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THE ROLE OF AWARENESS IN L2 DEVELOPMENT: THEORY, RESEARCH, AND PEDAGOGY

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Abstract

Cognitive psychology and cognitive science appear to agree that attention to stimuli is needed for long-term memory storage and that little, if any, learning can take place without attention. One strand of psycholinguistic research that has drawn quite a lot of interest, both from a theoretical and empirical perspective, is the role awareness plays in second language acquisition (SLA). To promote a further understanding of the role of awareness may potentially contribute to L2 development. This article will (1) briefly describe current theoretical approaches to the role of awareness in language learning, (2) review recent studies that have employed verbal reports to investigate the effects of awareness on L2 development, and (3) provide, based on the review, some awareness-raising pedagogical tasks for the L2 classroom setting.

Keywords: attention, awareness, detection, feedback, L2 development, noticing, task-essentialness

INTRODUCTION

Psycholinguistic research in second/foreign language (L2) learning or acquisition has undoubtedly become one of the major components of many current teacher education programs (Bardovi-Harlig & Hartford, 1997; Leow, 1994a, 1994b, 1995a, 1995b). One strand of research within this field that has drawn quite a lot of interest, both from a theoretical and empirical perspective, is the role awareness plays in second language acquisition (SLA). To promote a further understanding of the role of awareness may potentially contribute to L2 development. I will (1) briefly describe current theoretical approaches to the role of awareness in language learning, (2) review recent studies that have employed verbal reports to investigate the effects of awareness on L2 development, and (3) provide, based on the review, some awareness-raising pedagogical tasks for the L2 classroom setting.

THEORETICAL UNDERPINNINGS

The role of awareness or lack thereof in L2 learning is subsumed in several major theoretical approaches to the role of attention in SLA (e.g., Robinson, 1995a; Schmidt, 1990, 1993, 1994, 1995, 2001; Tomlin & Villa, 1994) mainly in the formal classroom setting. Many theories of SLA posit, directly or indirectly, some role for attention, but the construct is especially emphasized in cognitivist accounts, where it is argued that "attention appears necessary for understanding nearly every aspect of second and foreign language learning" (Schmidt, 2001, p.6). Indeed, both cognitive psychology and cognitive science appear to agree that attention to stimuli is needed for long-term memory storage and that little, if any, learning can take place without attention (e.g., Carlson & Dulany, 1985; Carr & Curran, 1994; Nissen & Bullemer, 1987; Posner, 1992; Reber, 1967, 1976, 1989, 1993).

There are three major approaches to the roles of attention and awareness in SLA, namely, Tomlin and Villa's (1994) functional model of input processing in SLA, Schmidt's (1990 and elsewhere) noticing hypothesis, and Robinson's (1995a) model of the relationship between attention and memory.

TOMLIN AND VILLA'S FUNCTIONAL MODEL OF INPUT PROCESSING IN SLA

Drawing on the work of Posner (1992) in cognitive science, Tomlin and Villa (1994) propose a functionally-based, fine-grained analysis of attention. In their model, attention has three components with neurological correlates: (1) alertness, which is an overall readiness to deal with incoming stimuli, (2) orientation, which is the direction of attentional resources to a certain type of stimuli, and (3) detection, which is the cognitive registration of stimuli. According to Tomlin and Villa, it is only the attentional function of detection that is necessary for further processing of input and subsequent learning to take place. The other two components (alertness and orientation) can separately or together enhance the chances that detection will occur, but neither is necessary. In addition, detection does not imply awareness given that, according to Tomlin and Villa, a learner may detect some linguistic information in the input, processes it but does not need to be aware of doing so.

SCHMIDT'S NOTICING HYPOTHESIS

In direct contrast to Tomlin and Villa's (1994) postulation that awareness is not necessary for learning, it is more widely accepted in SLA that the absence of awareness during input processing may only result in short-term memory, which may then not be further processed for learning to take place. According to Schmidt's (1990 and elsewhere) noticing hypothesis, attention controls access to awareness and is responsible for noticing, which is "the necessary and sufficient condition for the conversion of input into intake[1]" (Schmidt, 1993, p. 209). He views attention as being isomorphic with awareness and rejects the notion of learning without awareness. Furthermore, Schmidt proposes that, in addition to noticing, that is, awareness at the level of noticing, there is another higher level of awareness, which he refers to as awareness at the level of understanding. This level of awareness is characterized by learners' ability to analyze, compare, and test hypotheses and leads to deeper learning marked by restructuring and system learning. On the other hand, awareness at the level of noticing leads to mere intake of linguistic information.

