RELATIONS AMONG SYNTACTIC AND LEXICAL MEASURES OF PERFORMANCE IN L2[1]

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I. INTRODUCTION

A now familiar body of L2-acquisition literature is concerned with the determination of the order in which English morphemes are acquired or with the relative "accuracy" with which they are produced by different groups of speakers. This research paradigm was adapted from first-language acquisition work (Berko, 1959; Brown, 1973; De Villiers and DeVilliers, 1973) and was explored by Dulay and Burt (1974) and by a number of other applied and psycho-linguists (Bailey, Madden and Krashen, 1974; Perkins and Larsen-Freeman, 1975; Krashen et al., 1976; Larsen-Freeman, 1975, 1976). We will not enter here into the results of these studies, nor into any detailed consideration of the now well-known work on the problems raised by experimentation with the first published version of the "Bilingual Syntax Measure" (Burt, Dulay and Hernández-Chavez, 1973; Rosansky, 1976; Porter, 1977; Krashen, 1978), the instrument widely used to test English morpheme "accuracy" orders. Suffice it to say that some controversy has persisted as to whether, across populations of English L2 speakers, there is a uniform acquisition and/or difficulty order for English morphemes which is different from the L1 acquisition order and independent of age, mother tongue, and data collection and agregation procedures (Mazurewich, 1977; Lightbown, 1981).

The determination of the order in which native and non-native speakers acquire fundamental grammatical elements of a given language retains its importance, however, as one of the empirical prerequisites to the understanding of the similarities and differences between L1 and L2 acquisition. Structural

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complexity, opacity and L-specificity criteria will lead us to postulate a universal acquisition and difficulty order. Any inclination to attribute linguistic importance to cognitive differences, say, between small children and other age-groups will lead us to look for age-based differences in emergence and relative difficulty of structural elements. Interest in the possibility of subtle but pervasive types of interference (Snow et al., 1980; Jordens and Kellerman, 1979 and elsewhere; Clahsen et al., 1983; Meisel, 1983) will lend importance to fundamental typological differences between the speakers' L1 and the target language.

Clahsen, Meisel, and Pienemann (ibid.) examine the acquisition of German syntax by foreign workers in West Germany who have, as L1, Spanish, Portuguese, or Italian. In particular (for our purpose here), they postulate, defend, and attempt to explain an order of development for five major word-order rules which determine the relative position of constituents and separable verb elements. Their suppositions about the underlying word order of German (Clahsen and Meisel, 1979) are not crucial to this discussion, since it is not strictly necessary to invoke movement rules in order to explain the structural differences in question. The names given to these constructions (here as elsewhere in the study of German syntax) can be taken as designations of configurations or sequences, though we will sometimes use movement terminology here. The developmental order, claimed to be the same as in child German L2 acquisition (Pienemann, 1981) is, from first to last, or, at least, associated with lowest to highest proficiency:

1) ADV-VOR
2) PARTIKEL
3) INVERSION
4) ADV-VP
5) VERB-ENDE

The first of these rules simply situates adverbial elements in sentence-initial position:

6) **Heute* ich bin müde. 'Today I am tired'.

All but three of the 45 speakers studied by Clahsen et al. (loc. cit.) applied this rule at least once in their corpus, though in many cases in the absence of the obligatory inversion rule (3), which it feeds.

Rule (2) in the above list accounts for the separation of the components of complex verb forms, filling second and typically proposition-final positions in main or independent clauses:

MOD INF
7) Ich *will* das *tun*. 'I want to do that.'

AUX p.p.
8) Ich *habe* das *getan*. 'I have done that.'

V PARTIKEL
9) Ich *fahre* jeden Tag *hin*. 'I drive there every day.'

Position two contains the finite verb form in this construction. Clahsen et al. distinguish a fourth variant:

AUX PARTIKEL p.p.
10) Ich *bin* heute *ausgegangen* 'I went out today',

which of course combines elements of the structures illustrated in (8) and (9) above.

