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IMPLICIT AND EXPLICIT PROCESSES

Commentary

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The relation between experimental psychology and second language acquisition research has gone through at least two major swings of the pendulum. During the heyday of behaviorism, the pendulum swung strongly toward psychology. The behaviorist psychologists advised us to think of language learning as nothing more than habit formation (Mowrer, 1960), and second language learning materials reflected an emphasis on repetition, drill, rewards, practice, and conditioning. During the early years of the cognitive revolution, Chomsky (1959) argued that viewing language as a conditioned response (Skinner, 1957) ignores the complexities of both language structure and cognition. Persuaded by these arguments, second language researchers turned away from behaviorist psychology and sought the explanation for language acquisition in universals of language structure (Dulay & Burt, 1974).

During the 1970s and 1980s, the pendulum continued its swing away from learning psychology and toward nativist linguistics. Indeed, the very name of the field of second language acquisition ended up codifying the claim that acquisition is central and that learning is peripheral (Krashen, 1982, 1994). Toward the end of the 1980s, the pendulum began its swing back toward the center. The papers in this special issue reflect this new direction.

The new themes being borrowed from experimental psychology include: practice effects, the power law, connectionism, implicit learning, and miniature artificial languages. Among these topics, the one that appears to be most central to the six papers appearing in this issue is the contrast between explicit instruction versus implicit learning. The importance of this topic for language pedagogy is obvious. The idea is that, if we can show that explicit instruction is unnecessary or even

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counterproductive, we can then accept Krashen's contrast between learning and acquisition (Krashen, 1978), and we can banish explicit grammatical instruction from the classroom.

Unfortunately, the psychological issues involved in this debate have not yet been properly clarified. Explicit instruction and explicit learning are two very different beasts. Explicit instruction does not necessarily lead to explicit learning. If the instruction is confused and the rules are complex, the student may get little out of explicit instruction and may fall back on exhaustive learning of individual exemplar sentences and words. On the other hand, even without explicit instruction, a student may attempt to extract an explicit rule to characterize a set of input data. This means that we need to break up the unitary exploration of the effects of explicit teaching into two topics. First, we need to know whether explicit teaching leads to explicit rule formulation in students. Second, we need to know whether explicit rule formulation in the student leads to higher levels of achievement.

In the experiments by DeKeyser and de Graaff, we find evidence that learning is facilitated by explicit instruction. Psychologists find these results unsurprising but, for the historical reasons I have noted, results of this type are still a matter of controversy for SLA researchers. Psychologists have shown repeatedly that concept learning with advance organizers and clues is always better than learning without cues. Students who receive explicit instruction, as well as implicit exposure to forms, would seem to have the best of both worlds. They can use explicit instruction to allocate attention to specific types of input (Ellis, 1994; MacWhinney, 1978; Schmidt, 1994), narrow their hypothesis space (Levine, 1975; Quine, 1960), tune the weights in their neural networks (McDonald, 1989), or consolidate their memory traces (Gupta & MacWhinney, in press). From the viewpoint of psycholinguistic theory, providing learners with explicit instruction along with standard implicit exposure would seem to be a no-lose proposition. It is difficult to think of any study that has shown a linguistic pattern for which students do worse when given additional explicit instruction. If such an effect could be achieved, it would need to involve providing instruction that was either hopelessly confusing or actually wrong. Furthermore, there is nothing in the implicit learning literature that says that explicit instruction cannot further modulate implicit learning. Rather, the claim in the implicit learning literature is simply that some types of learning can occur implicitly.

Explicit instruction works best for clear, simple structures (Green & Hecht, 1992), and instruction in hopelessly complex rules can be counterproductive. De Graaff investigates two points along this dimension. However, both of these points sit on the simple side of the complexity continuum. Although one of the rules he looks at is a bit more complex than the other, neither is really all that forbidding. De Graaff finds that explicit instruction is helpful for both, but a clearer test of the complexity hypothesis would include one simple rule and one really complex rule. To generate really complex rules, one needs to work with a really complex language.