ROBINSON'S MODEL OF THE RELATIONSHIP BETWEEN ATTENTION AND MEMORY

A third model of attention proposed in SLA is that of Robinson (1995a) who reconciles Tomlin and Villa's (1994) notion of detection (which does not involve awareness) and Schmidt's (1990 and elsewhere) notion of noticing (which does involve awareness). Robinson's model strategically places detection at an earlier stage in the process in relation to noticing and input processing. Noticing, according to Robinson's model, is "detection plus rehearsal in short-term memory, prior to encoding in long-term memory" (Robinson, 1995a, p. 296). Noticing, like in Schmidt's hypothesis, does involve awareness, and is crucial for learning to take place. Robinson's model, then, acknowledges Tomlin and Villa's notion of detection in language learning but reduces its impact on learning by relegating it to an earlier stage in the learning process before Schmidt's notion of noticing, which he places at a later and more crucial stage of input processing.

AWARENESS AND LEARNING

As can be seen from the different theoretical models of attention, while the facilitative role of attention in L2 development is generally

accepted, the role of awareness in language learning is not without debate. Specifically, Schmidt's noticing hypothesis and Robinson's model of the relationship between attention and memory posit a crucial role for awareness, whereas Tomlin and Villa's functional model of input processing does not. But what is awareness and how has it been defined in SLA? Tomlin and Villa (1994) define awareness as "a particular state of mind in which an individual has undergone a specific subjective experience of some cognitive content or external stimulus" (p. 193). Awareness, according to Allport (1988), is demonstrated through a) some resulting behavioral or cognitive change, b) a report of the experience, or c) metalinguistic description of an underlying rule. While it is accepted that attentional resources may be allocated to a specific linguistic item in the input, the question that remains unanswered is whether the presence of learner awareness is required for the grammatical information to be processed further by the learner. Not surprisingly, several researchers have supported a dissociation between learning and awareness (e.g., Carr & Curran, 1994; Curran & Keele, 1994; Hardcastle, 1993; Tomlin & Villa, 1994; Velmans, 1991) while others have rejected this dissociation (Leow, 2000; Robinson, 1995a; Schmidt, 1990 and elsewhere).

MEASURING AWARENESS: METHODOLOGICAL ISSUES

Operationalizing and measuring awareness in SLA has been approached from two procedures, namely, offline/retrospective (that is, data are collected after exposure to the L2 data) and online/introspective (that is, data are collected while learners are interacting with the L2 data). The favored offline procedure has been the use of a questionnaire after exposure (e.g., Carr & Curran, 1994; Curran & Keele, 1993; Hartman, Knopman, & Nissen, 1989; Nissen & Bullemer, 1987; Robinson, 1995b, 1996, 1997a, 1997b). For example, Robinson (1995b) developed a three-item post-exposure questionnaire asking participants whether they *noticed*, *looked for*, or *were able to verbalize* the rules underlying the targeted structures. The major limitation of this procedure is the low internal validity of the data, that is, the data may not reflect truly what learners became aware of while exposed to the input (for a review and critique of relevant studies, see Leow, 1997, 2001, Robinson, 1995a; Shanks & St. John, 1994).

Recently, a strand of studies has employed online or concurrent data elicitation procedures to operationalize and measure attention and awareness during exposure to L2 input. Online procedures include, for example, verbal reports or think aloud protocols in which learners are requested to simply say aloud whatever they were thinking while they were processing the L2

input. Such online data, according to Schmidt (2001), is "[T]he clearest evidence that something has exceeded the subjective threshold and been consciously perceived or noticed is concurrent verbal report" (p. 20). Studies employing verbal reports to operationalize and measure the construct awareness in SLA are reported in the next section.

