Is Language Teachable? Psycholinguistic Experiments and Hypotheses

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In this article I demonstrate that the teachability of language *is constrained by what the learner is ready to acquire. I set out a series of psychological constraints on teachability and relate these to the 'multidimensional model of SLA', taking a speech processing approach towards the explanation of language acquisition. This article supplies the empirical evidence for these constraints—namely experiments and longitudinal studies—which were available at the time of submission (1985). I take the position that while this research has important implications for 'formal interventions' in the acquisition process, the nature of such interventions do by no means follow from the research on teachability reported on in this article.*

0. INTRODUCTION

Language teaching has always been a discipline dependent on the theoretical capacities of 'parent disciplines', such as psychology, linguistics, or pedagogical 'methodology'. The discontinuity that characterizes the history of language teaching—the succession of 'new waves' in teaching methods—is due to misapplication of findings from parent disciplines, and to the lack of an independent theoretical basis for teaching itself.

This kind of 'theoretical dependence' has appeared in all the major upheavals experienced by modern language teaching. The grammar-translation method exemplified the linguistic thinking of its time, and the 'direct method' that followed it reflected just as clearly the pedagogical and psychological thinking of the following era (cf. Kelly 1969). Similarly, linguistic structuralism and behaviouristic learning theories totally dominated language teaching in the fifties and sixties, and the growing attention to communicative functions in many branches of linguistics created yet another 'new' paradigm after this.

While the history of language teaching is largely a history of discontinuity, it has at least one consistent thread: regardless of the method in vogue, the central object of language teaching—namely, the nature of the language teaching process—has always been an object of indirect speculation. This speculation has been characterized (1) by a conspicuous lack of recourse to research into language learning (in either natural or formal contexts) and (2) by an excessive reliance on *a posteriori* explanations derived from parent disciplines. Consequently, this question of *whether language is teachable* is one which in many approaches has not been asked at all, while in others it has been answered purely on the basis of intuition.

In this article I will examine precisely the question posed above, and in doing

so I will outline what I consider to be the very beginnings of a theory of language learning which has serious consequences for teaching. This is not to say that yet another new teaching method will be announced. Rather, my remarks will be restricted to some of those crucial problems of language learning which in the past have been solved only intuitively and for which we have now begun to develop a more general and theoretically underpinned understanding. To this end, I will make a number of claims which specify what language teaching can model in the learning process and what it cannot.

1. EVERY LEARNER BUILDS UP HIS OR HER OWN GRAMMAR[1]

This hypothesis is, in fact, the central assumption of most research into first and second language acquisition, and it is supported by a great number of empirical studies (for an overview, see Nicholas and Meisel 1983). Still, the significance of these studies for language teaching has not been widely recognized.

In teaching settings like the ESL classroom the importance of our first hypothesis becomes quite apparent: for most learners, the classroom is just one source of language learning, the other being the 'unguided' process of natural acquisition. It therefore follows that a successful ESL course should build on the learning processes occurring outside the classroom and incorporate them systematically into guided acquisition.

Before we go into details about research findings on formal (i.e. classroom) second language acquisition, it is necessary to outline some of the concepts in L2 acquisition theory which are relevant to the theme of this paper.[2]

One of these concepts is, of course, the idea of *general stages of acquisition* through which all learners must pass. For the reader's convenience I will illustrate this point with a frequently cited example, namely, the acquisition of German word order. On the basis of longitudinal and cross-sectional studies the following stages of acquisition have been determined for German as a second language—henceforth GSL—(cf. Clahsen 1980; Pienemann 1980, 1981; Meisel, Clahsen, and Pienemann 1981; Clahsen, Meisel, and Pienemann 1983).

Stage X = canonical order
Romance learners of GSL start out with a subject-verb-object—henceforth SVO—order as their initial hypothesis about German word order. For example:

die kinder spielen mim ball (Concetta)
'the children play with the ball'[3]

(Note: in most sentences with a simple verb this order is in line with standard German. Deviations appear with some types of adverbials, which in standard German must not appear in final position.)

Stage X + 1 = adverb preposing (ADV)
For example:

da kinder spielen (Concetta)
'there children play'

At this stage all sentences with ADV are deviant since standard German requires a word order like (*there play children* (i.e. verb in second position). The verb-second rule (or 'inversion') will, however, only be acquired at stage x + 3 (=INV). The preposing rule itself is optional.

Stage X + 2 = verb separation (SEP)
For example:

alle kinder muß die pause machen (Concetta)
'all children *must* the break *have*'

Before the verb separation is acquired, the word order in the interlanguage is the same as in sentences with main verbs only (cf. the English equivalent—*all children must have a break*). Verb separation is obligatory in standard German.

Stage X + 3 = inversion (INV)
For example:

dann hat sie wieder die knoch gebringt (Eva)
'then *has she* again the bone bringed'

In standard German the subject and inflected verbal element have to be inverted after preposing of elements.

(Note: in the process of L2 acquisition the learner *accumulates* these rules. This means that at least for the domain of word order the structure of a given interlanguage can be described as the sum of all the rules the learner has acquired so far.)

Researchers have tried to explain acquisitional sequences like the one sketched out above from a number of perspectives (cf. Berman 1982 for discussion). In this paper I will adopt the position that the constraints imposed by language processing play a decisive part in determining the specific order in which given sets of L2 items are acquired by different individuals.

