Learning of Linguistic Rules in Formal Second Language Learning: A Classification of the Activity Types from a Psycholinguistic Perspective

Toshihiko Yamaoka

Two Types of Linguistic Knowledge

In the field of second language learning and teaching in recent years, the naturalistic and communicative approaches seem to be in vogue. In these trends it may seem that formal instruction of linguistic rules is considered to be of minor importance in learning a second language\(^1\). In the former approach, as is exemplified by Krashen (1982, 1985) and Pica (1985), formal instruction is ruled out as irrelevant or even inhibitive to the natural development of second language competence. In the latter, functions and notions of language are given primary importance and communicative activities are stressed in the learning process.

It is true that first language learning and second language learning in natural settings take place in actual communicative interactions without formal instruction. Our argument to be made in this article, however, takes a different perspective of learning. It proposes that in tutored second language learning typically taking place in the classroom in foreign language environments, learners are expected to have conscious awareness of linguistic rules of a second language through formal instruction and then to internalize them for functional purposes. The argument also goes to admit that the internalized functional rules must be automatized in their execution so that learners can free themselves and concentrate on meaning, which is necessary for fluent production of the language. This article proposes a justification of this way of learning as a possible and efficient alternative to a natural mastery of the language.

The argument is based both on the observation of second language classroom conditions and the theoretical discussion of the possible effect of formal instruction. On the conditional aspect, it must be stressed that second language learning in the classroom has several particular characteristics which are lacking in natural language learning. Firstly, most learners have attained a certain level of cognitive maturation. This makes it possible for them to cope with abstract concepts such as linguistic rules. Secondly, they have fully mastered their native languages. This means that learners already know what language is and it conduces to an objective observation of a new
language. And thirdly, they do not have much opportunity of contact with the second language out of the classroom. These conditions may necessarily suggest the possibility of an alternative route to the mastery of the language. One such alternative suggested here is the route originating form conscious awareness of linguistic rules to their subconscious internalization for language use. However traditional it may seem, the alternative way deserves serious consideration as is discussed in the following.

It is not new in our discipline to maintain these two stages in second language development. However, what we are going to discuss in the following is concerned more with their functional differences and their possible interrelationships in terms of a psycholinguistic perspective on development. This is concerned with our second point of argument regarding the effect of formal instruction. Reviewing the literature on the effect of formal instruction in second language learning, it can generally be stated that formal instruction can serve to the rate/success of learning, but it can not contribute to the route of learning. That is, formal instruction can not change the natural route of second language learning (Ellis 1985, 1990). But it must be kept in mind that this is not the final conclusion reached on the effect of formal instruction. Much remains to be made clear in the discussion of formal instruction not only in terms of theoretical explanation addressed but also in terms of experimental procedures adopted in the earlier research. In the following, one crucial aspect of such explanation is discussed, which has been largely neglected so far.

In the argument of conscious awareness of linguistic rules, a very delicate but important fact to note is that the formal properties of the target language to which the learner's attention is drawn are the results of formal analysis of sentences on the surface structure of the language. Note that surface structures in the form of sentence are the final manifestations of the internal process of their production. They are concerned with the product level of language in contrast to its internal process level. Thus, the rules of structural properties on the surface structure must be distinguished from the rules which function in their realization process. It also seems reasonable to assume that the function of the structural rules of the target language on the final product level has a different nature comparing with that of rules functioning in their realization process. This position is very similar to that proposed by Seliger (1979), who distinguishes conscious rules from internalized rules. He claims that conscious or pedagogical rules are not stored or internalized into the grammar of the learner as output devices. Thus, conscious or pedagogical rules, he claims, can be seen as "acquisition
facilitators” in that they “make the inductive hypothesis testing process more efficient.”3

Our argument and Seliger’s proposition both admit two qualitatively different types of language knowledge just like Krashen’s distinction between learned competence and acquired competence. But unlike Krashen, our position as well as Seliger’s assigns an important role to conscious rules in the formation of functional rules in the learner’s mind. Thus, we are in a weak version of the interface position**: learning can assists acquisition rather indirectly.

