A Review of Jennifer M. Goldschneider and Robert M. Dekeyser's the *"Natural Order of L2 Morpheme Acquisition" in English: A Meta-analysis of Multiple Determinants*

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Abstract: Many researches show that there is a "natural order" of the acquisition of grammatical morphemes in ESL, but little concern about the explanation of the order findings. Goldschneider and Dekeyser apply the meta-analysis by collecting all the data from the present studies on the "natural order" and investigate five potential predictors which might determine that order: perceptual predictors, semantic complexity, morphonological regularity, syntactic category and frequency. Their conclusion is beneficial to the study of SLA. However, the author believes language transfer might be one more determinant on the basis of analysis of more SLA researches.

1. Introduction

During the past decades, there is a great deal of criticism on the "morpheme order studies", so the researchers of morpheme order should be on pressure to solve the question: what on earth were the proposed predictors that determined observed order of acquisition of grammatical functors in ESL. Therefore, Goldschneider and Dekeyser investigated the previous researches on the order of acquisition of certain English grammatical functors and elicited the determinants of "natural order" of grammatical morphemes acquisition.

2. Background of Morpheme studies in L1 & L2

Brown (1973) studied three unrelated children (Adam, Eve and Sarah) with Suppliance in Obligatory Context (SOC) method, and discovered that the order in which the grammatical morphemes of English appeared in the children's speech was the same. The sequence was:

Table 1: Mean order of acquisition of morphemes (Brown, 1973)

Order	Morpheme	Order	Morpheme
1.	{-ing} (present progressive)	9.	{-ed} (past regular)
2/3.	{in}/{on} (preposition)	10.	{-s} (third person regular)
4.	{-s} (plural)	11.	{-s} (third person irregular)
5.	(past irregular)	12.	{am/are/is/was/were} (uncontract AUX)
6.	{-'s} (possessive)		
7.	{is/am/are} (uncontractible copular)	13.	{-'m, -'re, -'s} (contractible copular)
8.	{a}/{the} (articles)	14.	{-'m, -'re, -'s} (contractible AUX)

Source from Roger Brown (1973) p317

Then Brown postulated the natural order existed in L1 acquisition. Dulay and Burt (1973) extended the study into L2 acquisition. They investigated 151 Spanish-speaking children through the Bilingual Syntax Measure (BSM) to try to find if there was a common sequence when children acquired English as second language. The result was that a common order of acquisition of morphemes existed in L2 acquisition. Constantly, Dulay and Burt (1974a) studied 60 Spanish and 55 Chinese children learning English, and concluded that the sequences of acquisition of the functors obtained for Spanish and Chinese children are exactly the same. In addition, Krashen *et a*l (1976) tested 66 adults from mixed L1s and elicited that "child and adult ESL learners do not differ significantly with respect to which aspects of English grammar they find hard and which aspects

they find easy" (Krashen *et al*, 1976, p149). Later, Makino (1980) tested 777 high school students of English studying in Japan, and drew the conclusion that the sequence was also the same with L2 learners in classrooms in their own country as well as those in a foreign country. These researches tend to postulate that there are similarities to the sequence of acquiring the grammatical morphemes, no matter in L1 or L2 acquisition, or of child learners or adult learners, or under the different exposure to the given language.

All the studies reveal the "natural" order of acquisition of grammatical morphemes, but it seems that very little concern has been brought on explaining the order findings. Most of the attention was focused on whether the order was real, and under what conditions the order was found (Glodschneider & Dekeyser, 2001). Brown's study (1973) had been regarded as the starting point for the acquisition order research. He suggested several possible determinants of the order morpheme acquisition, including frequency, semantic complexity and grammatical complexity. However, there still lacks of the explanation for the observed order. Whereas, Larsen-Freeman (1975) introduced an important new point in functor order research – an explanation for the order. After a brief discussion, Larsen-Freeman concluded that "a single explanation seems insufficient to account for the findings" (Larsen-Freeman, 1975 p419). Moreover, de Villiers & de Villiers (1973) implied that both semantic and grammatical complexity to some extent predicted the sequence of the morphemes acquisition, but it was unlikely to separate out the relative contributions of each type of complexity since they made the same predictions. Actually the order of acquisition might be predicted by some combination of grammatical and semantic complexity, frequency, and perceptibility in speech. It was plausible that no one factor could be considered respectively of importance in determining the acquisition of morphemes. Other investigations have been put forward, but few came to a clear explanation with the predictive power to the acquisition order of grammatical morphemes.

