminars, a useful activity is detailed and frequent analysis of transcribed pieces of classroom interaction, and closely scrutinized viewing and discussing of videotaped lessons.

A more organic view of consciousness, in line with Vygotsky's prophetic vision, and recent discussions such as Dennett, 1991 and Humphrey, 1992, coupled with an analytical focus on interactional processes in the classroom, is one way of moving pedagogy towards a more democratic stance and towards equality for all students.

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HOW IMPLICIT CAN ADULT SECOND LANGUAGE LEARNING BE?

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Abstract

This paper argues that there is very little evidence for implicit learning of abstract patterns, either in cognitive psychology or in second language research. After a brief overview of the psychological literature, the evidence from applied linguistics is presented in more detail, first classroom studies and then laboratory research. While the conclusions from the literature review are largely negative, the author acknowledges that implicit learning may be more useful for certain structures than for others, that is more for morphology than for syntax, and more for fuzzy rules (prototypes) than for categorical rules. The results of a pilot study testing the latter hypothesis are presented. The paper concludes that it is somewhat surprising that in applied linguistics the burden of proof seems to be on those claiming explicit learning works, whereas in cognitive psychology it is the other way around.

Introduction

As Schmidt (this issue) shows, the term "consciousness" covers a wide range of meanings. This paper will be restricted largely to the third interpretation listed by Schmidt, i.e. awareness; in keeping with most of the literature, I will use the adjectives "explicit" and "implicit" to refer to learning with and without awareness, respectively. To the extent that the literature to be reviewed confounds awareness and attention, however, I will also deal with the latter interpretation of "consciousness".

The possibility of implicit learning has been a controversial point in the cognitive-psychological literature for a number of years now, and the issue is certainly not about to fade away, as shown most recently by the 25th Carnegie Symposium on Cognition held in Pittsburgh in May of 1993, whose theme was "Scientific Approaches to the Question of Consciousness". A similar controversy exists in the field of second language acquisition/applied linguistics, even though what has been controversial there is the viability of explicit rather than implicit learning.

1. Research in cognitive psychology and psycholinguistics

In general cognitive psychology several strings of experiments have shown that subjects can learn very complex patterns without ever being able to verbalize them. Lewicki and his collaborators (e.g. Lewicki et al., 1987, 1988) found that their subjects could successfully predict where a character would appear on a projection screen, after they had been exposed to its complex pattern of movement many times; none of the subjects, however, could describe the pattern at all. Cleeremans and McClelland (1991; cf. also Cleeremans 1993), in a more complex task of the same kind, found that subjects learned sequences of positions with only very limited reportable knowledge of the sequential structure of the material; moreover, their subjects reported their performance deteriorated when they tried to rely on the limited knowledge they were aware of. Similarly, Berry and Broadbent (1984) found that, when subjects were asked to verbalize their emerging knowledge of what they needed to do to keep a computer model in a state of equilibrium, they started to perform worse than when no verbalization took place. Brooks (1978) showed the power of implicit learning in a variety of concept learning tasks.

Psycholinguistics offers a series of experimental studies that are somewhat more directly related to our concerns with language learning. Reber (1976, 1989, 1993; Reber et al. 1980, 1985) has argued, on the basis of an extensive series of experiments with artificial grammars, that subjects can learn roles underlying the complex pattern of cooccurrence of forms without consciously thinking about these rules, and that this implicit learning may be superior to explicit (conscious) induction of the roles by the subject. Reber et al. (1980, Exp. 1), however, also showed that, when relatively simple roles underlie a very complex set of stimuli, explicit presentation of the role system before examples leads to better learning than examples presented before roles, examples only or roles only. Their results cannot be generalized to situations where the roles themselves are very complex or apply only probabilistically. Mathews et al. (1989) as well as Reber et al. (1980, Exp. 2) showed that a combination of implicit and explicit learning may yield the best results. (For additional information on artificial grammar learning see especially Schmidt [in press] and Shanks and St. John [in press]).

The view that the structure of artificial grammars can be abstracted implicitly (i.e. without awareness in Schmidt's [this issue] terminology) has come under heavy attack. Dulany et al. (1984, 1985) argued that subjects consciously learn fragments of grammar that correlate with the real structure rather than learn that structure itself without being aware of it. Evidence for this claim is the fact that subjects' reported roles predicted their (correct) grammaticality judgments without significant residual. Similarly, Perruchet and Pacteau (1990, 1991) showed that subjects' implicitly acquired knowledge, if it exists at all, tends to be limited to what bigrams or trigrams are acceptable, and hardly includes any information about position of these letter combinations in the strings generated by the grammar. Dienes et al. (1991) also showed that subjects' assessment of isolated parts of strings was sufficient to account for their classification performance; moreover, instructional set (intentional versus incidental) did not affect subjects' performance.

These criticisms do not imply that implicit learning of structured sequences is not possible. The fact that subjects are aware of certain fragments of strings does not mean that they may not have deeper knowledge, not accessible to consciousness, about their frequency or cooccurrence, or that the fragments cannot form a hierarchical structure (Servan-Schreiber & Anderson, 1990). Furthermore, even if knowledge was acquired explicitly, its retrieval may still happen without conscious awareness (Servan-Schreiber & Anderson, 1990), i.e. without relying on explicit memory: in Schmidt's [this issue] terminology.

What remains problematic, however, is the existence of knowledge that is both highly abstract and implicit (Servan-Schreiber & Anderson, 1990; Perruchet & Pacteau, 1990, 1991; Carr & Curran, 1993). On the one hand, even knowledge that appears to be highly abstract, such as the ability to judge letter strings consisting of different letters than those in the training set (Mathews et al., 1989; Reber, 1976) can be explained largely by analogy with specific training items (Brooks & Vokey, 1991; Vokey & Brooks, 1992). On the other hand, virtually all studies purporting to show a lack of explicit knowledge corresponding to subjects' performance use tests that do not allow a valid assessment of explicit knowledge: Shanks and St. John (in press) show how they fail to meet two criteria, information and sensitivity. The information criterion concerns the match/mismatch between what the subjects are learning and what they are asked to report; if they are asked to report rules, then their failure to do so may indicate that they have learned information other than rules rather than that they have acquired roles implicitly. The sensitivity criterion concerns the difficulty of obtaining complete information about the subjects' explicit knowledge through verbal reports.

A question related to the issue of implicit learning is that of the role of attention. Nissen and Bullemer's (1987) finding that serial reaction time tasks, while measuring implicit knowledge that does not require awareness, do require focused attention, has led to a variety of experiments on the role of attention in structured sequence learning. Several studies, with artificial grammars as well as other forms of structured sequences, concur that bigrams or 'unambiguous sequences' can be learned under dual-task conditions, but that acquiring knowledge about the possible position of these bigrams or 'ambiguous sequences' requires undivided attention (Cohen et al., 1990; Curran & Keele, 1993; Dienes et al., 1991).

2. Research in second language acquisition

It is not dear to what extent the research on artificial grammars can predict anything about natural language learning. The stimuli used in this paradigm consist of letter strings embodying a finite state grammar, a formalism that has been shown not to be an adequate model of natural language (Chomsky, 1957). Most importantly, the letter strings do not have any referential meaning, which again is not representative of natural language learning. Therefore, we need direct experimentation with implicit learning in a second language context. (For further criticisms of the finite state grammar research paradigm, see Van Patten [this issue] and Schmidt [in press]).

Even if all this research on artificial grammar learning is not directly relevant to second language acquisition, though, it is very important as a source of precise hypotheses as well as methodological caveats because so much applied linguistics research is so unfocused in its design. The applied linguistics literature contains numerous references to the implicit-explicit issue, in particular in discussions of the role of grammar teaching in second language learning, but there is a wide variety of partially overlapping terms and concepts.

Precisely this terminological imprecision in pedagogical discussions is probably one of the most important reasons why the teaching of grammar rules has been such a controversial issue. Some of the overlapping concepts are: the role of instruction in general (e.g., Krashen, 1981 a, 1982, 1985; Long, 1983, 1988; and especially the June 1993 thematic issue of SSLA), focus on form (e.g. Long, 1991; Larsen-Freeman and Lang, 1991), input enhancement (White et al. , 1991), analytical versus experiential learning (Stern, 1990, 1992), inductive versus deductive learning (Shaffer, 1989), implicit versus explicit learning (Levin, 1972; Scott, 1989).

The last two pairs of terms are particularly problematic. Inductive means that examples are seen before the rule is inferred (implicitly or explicitly); deductive means that the rules are given before any examples are seen. Implicit means that no rules are formulated; explicit means rules are formulated (either by the teacher or the student, either before or after examples/practice). Thus, while the two dichotomies are clearly independent in principle, they tend to coincide in practice (deductive and explicit versus inductive and implicit), because explicit learning is almost always the result of deductive teaching, given that encouraging students to formulate their own explicit rules by inducing them from a set of examples seldom works well (Ausubel, 1963; Carroll, 1964; pace Shaffer, 1989) and is probably not a very common practice.