The two kinds of linguistic knowledge in our argument may be expressed in the following phrases:

1. conscious structural rules on the product level
2. functional processing rules on the process level

Hereafter, each type of rules is called ‘structural rules’ and ‘processing rules’ respectively.

In contrast to the weak interface position, some propose a strong interface position and insist on a direct interrelationship between the two types of knowledge. Bialystok (1981, 1982), for example, distinguishes between ‘analysed’ and ‘unanalysed’ knowledge respectively, suggesting that development proceeds according to the level of mastery of analyticity5. In an information processing perspective, McLaughlin et al. (1983) also identifies ‘controlled’ and ‘automatic’ processes in second language learning, admitting that the latter develops from the former reflecting the familiarity with the processes. Proponents of the strong interface position do not assume the qualitative difference between the two types of knowledge. The two types differ only in the manner and speed of access to the respective type of knowledge.

Although the two interface positions differ in their essentials, we may say that they are compatible in the framework of our argument. Structural rules which are learned through formal instruction are restricted only to the product level of utterance. In contrast, functional processing rules are responsible for the realization process of utterance. A weak version of the interface position may hold here: the former may serve as facilitators for internalizing the latter type of rules in one way or another.

Processing rules can be executed either with controlled attention on them or with no attentional care, namely, automatically. Thus a strong interface position can stand on this continuum of executive automaticity. Thus, in our framework the two interface positions can be combined into a unified picture as is shown in Figure 1.
To summarize, while structural knowledge of rules concern itself with the surface structure of a language, functional processing knowledge of rules is supposed to work in the realization process of the surface structure. These two types of knowledge are of quite different natures. Take, for example, the rule working for the conjugation of the verb in sentence 1.

1 *He always drinks too much beer*

The learner may be aware of the rule through either a metalinguistic explanation or some other less direct guidance appealing to the learner's self-induction. But the descriptive rule on this level is not the same as the functional rule which actually leads the realization process. This is indicated by a simple case of learners who can not produce the sentence correctly in spontaneous speech in spite of their conscious knowledge of the rule. However, in a developmental perspective of linguistic knowledge, the structural type of knowledge can be expected to serve as facilitators in the acquisition of the processing type of knowledge. Another developmental perspective can be conceived of about the processing rules: first controlled with attentional care paid on the process, then automatized with increasing familiarity.

The restricted nature of the effect of formal instruction suggested in the earlier research must be reconsidered in terms of how far formal instruction covers the developmental stages of linguistic rules ranging from the structural level to automatic processing level in Figure 1. Specifically this is essential since the effect of formal instruction is usually assessed with spontaneous speech data from the learner.

As a help to the clarification of our argument, a psycholinguistic model of speech production is introduced and its potential contribution to our argument is discussed in the next section.

**A Model of Internal Process of Speech Production**

The model of internal process of speech production which we adopt is
presented in Figure 2. The model is based on a production model proposed by Schlesinger (1977) in its essential parts and many of the terms and their definitions are borrowed from him.

Production begins with self-awareness of one's intention of transmitting some meaning to the interlocutor in a situational and discourse context. This is followed by self-identification of a conceptual construct which forms the basis of what the speaker intends to express. This construct is called cognitive structure (Schlesinger). This structure is at a nonlinguistic level and it consists largely of uncategorized semantic elements and relations among them (Schlesinger). The construct may be parallel to a thought in Vygotskian terms which may be compared to a cloud shedding a shower of words. The intention in our model may correspond to the wind that moves the cloud, again in Vygotskian terms. It is important to take notice of the fact that Schlesinger supposes that cognitive structures are universal.

From a cognitive structure, the speaker selects protoverbal elements and relations among them (Schlesinger), both of which the speaker considers necessary in his or her utterance. This is the process of coagulation.
(Schlesinger) leading to a semantic representation\(^{10}\). According to Schlesinger, uncategorized elements and their relations in a cognitive structure are categorized in the course of coagulation into I-marker elements and their relations (Schlesinger). It is important to note that there are often several possible alternatives available to the speaker for coagulating a cognitive structure. Take, for example, the next four sentence-like assemblies (semantic representations), each of which is composed of its semantic (protoverbal) elements (for convenience, these are presented in morphemes and words) and the relations among them (represented in their relational orders).

