Formal Instruction and Second Language Acquisition : Towards A Cognitive Model of the Relationship Between Explicit and Implicit Knowledge

Sandra S. Fotos

1. Introduction: The Case for Formal Instruction

In the field of Teaching English as a Second Language (TESL), the past several decades have seen the rise of various communicative and humanistic approaches to language teaching based on theories (cf. Krashen 1985) which distinguish between language *acquisition*, considered to be an unconscious process similar to the way small children acquire their first language, and language *learning*, or formal instruction on isolated linguistic units. These theories claim that the best way to learn a language, either inside or outside a classroom, is not by treating it as an object of study, but by experiencing it as a medium of communication (Long 1988) where the focus is on of meaning, not on form.

However, when we consider English language education throughout the world, it is apparent that, numerically speaking, the preponderance of learners study English as a Foreign Language (EFL) within their home countries. Often the English teachers' primary responsibility is to prepare their students for institutional entrance examinations which require knowledge of English grammar and translation skills. In such situations, the use of communicative approaches is not always practical, and formal grammar instruction tends to prevail, even though the teachers would like their students to develop communicative ability in English.

Given these considerations, it is not surprising that many teachers have sought a compromise between the two extremes of a linear, additive pedagogy where the focus is a series of isolated linguistic forms, and a pedagogy with no focus on linguistic forms whatsoever. A number of English teachers have, thus, come to favor an eclectic approach which

combines communicative activities with formal instruction.

There is considerable empirical support for this orientation. The large body of classroom process research (reviewed in Chaudron 1988) has established the value of meaning-focused communicative activities in providing learners with comprehensible input, and the opportunities for improvement in their own output. Additional studies (reviewed by Long 1983 & 1988 and Ellis 1990) on the conditions for the attainment of language proficiency suggest that focus on linguistic forms through instruction is strongly related to both the speed and the ultimate level of target language attainment. Students who received formal instruction outperformed those who did not, both in terms of their rate of language acquisition, and their general level of proficiency. Supporting research (White 1987) indicates that some grammatical forms cannot be acquired solely on the basis of comprehensible input, and that formal instruction is required to ensure that learners obtain the data needed to acquire them.

Thus, there is empirical evidence supporting both communicative activities, where the students listen to and use the target language in situations where the focus is on the meaning of what is being said, and formal instruction, where students are presented with rules and examples of the structure of the language. Both types of activities, meaning-focused and form-focused, have been shown to be necessary for successful second language acquisition.

2. The Need for an Expanded Model of Language Acquisition

This paper attempts to develop a cognitive model of language acquisition which can accommodate these two types of linguistic knowledge: that gained from a form-focused traditional grammar lesson, and that gained from communicative, meaning-focused use of the target language. This model is based on the author's belief that it is pedagogically desirable to integrate the formal teaching of grammar in the EFL classroom with the provision of opportunities for communication involving meaning-exchange through the use of classroom language tasks which provide learners with

grammar problems to be solved interactively (Fotos 1990; Fotos & Ellis 1991).

Choice of a cognitive approach to language acquisition rather than an approach based on Universal Grammar has been recommended by authors such as the noted psycholinguist McLaughlin (1987), who suggests that among the various pyschological theories of language learning, the information processing model based on cognitive theory offers the best current explanation. This paper will employ a version of cognitive theory and information processing in an attempt to develop a psycholinguistic model of what might take place within a learner's cognitive processes during a language lesson which uses both formal instruction and subsequent communicative task performance.

A. The Theoretical Basis for the Cognitive Model Proposed Here

The theoretical assumptions underlying the model are:

(1) Formal instruction develops *explicit* knowledge of grammatical features. Here, explicit knowledge refers to declarative knowledge (Anderson 1985), or knowledge about something, such as the formal knowledge of various rules about the grammar feature presented, and about language in general.

(2) The process whereby a learner gains explicit knowledge of a linguistic feature and can monitor with it—that is, consciously correct erroneous output—has been termed "consciousness raising" (Schmidt 1990; Sharwood-Smith 1981) in psycholinguistic theory. "Consciousness raising" as used here refers to the act of noticing and the subsequent continued awareness of a particular grammatical feature (Schmidt 1990b). Consciousness, or increased awareness of some particular feature in language input, is increasingly being seen as critical to the language acquisition process (Ellis 1990) for the following reason:

(3) Once a learner has developed explicit knowledge about a grammatical feature, the learner is more likely to notice that feature in input, and subsequently, to acquire the feature as *implicit* knowledge.