LEARNING WITH AWARENESS

Arguably the first study to employ online procedures to operationalize and measure awareness in SLA, Leow (1997, see also Leow, 2001) quantitatively and qualitatively addressed the role of awareness in foreign language behavior in relation to Schmidt's noticing hypothesis. He undertook to ensure that noticing did occur before attempting to address the role of levels of awareness and their effects on L2 behavior. Awareness in this study was based on Tomlin and Villa's (1994) restricted definition and Allport's (1988) criteria for the presence of awareness: (a) a show of some behavioral or cognitive change (e.g., verbal or written production of the stem-change of the targeted form) due to the experience and either (b) a report of being aware of the experience or (c) some form of metalinguistic description of the underlying rule. Leow analyzed the think aloud protocols produced by 28 adult beginning learners of Spanish who were required to complete a problem-solving task (a crossword puzzle) and their immediate performances on two post-exposure tasks designed to elicit recognition and written production of the targeted forms, the "irregular" third person singular and plural preterit forms of stem-changing *-ir* verbs in Spanish. From the analysis of the think alouds, he identified three levels of awareness: [+ cognitive change, -meta-awareness, - morphological rule formation] where participants did not provide a report of their subjective experience nor did they verbalize any rule, [+ cognitive change, + meta-awareness, - morphological rule formation] where participants did report their subjective experience but did not provide any verbalization of the rule, and [+ cognitive change, + meta-awareness, + morphological rule formation] where participants provided both a report and a verbalization of rule formation (similar to Schmidt's notion of understanding that is a higher level of awareness).

Leow put forward three conclusions. First, he found that different levels of awareness led to differences in processing. More specifically, meta-awareness appeared to correlate with an increased usage of hypothesis testing and morphological rule formation (conceptually-driven processing) while absence of meta-awareness appeared to correlate with an absence of such processing. Second, the findings indicated that more awareness

contributed to more recognition and accurate production of the noticed forms by facilitating or enhancing further processing of such forms contained in the L2 data. Finally, the findings provided empirical support for the facilitative effects of awareness on foreign language behavior.

Like Leow (1997, 2001), Rosa and O'Neill (1999) also employed a problem-solving task to examine the role of awareness in L2 learning. The problem-solving task was a multiple-choice jigsaw puzzle divided into two pasted sections on a page: (1) a piece of the puzzle depicting an event, a person, or the result of an event and (2) another piece of the puzzle with the main clause of a conditional sentence of either one of two experimental targeted structures. Each page also had three other pieces of the puzzle each with a subordinate clause written on it. Participants were required to select one of the three unpasted pieces that would correctly fit between the picture and the main subordinate clause. Sixty-seven adult L2 learners of Spanish were randomly divided into five conditions of different degrees of explicitness. Two factors were varied to create the five conditions: explicit instruction on Spanish contrary-to-fact conditional sentences and directions to search for rules. Concurrent data on learners' awareness were gathered through the use of think aloud protocols performed while they were performing the problem-solving tasks. Rosa and O'Neill found that both awareness at the level of noticing and at the level of understanding translated into a significant improvement in intake scores from the pretest to the posttest. In addition, they also found, like Leow (1997, 2001), that learners who demonstrated understanding of the targeted structure performed significantly better on intake posttests than learners who evidenced noticing only.

Rosa and Leow (2004a) also provide further empirical support for the role of awareness in L2 development. They extended Rosa and O'Neill (1999) to examine (a) whether exposure to L2 input under different computerized task conditions had a differential impact on learners' awareness and (b) whether different levels of awareness influenced learners' ability to recognize and produce the targeted structure immediately after exposure to the input and over time. The problem-solving task was also a jigsaw puzzle comprising a series of 28 interactive Libra cards, each containing a Spanish contrary-to-fact conditional sentence. The learners' task was to solve all 28 puzzles, each of which had the following structure: there were two puzzle pieces on the computer screen, a main clause piece and, right next to it, an empty piece. Underneath the two puzzle pieces were four moveable subordinate clauses, the only difference between them being the tense of the verbs. This feature promoted learner attention to the targeted structure (both on the morphology of the four candidate verbal forms and on the function of the correct form, that is, on the reason why

some tenses worked in certain contexts while not in others). Learners solved each puzzle by filling the empty piece with the different moveable subordinate clauses and finding out which of these four clauses corresponded to the given main clause piece. L2 development was assessed through recognition and controlled-production tests containing old and new exemplars of the targeted structure.

One hundred fifth semester students were randomly assigned to six different conditions premised on six degrees of explicitness (a combination of the feature (+essentialness), provision of explicit grammatical information [+ Pretask], and type of feedback [explicit vs. implicit]). The computerized puzzle and concurrent data elicitation procedures (think alouds) were used to address the effects of awareness on learners' recognition and production of both old and new exemplars of the targeted Spanish contrary-to-fact conditional in the past.