Rule (3) permutes the subject with the finite verb form after preposed elements:

WH V subject
11) Was machen Sie? 'What are you doing?'

ADV V subject
12) Im Moment schreibe ich. 'At the moment I'm writing.'

D.O. V subject
13) Den Hund suchen wir. 'It's the dog that we are looking for.'

PROPOSITION V sub.
14) Wenn es regnet, bin ich müde. 'When it rains, I'm tired.'

Clahsen et al. (loc. cit.) designate the variants of inversion exemplified in (13) and (14) as "TOPI 1" and "TOPI 2", respectively, where "topicalization" is presumably to be taken as a strictly syntactic label. In analyzing child L2 corpora (see below), we have also considered inversion after non-adverbial PP's as a variant of "TOPI 2":

pp V subject
15) *Für meinen Chef* mache ich die Arbeit. 'It's for my boss that I'm doing the work.'

since one child clearly manifested inversion in this distinct context without producing clause preposing, which may be a stylistic device more typical of adult speech. Pre-posing of adverbial PP's is of course a variant of adverbial pre-posing as illustrated in (12) above.

Rule (4) accounts for the placement of adverbials between the finite verbal element and the remainder of the VP:

V ADV OBJECT
16) Ich hilfe *jeden Tag* meiner Schwester. 'I help my sister every day.'

Rule (5), finally, postposes the finite verbal element in subordinate clauses:

COMP V
17) Ich weiβ daβ er die Arbeit *macht*. 'I know that he's doing the work.'

WH V
18) Ich weiβ nicht, warum er das *sagt*. 'I don't know why he says that.'

rel V
19) Ich suche den Jungen, *den* du gesehen *hast*. 'I'm looking for the boy whom you saw.'

The variants of each of the five rules which we mention here (with the slight addition noted in connection with inversion above) are those distinguished by Clahsen et al. in their corpora. The variable behavior (on the part of each speaker and of the group) with respect to these rules has a special status for the authors. Just as systematic variation does not always signal diachronic change, it does not always mark passage from one developmental stage to the next. It is the beginning of "productive" use of each of these five rules which, for the authors, characterizes the transition from certain lower to higher acquisition stages. Though we have respected their order of presentation of the variants, neither they nor we claim that their data justifies prediction of a strict order for the emergence of each of them. Certainly, some variants are much more frequent in their (cross-sectional) data than others, and in particular relatively more frequent for informants whose independent indices show to be relatively less advanced. The comparative scarcity of contexts for certain variants in this single-interview data would in any case restrain Clahsen et al, and must restrain us, from postulating sub-orders for the emergence of the given rule variants, and thus sub-stages within the six characterized by these rules. Citing Felix (1982, p. 73), the authors (p. 35) state explicitly that in postulating an acquisition sequence, they are making a claim as to which rules, in contrast to which others, are acquired in an invariant order, and, of course, as to what that order is. We shall see below, however, that adopting a requirement as to the proportion of the designated variants which must appear at least once in the corpus has important consequences.

II. The Present Study

The study on which we would like to report here was based in part on the Clahsen et al. (loc. cit.) data. In particular, we were interested in the relative importance of syntactic and lexical development in adult vs. in child L2 acquirers. Felix (1976) had suggested that there might be an important difference in child L1 vs. (later childhood) L2 development with respect to the relative elaboration of the syntax and of the lexicon. That is, his observations of the development of German as L2 by children, in comparison with reports on L1 development, had led him to suspect that while very young children generally develop a relatively large lexicon before starting to produce complex syntax, older children who start learning a second language in a natural environment rapidly develop considerable syntax, beside a severely restricted lexicon.