This explanatory approach is the one taken by the ZISA group (cf. Meisel 1980; Clahsen, 1981; Meisel, Clahsen, and Pienemann 1981; Clahsen, Meisel, and Pienemann 1983). The ZISA workers set out a general framework of speech processing constraints which was able to predict the order of acquisition for the word order rules described above as well as for a set of further word order rules. This approach has been extended by Pienemann and Johnston (1985) to a wider range of phenomena in morphology and syntax. In their model, Pienemann and Johnston further attempt to determine the chronology in which the actual speech processing prerequisites are acquired.

For reasons of limited space I can, in this paper, only very briefly sketch the way in which the above approach predicts the sequence which was found for the acquisition of German word order: it is a general finding from research into sentence processing that a canonical word order is psychologically the simplest way of marking underlying grammatical and sentence-semantic relations (cf.

Slobin and Bever 1982; Clahsen 1984). This is exactly the order we find at Stage X of the above sequence. In the following stages the learner gradually builds up his ability to re-order constituents in the way the target language requires. Now it is important to note that there are qualitative differences in these re-orderings. After the application of ADV the basic SVO strategy is still maintained (thus: ADV + S + V + O), while for SEP and INV this is not the case. Therefore, ADV is simpler than the latter two rules. It should also be noted that the application of ADV is facilitated by the fact that ADV always moves elements into a psychologically salient position (which is easier to recognize and remember than other positions). In the case of SEP and INV associated elements (such as aux + V) have to be disrupted. Such disruptions eliminate the SVO strategy as a basic pattern for sentence comprehension. Therefore, sentences with SEP or INV have to be analysed more deeply. In both cases an element in sentence-internal position has to be identified and to be moved into another position. The crucial difference between SEP and INV is now that SEP moves an element into final position which is perceptionally salient, while INV moves the element into sentence-internal position. Thus, for SEP the learner can partially rely on a general perceptional mechanism, while for INV the operation has to rely solely on language-specific processing prerequisites.

A further aspect of the speech processing approach is the implicational nature of the structures acquired at the different stages of acquisition: a sentence-internal permutation implies that an element can be moved from internal into a salient initial or final position. The latter implies that an element can be moved from one salient position into another salient position. This means that the structure acquired at each stage is a prerequisite for moving on to the following stage.

In Pienemann and Johnston (1985) we have shown that this implicational nature of acquisitional sequence is caused by the way the learner acquires the necessary processing prerequisites. A hierarchy in the development of processing prerequisites then serves as a general grid for the prediction of acquisitional chronologies for a wide range of structures in morphology and syntax. This model has been tested successfully for German and English as second languages and a variety of typologically different source languages (cf. Pienemann and Johnston 1985).

Another important concept originating from the work of the ZISA group is the notion of 'learner's orientation' (cf. Pienemann 1981; Clahsen, Meisel, and Pienemann 1983). One of the implications of the concept is that while acquisitional stages are fixed and predetermined, there is nevertheless sufficient room for the individual to find his own path in the acquisition of the L2.

An example of the concept of learner's orientation involves insertion of the copula. When some learners start using equational sentences, they produce them without the copula (e.g. *he good*), while others produce such sentences in the 'correct' form immediately. In comparison with other structural features, however, the 'deviant' form appears earlier, giving the learner who produces it a communicative advantage (cf. Pienemann 1981). Furthermore, the frequency

of copula insertion does not necessarily increase either absolutely or proportionately as a learner moves from one acquisitional stage to another. Rather, some learners produce correct copular structures at an early stage, while others continue to omit the copula even at an advanced stage (cf. Clahsen, Meisel, and Pienemann 1983).

Another example of the concept of learner's orientation is the interplay of ADV and INV. As in the preceding case, the learner finds himself in a conflict situation the moment he enters the stage ADV, since whenever he applies ADV, INV will automatically be violated, as it cannot be processed at this stage. Once again, as in the preceding example, the learner has the choice between being 'correct' by avoiding ADV or being communicatively effective by exploiting ADV despite the resulting 'deviations'.

Since the present paper concentrates to some extent on this interplay of ADV and INV, I shall briefly illustrate some communicative effects of ADV.

(a) The general effect of the preposing of elements is that the listener's attention gets focused on the preposed element. There are two reasons for the salience of such elements: (1) initial elements are easy to memorize, and (2) the preposed element is different from the subject, which is the element that would normally be expected to occupy this position. (This expectation is a result of a very basic strategy of sentence comprehension, cf. Bever 1970).

(b) By focusing the listener's attention on one element of the sentence, the learner can specify the meaning of a sentence. In the following example

in italia *viel interessiert die kinder die familie* (Elisio)
'in Italy much interested the children the family/in Italy people are very interested in children and the family'

the preposed adverbial clarifies the *local* background information conveyed. The *temporal* background can be emphasized in a similar manner. Preposing of adverb and adverbials is also used by L2 learners to contrast two pieces of information.

These examples may be sufficient to illustrate that within the fixed hierarchy of acquisitional stages there is considerable leeway for each learner to find an individual path to the target language.

Another point concerning learner's orientation which should be mentioned here is that it is constant across different structural domains—i.e. on the basis of an examination of a variety of features it is possible to locate a given learner in a unique place on a continuum whose poles are the competing goals of 'effectiveness' versus 'correctness' (for further details, see Clahsen, Meisel, and Pienemann 1983).