Further obscuring the issue are the failure to take into account that different rules (e.g. Krashen, 1981a; Hulstijn & de Graaff, this issue) and different students (e.g. Krashen, 1981b; Wesche, 1981) may be more or less amenable to (different kinds of) teaching, and the tendency to equate implicit vs. explicit knowledge with knowledge acquired implicitly vs. explicitly. Empirical studies on the relationship between implicit and explicit knowledge in second language speakers or advanced learners (e.g., Bialystok, 1979; Furey, 1987; Green and Hecht, 1992) have shown that implicit knowledge is what is used in grammaticality judgments by these speakers, and that it is largely independent of explicit knowledge. These studies do not shed any direct light, however, on the relationship between the two types of knowledge at the time a specific rule is learned (cf. also Schmidt., this issue).

2.1. Classroom studies

Some theoreticians, most notably Krashen (1981a, 1982, 1985, 1992, 1993), have argued that the explicit teaching of grammar in the classroom is fruitless, because the learner cannot use explicit rules efficiently during communication, except for the best learners and simplest rules. Instead of teaching students rules, Krashen argues, the teacher should provide them with large amounts of language that is just easy enough for them to understand; they will then induce the rules from this "comprehensible input" without any conscious learning, just as is the case for first language learning. Krashen's arguments in favour of implicit learning are mostly indirect, however: they are not based on direct tests, through controlled experimentation, of the hypothesis that implicit learning is better. Therefore, his theories have remained very controversial (cf. e.g., Long, 1988; McLaughlin, -1978, 1987; Stern, 1990, 1992).

Recent empirical studies on classroom second language learning, on the other hand, have tended to show that focusing students on form, mainly by teaching them rules and correcting errors, is superior to implicit learning. Lightbown and Spada (1990) established some tentative links between the teacher's emphasis on certain grammatical structures in the classroom and the students' level of accuracy for the same structures. White et al. (1991), in a similar study, showed more clearly that "input enhancement" (form-focused instruction, including corrective feedback) had a positive impact on ESL students' ability to form questions correctly, as measured by a variety of immediate and delayed post-tests, from written and form-focused to oral and communicative (Lightbown and Pienemann [1993] stress that the oral tests were communicative rather than monitored). A parallel study on adverb placement (White, 1991) yielded more complex results, in that the positive effect of input enhancement disappeared on the delayed post-test. Harley (1989) came to the same conclusions in a study of French past tenses in immersion students. Scott (1989) found a clear advantage for the explicit teaching of two rules of French grammar compared to saturated exposure, but only for a written test.

The reason why explicit grammar instruction is useful, according to Terrell (1991), is three-fold: it helps to segment the otherwise overwhelming input; it helps to establish meaning-form links, especially for morphology that is neither salient nor semantically essential; it helps to improve the learner's output, which may subsequently become auto-input.

R. Ellis (1993) and Sharwood Smith (1993) see a more limited role for focus on form: it should be directed at how learners perceive and process input, and not at practice in production. Van Patten and Cadierno (1993a, 1993b; cf. also Van Patten, this issue) provide some empirical evidence for this view, in the sense that learners who were given grammar explanations for certain structures in Spanish as a foreign language, and then practiced the relevant distinctions in comprehension exercises, did better on comprehension post-tests and equally well on production post-tests compared to learners who received grammar explanations and then engaged in traditional production practice. It should be pointed out, however, that the structures investigated in these studies are morphologically very simple, which makes them easier to produce and harder to notice than most grammatical morphemes; this could explain why instruction for 'processing' (comprehension) had more impact than instruction for production. Fotos (1993) takes a closer look at the first step in the sequence of focus on form, noticing in input, acquiring, and producing by comparing the effectiveness of two kinds of focus on form (traditional grammar instruction and an interactive grammar problem-solving task) in increasing the rate of subsequent noticing. She found both techniques to be equally effective in stimulating noticing. Positive correlations between noticing and proficiency were also established. Care should be taken in interpreting this study, however, because of the way noticing was operationalized (underlining the relevant forms in a text), and because the correlation between noticing and proficiency does not imply causality.

These recent classroom studies concerning focus on form show important advantages over older studies on the role of instruction or explicit grammar teaching, such as a narrower linguistic focus, and a better controlled and described set of treatments, but attention and awareness as defined by Schmidt (this issue) are still confounded. Students with focus on form/input enhancement have their attention drawn to specific structures, and are made aware of specific rules. Only the literature on artificial grammars and miniature linguistic systems, to be reviewed in the next section, provides evidence on the role of awareness separate from attention to form.

2.2. Laboratory studies

The laboratory studies on the role of awareness in second language acquisition will be reviewed here in order of 'artificiality', from studies involving human interaction, but in a laboratory-type context, with a 'regular' second language (a language the students were learning for other than experimental purposes), via computerized experiments with a 'regular' second language, to experiments with an exotic or artificial language. The first two categories still look at awareness along with other issues; only the studies involving an exotic or artificial language have separated the two.

Van Patten (1990) approached the issue of awareness/attention from a somewhat unusual angle: instead of asking how effective explicit learning is, he investigated to what extent it is possible to pay attention to/be aware of form (lexical items, articles, verb endings) and still comprehend the input (the assumption being that comprehending input is what drives second language acquisition, so that anything interfering with it is to be avoided). For a group of college students of Spanish, he found that simultaneous attention to content and form was difficult at the early and intermediate stages of learning, but left open the possibility that the ability to "consciously process both meaning and form" may develop over time. One could also argue, of course, that if learners at the beginning and early stages find it hard to pay attention to meaning and form at the same time, they should receive a fair amount of form-focused instruction till their knowledge of form will be sufficient to make input more 'comprehensible', i.e. processable without attention to form.

Carroll and her colleagues looked at the desirability of explicit intervention in the form of error correction. Carroll et al. (1992) taught two French suffixation rules to intermediate and advanced learners and then corrected mistakes for one group by giving them the correct form after each mistake in an individual training session. They found a positive short-term effect of feedback in getting the learners to remember what suffix is attached to a specific stem, but there was no evidence that learners in the feedback group induced the (rather complicated) suffixation rule any more than the learners in the control group. In a subsequent experiment (Carroll & Swain, 1993), however, Spanish learners of ESL did better in learning a general dative alternation rule after a training period during which they were told they were wrong after each mistake and then given the rule than learners under any of the other feedback conditions in the experiment. These other conditions were: 1) the learners were told they were wrong (not given the rule); 2) they were given a correct response (if they were wrong); 3) they were asked if they were sure they were correct (when they were wrong); and 4) they were not given any feedback. This last group did worse than any other group.

Doughty (1991) conducted a carefully designed computer-assisted study comparing rule-oriented learners (who were given explicit rules), meaning-oriented learners (for whom the relevant structures were highlighted in various ways), and learners who received mere exposure to the relevant structures (different types of relative clauses in English as a second language). Both instructed groups scored higher than the control (mere exposure) group on both comprehension and production tests. Moreover, the meaning-oriented group did better than the rule-oriented group in comprehension. It is hard to know what this latter advantage of the meaning-oriented group means, because this group received lexical and other semantic explanations, which the rule-oriented group did not. The comparisons with the control group, however, show a clear advantage for the instructed groups, instruction having provided both attention to and (different degrees of) awareness of form to the learners in these groups compared to those in the control group, who were only concerned with comprehending text.

A similar study was carried out by Alanen (1992, cited in Schmidt, in press), but with semi-artificial Finnish as a second language (learning targets were locative suffixes and a rule of consonant gradation), and with four groups instead of three. The first three correspond to Doughty's groups of control (mere exposure), meaning orientation (input enhancement) and rule orientation (rule presentation); a fourth group received both rules and input enhancement. The results showed that the groups with rules did better than the other two, but that the input enhancement group did not outperform the control group. There was a qualitative difference between the latter two, however, in the sense that the control group omitted more suffixes, while the input enhancement group supplied more erroneous suffixes (similar effects of instruction were found by Pica [1983] and Pavesi [1984, quoted in Lang, 1988] and called process effects in Long [1988]).

Finally, N. Ellis (1993) performed a highly complex computer-assisted experiment, which involved learning rules for the soft mutation of initial consonants in Welsh. There were essentially three groups of learners: the random group received nothing but exposure to the different kinds of consonant alternations (and lack thereof) in a random order; the grammar group received explicit rule instruction, followed by the same random presentation of examples as for the random group; the structured group received rules accompanied by two examples for

each rule, and then the random presentation of examples. The random group was found to be the fastest in learning to judge the well-formedness of sentences encountered before, but the slowest in generalizing their knowledge (implicitly or explicitly) to instances not encountered before. The grammar group showed solid explicit knowledge of the rules, and some transfer to new analog structures, but at early stages there was a wide gap between this explicit knowledge and applying it (with or without monitoring). The structured group not only had solid explicit knowledge, but did well on the speeded well-formedness tests from the beginning, which shows, according to Ellis, that there was transfer to implicit knowledge. In summary, the study showed that, even though there was some implicit learning in the sense of above-chance performance on well-formedness tests of new instances by learners in the random group, explicit instruction, especially in the sense of demonstrating the rules in operation, was the most effective treatment, in terms of both explicit and implicit knowledge.

In conclusion, both the classroom studies and the laboratory research reviewed here provide strong evidence for the effectiveness of explicit learning. The main drawback is that most of the outcome measures used allowed for a certain degree of monitoring, which leaves open the possibility that the explicit learning only yielded explicit knowledge, and not the implicit knowledge necessary for accurate and fluent spontaneous production. In at least some cases, however, monitoring was unlikely because of the speeded nature of the test (N. Ellis, 1993) or the lack of hesitation during oral testing (cf. Lightbown and Pienemann, 1993).