We will not attempt to verify Felix' hypothesis here. Instead, we will go on to another comparison suggested by the one presented speculatively in his work: Are there important differences between the relative development of syntax and the lexicon in child vs. adult L2 acquirers? As a simple hypothesis at the outset, we postulated that in studying the "natural" acquisition of a given L2 by children and adults having the same L1, we would find that the syntax of the children is more highly developed than that of the adults at a given level of lexical development. Conversely, at a given level of syntactic development, the lexicon of the adults would be more highly developed than that of the children. This hypothesis was suggested not only by the work of Felix (ibid.), but also by the fact that the lexicon is the "open" component of the grammar and is known to be able to continue developing throughout a speaker's lifetime. Syntax, on the other hand, is of course highly structured and, in the main, closed off from further development in (L1) adulthood. Adult L2 acquirers, in untutored as well as in formal learning environments, often fossilize with respect to some, even major syntactic-structure development. Child L2 learners, on the other hand, if they are fully integrated into the social environment in which the L2 is spoken natively, normally become native speakers with respect to syntax. This view of the matter is of course oversimplified, but it formed the basis for the work to follow.

Thus our project was to study the syntactic and lexical development in German of 20 Italian *Gastarbeiter* and 16 Italian (Italophone) children between the ages of seven and eleven.[2] The former (adult) speakers had been interviewed under the direction of Clahsen, Meisel, and Pienemann (see Clahsen et al, loc. cit.), and their relatively spontaneous interview speech had been recorded and transcribed in slightly modified German orthography.[3] That is, the orthography was modified when neccessary to reveal syntactic or morphological information about the speaker. Using the same procedures, Pienemann had directed the interviewing and transcription of the child informants.

In order to compare degrees of syntactic and lexical development, it would be necessary to assign quantitative indices. We wished to respect the fact that Clahsen et al. had characterized five stages of syntactic development on the basis of the use of five major rules of apparently increasing difficulty (see above). That is, the criterion lacked the quantitative mastery dimension formulated by Brown (loc. cit.), and adapted to L2 acquisition studies by Dulay and Burt (loc. cit.). Clahsen et al. did calculate percentages of application of each rule and variant in possible contexts (since not all of the crucial rules are obligatory), and distinguished among:

[2]The latter corpus, transcribed, was kindly provided by Manfred Pienemann.

[3]My thanks to the ZISA research team (Zweitspracherwerb italienischer und spanischer Arbeiter), at the Universität Hamburg, for access to the *entire* cross-sectional corpus of the spontaneous speech of 20 Italian Gastarbeiter. This corpus was not published in full in Clahsen et al. (1983).

a) failure to create contexts for the rule (expressed by X in their data summary tables);

b) failure to apply the rule in possible contexts (expressed by 0);

c) failure to create more than 4 contexts for the rule (in this case, the percentage of application, 0 or otherwise, was given in parentheses); and

d) application of the rule in 5 or more possible contexts (in which case, percentages were given unparenthesized in data tables). It must be remembered, however, that the authors specifically take a position against determining acquisition orders on the basis of error rates (p. 43).

Examination of their Table 3, pp. 130-4, shows that the data which they used did not, in any case, permit them to calculate percentages for all rules for all informants in the sense of (d) above, much less for the rule variants distinguished by the authors and exemplified earlier in this paper. The well-known Heidelberger "Pidgin-Deutsch" project had faced a similar problem (Klein and Dittmar, 1979). This is not only because the corpora of some informants are brief; some speakers used very few of the criterial syntactic rules at all, and although the interviews were "semi-directed", there was no linguistic elicitation as such in the corpora studied here. Thus it became necessary to assign a quantitative index based solely on the emergence (which I will take to be first occurrence of rules) and the position of each rule in the acquisition hierarchy. If we had considered only the five major rules used to characterize the above-mentioned stages, we obviously would have arrived at a great many ties in calculating such a syntactic score, and would lose interesting information about the emergence of the rule variants. It is clear (p. 46) that our authors value the appearance of several variants more than the categorically correct usage of only one. Thus we assigned scores to the occurrence of the variants (as distinguished by Clahsen et al.), such that the possible score accumulable by all variants of one major rule was less than the total possible score for the rule above it in the hierarchy and greater than the total possible score for the rule below it in the hierarchy. The score assigned to each rule variant (where variants are distinguished) exceeds that assigned to variants of rules below, and is less than that assigned to variants of rules above. Referring once again to the major rules and rule variants exemplified above, then, the components of the syntactic score were as follows: occurrence of