On the basis of the results reported above (which are in essence that second language acquisition in a natural setting is systematic), the following claim will be made: in a mixed (i.e. formal and natural) acquisition setting, formal language teaching can capitalize on a natural process of language learning. It should be noted that this claim is quite specific and testable, and is therefore not to be

classed with apparently similar but empirically vacuous proposals (cf. Krashen 1981; Krashen 1982; Krashen and Terrell 1983).

Using the acquisitional model described above, a number of predictions can be made. First, on the basis of an analysis of what has already been acquired by a given learner, it is possible to predict what the next natural learning problem will be for that learner. Second, the learner's orientation can be assessed. (It should be noted that this assessment can be obtained through a linguistic analysis.) In addition, since different features of a learner's interlanguage are structurally interrelated, it is possible to obtain a reasonably extensive description of the learner's rule system as it currently stands.

Information about a learner's developmental status and orientation is of considerable value to the teacher, since it enables the latter to predict and classify imminent learning 'errors'. The teacher will be able to recognize some of these errors as a consequence of the learner's current stage of development, while others will be recognized as resulting from the learner's use of communicatively effective 'short cuts'. The teacher will also be able to determine what, if any, relationship the linguistic items to be presented in the course have to the learner's current interlanguage grammar.

2. YOU CAN'T TEACH EVERYTHING YOU WANT

In the first section I restricted my claim about the significance of natural acquisition for teaching to the so-called 'mixed' setting of L2 acquisition, and I limited myself to proposals about the possibility of *diagnosing* the current state of the learner's interlanguage and to *predicting* the subsequent order of learning problems as these appear in natural acquisition. So far then, there is no implicit claim about the active role of teaching—that is, whether or not the natural order of acquisition should be followed in teaching or whether teaching should seek to 'rectify' 'deficient' natural learning processes. In the present section, I will address precisely this question about the role of teaching.

It should be remembered that teaching has traditionally been considered an instrument for steering and shaping the process of language learning. From this traditional perspective, natural acquisition and classroom learning appear to be two separate phenomena—if for no other reason than that the learning environment in each case is obviously quite different. Given this point of view, it would seem to be absolutely logical to regard natural acquisition as deficient, since it is a process characterized by the production of a great number of errors which are not perceived as indices of development or learner's orientation. Consequently, teaching is envisaged as a process of systematic formal instruction whose object is to remedy the 'deficiencies' of natural acquisition.

In what follows, however, I will demonstrate that the acquisition process cannot be steered or modelled just according to the requirements or precepts of formal instruction. On the contrary, I will show that teaching itself is subject to some of the constraints which determine the course of natural acquisition. I will henceforth refer to this proposition as the Teachability Hypothesis (Pienemann 1984a).

2.1 *The Teachability Hypothesis*

The Teachability Hypothesis is based on an experiment designed to 'beat the order' of acquisition through formal instruction. If formal instruction is indeed capable of this, then it is not unreasonable to argue by extension that it can also overcome other constraints imposed on natural acquisition.

The experiment itself took the following form. From a population of Italian speaking elementary school learners of GSL (the acquisition context was largely natural), ten children whose interlanguage was between Stages X to X + 2 were selected. The informants were 'taught' a structure found at Stage X + 3. A variety of materials and activities were used in the teaching. In order to provide a parallel for the dimension of learner's orientation, a further object of the experiment was the inculcation of standard patterns of use for the copula. Table 1 provides an idea of the general design of the experiment.

Table 1: Data gathering procedure

Step	No. of interviews	Time (days)
Selection of informants	100	7
Interview 1	10	1
First hidden recording	10	2
First instructional period		5
Interview 2	10	1
Second instructional period		5
Interview 3	10	1
Second hidden recording	10	2

Results for two learners, Teresa and Giovanni, are given in Tables 2 and 3. Teresa's interlanguage is obviously at Stage X. Thus, she does not apply SEP or INV before the experiment. For SEP this situation does not change, while for INV there is a jump from zero to 83 per cent after the experiment. This latter result is misleading, however, and I have shown elsewhere (Pienemann 1984a) that the increased use of INV is entirely accounted for by the appliction of rote memorized patterns from the experimental input. In *all* sentences where Teresa

Table 2: Teresa

	Hidden rec.	Interview 1	*(Teaching: copula)*	Interview 2	*(Teaching: inversion)*	Interview 3
Adverb	X	X		X		X
Particle	(0.)	0.		0.		0.
Inversion	0.	0.		0.		0.83
'Inversion'						
da is	(X)	X		X		X
was/wo is?	(X)	X		X		X
da V	(X)	X				

Table 3: Giovanni

	Hidden rec.	Interview 1	Interview 2	Interview 3	Hidden rec.	Hidden rec.
		(Teaching: copula)		*(Teaching: inversion)*		
Adverb	X	X	X	X	X	X
Particle	0.47	0.31	0.14	0.50	0.61	0.56
Inversion	0.17	0.11	0.20	(0.67)	1.	0.67
'Inversion'						
da is	X	X	X	X	X	X
was/wo is?	X		X		X	X
da V			X		X	X
Verb and complement separation	0.	0.	0.	(0.5)	0.29	0.36

deviated from the classroom dialogues she failed to apply INV. Thus, it is fair to say that she had not learned to use the rule productively, although in terms of the lesson she was formally successful. The picture looks quite different for Giovanni. At first glance, he seems to have acquired all three structures—including INV, the object of the teaching experiment. Once again, however, I have shown elsewhere that up to interview 2 (i.e. before INV was taught) all structures with INV can be explained by a subject-final strategy which only requires the same processing capacity as SEP—an $X + 2$ rule (cf. Clahsen 1981). Only after the teaching of INV did the procedure underlying INV (a sentence internal permutation) appear in Giovanni's language. This is reflected in the last line of Table 3 which displays the percentage to which—in each interlanguage—the verb and its complement are separated by the subject of the sentence. Such a separation only appears with sentence-internal subject-verb inversion and not with the subject-final strategy.