3. Not all roles are created equal

Ever since Krashen (1982), building on the morpheme studies of the 1970's, made a distinction between rules that are easy to learn and rules that are easy to acquire, the idea that the effectiveness of explicit teaching and learning depends on the nature of the rule has been widely accepted. Nevertheless, many studies continue to generalize their findings about certain rules to the entire grammar of the language in question, or even the entire structure of the language, and sometimes even any rule in any second language (with exceptions such as the work on markedness, some of the work on universal grammar, and some work on the role of negative evidence, e.g. the White [1991] and White et al. [1991] articles reviewed in the section on classroom studies). Even when researchers are less inclined to rush to generalizations, they rarely dwell on the exact nature of the rules present in the input, those present in the output, and the mechanisms of analogy or generalization that presumably link the two.

Hulstijn and de Graaff (this issue) provide a set of important hypotheses to help remedy this gap in the literature. Among the factors likely to increase the role of explicit instruction for a given rule, they list: the rule falling outside of the scope of universal grammar, L2 forming a subset of L1, the rule being complex, its having large scope and high reliability, the impossibility of relying on mere item memorization, the rule not having semantic implications (for comprehension), and its having such implications (for production). They also hypothesize that explicit instruction affects L2 comprehension sooner than production overall.

A few more hypotheses can be gleaned from the research on artificial grammars reviewed above, keeping in mind, of course, the aforementioned caveat that generalizability from artificial grammars to second language learning cannot be taken for granted. Mathews et al. (1989) found that implicit processing was sufficient for learning a finite state grammar, but not for "biconditional rules", i.e. long-distance cooccurrence rules that do not generate concrete sequences of contiguous symbols. Cleeremans and McClelland (1991) found that subjects in a sequence learning experiment could predict target location by reference to the last three locations, but could not learn a long-range contingency (involving 4 locations earlier), even after 60,000 trials. This finding, together with evidence (cf. the end of section 1) that a different amount of attention is required for learning 'unambiguous sequences' (locally determined) versus 'ambiguous sequences' (determined by elements at a distance) could imply that in second language learning knowledge about morphologically correct word endings (e.g. what specific ending goes with a given root, especially for irregular verbs or nouns) does not require attention to the form of an utterance, while more abstract, syntactic, knowledge that requires

relating an ending to a functionally connected but more distant part of the sentence (e.g., the subject of the verb, in order to determine the verb ending) does require such attention. This hypothesis is reminiscent of Hulstijn and de Graaff's (this issue) hypothesis 5, i.e. that explicit instruction has more effect when item learning is not a viable strategy, but makes additional predictions in cases where word forms have to be produced that were rarely or never present in the input. In such cases, implicit learning in the sense of a "memory-based mechanism for detecting patterns of family resemblance among exemplars" (Mathews et al., 1989, p. 1083) would seem to be more effective than for the syntax of equally unfamiliar sentences, provided that enough input is available for the detection of such patterns.

Furthermore, not only may there be a difference between the learning of morphology and syntax in the sense just described, but even within morphology the differential efficacy of implicit versus explicit learning can vary with the nature of the rule: is the rule a categorical rule that applies across the board, deterministically, or is it more like a prototype, a rule that applies probabilistically, and whose likelihood of application depends on a number of factors?

4. A pilot study

4.1. Background

The hypothesis that a distinction needs to be made between categorical rules and prototypes in order to test the effectiveness of explicit learning and teaching versus implicit learning was tested in a pilot study described in DeKeyser (1994) and summarized here. The three hypotheses motivating the study were 1) Prototypes are harder to learn than categorical rules; 2) Explicit (and deductive) learning is better than implicit for simple categorical rules (cf. Krashen, 1982; Reber et al., 1980); 3) Implicit learning is as good as or even better than explicit (and deductive) learning for prototypes (cf. Rumelhart, 1989).

The best known example of a prototype in natural language is probably the irregular past tense in English. Clusters of past tense forms such as ran, sang, shrank or dug, spun, strung form a prototype in the sense that, while there is no rule, i.e. no general, mechanical way to determine whether a verb will show a regular present/past alternation of the type link/linked or an irregular one like run/ran or dig/dug, those past tense forms are not merely exceptions either. The likelihood of a specific type of alternation depends on 1) the final consonant, 2) the initial consonant(s), and 3) the vowel of the stem, in that order. A string/strung type alternation, for instance, is most likely when 1) the final consonant is velar, 2) the initial consonant is /s/ (beginning a cluster) and 3) the vowel in between is /ɪ/, but none of these characteristics is absolutely necessary (Bybee & Moder, 1983.; cf. also Bybee & Slobin, 1982). In other words, the closer a base form of the verb comes to being prototypical that is having all the characteristics just mentioned, the more likely it is it will undergo a string/strung type alternation. Rumelhart (1989) has argued that implicit learning mechanisms (as implemented in a connectionist model) are particularly efficient for such similarity-based generalizations.

Applications of the concept of prototype in the field of second language acquisition have been very rare. Tanaka (1987) found that Japanese learners of English were most likely to use the least frequent dative construction (NP NP) when the object was semantically prototypical (alienable), and fell back on the 'default' construction (NP PP) when the object was less prototypical. Yamaoka (1988) argued that Japanese learners of English first acquire the 'be easy to V' structure in semantically prototypical sentences, and later learned to interpret them in more ambiguous situations. Sokolik and Smith (1992) simulated the implicit learning of the French gender system in a connectionist network. The most directly relevant study, for our purposes, is Tucker et al. (1968), which showed that college students of French as a second language did better when phonological cues to the gender of nouns (a prototype system) were explicitly taught than when students were left to induce them from systematic exposure. (It should be stressed, however, that only the most reliable cues to gender were used in this experiment, which makes it almost a test of categorical rules rather than prototypes.)

4.2. Methodology

Implexan, the linguistic system designed for this experiment, is an agglutinative SVO language with number (categorical) and case (prototypical) marking on the noun, and number (prototypical) and gender (categorical) marking on the verb. Nouns and verbs can be 0, 1, 2 or 3 steps (phonemes) removed from the core prototype. For prototypical rules, words belonging to these four classes respectively have a 100%, 80%, 60%, or 0% likelihood (reflected in both type and token frequency) of receiving the allomorph that goes with the core prototype rather than the other allomorph. There are close to 100 words in the lexicon. Most input sentences refer to people performing certain actions with certain objects. Color photographs corresponding to 124 such sentences were taken and digitized for use on a Macintosh computer.

The subjects were six paid undergraduates, three for the implicit and three for the explicit condition; the two groups were balanced in foreign language learning experience.

All subjects participated in 20 learning sessions of about 25 minutes each (two consecutive sessions twice a week). In each session they saw every picture with its corresponding sentence on a computer screen for about 4 seconds. The order of the pictures was randomized differently for every session.

The explicit subjects were presented with the grammar rules of Implexan before the first, third and tenth session. The implicit subjects received no explanation of grammar; nor was it ever even mentioned to them that the sentences they saw had grammar rules underlying them.

All subjects were occasionally tested (for 20 sentences out of 124) with a judgment test (classifying sentences as correct or incorrect by clicking yes/no) at random times during each learning session; this was done in order to make sure that subjects would attend to the picture/sentence combination at all times. These test sentences never contained any grammar errors, only errors of vocabulary; the subjects were not told, however, only to expect vocabulary errors. All subjects were administered both a judgment and a production test of the same 44 sentences about two weeks after the last learning session; at the same time they were also asked to retrospect for about ten minutes about their learning experience.

4.3. Results

Only the results from the production test and the retrospection will be discussed here; for the results of the judgment tests see DeKeyser (1994).

The first hypothesis, i.e. that prototypes are harder to learn than categorical rules, received limited support, in the sense that this was the case for two of the (explicit) subjects in the final production test. For all other subjects there was no difference between prototypical and categorical (largely because both had been learned very poorly); prototypical rules were never learned better than categorical rules.

The second hypothesis, i.e. that explicit learning is better than implicit learning for categorical rules, was borne out in the sense that all three subjects in the explicit group learned categorical rules to some extent, while none of the implicit group subjects did. The comments the subjects made during the retrospection session confirm that their performance on the production test was directly determined by how well they had learned explicitly (parts of) the grammar presented to them.

The third hypothesis, i.e. that implicit learning is at least equally as good as explicit learning for prototypical rules was borne out, but only in the trivial sense that all subjects performed poorly on prototypes. The explicit subjects supplied morphemes more frequently, but had not learned the allomorphy involved in the prototypical rules any more than the implicit subjects. Pending further results that avoid this floor effect, no conclusions can be drawn concerning the third hypothesis.

While the primary goal of this pilot study with a very limited number of subjects was not to test hypotheses, but rather to try out the methodology, the results are encouraging in that the first two hypotheses were confirmed. No conclusion could be drawn regarding the third hypothesis, due to a floor effect. We are now conducting a full-scale study with 60 subjects, where feedback is given during the learning sessions to increase the overall level of perfor-

mance, and where explicit knowledge of grammar is tested formally for the explicit group. Two symmetrical versions of Implexan are being used to counterbalance any possible effect of semantics or similarities with other languages on ease of learning prototypical versus categorical rules. We are also planning to test for interaction of the implicit/explicit condition with individual differences in the sense of (different components of) language learning aptitude.