It is very essential for Goldschneider and Dekeyser to apply the meta-analysis to morpheme researches since all these implications formed the foundation for the meta-analysis of multiple determinants: the order of acquisition of grammatical morphemes was likely to be determined by properties of the functors themselves. (Goldschneider and Dekeyser, 2001)

3. Introduction of the Mata-analysis of morphemes studies

Goldschneider and Dekeyser collected all the data from the present studies on the "natural" order of morpheme acquisition in order to maximize the generalization of the results and to summarize some principles. They carefully set six criteria when selecting the data in order to make the studies balanced and results comparable. So six functors (present progressive *–ing*; plural *–s*; possessive *'s*; articles *a, an, the*; third person singular present *–s*; regular past *–ed*) were included; and 12 studies (Bailey *et al*. 1974, Fathman 1975, Fuller 1978, Houch *et al*. 1978, Kjarsgaard 1979, Krashen *et al*. 1977, Krashen *et al*. 1976, Mace-Matluck 1977, Pica 1983, Riddle 1993, Rosado 1986, Rosansky 1976) were used in the analysis. Golschneider and Dekeyser investigated five potential predictors to account for the "natural order", which are perceptual salience, semantic complexity, morphophonological regularity, syntactic category and frequency. However, L1 transfer was excluded from this analysis. The results were shown in table 2:

Table 2: Intercorrelations for all independent and dependent variables

Variable	1	2	3	4	5	6
1.Frequency	--	.62***	-.44***	.16	.27*	.44***
2.Phonological salience		--	-.12	-.59***	.57***	.63***
3.Semantic complexity			--	-.26*	-.36**	-.41**
4.Morphophonological regularity				--	-.37**	-.41**
5.Syntactic category					--	.68***
6.Percentage correct						--

Note. n=68; *p<.05; **p<.01; ***p<.001.
Source from Glodschneider & Dekeyser 2001 P33

The multiple regression analysis showed that "phonological salience and syntactic category have the highest correlation with percentage correct, while the predictive power of frequency, semantic complexity and morphophonological regularity is somewhat lower …… shows a very high degree of intercorrelation among the predictors." (Glodschneider & Dekeyser, 2001 p33) It clearly suggested that a combination of the five predictors did account for the sequence of the grammatical functors. Additionally, they took a close look at the five predictors, and realized that these predictors constituted a salience in a broad sense of word.

Perceptual salience suggested that the more perceptual salient a morpheme was, the earlier it would be acquired; semantic complexity predicted that forms with more meanings should be more difficult to learn and later acquired than forms with fewer meanings; morphophonological regularity suggested that a morpheme with more phonologically regular should be acquired earlier. It led to a more abstract form of salience of the form-meaning relationship; syntactic category predicted that lexical items appeared to be acquired before functional items, and free morphemes were acquired before bound ones since the former were more noticeable and the latter were more salient; frequency straightly showed that the more frequent a grammatical item was in the input to the learner, the more easily and quickly that item should be acquired.

Since the five predictors constituted phonological, morphonological, syntactic, semantic and numerical aspects of salience, it was plausible that only one variable – salience played an important role in explaining the natural order of acquisition. And this salience speeded the process of acquisition of grammatical structure from elements of the input, so there were no other factors which were required to be examined to elaborate the order of acquisition.

4. Evaluation of Meta-analysis

Goldschneider and Dekeyser pooled data about the natural order studies, and selected data for meta-analysis with a series of criteria. All the studies should be on the order of acquisition found in English, and involve oral production data. Under the different testing situation, performance of the subjects might be different and the data would be different. Moreover, the studies should cover on both children and adults to exclude the other controversial factor: e.g. age influence. The studies should basically use suppliance in obligatory context (SOC) method to avoid the effects of different methods in different researches. Also the studies should be concerned with the availability of actual scores and concern the same number of functors. Therefore, all pooled data could be comparable to get the principles.