ADV-VOR		4 points	maximum 52
PARTIKEL:	MOD + INF	2	
	AUX + p.p.	2	
	PARTIKEL ↔ V	2	
	AUX + PARTIKEL + p.p.	2	
INVERSION:	WH-VOR	3	
	ADVERB	3	
	TOPI 1	3	
	TOPI 2	3	
ADV-VP		13	
V-ENDE	COMP	5	
	WH	5	
	REL	5	

As for lexical development, we interpreted it as a matter of variety, though of course other kinds of lexical measures have also been used in other studies (see, for example, Mackey, 1962 and elsewhere). Given the extreme variation in the length of the corpora of our 36 informants and our desire to use the whole corpus of each speaker for the lexical as well as for the syntactic study, we calculated (lexical) type-token ratios. We will not enter here into the obvious methodological problems associated with the decisions assigning tokens to types for a language rich in inflected forms, derivates, compounds, and productive rules for forming the latter. Suffice it to say that we tried very hard to be consistent in the application of morphological considerations to this task. We will see below, however, that, once calculated, type-token ratios present problems related to their inverse variation with text-length. We will be led to return to the components of this measure: (a) text length in lexical tokens and (b) number of lexical types, each of which has an interesting relation to syntactic performance.

Our question, in the most general terms, was whether the relation between syntactic and lexical development was different in child from in adult L2 acquirers. This was part of our still more general preoccupation with the differences in outcome between L2 acquisition in children and adults, even when in both cases it is relatively "natural" or "untutored", as in this study. That is, these Italian acquirers of German had been learning it principally by using it rather than by explicit lessons on the language. Yet the typical difference in the outcome of such learning is that children who are immersed in environments where the L2

is spoken natively eventually pass for native speakers, while adults, even those in analogous environments, do not. Our study, then, must be seen as part of the large empirical enquiry into the possible linguistic correlates of this typical difference.

More concretely, given the nature of our data, we wish to answer the following questions:

a) What is the correlation between the "syntactic score" which we have derived for each speaker and his (lexical) type-token ratio?

b) Given the statistical properties of the latter measure, what correlations exist among it, its components, and the syntactic score?

c) Are there important differences between children and adults in the answers to questions (a) and (b)?

After inspecting and working with the data, we suspected that text length, which varied enormously in these semi-directed interviews, would be a crucial differentiator among speakers and determinant of the measures which we had set out to derive. The more "loquacious" speakers (in the sense that their transcribed corpus was long) generally accumulated the higher syntactic scores. On the other hand, length of text obviously tended to depress the type-token ratio, since new lexical types could not continue indefinitely to be added to the text at a constant rate. There was also a great difference between adults and children in the range of text lengths (in lexical token): for the former, from 259 to 3943; for the latter, from 63 to 1011. It then seemed to us that it would be necessary to abstract from these overwhelming differences in corpus length among speakers in order to see others.

It was surprising and interesting that nearly all of the children in the study managed to accumulate syntactic scores almost identical to those of adults with much longer texts. That is, 12 child speakers could be paired with 12 adult speakers from whom their syntactic scores differed by no more than one point. In all 12 comparisons, the adult's text was longer. The differences between the paired text-lengths ranged from 46 to 3529 tokens. From a slightly different perspective, of the eight adults with high syntactic scores (>38), only the one with the lowest syntactic score (in this sub-group) had a text-length shorter than the longest child text. All other adults with "high" syntactic scores (N = 7) had produced texts longer than the longest child text, by 273 words or more.