5. Conclusions and directions for further research

The cognitive-psychological literature and the psycholinguistic research on the learning of artificial grammars provide some evidence for implicit learning, but not for implicit induction of abstract patterns, i.e. for learning rules without awareness. Studies purporting to document such learning fail to meet the information and sensitivity criteria that Shanks and St. John (in press) have shown to be essential for the demonstration of implicit learning. On the other hand, all recent classroom studies of second language learning that have investigated the effect of explicit instruction have demonstrated an advantage of explicit over implicit learning. While it is true that this advantage was no longer found for delayed tests in some of these studies, no classroom studies have demonstrated a long-term effect of implicit learning in the sense of near perfect rule-governed production either. The same can be said about the laboratory-type studies of error correction or exotic/artificial language learning. Thus, no studies on second language learning exist yet to which one could even apply the sensitivity and information criteria.

What has been documented, however, both in artificial grammar studies (e.g. Mathews et al., 1989; Reber et al., 1980) and in at least one study of 'naturalistic' second language acquisition (Schrnidt & Frota, 1986), is an interaction between implicit and explicit learning in the sense that the combination of the two yielded results beyond what either explicit or implicit learning could achieve separately. Several authors (e.g. Ellis, 1993; Long, 1988; Van Patten, this issue; Van Patten & Cadierno, 1993a, 1993b) have argued that this synergistic effect is found because explicit instruction facilitates the awareness of form, or noticing (Schmidt, 1990), required for intake. It remains to be seen (pace R. Ellis, 1993; Van Patten, this issue; Van Patten and Cadierno, 1993a, 1993b) whether this effect of explicit instruction only obtains through its impact on intake via the processing of comprehensible input, or whether practice in production further enhances it.

Therefore, research on the effect of different kinds of explicit instruction and that of practice of the resulting knowledge seems a priority for further work in this area. R. Ellis (1993; cf. also the Robinson [1994]/Ellis [1994J] exchange) argues that a 'strong interface position', i.e. the view that explicit knowledge can change into implicit knowledge as a result of practice, is untenable, because it would imply the implausible transformation of explicit declarative into implicit procedural knowledge. Such an interpretation of the 'strong interface position' is unwarranted, however, because it ignores the possibility that explicit declarative knowledge first becomes proceduralized and then 'automatized' through successive stages of production practice, as contemporary skill acquisition theory claims (Anderson, 1982, 1987; cf. also Hulstijn & de Graaff, this issue). More empirical second language learning research based on skill acquisition theory is needed in order to evaluate whether second language learning shows the same stages of skill development that have been documented in areas as diverse as trigonometry, computer programming and cigar making, and what kind of practice is most conducive to bringing about the desired implicit procedural knowledge.

Given how many variables have been identified that may have an impact on the role of explicit learning, researchers will have to make great efforts to have more control and less confounding than has typically been the case in the applied linguistics literature. Therefore, laboratory-type research of the kind documented in section 2.2 is likely to play an important role in this area, along with the more ecologically valid classroom research exemplified in section 2.1. Instructional variables, linguistic variables, and individual difference variables should be carefully considered, and not just as control variables, but as a central part of the design, in order to facilitate the detection of interaction effects.

In the meantime, careful handling of the bewildering terminology is in order. The term "conscious" is certainly to be avoided, given that it has received a wide variety of meanings in the second language literature (Schmidt, this issue), that even the international array of specialists on consciousness gathered for the aforementioned Carnegie Symposium on Cognition could not arrive at a definition after three days of talks, and that the term is impossible to operationalize (McLaughlin, 1978, 1990). What term should replace it depends on the purpose of a specific study. Incidental vs. intentional, inductive vs. deductive, implicit versus explicit, automatic vs. controlled, and focus on form vs. focus on meaning all have their advantages and disadvantages, and none of these dichotomies are perfectly clear-cut. The most important points to keep in mind are not to conflate these dichotomies, and not to make any claims for a dissociation of two kinds of cognitive mechanisms in a study without applying the criteria of information and sensitivity to its data collection methods.

Finally, when one compares the second language literature to the work in cognitive psychology and psycholinguistics, it is somewhat surprising to see that, while work in the latter areas has tried (with very limited success, according to Shank and St. Johns' [in press] thorough literature review) to demonstrate the existence of implicit learning, the situation in the second language field is rather the opposite. A large part of the research effort of the last two decades has gone into documenting how unsuccessful explicit teaching and learning of a second language can be, a fact that few people remain to be convinced of. Very little second language research has even tried, however, to demonstrate the success of implicit learning in the sense of reaching a high level of morphosyntactic proficiency ostensibly based on a rule system identical to or at least very similar to that of the native speaker, without awareness of rules during the learning process. There is a question I have asked many audiences over the last few years, and nobody has come up with a convincing example of what I, and a fortiori those who are eager to demonstrate the success of implicit second language learning, are looking for. I will leave it with the reader to ponder: How many people do you know personally (not from hearsay) who, as adults, have learned a language really different from their native language (not just a different dialect or a very closely related language), who have done this without any explicit teaching (or explicit learning from textbooks, linguistic fieldwork, or simply informal reflection like the learner described in Loup et al. 1994), and who have attained a linguistic competence in that second language comparable to that of a native speaker? From my experience, people like that are truly white ravens, which is all the more significant if it is true that over half of the world's population is to some extent bilingual.

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UNDER WHAT CONDITIONS DOES EXPLICIT KNOWLEDGE OF A SECOND LANGUAGE FACILITATE THE ACQUISITION OF IMPLICIT KNOWLEDGE? A RESEARCH PROPOSAL¹

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Abstract

This paper proposes nine hypotheses for empirical research aiming to assess under which conditions explicit grammar instruction helps the acquisition of implicit knowledge of a second language. The results of empirical studies, designed on the basis of these hypotheses, may replace the unqualified interface and noninterface positions by qualified positions claiming that explicit instruction facilitates the acquisition of implicit knowledge under specific conditions. These conditions depend on factors such as linguistic domain, complexity, scope and reliability, and semantic or formal redundancy of the target structures. Furthermore, they depend on factors such as rule versus item learning and reception versus production. Finally, they depend on moderating factors such as type of instruction, fluency of performance, and learner characteristics.

1. Introduction

In this paper we take an empirical approach to the question to what extent the acquisition of implicit knowledge, as the product and goal of second language (L2) learning, can be facilitated by explicit learning. We use the term "explicit learning" in the sense defined by Schmidt (this issue), as learning with awareness at the point of learning. According to Schmidt, explicit learning may vary from spontaneous rule discovery by the learner on the one hand to explicit instruction on the other hand, i.e. guidance on the part of the teacher through input enhancement or presentation and explanation of grammar rules.

Some researchers take the stance that explicit grammar instruction is of little help and that L2 acquisition must be fostered by giving L2 learners large amounts of "comprehensible input" (e.g. Krashen, 1981, 1982, 1985). Others recognize the prime importance of large amounts of comprehensible input and involvement of L2 learners; in communicative activities, but take the view that, under certain conditions, explicit grammar instruction, in one way or another, can be of considerable help (e.g. Bley-Vroman, 1988; Doughty, 1991; Ellis, 1990, 1993a, 1993b; Larsen-Freeman, 1991; Larsen-Freeman & Long, 1991; Lightbown & Spada, 1993; Schmidt, 1988, 1990, 1993; Rutherford & Sharwood Smith, 1985; Sharwood Smith, 1993; Terrell, 1991; VanPatten & Cadierno, 1993a, 1993b).

Our perspective is a programmatic one: assuming that the answer to the question of whether explicit grammar instruction facilitates the acquisition of implicit knowledge will not be an unqualified "never" nor an unqualified "always", how can we layout a programme of research which aims at assessing when, i.e. under which conditions, explicit grammar instruction helps?

This paper is set up as follows. Section 2 lists our assumptions, and summarizes and discusses various theoretical positions: Krashen's (1981, 1982, 1985) noninterface position, Anderson's (1980, 1982) strong interface position, and Ellis' (1993a) weak interface hypothesis. Section 3 provides a number of testable hypotheses, based on various theoretical

¹ We would like to thank the following people for their comments on an earlier version of this paper: Rod Ellis, Leo van Lier, Richard Schmidt, and Bill VanPatten.

and pedagogical considerations. Section 4 sums up some moderating factors which have to be taken into account when designing investigations to test any of the hypotheses mentioned in section 3. Section 5 discusses the relative merits of "natural" versus (semi)artificial experiments. In section 6, we give, by way of example, a brief description of a study in progress, conducted by ourselves. In section 7 we draw our conclusions.

2. Theoretical positions

Let us summarize the assumptions underlying most current theories of L1 and L2 acquisition.

We sum these assumptions up, couched in our own terminology:

(1) Fluent language proficiency of native speakers of any age, is based on "implicit knowledge" (I-knowledge) of the grammar of their L1.

(2) Most native speakers have little "explicit knowledge" (E-knowledge) of their L1, although some E-knowledge may be learned in school.

(3) Almost nothing is known about the process of the acquisition of I-knowledge of the L1. One thing is certain, however, caretakers do not teach young children grammar rules. Thus, I-knowledge is not acquired through the acquisition of E-knowledge.