When Brown (1973) examined the order of acquiring morphemes in L1, he predicted that some determinants might account for the natural order, but no clear evidence showed frequency had effects on the order of development of the forms. So it was likely to say that frequency was not a significant variable. Nevertheless, semantic and grammatical complexity would affect the order of acquisition. Does input frequency have an effect on the natural order? We may take the third person singular "-s" and plural "-s" as example. These two morphemes have their own allomorphs, and bear morphophonological regularity, and both have the same perceptual salience and belong to bound morphemes, why are they acquired in different stage? It might be attributed to that plural nouns have greater semantic salience than singular verb inflection. Hsieh, Leonard & Swanson (1999) suggested that additional factors might contribute to the developmental differences between these two morphemes of English: input frequency, sentence position and duration. They examined the sample sentences produced by mothers and fathers to their preschool aged children with SLI. From the data, they identified 285 plural noun tokens and 55 verb tokens inflected for third person singular. The result was that "in conversation with and stories directed at young children, plural noun inflections are more frequent than third person singular verb inflections." (Hsieh, Leonard & Swanson, 1999 p540) According to the learnability theory of Pinker (1984), if an inflection occurs frequently, its grammatical function will be acquired sooner, and its representation in the discourse will be strengthened more quickly. Now we can get some positive explanation about the earlier acquisition of plural "-s" than third person singular "-s". The other evidence came from Bartke *et al*'s study (1996) on the effect of input frequency in German plurals. In order to discard the effects

of context, they used the invented noun – root noun and proper names. And children were asked to choose between the default for adults (which is –s) and the most frequent plural (which is –en). The result was shown: ①[1]
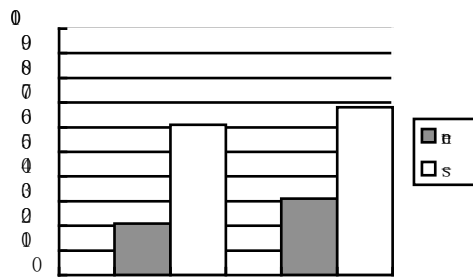

Fig.1. Proper names

Source from Bartke *et al* (1996) ②[2]

Although most nouns (65%) in Germany need *–en* to be plural form marking, proper names were frequently be marked *–s* as plural forms. This graph showed that German children preferred *–s* to *–en* as the plural markings after proper names. This might reveal the effect of frequency on choosing the morphemes. Therefore, frequency does play a role as the other predictors. It is valuable that Goldscheider & Dekeyser didn't exclude this predictor.

The meta-analysis applied all the previously reported research findings, and provided a large and more representative portion of data. However, the methodology and results may be problematic in some senses.

As illustrated before, one of the criteria to select the study is that the studies included in Meta-analysis would employ SOC method. On L1 acquisition, Brown (1973) ordered the morphemes according to the acquisition points at which children achieved 90 percent success in suppliance in obligatory contexts over time. This L1 sequence of acquisition is "based on the chronological points when the forms attain a certain level of accuracy in children's speech …… But something which is easy to start with does not necessarily get easier with time, and vice versa." (Cook, 1993 p33) Actually this means that 90% accuracy in SOC can manifest nothing. "Does an L2 speaker using the progressive 'John is going' mean the same as a native or something different? For instance, the boy studied by Wagner-Gough (1978) used 'Sitting down like that' as an imperative rather than a progressive." (Cook, 1993 p33) So the sequence of morphemes consisted of different items that were not operating at the same level in the grammar. Although the children got over 90% suppliance in obligatory contexts, we still could not be sure if the children applied their correct functions to the situation. In fact, no studies of the acquisition of morphology in L2 took account of the basic concepts of morphology in linguistics described (Bauer, 1988). It indicates that the accuracy of the order of morpheme might be reduced because of the method applied in most morpheme studies.