Thus Giovanni did apply INV after the instruction but not before. In addition, it is important to note that after the instruction Giovanni applied INV not just in a small range of linguistic contexts and with a low frequency as would be expected in the initial phase of the natural acquisition of the rule. Compared with natural acquisition his usage of INV is rather advanced, so that normal progress in his acquisition process can be excluded as an explanation for the changes observed in his interlanguage (for details, cf. Pienemann 1984a). Therefore it follows that Giovanni has learned INV through instruction.

The state of affairs I have illustrated for two learners can be confirmed for other members of the sample. From the above dicussion we can see that all the learners, regardless of stage, have mastered the formal learning tasks involved in the instruction. However, only learners already at Stage $X + 2$ have transferred this 'knowledge' to their actual speech production. Since the instruction was the same for all of the learners in the sample, we can conclude that the differential effects of the teaching can be attributed to differences in the stage of development which each informant had reached.

The Teachability Hypothesis, which is intended to explain these results, predicts that instruction can only promote language acquisition if the inter-language is close to the point when the structure to be taught is acquired in the natural setting. It can be roughly elaborated as follows.

As indicated above, the order of acquisition from Stages X to $X + 3$ can be explained by the processing complexity implied in the corresponding structures. It has been shown that the processing operation characterizing Stage $X + 1$ is also required for Stage $X + 2$, and that likewise the operation characterizing Stage $X + 2$ is required for Stage $X + 3$. In addition, however, for each later structure an additional operation has to be performed (for a detailed presentation of this theory, see Clahsen 1981; Pienemann 1984a). Thus structures from Stage $X + 3$ cannot be processed by learners at Stage X or $X + 1$, since these learners have not yet acquired a necessary processing prerequisite for the operation in question.

It should be noted that the Teachability Hypothesis is defined in terms of

underlying processing constraints. This means that it can be tested for developmental features where processing factors play a crucial part in production. In point of fact, quite a range of linguistic features fall under this rubric. Amongst such features are German word order rules (cf. Clahsen 1981; Pienemann 1984a) and morphemes, as well as a considerable number of English morphosyntactic structures (cf. Pienemann and Johnson 1985).

From a practical perspective, it might seem initially that the Teachability Hypothesis can be interpreted as follows: 'Teaching is ineffectual (i.e. impossible) since L2 acquisition can only be promoted when the learner is *ready* to acquire the given items in the natural context.' Consequently, one might conclude that it is not really necessary to concern oneself with teaching, since it will neither promote nor hinder acquisition.

I wish to make it quite clear that such conclusions are unwarranted. One reason is that it can be shown that instruction has an accelerating effect on acquisition for learners who are ready for it (cf. Pienemann 1984a). A further reason is that the Teachability Hypothesis is motivated in terms of speech processing constraints and is by definition therefore only concerned with the *developmental* dimension of acquisition.

2.2 Teaching and variable features

To investigate the influence of instruction on variable interlanguage features we need to consider the results emanating from the second part of the teaching experiment we have been discussing. The aim of this part of the experiment, it will be remembered, was to inculcate 'correct' patterns of usage for the copula—a linguistic feature which appears to be a particularly reliable indicator of learner's orientation (Clahsen, Meisel, and Pienemann 1983).

Table 4 shows the results of the experiment for five of the informants. For all of the informants tested, the frequency of copula omission diminished considerably after instructional emphasis. In short, variational features appear to be free of the kinds of constraints which affect the teachability of developmental features: once a variational feature can be produced at all it can be said to be teachable.

The finding reported above is in complete agreement with the Teachability Hypothesis. This is because the processing prerequisites for variational features like the copula can be said to have already been acquired when there is a probability of more than zero that the feature will be produced.

As has been pointed out above, rates of suppliance for variational features are determined by considerations such as communicative effectiveness and communicative effort (cf. Nicholas 1984), and cases of infrequent suppliance of such features are therefore not inconsistent with the learner having moved a considerable distance along the developmental continuum. For variational features, then, there is no learning barrier of the kind predicted by the Teachability Hypothesis for developmental features. At this point another phenomenon should be mentioned. Coincidentally, one of the original ten informants—Monica—was interviewed again some nine months after the

Table 4: The omission of the copula before and after instruction

	Hidden rec.	Interview 1	(Teaching: copula)	Interview 2	(Teaching: inversion)	Interview 3	Hidden rec.	Hidden rec.
Carmine	/	0.70		0.13		0.18	/	/
Monica	/	0.50		0.10		0.14	/	/
Mimmo	/	0.18		0.08		0.08	(0.33)	/
Teresa	0.	0.		0.		0.	/	/
Giovanni	0.	0.		0.		0.	0.	0.

teaching experiment, and it was found that her rate of copula omission had risen markedly to 0.34. Since there is a correlation (albeit of a complex nature) between a learner's orientation and social environment and psychological make-up, this observation suggests that the effects of instruction will not persist if other more permanent factors work against them—to date, however, the effects of this apparent conflict situation have not been investigated systematically.