(4) Although almost nothing is known about the process of L1 acquisition, we may assume that children's L1 acquisition necessarily involves some sort of "paying attention" to language forms, to the meanings expressed by forms, and to form-meaning relations (Levitt, Sinclair & Jarvella, 1978). Such focusing of attention may often be caused by error-detecting devices (Clark & Hecht, 1983; Marshall & Norton, 1978).

(5) As in the case of L1, a fluent use of the L2 is based on I-knowledge of that language. The behavioral correlate of this I-knowledge is fluency in language use.

(6) Fluent language use is characterized by nonserial (= parallel) processing. Not much is known about the process which takes I-knowledge as its input and has fluent behaviour as its output. However, current psycholinguistic theories claim that this process is characterized by parallel processing. Speaking of word recognition in reading, Rayner & Pollatsek (1989: 108) conclude that "parallel processing is the hallmark of automatic processing". This may be true not only for word recognition, but also for many other productive and receptive language skills (Levitt, 1989: 20-22).

(7) Fluent, automatic language use is a matter of parallel, incremental processing (Levitt, 1989: 24), and certainly not a rapid serial application of rules. It is, for example, not a matter of running extremely fast through a flow chart, making all the individual steps, taking into account all the conditions specified. Parallel processing creates the phenomenological experience of not being aware of the way in which information is being processed and how these processes are monitored.

One of the perennial issues of contention in L2 acquisition research and in L2 pedagogy is the following one:

Although I-knowledge of a L1 is not acquired through the acquisition of E-knowledge (assumption 3), it is an open question whether the acquisition of E-knowledge of a L2 can facilitate the acquisition of I-knowledge. In other words, to what extent can the goal of I-knowledge be reached more efficiently (i.e. with fewer difficulties and/or in less time) via the teaching and learning of explicit rules?

Basically, there are two answers to this question:

(1) I-knowledge of an L2 cannot come into existence as the direct result of E-knowledge, nor can it indirectly be influenced by E-knowledge of that language. This position has become known as the "noninterface position".

(2) The acquisition of I-knowledge of an L2 can be driven or influenced by the learning and teaching of E-knowledge. This is the "interface position".

The next subsections consider these positions in more detail.

2.1. The noninterface position

One of the best known proponents of the noninterface position is Krashen (1981, 1982, 1985). According to Krashen, there is a fundamental difference between -acquisition- (of I-knowledge) and "learning" (of E-knowledge). Learning does not facilitate acquisition. L2-utterances are generated on the basis of I-knowledge. E-knowledge only plays a role in monitoring utterances thus generated. Grammar instruction may result in E-knowledge but cannot result in, nor affect I-knowledge. For that reason, grammar instruction is of little or no importance for becoming fluent in the L2. I-knowledge can only be acquired by receiving large amounts of "comprehensible input". That is about all the noninterface position has to say about the mechanics of the actual process of acquiring I-knowledge. In this respect, Krashen's position reflects Chomsky's much quoted statement (1970), viz. "that we should probably try to create a rich linguistic environment for the intuitive heuristics that the normal human automatically possesses".

Krashen's noninterface position certainly is a well defensible position for L2 pedagogy. But from an empirical perspective it is a fruitless position, as long as the distinction between acquisition and learning has not been operationalized (Hulstijn & Hulstijn, 1984; Larsen-Freeman & Long, 1991: 224-225, 245-249; McLaughlin 1978, 1987 Ch. 2).²

2.2. The interface position

The interface position comes in two forms (Larsen-Freeman & Long, 1991:324). First, that E-knowledge becomes I-knowledge through practice. Second, that E-knowledge cannot become I-knowledge but that it aids the acquisition of I-knowledge. Thus, the interface position sees E-knowledge as either necessary or instrumental in acquiring I-knowledge. We will discuss each form in turn.

2.2.1. A strong interface position

According to what Ellis (1993a) has called the "strong interface position", I-knowledge emerges from E-knowledge directly, i.e. through practice. This position is derived from the literature on skill acquisition in cognitive psychology, in particular theories of controlled and automatic processing. One of the best known of these theories is Anderson's ACT* theory (Anderson, 1982). According to Anderson, declarative, propositional knowledge is converted into procedural knowledge by processes of compilation, tuning and restructuring.³ The original declarative knowledge need not always be replaced by procedural knowledge: "Sometimes the two forms of knowledge can coexist side by side, as when we can speak a foreign language fluently' and still remember many rules of grammar. However, it is the procedural, not the declarative knowledge that governs the skilled performance" (Anderson 1980:226; see also recommendation 7 in Schmidt's contribution to this issue).⁴

For many years, the strong interface position was the accepted view of most practitioners in the field of L2 pedagogy. A skilled and fluent command of the L2 was (and, by many, still is) viewed as the automatization of the application of explicit grammar rules. It should be noticed, however, that most educationalists interpreted the notion of automatization as rapid serial execution rather than as parallel processing.

² For a proposal to make the acquisition/learning distinct testable, see Schwartz, 1993:155.

³ Although Anderson (1980, 1982) does not use the term "parallel processing", which was introduced some years later in cognitive psychology (e.g. Rumelhart & McClelland, 1987), his notion of procedural knowledge appears to be more akin to parallel processing than to rapid serial processing.

⁴ Anderson appears to have changed his mind on the issue whether L1 acquisition comes about through the proceduralization of declarative knowledge. In the third edition of his popular textbook "Cognitive psychology and its implications" (1990), Anderson writes: "With respect to the issue of whether language is really a system different from other human cognitive systems. it is a fair summary to say that the jury is still out" (p.356). and "Children also appear not to be much helped by direct instruction but rather learn language more implicitly" (p. 325).

2.2.2. A weak interface position

Ellis (1993a) rejects the strong interface position while replacing it by what he calls a "weak interface position". To illustrate all three positions (noninterface, strong interface, and weak interface), Ellis presents the following figure, using labels from both Anderson's skill acquisition theory (1982) and Bialystok's two-dimensional model of language proficiency (see e.g. Bialystok, 1990a, pp. 118-129; 1991).

	Declarative	Procedural
	Type A	Type B
Explicit	Conscious knowledge of L2 items	Conscious knowledge of learning, production, and communication strategies. The learner can use explicit knowledge easily and rapidly.
	Type C	Type D
Implicit	Intuitive knowledge of L2 items	Ability to employ learning, production, and communication strategies automatically. The learner can use intuitive knowledge fluently.

Source: Ellis, 1993a, p. 94.

Figure 1: The difference between explicit/implicit and declarative/procedural knowledge

Ellis refers to the vertical dimension with the labels "knowledge dimension" and "analysis". For the horizontal dimension he uses the labels "process dimension", "control" and "automatic" (p.94-95).

According to Ellis, the noninterface position claims that Type D knowledge derives from Type C knowledge only. The strong interface claims that Type A knowledge can be converted into Type D knowledge through practice. According to Ellis own weak interface position, Type A knowledge may develop into Type C knowledge, provided learners are ready to accommodate the new knowledge into their interlanguage systems. Type D knowledge can develop from Type C knowledge through formal practice or natural communication.

It seems to us that Ellis' model comprises an incompatible combination of Anderson's theory postulating a transition from declarative to procedural knowledge, and Bialystok's dimensions of Analysis and Control. According to Bialystok (1988: 40; 1990b: 47), E-knowledge cannot be converted into I-knowledge, as Ellis wants it in his weak interface position, and automaticity is epiphenomenal. However, it must be acknowledged that Bialystok's earlier work (1978) allows for E-knowledge to be converted into I-knowledge. Ellis (1994; and personal communication 31 March, 1994) points out that his 1993 model is based on Bialystok's earlier work.

Thus, if the horizontal dimension cannot be conceived as a matter of gaining automaticity, there is no difference anymore between Type C and Type D knowledge. Having I-knowledge of

grammar amounts to being able to use that knowledge fluently (cf. section 2, assumption 5), although, evidently, fluency may be affected by performance factors.⁵

2.3. The interface position as assumption for empirical research

Although we do not wish to commit ourselves to the strong or weak interface position as defined by Ellis (1993), we do not dismiss the interface idea altogether. On the contrary, the most fruitful approach to further an understanding of L2 learning is to adopt the interface position as a framework within which hypotheses can be formulated and empirical research can be based. A discipline cannot exist of theories alone, it must advance through empirical work as well. For that reason, we contend that it is potentially more fruitful to start on the assumption of an interface position than on the basis of a noninterface position. Starting on the basis of an interface position, then, our task is to specify under what conditions E-knowledge may be instrumental in acquiring I-knowledge. In other words, assuming that E-knowledge can be the result of explicit learning and that explicit learning can (but need not) follow from explicit instruction (see recommendation 4 - 6 in Schmidt's contribution to this issue), our task is to specify under what conditions explicit instruction of grammar rules does further L2 acquisition.

3. The interface position translated into testable hypotheses

Basing empirical research on the assumption that explicit instruction (and hence that explicit learning) somehow "facilitates" the acquisition of I-knowledge, does not mean that we have no theories or other sources of knowledge to draw upon. In this section, we present six dimensions within which variables can be chosen for the formulation of testable research questions. An illustrative example is given for each dimension, followed by one or more testable hypotheses.