Additionally, the more problematic factors would lie exactly on the determinants themselves. The main linguistics issue is the heterogeneity of the morphemes involved. The usual set of the morphemes included the morphology of the main verb (*-ing*, irregular past tense, third person *–s*), the morphology of syntax of the noun phrase (possessive *–s*, plural *–s*, *the/a*), and auxiliary and copular forms of *be*; thus these items might make the linguistic distinction between morphology and syntax vague to some extent. "The grammatical morphemes are a linguistically unjustified collection. On some aspects we may say that the research ignores their grammatical nature, and grammatical morphemes are being treated as separate lexical items to be acquired one after the other, other than as part of grammatical structures and systems." (Cook, 1993 p31) For example, the

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[1] ① Figures in the graph 1: Rhymes: -s>-en (means: .61vs.21, p=.002,sig)　Nonrhymes: -s>-en (means: .68>.31, p=.0001, sig)

[2] ② Here we only take a close look at the graph of proper names which shows the effect of frequency, and exclude the results on root nouns.

third person singular "–*s*" has allomorph "es", and may be pronounced as /s/ ("like"), /z/ ("pay"), /iz/ ("pass") in different phonological environment. Plural "–*s*" and regular past "*-ed*" both have their allomorphs as well. However, the L2 researches mixed important aspects of the sequence since they did not take allomorphs into account (Cook, 1993). Therefore, we can get the sequence of the morphemes such as progressive "*–ing*" is acquired earlier than third person "*–s*". Nevertheless, it is implausible if we explained with one predictor – perceptual salience, which refers to how easy it is to hear or perceive a given structure. According to the assumption, we may expect progressive "*-ing*" is more salient than the third person singular "*-s*" since "*-ing*" contains the vowel and forms a syllable. However, third person singular has the allomorph "*-es*", it also contains a vowel and forms a syllable. So does the regular past "*-ed*" which has an allomorph /id/. Actually "*-ing, -es, -ed*" all are salient. Then should they be acquired simultaneously or which morpheme should be acquired earlier? Moreover, we can analyze the allomorphs in another way. For instance, /s/, /z/ and /iz/ are the allomorphs of plural "*-s*". "Children acquire allomorphs of a morpheme in a definite sequence in the first language." (Cook, 1993 p32) According to Goldschneider and Dekeyser (2001), perceptual salience could determine the sequence of morphemes acquisition. We expect that children acquire /iz/ earlier than /s/ and /z/. However, Berko's study (1958) showed that L1 children learned /s/ and /z/ allomorphs of plural before /iz/ allomorph. And for L2 learning, Wode (1980, 1981) found an order of acquisition for the plural allomorphs from /s/ to /z/ to /iz/ for the children learning English as second language. Perceptual salience can not explain this phenomenon.
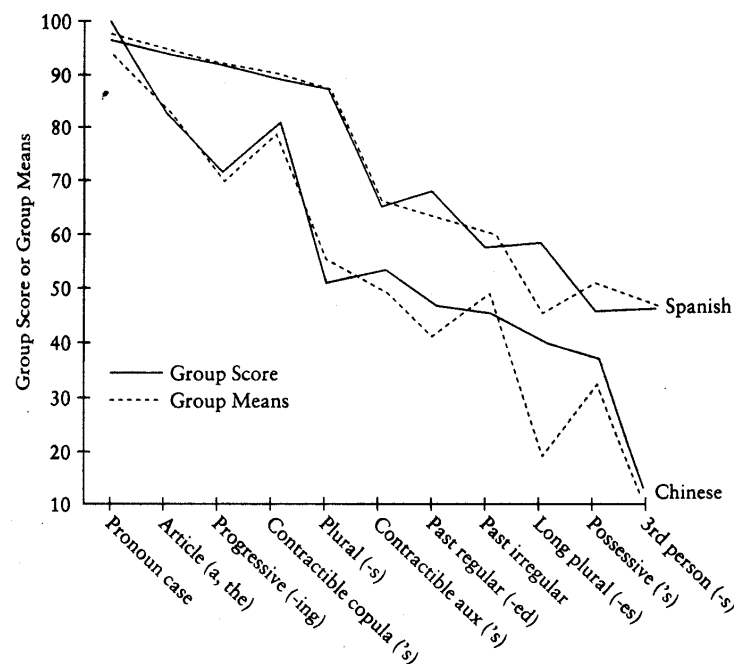

Fig.2 comparison of the accuracy profiles of native Spanish and Cantonese-speaking children on 11 English grammatical morphemes (from Dulay and Burt 1974:48)