Implicit knowledge, also called procedural knowledge (Anderson 1985),

refers to knowledge about how do do something. In this case, implicit knowledge refers to the internalization of a language rule or form so that the learner is able to use the rule or form accurately in natural speech. Implicit knowledge is gained from meaning-focused communication in the target language. Thus, the term "language acquisition" refers to the nonconscious development of implicit knowledge through meaning-focused interaction using the target language, whereas the term "language learning" refers to the conscious development of explicit knowledge through formal instruction about different language rules or forms of the target language.

B. The Relationship Between Explicit and Implicit Linguistic Knowledge

A major issue which the model attempts to address involves the nature of the relationship between explicit and implicit knowledge. Is it possible that the two forms of knowledge can somehow be converted to each other? Does an interface exist between explicit and implicit knowledge of language, as has been suggested by researchers such as Sharwood-Smith (1981) and Gregg (1984)? Or is the non-interface position advocated by Krashen in his Monitor Model (1985) and Ellis (1990) more accurate? Although a number of studies (reviewed in Long 1988 and Ellis 1990) seem to favor the latter view, the model developed here provides for an interface, so that language items learned through instruction can eventually become available for use in communicative situations. Perhaps a necessary event is the structure's appearance at a certain level of frequency in the target language input *after* the learner has become conscious of it through formal instruction. Anecdotally, the author recalls her own acquisition of the Japanese term for the recently instituted consumption tax, *shouhizei*. Despite reading a formal explanation of the term in an English language newspaper, it nonetheless required a number of meaning-focused, communicative situations involving the new term before it could be used accurately in discourse.

Often explicit knowledge about a particular language structure still remains available to the learner even after the learner is able to use the

form automatically in natural speech. In other cases, learners have naturalistically acquired structures in the target language, but if they are asked, they cannot articulate grammar rules about their usage. However, such learners can be instructed in the formal rules governing structures which they already know implicitly. Such cases suggest that explicit and implicit knowledge exist independently, as separate types of knowledge, despite the presence of an interface between them.

3. A Description of An English Lesson Combining Form-Focused Instruction on a Grammar Point and Performance of a Meaning-Focused Communicative Activity

The cognitive model presented here is based on an English lesson consisting of a formal, teacher-fronted explanation of a grammar point followed by student performance of an interactive, grammar problem-solving task, and then teacher feedback on task outcomes. The English lesson is designed for Japanese first year college EFL students who have had at least 6 years of English mainly using the Grammar-Translation and Audio-Lingual methods. As a consequence of these teaching methods, the students possess metalinguistic knowledge about English, explicit knowledge about English syntax and a number of lexical items and memorized chunks of language. However, the students tend to lack implicit or procedural knowledge of English and have considerable difficulty understanding and speaking in communicative, meaning-focused situations.

The grammar point selected is dative alternation, or indirect object placement. This is problematic for many students of English. There are 3 patterns of indirect object placement in English verbs. The first allows placement of the indirect object either after the verb or as a prepositional phrase at the end of the sentence, as in the following:

He gave **me** the book. He gave the book **to me.**

The second pattern permits placement of the indirect object only as a prepositional phrase and is generally the case with Latinate verbs:

He translated the book **for her.**

The third pattern is applicable to a limited set of verbs such as "ask", meaning "inquire", and necessitates placement of the indirect object immediately after the verb:

He asked **me** a question.

The teacher presents a formal grammar lesson. The medium of instruction is English, the students' target language. Use of the target language as the medium of instruction promotes the development of implicit knowledge, since the students are focused on the meaning of what is being said, even through what is being talked about is English grammar. Two learning hierarchy concepts developed by the cognitive psychologist Ausubel (1968) are useful to understand what is happening: the advance organizer and anchoring ideas. The students are told in advance (the advance organizer) that they are going to study a problematic grammar structure which is confusing because there are different rules for different types of verbs. Reference is then made to previously studied patterns of English verb usage. Such references are anchoring ideas, which help organize the new material in relation to what has been learned before. The teacher then writes the 3 rules for dative alternation on the board, and below each rule, several examples of sentences with correct usages. The teacher points out and underlines the differing positions of the indirect object in each usage. As mentioned, the target language itself is used as the medium of instruction, so that the students are exposed to both meaning-focused and form-focused language use during the grammar lesson.

After the lesson, the students are then divided into groups of four or pairs. They are given a task sheet, containing a number of verbs with different patterns of indirect object placement, and task cards with correct and incorrect sentences using the verbs on the task sheet. Each student has different task cards and must read the information in English to the rest of the students, who must listen carefully. The students, speaking in English, must determine the correct placement of the indirect object for each verb on the task sheet, based on the sentences which they heard.