From the outset, however, it must be emphasized that each hypothesis embodies a simplification: the reader has to add the phrase *ceteris paribus* to each hypothesis, as it were. In reality, however, all other things aren't equal. A factor mentioned in one hypothesis may well interact with a factor mentioned in another hypothesis. Indeed, it is likely that cases of interaction constitute more interesting issues to be pursued than the straight ones covered by the hypotheses below.

3.1. Linguistic domain

The first dimension within which one must specify the interface position is linguistic. In which linguistic domains can explicit instruction help the acquisition of I-knowledge? In the domain of morpho-phonology? In the subdomain of lexical, inflectional morphology only (e.g. verb

⁵Ellis (personal communication, 31st March 1994) comments as follows: "You may still wish to argue that there is no distinction between Type C and Type D knowledge and that 'fluency is an epiphenomenon of I-knowledge', I think, however, that there is an empirical basis for claiming a difference - in the study of interlanguage variability, How do we explain variability within the learner's vernacular style (i.e. the style that can be considered to favour use of I-knowledge)? One possibility is that the learner attempts to edit his/her performance using E-knowledge. Such an explanation is not entirely adequate, however. Learners find it easier to control (access for production) 'old' I-knowledge than 'new' I-knowledge, as reflected, for example, in the forms they supply when performing in this style. Thus, form x (for example, the target form) may be supplied more readily and more consistently than form y (for example, a non-target form) in the vernacular style, in both cases the learner not being 'aware' of which form is used. A good example might be the kind of variability that is evident in the use of copula (see my article in Applied Linguistics 1988). Learners begin with zero copula and then learn to supply the copula. Their control over copula can be seen to increase over time, partly in accordance with linguistic context. I agree, however, that the case for distinguishing Type C and Type D knowledge has to be made more carefully than in my TQ93 article. I think, though, that the distinction can be operationalized, although more easily in a longitudinal study than in the kind of experimental study you have in mind."

conjugation, noun declension)? In syntax? In certain limited areas within syntax only (e.g. word order phenomena related to L1/L2 differences at the level of D-structure, in contrast to S-structure)?

Given the current state of linguistics, one of the most important criteria to distinguish, in a principled way, between various linguistic domains, is offered by Generative Grammar. Generative grammarians distinguish between formal aspects of grammar within the domain of Universal Grammar, and domains falling outside the UG scope. Concerning the UG aspects of grammar, our hypotheses might depend on our stance on the issue of whether UG is still available to L2 learners or not. In the former case, parameter resetting is possible. In the latter case, L2 learners will depend more on general cognitive capacities to overcome the loss of the ability to acquire the L2 grammar on the basis of positive L2 input alone. If we assume that UG is still available, our hypotheses might depend on whether the L1 setting of a parameter constitutes a subset or a superset of the L2 setting. In the latter case, L2 learners have to "unlearn" the marked L1 setting, and this may require receiving negative evidence. If a parameter has two possible settings only (e.g. the Head-position parameter, which can either be head-initial or head-final), and one is found in L1 and the other in L2, the acquisition of the L2 setting may be possible on the basis of primary linguistic input (positive evidence) only. Finally, when various rules cluster under a single parameter, teaching all rules may not be necessary and even fruitless after one rule has been acquired (Rutherford, 1989; White, 1992; Schwartz, 1993; Jordens, 1993).

Here are some tentative hypotheses which could be tested on the basis of the above considerations:

- * H1 The advantage of the provision of explicit instruction, in comparison with the non-provision of explicit instruction, is greater in the case of aspects falling outside the scope of UG than in the case of aspects falling inside its scope.
- * H2 The advantage of explicit instruction is greater when the L1 setting of a parameter forms a superset and the L2 setting a subset of a parameter, than in the reverse situation.

With "is greater" in these two and all following hypotheses we mean that the acquisition of L-knowledge with the help of explicit instruction takes place more easily and in less time than without. We do not claim, however, that explicit instruction (and learning) will always result in a higher level of ultimate attainment. Note that, for ease of reading, we have left out the phrase "in comparison with the non-provision of explicit instruction" in hypothesis 2 and all following hypotheses.

3.2. Complexity

The basic idea here is that L2 grammar rules, represented in a declarative, propositional form (as they appear in course books, for example), differ in complexity. Complexity here is not to be defined in terms of linguistic theory, but in cognitive terms.⁶

Consider the following two fabricated examples, illustrating complexity differences between two purely formal (phonological) rules and two semantic (aspectal) rules respectively. Example 1: In language M, verbs have different endings for two aspects, perfect and non-perfect; in language N, however, verbs have different inflections for three aspects, perfective, durative, and punctual. Example 2: In language X there are two plural suffixes for nouns: the suffix -s is added to singular nouns ending on a vowel, and the suffix -os is added to nouns ending on a consonant. In language Y there are the same two suffixes: -s for nouns ending on a vowel and for nouns ending on a consonant containing a front vowel in the penultimate syllable, -os for nouns ending on a consonant and containing a back vowel in the penultimate syllable. If we were to make flow charts for the derivation of inflections in languages M and N and for the derivation of the plural suffix in languages X and Y, the charts for languages M and X would

⁶In fact, it may be impossible to define linguistic (in contrast to cognitive) complexity independently from language development and accuracy data (Hoekstra, 1990). Circularity must be avoided. Thus, it would be wrong to define "late acquired" as "complex", and define a "complex" rule as one which is "late acquired".

contain fewer steps than those for N and Y respectively. Note that degree of complexity is contingent not so much on the number of forms in a paradigm, but rather on the number (and/or the type) of criteria to be applied in order to arrive at the correct form. On such a declarative notion of complexity, we may base the following hypothesis:

* H3 The advantage of explicit instruction is greater in the case of complex rules than in the case of simple rules.

The reason is that simple formal phenomena may be salient enough in the input to be discovered by L2 learners spontaneously, without the help of explicit instruction. In the case of complex phenomena, however, explicit instruction may save learners considerable time in discovering their intricacies.⁷ Note that this hypothesis is concerned with the (cognitive) complexity of a rule of language, not with the complexity of the way in which the rule is explained by teacher or textbook. Of course, it is a sound pedagogical principle that explanations should be formulated in as simple as possible terms. Furthermore, declarative complexity as defined here, is not to be confused with "complicatedness" or "difficulty", experienced by learners as a result of contrast between their L1 and L2 (see also H2).

Some researchers have tried to explain the notion of cognitive complexity in terms of processing constraints (Clahsen, 1984; Pienemann, 1989; Pienemann & Johnston, 1987). This was done to explain so called "natural" acquisition orders, found among L2 learners who did not receive formal L2 instruction.⁸ The hypotheses of Pienemann c.s. are of an entirely different nature than the one proposed here. The former hypotheses are embedded in a developmental theory pertaining to acquisition orders. Our claim that explicit instruction helps more in the case of complex than in the case of simple rules, pertains to the ease and duration of acquisition, not to the rank order of acquisition onset times of structural features.

3.3. Scope and reliability

Many rules of language apply only probabilistically. Such "rules", or "probabilistic tendencies" can differ in scope (the number of cases covered) and reliability (the extent to which the rule holds true, cf. Bates & MacWhinney, 1989).⁹ Scope may be large or small and reliability may be high or low. Let us draw two (arbitrary) border lines: the scope of a rule is said to be large or small when the rule covers more or fewer than 50 cases; the reliability of a rule is said to be high or low when the rule applies in more or less than 90% of all cases. According to these definitions, there are four possibilities. Consider the following examples concerning noun gender in German (masculine, feminine and neuter), as specified by Mills (1986:33):

- (1) Of the ca. 15.000 singular nouns ending on -e about 13.500 (90%) are feminine.
- (2) Of the 15 monosyllabic nouns beginning with Kn-, 14 are masculine (93%).
- (3) Of the 107 monosyllabic nouns ending on - C_{nasal} C, 75 are masculine (70%).
- (4) Of the 45 nouns ending on -ier, 27 are neuter (60%).

⁷Complexity is a likely candidate for interaction with various other factors. It is important to distinguish the notion of complexity from the notion of scope, to be explained in section 3.3. A language teacher, for example, might say that a verb conjugation rule which applies to only a small number of verbs (constituting one of a great number of verb classes), is too complex to teach with much effect. This would amount to claiming that the teaching of an explicit grammar rule does not help when this rule is too complex. In this case, however, it is the small scope rather than the degree of complexity of the phenomenon that would lead one to claim that explicit instruction does not aid the acquisition of L-knowledge. We cannot think of examples of rules, falling outside UG, being large in scope and reliability (see section 3.3.) that would be so complex that explicit instruction of them would not facilitate the acquisition of their L-knowledge. Anyway, our complexity hypothesis appears to us a well founded one and one which can and should be tested.

⁸DuPlessis, Travis & White (1987) give a linguistic explanation of this acquisition order.

⁹We suppose that the notion of scope and reliability can and must be distinguished to the extent that we are dealing with rules pertaining to a (practically) finite class of utterances. This will almost always be a lexical class. Therefore, scope and reliability can best be illustrated with examples from the lexicon. However, scope and reliability may even be distinguishable when we are dealing with rules pertaining to an infinite class of utterances, i.e. in nonlexical realms (e.g. syntax).