2 \( \text{the} + \text{bear} + \text{die} + ed \)
3 \( \text{the} + \text{hunter} + \text{kill} + ed + a + \text{bear} \)
4 \( a + \text{hunter} + \text{kill} + ed + \text{the} + \text{bear} \)
5 \( a + \text{hunter} + \text{kill} + ed + a + \text{bear} + with + his + gun \)

These four semantic representations can derive from a single common cognitive structure. This is the reason why cognitive structure is presented at a deeper level than semantic representation. The selection of the elements and their relations in a semantic representation is determined by the speaker's judgment concerning the three factors of communication and their interrelationship; the speaker him- or herself, the listener, and the situation. This may be called a socialization of utterance in terms of situational consideration.

Semantic representations do not provide the direct source for actual utterances. From a semantic representation, several different utterances can derive. For example, if the assembly expressed by 3 (\( \text{the} + \text{hunter} + \text{kill} + ed + a + \text{bear} \)) is selected as a semantic representation, it can be linguistically realized at least in the following three structures.

6 \( \text{the hunter killed a bear} \)
7 \( \text{a bear was killed by the hunter} \)
8 \( \text{it was the hunter who killed a bear} \)

It is for this reason that an intermediate level must be assumed between semantic representation and utterance. Let me call the intermediate level linguistic representation. This is a level which is not supposed in Schlesinger's original model. The speaker's determination of emphasis, focus, and style etc. is incorporated in the realization process of linguistic representation. This is a socialization of an utterance in terms of communicative consideration (Schlesinger).

Once a linguistic representation is set up in the mind of a speaker, the last step is to realize it phonologically into an utterance as a stream of sounds.
Here the speaker's emotion is expressed with suprasegmental elements. For example, if 7 (a bear was killed by the hunter) is selected as a linguistic representation, it can be phonologically realized as either a neutral statement or a deploring expression or a praising expression. This is a socialization of utterance in terms of suprasegmental consideration.

Finally, at the last end of the model, the utterance is monitored by the speaker him-or herself for a perlocutional checking.

Two Types of Linguistic Knowledge in the Production Model

Now it is appropriate here to examine the respective nature of structural rules and processing rules with reference to the production model. We may say that structural rules are concerned only with the level of linguistic representation in the model disconnected from its realization process. The lack of functional nature of structural rules can be understood as corresponding to the limited depth of activation in the whole process of production. While, the level of linguistic representation stands as the end product of its linguistic realization process, the structures on this level can be described independently of their deeper preceding processes.

In contrast, processing rules can be seen to be working directly in leading the linguistic realization process in the model. Take notice of the fact that this realization process originates from semantic representation. Thus processing rules work for mapping semantic representations onto linguistic representations. These rules are psycholinguistic in the proper sense of the word.

Seen from an information processing perspective, processing rules are controlled at the initial stage of learning with focal attention paid to the demands of rule selection and utilization. As the demands are eased down with increasing familiarity, automaticity develops and this results in automatic processing rules. Processing rules range from one end to the other according to the degree of automaticity. This is a very important point in rule learning, especially for second language learning in the classroom, because it is necessary here to deliberately incorporate some measures to foster executive automatization of processing rules.

A very subtle problem may be put forth with respect to the process of coagulation in the model. As was already mentioned, there are usually several possible alternatives for coagulating a cognitive structure. This may provide an explanation why production sometimes seems to be laborious for second language learners. They are often indecisive as to which semantic representation best expresses the cognitive structure in the second language
before they begin to search for the appropriate lexicons and relevant processing rules in the course of linguistic realization process. When we recognize the fact that each language has its own unique ways of coagulation in contrast to the universal nature of cognitive structures, this process imposes a special burden on second language learners. A typical example of this problem can be shown with Japanese learners of English. Suppose that they have the following cognitive structure 9 in mind (shown very roughly):

\[ \text{9 much snow + the train cannot start} \]

While the commonest way of coagulating the cognitive structure in Japanese is 10, English version of it might be 11.