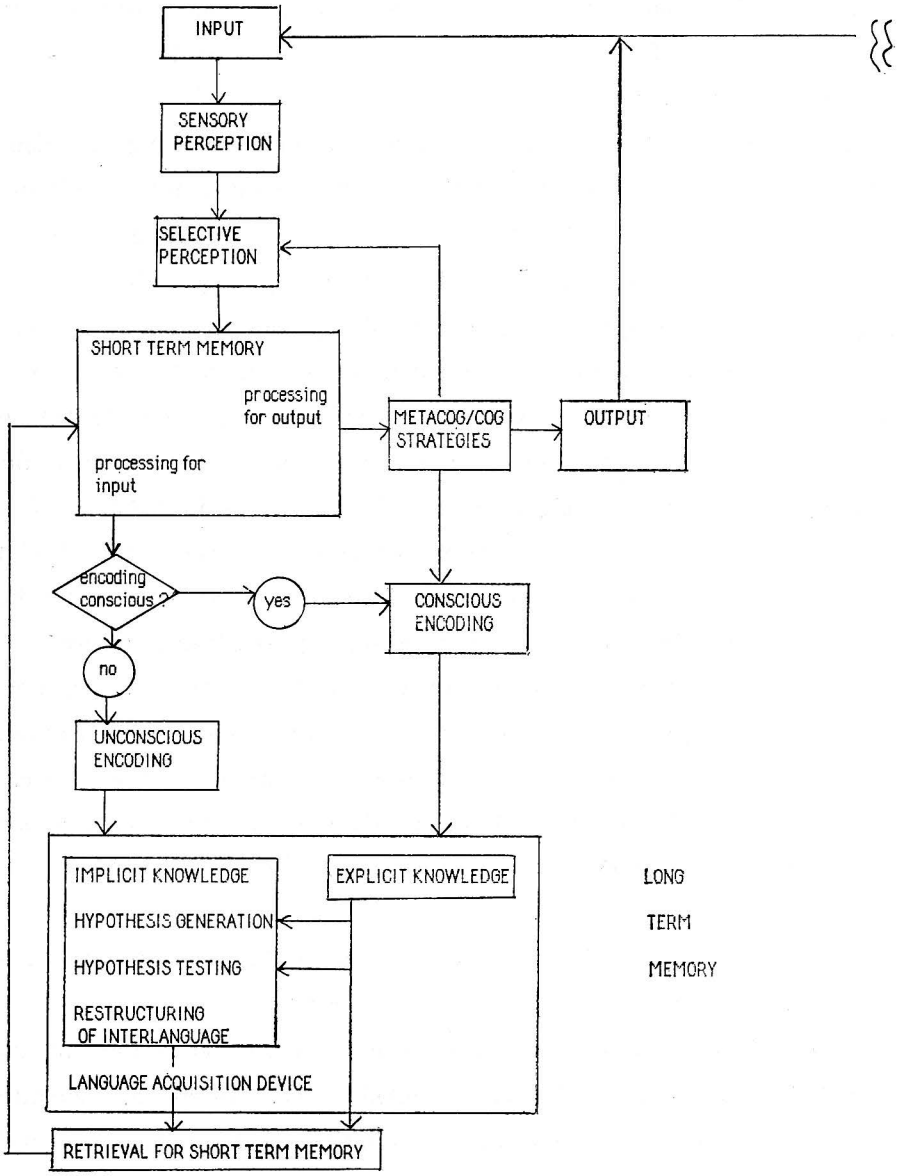
After task performance, the teacher reviews the verbs on the task sheet, writing sentences on the board showing correct indirect object placement, and asking the students to check their task sheets to make sure that the different patterns of indirect object placement were correctly matched with the different verbs.

The author recently reported on an experiment comparing proficiency gains in mastery of indirect object placement obtained as a result of a grammar lesson, similar to the one outlined above, given to a group of Japanese college EFL students with proficiency gains obtained from performance of the grammar problem solving task by another group of students (Fotos 1990, Fotos & Ellis 1991). Students in both groups took a pre-test on placement of indirect objects before the grammar lesson/task performance. After the lesson/task, the students took a post-test. Both groups of students made significant proficiency gains in mastery of the difficult grammar form. One obvious conclusion of the study was the potential effectiveness of a combined lesson featuring both a teacher-fronted explanation of a difficult grammar structure, followed by performance of an interactive, grammar problem solving task. Psycholinguistically, this type of lesson would offer the students a chance to develop both explicit and implicit knowledge about the problematic structure, as they first receive formal instruction, and then discuss the grammar point and solve the grammar problem interactively.