We can classify these four tendencies in terms of scope and reliability, as follows:

(1) = large scope & high reliability

(2) = small scope & high reliability

(3) = large scope & low reliability

(4) = small scope & low reliability

Many language teachers believe that it makes sound practice to restrict explicit grammar teaching to rules with both a large scope and a high reliability. In the three remaining cases, learners should not be given the rules. Such rules are believed to bring too little profit considering their costs (the law of "diminishing return"). Thus, in the cases of (2), (3) and (4), learners must be told to simply associate the gender feature to each word individually. On this practice we may base the following hypothesis:

*H4 The advantage of explicit instruction is greater when a rule applies to many cases (large scope) and when it has a high success rate (high reliability) than when it has a small scope and/or a low reliability.

Note that complexity on the one hand and scope and reliability on the other, although to be distinguished conceptually, in the practice of language pedagogy often go hand in hand. For instance, language teachers often decide not to present complex rules if they are small in scope. Furthermore, when teachers wonder whether they should explain a phenomenon either with a more reliable but more complex rule or with a less reliable but more simple rule, they may opt for the latter, sacrificing reliability for simplicity, e.g. presenting a general rule without its exceptions or subrules.

3.4. Rule learning versus item learning

Consider the following four rules of German:

1. The finite verb in declarative main sentences almost always takes second position.
2. When only one constituent is being negated, the negation word nicht is placed immediately before it, e.g. nicht A sondern B ("not A but B").
3. German nouns ending on -e are almost always feminine, as we have already seen; e.g. Küche ("kitchen") is feminine.
4. Verb forms in the present tense, indicative, first person singular almost always end on -e; e.g. ich lerne Englisch ("I learn English").

All four rules are large in scope and they rank: high on reliability. Yet there is a difference between rules 1 and 2 on the one hand and rules 3 and 4 on the other. For the latter two phenomena, there are, in principle, two ways for language production. The language user may either apply the rule, or produce individually stored forms (e.g. lerne) or: features (e.g. the feature Feminine with Küche). Thus, for phenomena 3 and 4, two alternative routes towards language production offer themselves, one based on rule learning and one based on item learning.¹⁰ For phenomena 1 and 2, however, there is only the possibility of rule application.¹¹ One could argue that teaching rules 3 and 4 does not foster language acquisition much, since learners may spontaneously learn individual forms or individual features (item learning). For phenomena 1 and 2, however, rule teaching may help learners to apply the principle (which may or may not have originated from previous encounters with a number of individual instances) to an indefinitely large class of instances.¹² This leads to the following hypothesis:

¹⁰Note that, viewed from a processing point of view, both routes lead to the same endproduct. They both may be active and both may be initiated automatically (just as the two word recognition routes in reading, one route of direct access and one indirect route via phonological coding).

¹¹What is called a "rule" in terms of grammar, may be called an "analogy" in terms of language processing. Furthermore, even the "verb-second" and the "nicht + the to be negated constituent" analogies may stem from item learning, i.e. they may be derived from the storage of individual instances previously encountered in the input, e.g. in the form of formulaic utterances (Ellis, 1993; Krashen, 1981, Ch. 7). See also Logan, 1988; Robinson & Ha, 1993; Schmidt, 1992.

¹²One might be tempted to use the label "nonlexical" for rules 1 and 2 and the label "lexical" for rules 3 and 4, and argue that "item learning" offers itself as an alternative to lexical rules only. However, the division between lexical and nonlexical rules may differ from one grammatical theory to another. It would therefore be wise to distinguish between constructs of a theory of grammar (lexical vs. nonlexical) and constructs of a theory of learning (rule learning vs. item learning), although the constructs may be related across disciplines.

*H5 The advantage of explicit instruction is greater when language production can only be based on rule application, than when it can be based not only on rule application but also on the retrieval of individually stored items ("item learning").

The likelihood of item learning as an alternative to rule learning may be dependent of the frequency with which items occur. Forms occurring frequently in the input may be more likely to be stored and accessed separately than infrequent forms. Since the issue of item vs. rule learning mostly pertains to inflectional morphology, a hypothesis concerning the relative merits of item learning might be more relevant for the learning of languages with monerate flexion (French, German, English) than for the learning of languages with high amounts of flexion (Turkish, Finnish, Hungarian). Thus, we can reiterate the above stated complexity hypothesis, while applying it to the domain of flexion:

*H6 The advantage of explicit instruction is greater in the case of complex inflectional rules (which are also reliable and large in scope' than in the case of simple inflectional rules (also reliable and large in scope).

There are two motivations for this hypothesis. The first reason is that grammar instruction may be more helpful to clarify complex, less salient structures than to clarify simple, more salient structures (section 3.2). The second reason is that, if there are fewer forms in an inflectional paradigm, each one of them is more likely to occur more often and is therefore more likely to be learned individually, than if there are more forms per paradigm. In the latter case, each form is likely to occur less frequently than all forms together, and is therefore less likely to be learned as an individual item.

3.5. Reception versus production

There is ample evidence that L2 learners often keep making errors in spontaneous speech long after the grammar rule in question has been presented and practised in written exercises. In fact, it is on the basis of such evidence that proponents of the noninterface position argue that explicit instruction in L2 pedagogy is of little importance and should perhaps be abandoned altogether. It is surprising, however, that the debate of whether explicit instruction is useful or not, focuses exclusively on E-knowledge's impact on speaking and writing and almost never on its impact on reading and listening. One might argue, however that E-knowledge (and hence explicit instruction) affects language comprehension during reading and listening positively, in that it helps L2 learners to discern the meaning of the input. Thus, although we might acknowledge that explicit instruction has limited effect on language production, we may hypothesize that explicit instruction has considerable effect on language comprehension.

*H7 The advantage of explicit instruction is greater in the case of L2 comprehension than in the case of L2 production.

3.6. Semantic versus formal redundancy

Some language forms are semantically redundant (e.g. the -s suffix in third person singular verb forms in English) while others are not (e.g. the -s plural noun suffix in English). This may be of more importance to language comprehension than to language production, since knowledge of semantically redundant phenomena may not be required for language comprehension. Hence, we frame the following hypothesis:

*H8 As for L2 comprehension, the advantage of explicit instruction is greater in the case of grammatical features with semantic implications than in the case of purely formal (semantically redundant) features.¹³

¹³Our hypothesis 8 is paralleled by hypothesis 1 in VanPatten's contribution to this issue. The difference is that VanPatten has formulated his hypothesis from the perspective of learners' spontaneous input processing activities, whereas we have formulated our hypothesis from the perspective of learners' input processing activities as they are guided by instruction.

In language production on the other hand, learners may have more difficulty to apply purely formal rules (e.g. adding third person singular -s to English present tense verb forms) than to apply combined formal-semantic rules (e.g. adding a plural -s to count nouns in English). Terrell (1991) states that explicit grammar instruction helps to segment the otherwise overwhelming input and to establish meaning-form links, especially for morphology that is neither salient nor semantically essential. This leads us to the following hypothesis:

*H9 As for L2 production, the advantage of explicit instruction is greater in the case of purely formal (semantically redundant) features than in the case of grammatical features with semantic implications.

4. Moderating factors

4.1. The conveyance of grammatical information

In all hypotheses mentioned so far, the phrase "explicit instruction" was used. Anyone who wants to test these hypotheses empirically, however, must become more specific as to how to provide the explicit instruction. In this section, we restrict ourselves to mentioning some options:

- With how much grammatical jargon will the rule in question be stated? Can the formulation of an explicit rule, with the use of grammatical terms, be avoided?

- Will the rule first be given together with the examples, or will the examples be given first and will the learners be invited to discover the regularity illustrated in them?

- Will grammar teaching be restricted to the presentation of the rules, i.e. without form-focused practice, or will grammar teaching consist of rule presentation plus form-focused practice?

- After the rule has been stated, will the learners first be involved in comprehension tasks (what Van Patten, this issue, calls "processing instruction", see also Van Patten & Cadierno, 1993a, 1993b; Ellis, 1993b), and will production tasks be delayed until much later? Or will the learners be requested to apply the rule immediately in rule-focused production tasks (what Van Patten calls "traditional instruction")?

4.2. Fluency in language production

When conducting empirical research on the influence of grammar instruction on L2 acquisition, we must measure performance of L2 learners on a variety of tasks. Three independent factors offer themselves as candidates for the measurement of L2 performance:

(1) Task: e.g. comprehension, production, or grammaticality judgment tasks.

(2) Time of testing: during or after instruction and practice.

(3) Task condition: subjects can be instructed to take as much time as they want (monitoring grammatical accuracy), or to perform the task as fast as they can. By manipulating task conditions, the researcher may be able to ascertain subjects' fluency.¹⁴

The third factor is especially relevant since we want to test hypotheses concerning the acquisition of I-knowledge. I-knowledge is a theoretical construct, not directly accessible by means of language tests. However, when a L2 learner can produce a target structure correctly only in a slow, and not in a fast pace, it is not likely that (s)he can be said to have I-knowledge of it. Fluency is the behavioral correlate of I-knowledge (assumption 6; see also Schmidt's recommendation 7 in this issue).

¹⁴Hulstijn (1989c) has tried to demonstrate the crucial importance of the distinction between Task and Task Conditions in the design of empirical L2 learning investigations.