To recapitulate, the Teachability Hypothesis does not predict that teaching has no influence whatsoever on acquisition. Rather, it maintains that the influence of teaching is restricted to the learning of items for which the learner is 'ready'. This claim has at least one important consequence for teaching: namely, that teaching can only promote acquisition by presenting what is learnable at a given point in time. To put this another way, items in a syllabus need to be taught in the order in which they are learnable.

2.3 Formal second language acquisition

I would like to consider one more aspect of the effect of teaching. This concerns the nature of the learning environment. So far, our discussion has concentrated on what has been termed the 'mixed' setting for acquisition, where both formal and informal acquisition take place. For some authors this would represent an important distinction, since they take the position that findings from natural acquisition cannot simply be generalized to formal acquisition because external factors associated with the latter setting might well create a learning process *sui generis* (cf. Bausch and Koenigs 1983).

Now, it should be evident that formal and natural L2 acquisition could well be different given, for example, that elements and structures filtered out of formal input cannot be acquired. In addition, there may also be learning strategies which are exclusive to formal acquisition. Nevertheless, a concomitant of the speech processing approach to L2 acquisition is that the constraints which operate on the speech processor do so uniformly across the spectrum of acquisitional settings. This being the case, the Teachability Hypothesis should hold just as well for purely formal contexts as it does for natural ones.

One type of evidence for this assumption comes from the studies of Felix (1981) and Hahn (1982). Both researchers compared errors characteristic of natural and formal ESL acquisition, and found them to be remarkably similar. A prime example is the acquisition of pronouns: in both contexts these were acquired through the gradual specification of semantic features such as person, number, case, and gender, although linguistic input was presented in a completely different fashion. The order of feature specification turned out to be the same for both learning contexts (cf. Felix and Simmet 1981).

Another type of evidence comes from Daniel's (1983) cross-sectional study of beginner learners of GSL attending university. In her analysis of learners' performance in respect of German word order rules after a year of instruction, Daniel found patterns closely resembling those which had been described for the natural acquisition of German as a second language.

Table 5: Formal GSL acquisition: verb movement rule according to linguistic environment (Westmoreland 1983)

Informant		1	2	3	6	7	8	10	11
SEP	P + FV	/	/	/	/	/	/	/	/
	MOD + NV	/	1.	(1.)	(1.)	1.	1.	/	1.
	AUX + NV	/	(1.)	/	(1.)	1.	(1.)	1.	(1.)
	Total	/	1.	(1.)	(1.)	1.	1.	1.	1.
INV	WH-DIR	/	/	(1.)	/	/	/	/	/
	PP	0.75	(0.33)	(0.)	(1.)	1.	/	0.67	1.
	TOPI 1	(1.)	/	/	/	(1.)	/	/	/
	TOPI 2	(0.5)	/	/	/	/	/	(0.5)	1.
	YES/NO	/	/	/	(1.)	/	/	/	/
	Total	0.75	(0.33)	(0.5)	(1.)	1.	/	0.63	1.
V-END	COMP	0.80	(1.)	(0.)	(1.)	0.80	(0.5)	(1.)	1.
	WH-IND	/	(1.)	/	/	(0.)	/	(1.)	1.
	RELATIVE	(1.)	/	/	/	/	/	/	0.83
	Total	0.83	1.	(0.)	(1.)	0.67	(0.5)	(1.)	0.96

Key *SEP* = verb separation; P + FV = separable prefix + finite verb; MOD + NV = modal + non-finite verb; AUX + NV = auxiliary + NV; *INV* = subject-verb inversion; WH-DIR = direct question; PP = INV after preposed adverbial; TOPI 1 = INV after preposed NP; TOPI 2 = INV after preposed subordinate clause; YES/NO = yes/no quetion; *V-END* = verb final rule in subordinate clauses; COMP = subordinating conjunction; WH-IND = indirect question; RELATIVE = relative clause; numbers in brackets are based on three or less obligatory contexts.

Meanwhile, the Teachability Hypothesis has also been tested in another cross-sectional study of formal GSL acquisition, conducted by Westmoreland (1983). The interlanguage data produced by eight beginner university learners in Westmoreland's study fall into the implicational pattern seen in Table 5. With the exception of learners 3 and 8, all of Westmoreland's informants appear to have arrived at the stage of V-END. For learners 3 and 8, the evidence is only clear up to the stage of SEP. For INV, there is inadequate data on which to base conclusions.[4] Regrettably, therefore, there is an insufficiently wide range of developmental stages represented in the study for it to *unequivocally* confirm that developmental stages in natural and formal acquisition of GSL are the same. Nevertheless, the findings as reported are not without weight. If the stage for the acquisition of word order rules for natural and formal acquisition were different, we would expect there to be gaps in Westmoreland's implicational scale—that is to say, cases of zero rule application for a non-zero number of obligatory contexts characterizing a developmental stage through which the learner should have already passed. Yet there is not a single gap of this kind!

2.4 *A longitudinal study of formal SLA*
Further evidence comes from my longitudinal study of the formal acquisition of

German (cf. Pienemann 1987a).[5] In this study, three adult learners of German without any prior knowledge of the language were interviewed fortnightly for thirty or forty minutes for approximately a year. The learners attended a beginner's course at the University of Sydney.