4. A Cognitive Model of the Processes Involved in the Grammar Lesson and Task Performance

Figure 1 is a tentative model of what might occur when the language learner is exposed to the lesson presented above. As stated, a cognitive explanation of a grammar point is given in the target language. Then the learners solve a grammar task in groups, speaking in the target language. The teacher then gives feedback on the task performance, again in the target language. Thus, the lesson requires the learner to process the target language in both form-focused and meaning-focused modes.

Figure 1. A Cognitive Model of the Relationship between Implicit and Explicit Linguistic Knowledge



Both serial and parallel processing is incorporated into the model. The initial processing steps are done serially and appear to follow a natural order, eg., input is received, and selectively taken into the short term memory (STM), with the aid of various strategies. However, the encoding of input is not straightforward. Some items in the STM are encoded consciously, with effort, attention and other strategies. Other items are encoded unconsciously during the course of the meaning-focused activities. It is even possible for a particular item to be encoded both consciously and unconsciously at the same time. Consequently, a Parallel Distributed Processing (PDP) approach (Pinker & Prince 1989, Hinton 1989) is more representative of this complex, co-occurring and less analyzable process. After encoding, the model posits two long term memory (LTM) structures: explicit knowledge of forms and rules, and implicit knowledge, which is contained in a structure called the Language Acquisition Device within the LTM.

As stated earlier, the model assumes an interface between implicit and explicit knowledge. However, these two structures are not seen as fixed, but rather as dynamic, with constant organizational modifications taking place as a result of restructuring and tuning from hypothesis generation and testing and new input of either type. Therefore, it is necessary to view implicit linguistic knowledge, explicit linguistic knowledge and hypothesis generation and testing to be related to one another as associative patterns in underlying neural networks operating in parallel (Pinker & Prince 1989) and capable of massive and rapid activation (Bialystok 1990; Schmidt 1990b), which is the view of the PDP model of human cognition.

A further aspect of the model proposed here is that it allows for the automization of both implicit and explict knowledge. The distinction between controlled and automatic processing has been suggested to apply to both implicit and explicit knowledge (Hulstijn 1990). Controlled processing of *explicit* knowledge has been called monitoring by Krashen (1985), and involves conscious attention to form during language production.

On the other hand, controlled processing of *implicit* knowledge can be seen in hesitation phenomena during the L2 speech of the learner as she searches LTM for lexical items or syntax, or in the use of careful, formal speech.

Automatization of implicit knowledge is, therefore, shown by increased fluency in communicative situations, and is achieved by the act of communicating. Automatization of explicit knowledge involves the swift production of rules and forms, for example, on a test or through practice and repetitions. However, it is important to note that explicit knowledge in the form of chunks or formulaic language which has been memorized and automatized through frequent usage cannot be distinguished empirically from language competency gained through the automatization of implicit knowledge. This important point, raised by Gregg (1984) in his criticism of Krashen is taken here as one piece of evidence for an interface between implicit and explicit knowledge through hypothesis formation and testing.

Let us now consider what would happen during performance of the grammar problem solving task. The learner listens to her partner read a sentence and notes the position of the indirect object. The steps involved in processing this information are given below, with reference to Figure 1.

Step 1: Sensory Reception. Auditory and visual input is received.

Step 2: Selective Perception. The learner is already paying attention and then consciously focuses on the location of the indirect object. Does it come directly after the verb or is it a prepositional phrase? The location of the indirect object is selectively perceived.

Step 3. Short Term Memory. Correct and incorrect placement of the indirect object enter the STM through conscious effort gained by directed attention and other cognitive strategies. The learner attends to the information and outputs it in writing before it is encoded into LTM. Simultaneously, the learner also inputs the utterances of her partner. She carefully notices the location and form of the indirect object and she also attends to the meaning of her partner's utterances.

Step 4: Encoding into Long Term Memory. It has been said that the process

of encoding and entering information into LTM is the central and critical event of learning (Gagne 1985). The model presented here posits two encoding processes: the first is a conscious process, involving effort and attention, and various encoding schemes which make up cognitive strategies. The second encoding process is unconscious—the first stage of language acquisition, whereby those forms which successfully convey meaning to the learner are somehow flagged for entry into the LTM. Krashen (1985) has called this type of input "i+1", referring to "i" as what the learner already knows, and "+1" as the new input, made meaningful by its context. According to Krashen's input hypothesis (1985), for input to be processed, the learner must understand what is being communicated. However, this may not be enough. Merely understanding what is said may not necessarily result in either encoding or acquisition, since it is possible for a learner to hear an utterance and guess at the meaning though context, without any encoding taking place of the new forms.