4.3 Learner characteristics

Every language teacher has experienced that some learners appreciate grammar rules, others detest them. It is not clear whether learners who appreciate grammar, actually profit from it more than learners who don't. Indeed, the literature on the role of learner characteristics such as cognitive style and learner strategies is inconclusive (Abraham 1985; Skehan, 1989). To the empirical researcher, two obvious options present themselves:

- (1) No additional hypotheses on the role of learner variables such as cognitive style are formulated. However, if learner variables can be simply and reliably measured, they can be treated as control variables. For instance, subjects may be assigned to experimental and control groups according to a principle of matching them on the basis of their scores on a previously administered cognitive style or learning style test.
- (2) When an additional hypothesis on the role of a learner variable such as cognitive style is formulated (e.g. that reflective L2 learners benefit more from explicit grammar instruction than impulsive learners), this variable must be incorporated into the design as an independent factor and treated accordingly (i.e. analyses must be conducted for reflective and impulsive subjects separately).

5. Laboratory versus natural settings: a twin approach

In the previous sections we have shown that the empirical study of the influence of grammar instruction on L-knowledge is a complicated affair. One of the most notorious methodological problems is to adequately manipulate all those independent variables which one wants to manipulate while keeping all other potentially interfering variables constant. This is almost impossible in "normal" classrooms with real L2 learners (Harley, this issue). It comes as no surprise, therefore, that the outcomes of such studies often form the object of considerable disagreement. This was recently illustrated by the controversy between Lightbown & Pienemann (1993) and Krashen (1993). Although research in "real" classrooms should bring the final proof because of the alleged validity of the classroom setting, a researcher may want to exert more control than is possible in a normal classroom setting.

There are various ways to bring instruction and learning under control of the researcher. The first way is to control the language to be learned. This can be done by teaching an artificial or partly artificial language (e.g. Issidorides, 1988; Hulstijn, 1989b; Yang & Givon, 1993; DeKeyser, 1994, this issue). The advance of this method is that the researcher can be certain that no subject in the experiment can have knowledge of the target structures and that performance on tests must stem from learning during the experiment.¹⁵

The second way is to control the instruction proper (i.e. the explanation of grammar rules). One way of doing this is to replace the live explanation of the teacher by a prerecorded explanation. Using a computer-controlled learning setting is an obvious way of controlling instruction (Doughty, 1991).

Finally, the researcher may control input in a quantitative way by specifying in advance how much instruction and practice subjects will receive. Here again, a computer-controlled

¹⁵Note that the nine hypotheses advanced in section 3 must ideally be tested with meaningful language materials, not with meaningless, purely formal symbols. Meaningless materials are used in Miniature Artificial Language experiments (e.g. Brain, 1971; McAndrews, Pat & Moscovitch, 1985; Nation & McLaughlin, 1986; the experiments conducted by Reber and associates, reviewed in Reber, 1989). What subjects are to induce in these experiments, are abstract letter patterns generated by a Markov type Finite State Grammar. Such experiments must be distinguished from studies which aim to test hypotheses based on the interface idea, as suggested here. To this extent, we agree with Van Patten (this issue).

learning setting presents itself as an obvious choice (e.g. Chapelle & Jamieson, 1986; Yang & Givon, 1993).¹⁶

Does this mean that hypotheses such as the ones advanced in section 3 should only be investigated in "unnatural", laboratory settings? Certainly not. The final proof should always be given in a "normal" language class, with "real" teachers and "real" L2 learners, learning a "real" L2 in the framework of a "real" language course, including "natural" exchanges between teacher and learners and among learners themselves (see Van Lier, this issue). However, for methodological reasons it may be recommendable to also conduct more laboratory-type of experiments in which the researcher can exert control of the targets to be learned, the instruction and the execution of receptive and productive tasks, both quantitatively and qualitatively. Natural learning experiments may score high on validity but are likely to score low on reliability. (Semi)artificial learning experiments may score high on reliability but are likely to score low on validity. That is why, in our own research, we adopt a so-called twin approach, combining an artificial or semi-artificial experiment with a "natural" experiment (Hulstijn, 1989a, 1989b, 1992, 1993).

6. An example

In this section we give a brief description of a study currently underway at our department.¹⁷ It is an example of a twin study which aims to test two of the hypotheses based on the position that E-knowledge facilitates the acquisition of L2-knowledge under certain conditions.

Subjects are university students, who follow an experimental self-study course in an artificial language, based on Esperanto (first experiment), or in a natural language, viz. Spanish (second experiment). For Spanish, four target structures have been selected. Esperanto was supplemented (and accordingly altered) with the same four structures. In this way, the results of the two experiments will be optimally comparable. Individual language learning takes place in a laboratory setting, during 10 sessions of 2 hours each, by means of a computer assisted learning program. This enables us to have a major control over the L2 input and students' activities.

Of the two subject groups in both experimental studies, one does and the other does not receive explicit information (EI) about grammatical features.¹⁸ However, the explicit-implicit distinction only exists in explanation and feedback; when practising, both groups have the same opportunity of focusing their attention on both form and meaning. The treatment contains, apart from output-processing activities, input-processing activities as have been proposed by Van Patten (this issue; see also Ellis, 1993b). In both the Esperanto-based and the Spanish language course, presentation and activities are directed at reaching communicative goals. Subjects' proficiency in the four target structures is tested during and after the course, in various comprehension and production tasks under both monitored and unmonitored conditions.

¹⁶There is a further possibility that should be mentioned. It consists of the presentation of L2 input with some artificial targets to "real" L2 learners. Although this option is methodologically very attractive, it may not be acceptable for moral reasons. In one experiment, reported in Hulstijn (1993), it was morally acceptable to adopt this approach, however. In this study, which lasted only a half hour for each subject, subjects read a L2 text containing 16 pseudo words without knowing this, and answered comprehension questions. Subjects, who were paid for their out-of-class voluntary participation, were debriefed afterwards. Since the tests session contained some "natural" tasks as well, from which subjects profited (in that they found them very instructive), none of the subjects complained about having been misled during the reading task.

¹⁷This research project, entitled "The Influence of Grammar Instruction on Foreign Language Acquisition", is supported by the Foundation For Language, Speech and Logic (under grant 300-173-028), which is funded by the Netherlands Organization for Scientific Research (NWO). The research is conducted by Rick de Graaff and supervised by Jan Hulstijn (May 1993-May 1997).

¹⁸Subjects are pretested on verbal aptitude and learning style, and assigned to the experimental groups on the basis of a matching principle (cf. section 4.3. option 1).

In connection with the dimensions presented in section 3. we distinguish between one simple and one complex lexical morphological rule, and One simple and One complex nonlexical syntactic rule. The distinction between lexical and non-lexical features is motivated by our aim to investigate the interface position in potential coalition with item learning as well as in isolation. The distinction between simple and complex features is based on the declarative cognitive notions as explained in 3.2.

The following four target structures of Spanish have been selected:

1. Plural inflection of the noun as the simple lexical rule.
2. Verb inflection for the imperative as the complex lexical rule.
3. Position of the negation particle as the simple lexical rule.
4. Position of the object and the use of the object clitic as the non-lexical rule.

In conclusion, the aim of the study is to investigate how and under what circumstances, test performance is influenced positively by providing explicit information on structural features in comparison with the non-provision of such information. On the basis of the general research question concerning the interface hypothesis, the analysis is geared in particular towards the testing of the following hypotheses:

- * The positive effect of EI will be more substantial in the case of the acquisition of complex rules than in the case of the acquisition of simple rules (cf. H3 in section 3.2).
- * The positive effect of EI will be more substantial in the case of the non-lexical, syntactic rules than in the case of the lexical, morphological rules (cf. H5 section 3.4.).

To accommodate the moderating factor of fluency, the following hypothesis is tested:

- * A fluent, correct command of the four grammatical structures will be attained sooner by the group receiving EI than by the group not receiving EI, not only in the Plus Monitoring condition, but also in the Minus Monitoring condition of proficiency tests (cf. section 4.2).

Conclusions

One of the most nagging questions which has haunted researchers and practitioners alike for a long time, is the question of whether grammar instruction aids L2 acquisition or not. The aim of this contribution was to show that it is highly unlikely that this question can ever be answered with an unqualified "yes" or "no". With the aid of the distinctions proposed by Schmidt (this issue) between explicit knowledge, explicit learning and explicit instruction, and working-in the framework of an interface position between explicit and implicit knowledge, we have tried to demonstrate that it is possible to formulate a fair number of hypotheses, specifying under what conditions explicit knowledge may facilitate the acquisition of implicit knowledge. Our second aim was to demonstrate that it is possible to go beyond the stage of claiming (on the basis of acquisition theories or pedagogical experiences and intuitions) that explicit knowledge may or may not help acquisition. Many hypotheses can and should be tested empirically. The preceding sections layout a vast research program. It is our hunch that the results of empirical studies, conducted in laboratories as well as in real classrooms, will replace the unqualified interface and noninterface positions, which have hitherto dominated the debate, by qualified positions. These conditions depend on factors such as linguistic domain, complexity, scope and reliability, and semantic or formal redundancy of the target structures. Furthermore, they depend on factors such as role versus item learning, reception versus production. And finally, they depend on more rating factors such as type of instruction, fluency of performance, and learner characteristics.

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