10 *Because of much snow + the train cannot start*

(literal translation of the Japanese)

11 *Much snow + prevents the train from starting*

The difference in the commonest coagulation type between these two languages makes it very difficult for Japanese learners to produce the appropriate English version of the cognitive structure. More generally, this is relevant to the issue of difference of conceptualization of things in different languages. It may be the most difficult aspect in second language learning.

**Four Types of Rule Learning Activity Interpreted with the Production Model**

With the help of the production model and the discussion on the two types of linguistic knowledge in the preceding sections, we can identify four activity types in the learning of linguistic knowledge. The classification is theoretical rather than empirical. It is not based on any empirical investigation; it is a result of theoretical considerations based on the preceding argument.

There is a first type of activity in which learners internally tread only the phonological realiztion process in the model. This can happen typically in what is called pronunciation and intonation exercises which are usually done in a repetition type of practice. This activity makes the motor articulatory mechanisms smooth and automatic. Even other types of activity aiming at a deeper level than the articulatory automatization are quite easily degenerated into this first type of activity when the learners' attention is distracted.

A second type of activity concerns itself with the level of linguistic representation in the model. Although linguistic representations are the products of linguistic realization process which transforms semantic representations into linguistic ones, this activity is concerned only with linguistic representations independent of their realization process. Here learners recognize sentence structures as fixed patterns. This type of activity occurs typically in a simple substitution type of practice. Learners do not have to
pay their attention to the meaning of each sentence. Other types of so-called pattern practice may also fall in this type of activity. Even if learners are required to change a declarative sentence into an interrogative form, this can be done on the level of linguistic representation without necessarily going back to its realization process. The pattern recognition here is not creative, because it excludes the realization process from its scope.

Rules are creative and functional only when they operate in direct connection with meaning\(^1\). This is possible with a third type of activity. The type is concerned with the linguistic realization process itself. This may be associated with the functional processing rules in our argument. Here learners employ rules for mapping semantic representations onto linguistic ones. Meaning is a necessary and inherent accompaniment for this kind of rule operation. In this type of activity, learners are given semantic representations instead of structural patterns.

As is already stated earlier, functional processing rules range from controlled to automatic. The automatization of functional rules is an indispensable process in language learning in general. While in natural language learning, may it be first or second language, automatization is almost a result of subconscious and unintentional process, in second language learning under formal instruction it must be done deliberately and accumulatively. Automaticity is expected to develop mainly through this third type of activity.

If the production process starts from the level of cognitive structure, this is truly communicative. And if this original production can be set in an activity, this is a fourth type of activity. Here everything is left to the learner. A very difficult problem in second language learning is included in this type of activity. As we have already recognized it, while cognitive structures are universal, semantic representations are language-specific. The language-specific patterns of coagulation are not easy to treat with except for giving occasional explanations about the differences. Much is not known, or even discussed, to my knowledge, about the way to incorporate this aspect into learning activities. In this sense, it may be an ideal goal for most second language learners to have the same patterns of coagulation process habituated just as those of the native speakers of the language.

**Summary of the Types of Learning Activity**

In the commonest case of second language learning in the classroom in a foreign language environment, linguistic rules are learned consciously with the help of formal instruction. But the rules tend typically to remain on the
linguistic representation level of the production model. These rules are best recognized as something like the scaffolding, with whose help learners attain the corresponding functional processing rules which really control the internal process of production. And these processing rules need to be automatized especially for learners in foreign language environments.

Four types of learning activity are examined in terms of the depth of internal process of speech production each activity type can cover. Each of them can be expected to make its proper contribution to the final goal of attaining functional processing rules and their automatization. It is convenient to call each activity type by a respective name. The first may be called rote or phonological drills. Here, activity is motor rather than mental since it corresponds only to the phonological realization process and utterance level of the model. We may call the next type mechanistic or structural drills. Here, activity only covers the level of linguistic representation disconnected from its realization process and fixed structural patterns can be learned by the learner. The third type of activity may be labeled expressive or meaningful exercise. This is meaningful in the sense that an utterance in the activity originates from its semantic representation. The fourth type can be called communicative or interactive exercise. In the exercise learners produce utterances from their deepest cognitive structure level.