The basic principle is that giving learners clear access to relevant information is never a bad idea. This notion carries over equally well to the study of pidgin input in Yang and Givón's Keki language. In one condition in that study, learners were exposed to the full language from the beginning; in the other, they were exposed

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to a limited version with certain rules excised for the first half of the learning and then the full language for the remainder of the sessions. Unlike Yang and Givón, I am not surprised that the group that had to undergo the wrenching change from incorrect input to correct input did more poorly than the group that received full input. Again, the basic principle must be that withholding basic information from learners works against language learning.

The same principle is supported in Robinson's study of the learning of the English dative shift rule by Japanese ESL learners. By giving the learners a couple of minutes of clear instruction in a simple, albeit essentially incorrect, syllable-count rule for use of the double object construction, Robinson was able to increase their accuracy of generalization to new instances and lower their reaction times for grammaticality judgment. Again, it appears to be the case that giving learners good clear information about useful cues is helpful for their language learning. Should we call this "rule learning"? Probably not, because all learners acquire in the end is the linkage between a cue and a pattern. In his "enhanced" condition, Robinson attempted to lead the learners into inducing the rule on their own. The results show that you can lead a horse to water, but you can't make it drink. And perhaps the same is true with students confronted with an unnatural version of an inconsistent "rule" like that for dative shift in English.

Ellis and Schmidt take the analysis one step farther by showing how connectionist models can be used to capture the implicit learning that occurs during the acquisition of inflectional paradigms, such as the conjugational paradigm for the English past tense. Neural networks convert what appears to be a massive formal problem, such as the learning of the German case-number-gender system for nominal inflection into a simple problem in implicit learning (MacWhinney, Leinbach, Taraban, & McDonald, 1989). Exactly the same neural network model that works for the learning of German can also be used to account for the learning of English (MacWhinney & Leinbach, 1991). Ellis and Schmidt use a model of this type to explore the role of frequency in the learning of regularly inflected words such as *jumped*. Earlier, Stemberger and MacWhinney (1986) had studied adult native speakers and demonstrated effects of higher frequency on latency to past-tense formation for both irregular past-tense forms such as *fell* and regular past-tense forms such as *wanted*. Additional similar empirical results for adult native speakers have also been reported by Bybee (in press) and Shirai (1996), suggesting that Ellis and Schmidt's interpretation of the regular frequency effect as exclusively a second language acquisition phenomena may be incorrect. Despite this technical detail, the connectionist framework adopted by Ellis and Schmidt seems to offer great promise as a way of characterizing the contrast between implicit and explicit learning of second languages.

In the end, the attempt to attribute language learning to either implicit or explicit processes will inevitably have to be answered by a position that emphasizes the contribution of both sets of processes. Of course, some researchers, such as Krashen (1994), who have taken a strong position against the role of explicit learning and explicit teaching, might well complain that this dual-process position is virtually unfalsifiable, because attempts to exclude the role of explicit processes would amount to attempts to prove the null hypothesis. One might also complain that

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studies that look at the effects of explicit instruction by using formal academic outcome measures are biased toward overestimating the effects of explicit learning on real "acquisition." It seems to me that both of these objections are reasonable. Eventually, we will need to replace the simple dichotomy of explicit and implicit learning with a fuller model that looks at the detailed mechanics of second language learning of particular target structures. In effect, this is the course taken by Ellis and Schmidt and by work that extends the Competition Model to the study of second language acquisition using connectionist modeling (Hernández, Bates, & Ávila, 1994; Kempe & MacWhinney, 1995; Kilborn, 1989; MacWhinney, in press; McDonald, 1987). Within the context of models such as these, we can begin to create more fine-grained analyses that characterize precisely the ways in which the basic implicit generalization mechanisms interact with higher level explicit control processes.

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