There is a methodological problem associated with the fact that we are studying the relation between our "syntactic score" and text length. Clahsen et al. (loc. cit.), analyzing the syntax of the adults studied here (among others), normally used a coherent 50- utterance excerpt from the interview to identify presence or

absence of these and other rules,and to calculate percentage of occurrence in possible contexts. However, in case of doubt about the representivity of this sub-text with respect to rule occurrence, they used 50 other utterances. More generally, they used the whole transcript when necessary to see if syntactic rules which were obviously rare in the corpus were to be found (pp. 69-70). Since we (unlike Clahsen et al.) are concerned here with emergence only, and since we know that Clahsen et al. took pains to assure that the syntactic rules attributed to each speaker were representative of his whole corpus, we will relate text length or "loquacity", in tokens, to their word-order rule occurrence inventory. Percentages of rule occurrence will not be used, in part because they would not be based on corpora of comparable length in the case of the children, for whom we used the whole corpus directly to determine presence or absence of each rule.

As a check on this understanding of the ultimate comparability of the basis for determining each speaker's rule inventory, we examined the authors' pp. 133-4, the final two pages of Table 3. The speakers inventoried here with respect to the crucial rules showed use of very little but ADV-VOR (rule 1 above). Clahsen et al. would not have based their view of these speakers' developmental stage arbitrarily on 50 utterances if elsewhere in the corpus these informants had shown the emergence of higher rules.

III. The Statistical Analysis

When all informants in each group were included in the statistical analysis, the partial correlation coefficient which had interested us at the outset, that between the syntactic score and the type-token ratio, was negative for both groups: -.25 ($p = .172$) for the children and -.35 ($p = .068$) for the adults. The simple measures, however (syntactic score, types, and tokens) were all positively, highly, and quite significantly correlated among themselves for the children:

	tokens	types	syntactic score
tokens		.93 ($p = .001$)	.72 ($p = .001$)
types			.86 ($p = .001$)

In the case of the adults, these first correlations show that the length of the text is less clearly related to syntactic performance than for the children:

	tokens	types	syntactic score
tokens		.86 ($p = .001$)	.33 ($p = .075$)
types			.56 ($p = .005$)

In addition, when tokens were controlled for, the correlation between type-token ratio and syntactic score was .70 ($p = .002$) for the child sample, but still negative for the adults: -.13 ($p = .297$).

The two adults who were atypical in that they were much more "loquacious" than everyone else (though one was syntactically weak and one syntactically strong) were then excluded from the statistical analysis, along with the child who (atypically) combined a very short text with the highest (child) syntactic score. Under these conditions, all the relevant correlations reach significance for both groups of informants, though of course type-token ratio is still negatively correlated with the simple measures:

CHILDREN

	tokens	types	type-token ratio
tokens		.95 ($p = .001$)	-.82 ($p = .001$)
types			-.64 ($p = .005$)
syntactic score .81 ($p = .001$)		.89 ($p = .001$)	-.47 ($p = .04$)

ADULTS

	tokens	types	type-token ratio
tokens		.96 ($p = .001$)	-.76 ($p = .001$)
types			-.61 ($p = .004$)
syntactic score .64 ($p = .002$)		.63 ($p = .003$)	-.54 ($p = .01$)

This series of comparisons shows, most clearly, a high correlation between types and tokens, even for data from small groups of speakers. This suggests that, unless lexical frequency and variety data are of intrinsic interest in texts of this sort, a token (length) count can be taken as an indirect indicator of lexical development. Needless to say, it is a much simpler task than the determination of the lexical types (to permit subsequent counting of them). Syntactic proficiency seems generally, however, to be more clearly related to lexical types than to number of tokens. This is not surprising, since the length of the corpus in semi-directed interviews is also dependent on the interviewer and on what the transcriptor manages to decode.

The second set of correlations (especially for the adults) seems to indicate that the exclusion of the obviously atypical individuals (in this case, the two adults who were much more "loquacious" than everyone else) seems to bring the correlation for tokens (with syntactic score) close to that for types. The type-token ratio, while it is by definition a measure of relative lexical variety in texts of diverse lengths,

appears, in this kind of study, to occasion unnecessary complications, since there are positive and highly significant correlations between its components.