Paulston (1970) classified structural pattern drills into a mechanical, a meaningful, and a communicative drill according to the degree of control given over the learner's responses. The criterion of classification in her case is set by the teacher and, thus, it is outside the learner’s mind. In contrast, our criterion is inside the learner. It is related to the hypothesized internal process of speech production. Here teachers' role is preparatory rather than deterministic; they prepare conditions which provide the maximum possibility for each particular level of internal process to take place in the learners' minds. But eventually it is up to learners themselves whether or not they follow the expected internal process.

In theoretical terms, a classification according to some criterion outside the learner can not be essential, because the control given by the teacher may not necessarily control the internal process of the learner. For example, even in a mechanical type of drill in Paulston's classification, it is conceivable that there are some learners who produce the responses creatively rather than mechanically by going back to the meanings of the response sentences and by converting the semantic representations to linguistic ones. This may explain the exceptional learners who can attain the competence to speak spontaneously in spite of the pattern practice which is very often felt tedious for the
most other learners.

In contrast to Paulston, our classification is psycholinguistic in that it corresponds to the depth of internal process of speech production each learner is expected to follow in each type of activity. For summary, our psycholinguistic classification of activity types is shown in Figure 3 with reference to different levels of the internal process of speech production.

<table>
<thead>
<tr>
<th>cognitive structure</th>
<th>semantic representation</th>
<th>linguistic representation</th>
<th>utterance</th>
<th>level of process of activity</th>
</tr>
</thead>
<tbody>
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<td></td>
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<td>rote (phonological)</td>
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<td>mechanistic (structural)</td>
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<td>expressive (meaningful)</td>
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<td>communicative (interactive)</td>
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</tbody>
</table>

Fig. 3 A Graphic Representation of the Relation Between Activity Types and the Depth of the Internal Process

To conclude, formal instruction in the classroom is just a beginning of the whole story of second language learning. In order to fulfill the effect of formal instruction, other types of instruction are required to inculcate learners with functional processing rules along with their executive automatization. Each of the several types of activity presented in this article can be expected to make its own unique contribution to the fulfillment of the effect of formal instruction. Structural rules are indeed facilitators of learning of processing rules. However indirect and time consuming it may seem, the progression from structural to processing rules is a reliable way to the attainment both of accuracy and fluency in the language, especially for classroom second language learners.

Notes

1 In this article no intention is maintained to make the technical distinction between learning and acquisition.

2 Let me point out that conscious awareness of linguistic rules does not necessarily mean that the learner can verbalize them. It may be attained in either explicit or implicit manner. Consciousness-raising by Rutherford (1988)
is in the same line with our argument.

3 The only difference between his position and ours is that conscious rules only refer to “conscious verbalizations of underlying language knowledge” in his case.

4 The weak interface position here and the strong interface position shown just after it are in line with the definitions by Ellis (1985). It should be noted that Krashen (1985) also uses these same terms in quite different meanings.

5 Concerning the qualitative commonality between the two types of knowledge, see the following comment by Hulstijn (1990:36): “Note that, in contrast to procedural knowledge in the information-processing approach, all knowledge in Bialystok’s framework, regardless of its degree of analysis, is assumed to be represented in the same propositional form, for example, as predicate-argument structures.”

6 See Yamaoka (in press) for further discussion on this point.

7 The term or definition originating from Schlesinger’s model is designated by his name in parentheses just after the item.

8 It must be noted, however, that in Vygotsky’s paradigm the distinction corresponding to cognitive structure and I-marker in Schlesinger’s model is not assumed.

9 Coagulation is the process of converting cognitive structures into Input-markers, which are formalizations of semantic representations.

10 Semantic representation in this model corresponds to Input-marker or I-marker in Schlesinger’s model.

11 Creativity in Chomsky is defined as rule-governed as a criticism to the behavioristic stimulus-response paradigm. It is not clear, however to what extent Chomsky’s creativity is connected with meaning. Although creativity is associated with meaning in our discussion, it does not claim that we create meaning. Creativity is the function of linguistic rules operating when we encode a semantic representation into a linguistic one. Thus, our creativity is not incompatible with the basic idea of creativity by Chomsky as being rule-governed.

REFERENCES


Ellis, Rod. 1990. Instructed Second Language Acquisition: Learning in the