They found (a) a positive relationship between the explicitness of the various learning conditions and the levels of awareness reported by learners in each condition, (b) higher levels of awareness (i.e., understanding) were associated with learning conditions providing an explicit pretask as well as implicit or explicit feedback. In conditions with one source of information on the targeted structure, more explicitness translated into higher levels of awareness, (c) higher levels of awareness (i.e., understanding) were substantially more effective than lower levels (i.e., noticing) in helping learners recognize and produce novel exemplars of the targeted structure. However, awareness at the level of noticing was still effective enough to provoke a significant score improvement from the pretests to the immediate and delayed recognition and production posttests, and (d) higher levels of awareness were associated with sophisticated input processing strategies such as hypothesis formation and testing, as well as with verbal formulation of rules accounting for the form and function of the targeted structure. These findings corroborate those of Leow (1997, 2001) and Rosa and O'Neill (1999), and provide additional support to Schmidt's (1990 and elsewhere) claims regarding the cognitive processes associated with different levels of awareness.

One recent study (Leow, 2000) also investigated the issue of "aware" versus "unaware" learners. Thirty-two beginning learners of Spanish were exposed to the same crossword puzzle and requested to think aloud while completing the task. Based on the think aloud protocols produced, they were then separated into an aware and unaware group. Their performances on a post-exposure multiple-choice recognition task and a written production task were then statistically compared. The findings appear to indicate that (1) learners who demonstrated awareness of the targeted morphological forms (irregular stem-changing preterit verbs in Spanish)

during the experimental exposure took in and produced in writing significantly more of these forms when compared with the group that demonstrated a lack of such awareness, (2) aware learners significantly increased their ability to recognize and produce in writing the targeted morphological forms after exposure whereas the unaware group did not, and (3) from a theoretical perspective, no dissociation between awareness and learning was found in this study, the results of which are compatible with the claim that awareness plays a crucial role in subsequent processing of L2 data (e.g., Schmidt 1990 and elsewhere; Robinson, 1995a).

Of importance in the selection and design of the experimental tasks employed in the studies reviewed above are two issues: (1) task-essentialness, that is, learners need to pay attention to the grammatical form or structure in the task to successfully complete the task, and (2) feedback, which may be implicit or explicit and confirms or disconfirms previous hypotheses formation facilitated by task-essentialness (Loschky & Bley-Vroman, 1993). In cognitive psychology, feedback has traditionally been linked to the process of hypothesis formation and testing (Estes, 1989). The importance of feedback in structure-based communicative tasks is also directly related to the body of current empirical research in SLA showing that hypothesis formation and testing are necessary for system restructuring to occur (e.g., Leow, 1997, 2001; Rosa & Leow, 2004a, 2004b; Rosa & O'Neill, 1999). In addition, the provision of computerized feedback (implicit or explicit) concurrently or during performance of the task is reported to have beneficial effects on learners' subsequent processing of the L2 data (e.g., Nagata, 1993; Nagata & Swisher, 1995; Rosa & Leow, 2004b),

To conclude on the findings of the effects of awareness on L2 development, a number of SLA studies have provided empirical support for the facilitative effects of awareness on foreign language behavior and learning. More specifically, the main findings indicate that (a) awareness at the level of noticing and understanding contributed substantially to a significant increase in learners' ability to take in the targeted form or structure (Leow, 1997, 2000, 2001; Rosa & Leow, 2004a; Rosa & O'Neill, 1999) and produce in writing the targeted form or structure (Leow, 1997, 2001; Rosa & Leow, 2004a), including novel exemplars (Rosa & Leow, 2004a); (b) awareness at the level of understanding led to significant more intake when compared to awareness at the level of noticing (Leow, 1997, 2001; Rosa & Leow, 2004a; Rosa & O'Neill, 1999); (c) there is a correlation between awareness at the level of understanding and usage of hypothesis testing / rule formation (Leow, 1997, 2000, 2001; Rosa & Leow, 2004a; Rosa & O'Neill, 1999); (d) there is a correlation between level of awareness and formal instruction and directions to search for a rule (Rosa & O'Neill,

1999); and (e) there is a correlation between awareness at the level of understanding and learning conditions providing an explicit pretask (with grammatical explanation) as well as implicit or explicit concurrent feedback (Rosa & Leow, 2004b).

LEARNING WITHOUT AWARENESS?