It also seems (in partial answer to our question (c) above) that lexical and syntactic proficiency may be more reliably and closely related in children than in adults, especially unless the somewhat artificial precaution of eliminating "atypical" adult speakers is taken. This elimination is artificial in the sense that such groups of second-language learners as the *Gastarbeiter* studied here are typically very heterogeneous in performance and in loquacity.

As for our original hypothesis as to the comparative development of syntax and the lexicon in child vs. adult L2-learners: We have seen that text-length turns out to be an indicator of lexical development, and certainly, adults tend to produce much longer texts than children in similar semi-directed interviews. We also saw above the tendency for the children to "earn" higher syntactic scores than those of adults who produce texts as short as theirs and equal syntactic scores to those of other adults, in shorter texts. It is in this sense that our original hypothesis is supported by the data: Under conditions made as similar as possible, given the obvious pragmatic and cognitive constraints, the children showed signs of greater syntactic development than the adults at comparable levels of lexical development or "loquacity", while the adults showed signs of greater lexical development in producing much longer texts on the average than the children.

IV. The Syntactic Hierarchy Revisited

Whatever the ultimate value of one or another lexical measure may be, exploration of the bases for syntactic indices of development retains intrinsic interest, for typological as well as psycholinguistic reasons. The reader will already have noted above that the logic of our system for assigning points to the emergence of syntactic rules and rule variants led to giving enormous weight to a single major rule: ADV-VP (13 points). Statistical analyses of the contribution of the occurrence of each rule and variant to the syntactic score show, not surprisingly, that this rule has been the greatest single contributor to the set of scores. Suppose, however, that we were to question the position of ADV-VP in the developmental hierarchy, the basis for assigning to its occurrence the score of 13 rather than 9, the appropriate score if it were rule (3).

For the reasons mentioned above, any suggested change in the syntactic evaluation would have to conserve the importance of the emergence of rules and variants. In order to characterize the passage into a higher acquisition stage in a way which captures the importance of the variant forms of rules, we propose to add the criterion that the speaker's corpus must show occurrence of not just one but at least half the variants of the criterial rule. This additional requirement is of course only pertinent for rules (2), (3), and (5) above, and means that two variants

must appear for each of them. In the case of our 36 informants, imposing this criterion had a surprising effect. Nine speakers (four children and five adults) fail to manifest ADV-VP (rule 4), but eleven speakers (five children and six adults), fail the test for INVERSION (rule 3), under the new requirement.

If we permute ADV-VP and INVERSION in the hierarchy, this has a striking consequence for the distribution of certain speakers, though the effect is partially due to chance: Stage Zero (in our terms, not those of Clahsen et al.) is occupied by speakers who manifest none of the criterial rules, Stage One by those who show occurrence only of ADV-VOR, Stage Two by satisfiers of ADV-VOR and PARTIKEL (⇒ 2 variants), Stage Three by satisfiers of ADV-VOR, PARTIKEL, and ADV-VP, Stage Four by satisfiers of ADV-VOR, PARTIKEL, ADV-VP, and INVERSION (⇒ 2 variants), and Stage Five by satisfiers of all five rules, including V-ENDE (⇒ 2 variants). In the case of our informants, it happens that the occupants of what would have been our Stages Two and Three, if the Clahsen et al. hierarchy were respected, change places, although this precise result is not logically necessary. Thus a modest tightening of the criterion for rule emergence has led to an important change in the evaluation of the level of syntactic development for certain speakers (only seven in this case: two children and five adults).

For some readers, such preoccupation with methods for evaluating L2 development, and for choosing among closely related lexical and syntactic measures, may pass for fastidious tinkering. I am profoundly convinced, however, that it is by well-motivated but varied empirical analyses, whose results are not always obvious at the outset, that we will ultimately reach an understanding of second language acquisition.

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