In the following paragraphs I will briefly compare—through an examination of classroom input and the learners' output—what the students were taught and what they learned. For convenience and comparability, I will once again focus the discussion on German word order: it should be noted, however, that a more explicit and wide-ranging analysis of the data is being conducted (cf. Pienemann 1987a). The results of the longitudinal study of formal GSL development are displayed in Tables 6–10 which are all designed in the same format. The first line refers to the different points in time (weeks) at which the data were collected. The first column (from the left) refers to the stages of German word order development as they were reported in the previous sections (SVO, TOPI, SEP, INV, V-END). In this context the label 'TOPI' is used instead of 'ADV', because it subsumes a number of structurally related rules. The second column lists different structural environments for the rules mentioned in the first column. For SVO, the environments are 'COP', 'AUX', 'V' and 'QUESTION'; i.e. different verbal elements and SVO structures in questions. For TOPI, the labels 'PP', 'OBJECT', and 'Q-PRO', refer to preposed PPs, objects, and question pronouns. The lines ... WITH V-COMPLEMENT' are explained in the following paragraphs. The remaining structures are explained in the key to Table 5.

Tables 6 and 7 display two different aspects of the input as it was structured over the first nineteen weeks of the course (i.e. two trimesters). Table 6 lists those structures in the domain of word order which were in the syllabus (where a conscious attempt to teach them through intensive exercises was made). The most important observation in Table 6 is that all major word order rules (except V-END) are introduced as early as the fifth and seventh week, within a short period of time, even though the different linguistic contexts in which these rules apply are spread over a more extensive time frame.

Table 7 further summarizes which structures were contained in the written input (i.e. in exercises, textbooks, etc.). It is apparent that here far fewer structures are filtered out and that the learners are exposed to all German word order structures from an early stage.

Tables 8, 9, and 10 provide an analysis of the interlanguage of three learners for a period of 27 weeks (Steven), 19 weeks (Guy), and 9 weeks (Vivien). The occurrence of optional rules is marked with an 'X', while for obligatory rules the relative frequency is given. The symbol '/' is used in order to stress that in the given interlanguage the structural description of the rule given on the left hand side of the table is not met in a single case. If this fact was not to be stressed, the appropriate section of the table was simply left blank.

Let me also draw the reader's attention to the line 'SEP WITH V-COMPLEMENT': In many cases a sentence will only consist of NP + AUX + V. In such cases we cannot decide whether the learner applied

Table 6: Learning objectives in a study of formal E2 acquisition

Weeks		1	3	5	7	9	10	11	12	13	14	15	16	17	18	19
SVO	COP	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	AUX	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	V	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	QUESTION	X	X	X	X	X	X	X	X	X	X	—	X	X	X	X
TOPI	PP				(X)	(X)	(X)	X	X	X	X	X	X	X	X	X
	OBJECT			X	X	X	X	(X)	(X)	X	X	X	X	X	X	X
	Q-PRO	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SEP	AUX + NV													X	X	X
	MOD + NV			(X)	X	X	X	X	X	X	X	X	X	X	X	X
	P + FV			(X)							X	X	X	X	X	X
	SEP WITH V-COMPLEMENT															
INV	PP				(X)	(X)	(X)	X	X	X	X	X	X	X	X	X
	TOPI 2															
	TOPI 1			X	X	X	X	(X)	(X)	X	X	X	X	X	X	X
	WH-Q	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	YES/NO	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	INV WITH V-COMPLEMENT															
	Total															
V-END	V-END WITH V-COMPLEMENT															
	Total															

Table 7: Structures contained in the input

	Weeks	1	3	5	7	9	10	11	12	13	14	15	16	17	18	19
SVO	COP	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	AUX	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	V	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	QUESTION	X	X	X	X	X	X	X	X	X	X	—	X	X	X	X
TOPI	PP	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	OBJECT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Q-PRO	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SEP	AUX + NV								X	X	X	X	X	X	X	X
	MOD + NV			(X)	X	X	X	X	X	X	X	X	X	X	X	X
	P + FV			(X)	X	X	X	X	X	X	X	X	X	X	X	X
	SEP WITH V-COMPLEMENT															
INV	PP	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	TOPI 2													X	X	X
	TOPI 1			X	X	X	X	(X)	(X)	X	X	X	X	X	X	X
	WH-Q	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	YES/NO	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	INV WITH V-COMPLEMENT															
	Total															
V-END	V-END WITH V-COMPLEMENT															
	Total											X	X	X	X	X

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Table 8: Steven

Weeks		1	3	5	7	9	11	13	15	17	19	21	23	25	27
SVO	COP		X	X	X	X	X	X	X	X	X	X	X	X	X
	AUX					X				X			X		X
	V	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	QUESTION	X	X		X	X		X	X	X	X		X	X	
TOPI	PP			X		X	X	X	X	X	X	X	X	X	X
	OBJECT							X							X
	Q-PRO		X	X	X	X	X	X	X	X	X	X	X	X	X
SEP	AUX + NV						0.			0.72	1.	0.62	0.86	0.86	0.71
	MOD + NV			(0.)	(1.)	(0.8)	0.2	(1.)		0.66	1.	1.	0.57	0.87	0.28
	P + FV								(0.)		(0.6)				0.
	SEP WITH V-COMPLEMENT			/	(0.)	(0.4)	.16	(0.)	(0.)	.72	.90	.81	.79	.86	.46
INV	PP				0.	0.	(0.5)	0.	0.	0.	0.	0.	0.	0.	0.
	TOPI 2														
	TOPI 1										(0.)				(1.)
	WH-Q		0.5	1.	1.	1.	0.75	1.		1.			1.		1.
	YES/NO	(1.)	1.	1.	1.	1.	1.	(0.5)	1.	1.			1.		
	VERB TOPICALIZATION														
	INV WITH V-COMPLEMENT	(0.)	0.	(.33)	(.16)	0.	0.	0.13	0.	0.1	/	/	0.06	/	0.
V-END	V-END WITH V-COMPLEMENT						(0.)		(0.)	(0.)			(0.)	(0.)	(0.)
	Total						(0.)		(0.)	(0.)		(.33)	(0.)	(0.)	