The author has personally experienced this a number of times. Top-down processing and world knowledge has permitted comprehension of Japanese utterances, without any acquisition of the new forms subsequently taking place. It seems likely that some type of structural analysis of meaning-focused input is necessary even for nonconscious encoding to take place, otherwise the input is simply lost out of STM once the immediate act of communication has finished.

Step 5: Storage in LTM. The model represents implicit knowledge and explicit knowledge as existing separately, but do they differ in location or in representation, that is, the form in which the knowledge is stored? Explicit knowledge involves rule learning and patterns of information. Both semantic and syntactic forms seem to be stored, since students can often recall exact sentences, as well as paraphrases of grammatical rules and forms. However, storage of communicative language in the LTM also appears to involve rules and organizational patterns. What is the real psychological difference between explicit and implicit knowledge? This

critical question remains unanswered.

Step 6: Hypothesis Generation and Testing, and Restructuring of Implicit Knowledge in the LAD. Theorists such as Sharwood-Smith (1981), Rutherford (1987), Schmidt (1990a & b) and McLaughlin (1987) have suggested that the language learner goes through the following three steps when processing language. The language learner:

(1) notices linguistic features in processed input.

(2) makes a comparison between existing linguistic knowledge, called interlanguage, and the new input.

(3) constructs new hypotheses on the basis of differences between the new information and the existing interlanguage.

Explicit knowledge may be involved during the steps of comparison and hypothesis construction. Parallel Distributed Processing (PDP) is useful for representing an on-going, continuous relationship between explicit and implicit knowledge and hypothesis testing, a relationship which requires constant restructuring of the patterns of implicit linguistic knowledge.

Step 7: Retrieval from LTM. PDP posits a number of "prompts" which either excite or inhibit elements in the LTM system, resulting in the reinstatement of a pattern of activity among a set of interrelated elements. Experience is seen as strengthening the connections which exist among the elements and allowing easier retrieval.

Step 8: Production Strategies and Output. Strategies which assist output have been divided into planning strategies, including semantic and linguistic simplification, and correcting strategies (McLaughlin 1987). In the example considered here, the learner is not required to produce the correct form, but to merely recognize it. Thus, there is no need for simplification or correction of output. In fact, a lag in the ability of the learner to produce the correct form of different verbs is to be expected. McLaughin (1987) suggests that, although improvement in performance is related to the degree of automaticity, the process of restructuring often results in discontinuities in the learning process, such as Stroop effects (Preston & Lambert 1969). Such discontinuities delay successful production of the

new form.

Thus, in the lesson on dative alternation presented here, the learner is able to immediatly use explicit knowledge of the grammar structure to complete the task, but *cannot be expected to produce the new grammar form correctly in comunicative utterances.* However, learner output during task performance becomes new input, and can thus provide feedback into implicit knowledge (Sharwood-Smith 1981).

Step 3: Feedback. Feedback on the correctness of language is essential for hypothesis testing and the consequent development of implicit linguistic knowledge. It has been suggested that hypotheses are tested in several ways (McLaughlin 1987). The learner tests hypotheses receptive by comparing input to existing interlanguage. The learner also tests hypotheses productively, by producing utterances in the target language and assessing their correctness from the feedback received. In the lesson presented here, the learner receives immediate feedback, in the target language from the teacher on the correctness of the task sheets, and also on test performance. This feedback, in turn, comprises new input for processing.

5. Conclusions

The cognitive model of language processing presented here illustrates how an English lesson, given in the target language and containing both formal instruction and communicative activities, can be expected to promote language acquisition through development of both implicit and explicit knowledge. Even though the nature of the relationship between explicit and implicit knowledge remains undetermined, there is little doubt that the critical process in acquisition is the modification of the learner's linguistic system on the basis of comparisons between it and processed input. From this perspective, both form-focused and meaning-focused activities are necessary for successful language acquisition.

An important pedagogic implication of this model is the fact that there will necessarily be a lag between the presentation of formal instruction

about a particular grammar form and the learner's ability to use that form accurately in communication. Although a learner may develop explicit knowledge quickly, achievement of implicit knowledge or language acquisition is gradual and under internal processing constraints. Thus, language learners must be allowed to develop their communicative language skills in their own time, and the teacher's role is one of patience while the necessary processing occurs.

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(サンドラ・フォトス　本学教授　英語)