Additionally, it is plausible that the five predictors work together and affect the natural order of L2 morphemes acquisition. Did other determinants exist? Can we come to the conclusion that "no appeal to any innate blueprints or specific syntactic models is required to explain order of acquisition"? (Goldschneider and Dekeyser 2001 p36) In accordance to Brown's study (1973), a large part of human language faculty was innate, the L1 acquisition and final grammatical knowledge gained by native speakers were determined by abstract internal mental structures, and was considerably under-determined by the input (Towell and Hawkins1994). It means that all the children have blueprints for all the possible types of language. The innateness of language might account for the natural order of morpheme acquisition in L1. Dulay and Burt (1974b) applied Brown's study to the L2 acquisition, and provided Creative Constructive Hypothesis. It said that sequence of the morphemes was caused by "creative structure" – "the children would reconstruct the rules for the speech they hear, guided by innate mechanisms which cause them to formulate

certain types of hypotheses about the language system being acquired until the mismatch between what they are exposed to and what they produce is resolved" (Dulay and Burt, 1977 p97). This may suggest that the innate blueprints would affect the natural order of the grammatical morphemes in SLA. What's more, they claimed that the innate mechanism guided the L2 acquisition, while it was not the same as NL. If so, the similarities in the sequence of morpheme acquisition of different L1 could not be explained. There might be some influence of L1 transfer on the process of acquisition. If we came to Dulay &Burt's test (1974a) on 60 L1 Spanish (rich in morphemes) ESL speakers and 55 L1 Chinese (no morphemes involved) ESL speakers.

We could find the profiles of acquiring the morphemes for each group are quite similar, but the Spanish speakers achieved much higher scores than the Chinese speakers in the following figure. L1 influence on the acquisition of morphemes might be applied here to explain this phenomenon.

Additionally, Makino (1980) examined 777 L1 Japanese adolescents ESL by a technique similar to BSM. The subjects were divided into two groups: who received two years of classroom instruction prior to testing (the 8th graders) and those who received three years of classroom instruction prior to testing (the 9th graders). The results were shown in table 3.

Table 3. Group accuracy scores (%) on nine English morphemes produced by 777 L1 Japanese adolescents in a written test.

	8th graders (%)	9th graders(%)
Prog *-ing*	84.4	88.4
Article *a/the*	82.3	85.4
Plural *-s*	75.8	81.0
Possessive *'s*	67.3	68.7
Copular *be+adj/NP*	66.6	72.8
Regular past *-ed*	64.0	65.3
Irregular past	62.3	63.9
Auxiliary *be (+ V-ing)*	61.5	69.7
3rd person singular agreement marker *-s*	59.7	69.7

Source: Based on Makino 1980 p124

To compare the results of the two studies, we may find that progressive *–ing* and plural *–s* were the most accurate morphemes in both Makino's study and Dulay & Burt's study; On the contrary, copular *be* in Makino's study was less accurate than in Dulay and Burt's, while possessive *'s* was relatively more accurate than in Dulay and Burt's. Despite the input effect (i.e. subjects weren't necessarily most accurate on what they had been taught first), the difference might suggest some selective influence of the L1 on their performance (Hawkins, R. 2001). Therefore, the sequence of morpheme acquisition might be determined by L1 background. All the studies pooled in meta-analysis focused on L2 acquisition, L1 transfer should not be excluded and might be the sixth predictors in the meta-analysis. We may posit that a combination of six predictors accounts for the natural order of grammatical functors in L2 acquisition.

5. Conclusion

The meta-analysis presents a clear review about the literature of the order of morphemes in L2 acquisition, and is a new start to be used in language acquisition research. All the L2 comparable studies included in meta-analysis focus on the order of morpheme study of ESL, and the accuracy data pooled in the analysis show clear influence on the result: no respective predictor could account for the natural order, the five predictors (perceptual salience, semantic complexity, morphonological regularity, syntactic category, and frequency) work together to determine the natural sequence of morphemes.

However, more researches would be required to test the other predictors: such as L1 transfer. If more functors could be confirmed, the result would contribute a lot to the SLA and L2 teaching to

increase the rate of acquisition since the meta-analysis has investigated ESL. Teachers may increase the rate of acquisition under the application of the predictors to achieve the greatest value of the results.

Acknowledgement

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