Table 9: Guy

	Weeks	1	3	5	7	9	11	13	15	17	19
SVO	COP		X	X	X	X	X	X	X	X	X
	AUX			X	X	X	X	X	X	X	X
	V	X		X	X	X	X	X	X	X	X
	QUESTION	X			X	X		X	X	X	X
TOPI	PP				X		X	X	X	X	X
	OBJECT							X			
	Q-PRO			X	X	X	X	X	X	X	X
SEP	AUX + NV								1.	0.37	1.
	MOD + NV			(0.)	(1.)	(0.4)	0.25	0.	0.66	0.75	0.26
	P + FV						0.	0.		0.	
	SEP WITH V-COMPLEMENT			/	(0.)	(0.5)	0.	/	.75	.46	.41
INV	PP				0.		0.	0.	0.	0.	0.
	TOPI 2										
	TOPI 1						0.	0.			
	Q-PRO				1.	1.	1.	1.	1.	1.	1
	YES/NO				1.	1.	0.8	0.88	1.	1.	1.
	VERB TOPICALIZATION						(1.)				
	INV WITH V-COMPLEMENT				0.	0.	(0.22)	0.	0.	0.1	0.36
V-END	V-END WITH V-COMPLEMENT				(0.)			(0.)	(0.)	(0.)	(0.)
	Total				(0.5)			(0.)	(0.)	(0.)	(0.)

Table 10: Vivien

Weeks		1	3	5	7	9
SVO	COP	X	X	X	X	X
	AUX					
	V	X	X	X	X	X
	QUESTION	X	X	X	X	
TOPI	PP				X	X
	OBJECT			X	X	
	Q-PRO	X	X	X	X	
SEP	AUX + NV					
	MOD + NV					(0.)
	P + FV					
	SEP WITH V-COMPLEMENT					(0.)
INV	PP				0.	0.
	TOPI 2					
	TOPI 1			(0.)		
	Q-PRO	1.	1.		1.	(0.)
	YES/NO		1.		1.	
	VERB TOPICALIZATION		1.			
	INV WITH V-COMPLEMENT	(0.)	0.	(0.22)	0.	0.
V-END	V-END WITH V-COMPLEMENT			(0.)	(0.)	(0.)
	Total			(0.)	(0.)	(0.)

SEP or whether the structure was simply left in the same order as it would appear at the stage preceding SEP. This question can only be answered if AUX and V are separated by a verbal complement. In this line we therefore noted the relative frequency of SEP application in sentences with verbal complements. There is a similar phenomenon with the other obligatory word order rules. If we find a structure like PP + V + NP (where NP is the subject) we cannot decide whether the learner has simply applied a subject-final strategy which is as complex to process as SEP (Cf. Clahsen 1981; Pienemann 1984a) or whether he can in fact apply INV. Again, the test case is a sentence with a verbal complement. Therefore, we included the line 'INV WITH V-COMPLEMENT' which gives the relative frequency of INV application for sentences with verbal complements. A similar line is also included for V-END, because without a verbal complement the word order of German subordinate clauses is simply SV, which doesn't give us a basis to decide about the application of V-END.

If we now compare the input the learners received with the output they produced, we are not surprised to find that all learners acquired SVO first,

because this structure was also contained in the input from the first week on. Similarly, TOPI is present in the input as well as in the early interlanguages of all three learners.

The interesting structures are SEP, INV, and V-END. SEP was an explicit learning objective from the seventh week on and INV from the first week on, while V-END was not included as a formal learning objective. Table 8 shows that Steven does produce the linguistic contexts for SEP as early as from the fifth week on. Applications of SEP, however, only occur from week 17 onwards—as can be seen from the line 'SEP WITH V-COMPLEMENT'. (The figures for weeks 9 and 11 are based on just *one* sentence with verbal complement each!). That is to say: over a period of twelve weeks his interlanguage structure contrasted sharply with the input and the learning objectives of his German course.

As can be seen from Table 9, the situation is very similar for Guy, with the exception that he acquires SEP two weeks earlier than Steven, namely in the fifteenth rather than in the seventeenth week (the frequency of SEP application in sentences with complements rises from 0 to 0.75). Vivien did not acquire SEP during the nine weeks she was observed, although this rule was taught in weeks 7 and 9. It should be noted that Vivien completely avoids the contexts in which SEP has to be applied, while Steven and Guy do produce such contexts (which they must have learned/acquired from the input).