Contrary to these research findings, one recent study (Williams, 2004) has found some limited evidence to support the claim that there may be some language learning without awareness. In Experiment 1 of the study, 37 participants were exposed to an artificial micro-language that was based on Italian and comprising 8 determiners and 8 nouns. After participating in a series of learning trials in which they first listened to each word that was presented aurally, they performed three tasks: (1) they repeated each word aloud, (2) they indicated whether each noun referred to a living or non-living thing, and (3) they translated each noun to English. During the test phase, participants were then presented an English phrase and requested to choose between two alternate translations, one with a determiner of the correct animacy and one of the incorrect animacy. After the test phase, participants were probed to determine whether they were aware of the animacy relationship during the study. Participants who reported awareness were eliminated from the study. Data from the participants who did not demonstrate awareness indicated a performance significantly better than chance on the generalization test. However, care may need to be taken interpreting the results given that participants in the study were from various L1 backgrounds, and subsequent analyses found that those who spoke gendered L1 languages performed significantly better than those who did not. This result indicates that L1 background may be a potential confounding factor in the results. Experiment 2 in the study, which employed a different artificial micro-language that was less similar to natural noun class systems, did not reveal any evidence of implicit learning of form-meaning connections.

PEDAGOGICAL TASKS

The most important implication for the classroom setting derived from studies premised on attention and awareness in SLA is that learner attention to targeted forms in the L2 input is minimally a prerequisite for subsequent processing to take place. However, mere attention to targeted forms may not be sufficient to promote robust processing and potential internalization of the L2 linguistic information. Given the overall beneficial

effects of tasks (premised on the features task-essentialness and feedback) that raise learner awareness and are theoretically and empirically supported, it is recommended that pedagogical tasks or activities be designed to do the following: (1) explicitly draw learners' attention to targeted forms or structures and (2) encourage meaningful interaction with the input through the creation of explicit conditions, exposure, or instruction to promote the allocation of more attentional resources to notice such forms. In other words, these are tasks in which learners need to notice or be aware of the targeted form or structure in order to successfully complete the task.

Awareness-raising tasks[2] are easily designed via problem-solving tasks or activities, which, in addition to the inherent interest in solving the problem, create the opportunity to use the L2 from a student-centered and creative way.[3] Pedagogical tasks, which include carefully designed crossword puzzles, games, or self-discovery grammatical tasks, may be either classroom-based or non-classroom based. Since raising students' awareness of L2 linguistic features is more an internal than external process, it is suggested that these tasks be performed outside the classroom with the opportunity to extend the tasks into the classroom setting. The ideal platform for the creation and use of such awareness-raising tasks or activities is via the computer, and the targeted forms or structures may be the more problematic ones in the L2.

It is important to note that this article does not presume that these kinds of computerized awareness-raising tasks constitute the only pedagogical avenue for successful L2 development in the classroom setting. On the contrary, these computerized tasks only address one aspect of the learning and teaching processes. Indeed, the ideal setting for these computerized tasks is outside the classroom and should be viewed as ancillary tools to prepare students for communicative practice in the actual classroom setting, powered by the important role of the teacher.

CONCLUSION

This article has presented a concise overview of the theoretical and methodological issues surrounding the role of awareness in adult second/foreign language behavior and learning, and provided a brief report of current empirical studies that have employed verbal reports to investigate this role in L2 development in the L2 classroom. The overall findings appear to indicate facilitative effects of awareness on adult L2 learners' subsequent processing, intake, and learning of targeted L2 forms or structures embedded in the L2 data, providing empirical support for the facilitative role of awareness in SLA. Pedagogical tasks, premised on task-essentialness and

concurrent feedback and designed to raise learner awareness of linguistic information in the L2 input, are recommended for use as ancillary tools to promote robust learning of problematic forms or structures in the L2.

Notes

1. Intake is defined as representing "stored linguistic data that may be used for immediate recognition and does not necessarily imply language acquisition" (Leow, 1993, p. 334).

2. For descriptions of the designing of awareness-raising pedagogical tasks, see Leow (1997, pp. 475-476, p. 502) and Rosa & Leow (2004a, pp. 273-276). Given the consistent and superior benefits of higher levels of awareness on L2 development when compared to lower levels, these tasks can be supplemented by a request to provide an underlying grammatical rule after completion of the task to promote more hypothesis formation and testing by the learner while processing the L2 input.
3. In a study comparing teacher-centered instruction with learner-centered exposure, Leow (1998) reported that learners exposed to a problem-solving crossword puzzle performed significantly better on both recognition and written production tests when compared to learners exposed to the same linguistic information presented by the teacher. Interestingly, this superior performance lasted over the duration of one semester.

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