The contrast between input and output continues with the learning/ acquisition of INV. As can be seen from Tables 8 and 9, Steven and Guy produce INV-like structures in questions ('yes/no' questions and 'wh-' questions), but never apply INV after preposed PPs. Most of these INV-like structures, however, do not contain a verbal complement (compare the figures in the line 'INV and V-complement' in Tables 8 and 9), i.e. they can be accounted for by a subject-final strategy. Thus the frequency of INV application for sentences with verbal complements is close to zero. Note that the figures for the application of INV with verbal complements—for Guy *and* Steven—only represent as few as one or two sentences. The first exception to this is Guy's interlanguage in week 19, when INV is applied in 36 per cent of all sentences with verbal complements which meet the structural description of INV. Therefore this is the beginning of Guy's acquisition of INV.

Summing up, we can say that also in the case of INV, the structure which was taught and contained in the input throughout the whole period of observation was not produced for 17 weeks by one of the learners and not at all by the other two learners. The linguistic contexts for the rule were, however, produced by the learners, i.e. the application of the rule was 'attempted' over long periods of time.

The rule V-END was not a formal learning objective. It was, however, included in the input from week 7 on. Steven and Guy both produced a small number of subordinate classes from week 7 and 11 on respectively. However, they never applied V-END.

Looking at Tables 8, 9, and 10 as a whole there are two general findings which are important in the present context: (1) formal learners develop their language

stepwise, despite the scheduling of the teaching, and (2)—more importantly—in
the same order as has been found for the *natural* acquisition of German (at least
in the domain of word order).

As surprising as this result from classroom language acquisition may be, it is
exactly what would have been expected on theoretical grounds. This is so—to
recapitulate—because the structures involved are based on specific processing
prerequisites, each of which requires a processing device developed at the
preceding stage, with the result that there is no other way for the learner to
gradually develop the processing devices than in the order observed.

Let me stress again at this point that this neither implies that teaching has no
influence on acquisition nor that all types of language acquisition are identical.
In a recent paper (Pienemann 1987a) I was able to identify a number of
differences between natural and formal SLA. However, those differences in
learners' behaviour do not constitute evidence for genuinely different types of
acquisition, since they range well within the margin of variation possible in the
overall framework of universal constraints mentioned above—i.e. constraints
on processing capacity.

Finally, note that our discussion has so far not implied any specific con-
sequence for teaching, except the demand that it must be 'learnable'. This,
however, is not yet itself an unequivocal recipe. We will briefly return to the
practical consequences of our findings in Section 4.

3. PREMATURE LEARNING IS COUNTER-PRODUCTIVE

If one accepts hypotheses 1 and 2, one might argue from a traditional
perspective that the learning of linguistic structures before the learner is 'ready'
can still be profitable, since the learner might be able to squirrel away these
structures and recall them for active use when he has arrived at a stage where
they can be processed. This position, however, is untenable if teaching is meant
to promote acquisition—that is the actual use of the structures being taught[6]—
since it can be shown that this 'storing up treasures in heaven' approach to
learning, far from promoting acquisition, can actually produce disturbances in
the acquisition process.

The evidence I will adduce in support of this last claim comes from the
teaching experiment with the children mentioned above. A brief characteriza-
tion of the relevant structural characteristics of the informants' interlanguage
will help to put the analysis which follows into its proper context. Table 11
provides the information.

My point of departure is the use of ADV by our informants. The correspond-
ing figures are displayed in Table 12. Carmine has not reached Stage X + 1
(ADV) and therefore does not apply this rule. Giovanni and Mimmo, who are at
Stage X + 2 (SEP), show fairly constant figures in the frequency of rule
application. The effect of instruction appears with Monica and Teresa who are
at Stage X + 1 (ADV). After the introduction of INV the frequencies of ADV
application fall by 75 per cent! Table 13 gives additional evidence of this change.
It shows that the initial-final ratio of adverbial positions has decreased with

Table 11: Experiment overview

Stages of acquisition	Informants	
INV	—	—
SEP	Giovanni	Mimmo
ADV	Teresa	Monica
SVO	—	Carmine
Features for learner's orientation	+cop	+cop

Monica and Teresa after instruction in INV, while the ratio has stayed stable for the other learners. Thus, out of the number of adverbials used by the two informants, fewer are preposed after the experiment.

For an explanation of this change in Monica and Teresa's interlanguage, we have to refer back to the instruction in INV. One thing which we have to keep in mind is that—as was shown in the experiment and as is predicted by the Teachability Hypothesis—Monica and Teresa could not learn INV through instruction since they were at stage X + 1 (ADV), and thus had not developed the necessary processing prerequisites. The other thing is that ADV is a part of the structural condition for INV. In other words, INV has to be applied obligatorily when an element other than the subject is placed in the initial position in the sentence—this element often happens to be an adverbial. So in the instruction in INV the informants learned two things: (1) that elements can be preposed (this they 'knew' before), and (2) that consequently subject and verb have to be inverted (this they could not process).

Thus, the informants learned that they were performing an operation (ADV), the consequences of which (INV) they were not able to handle. The result was that they stopped performing this operation—that is, their use of ADV went down drastically. Note that this only occurred with the learners who could not handle INV: of course, Giovanni and Mimmo, who were able to process INV, had no reason to avoid the use of ADV and were unaffected.

Of course as long as a learner has not acquired INV, a decrease in the use of ADV always leads to greater 'correctness' in the interlanguage, because with fewer applications of ADV there will be correspondingly fewer violations of INV. This correctness, however, comes at a price: namely the abandonment of a communicatively very effective means of attention focusing (for a more explicit account of this point, and the whole study, cf. Pienemann 1986). Thus, the premature teaching of INV has led to the 'withdrawal' of an already developed means of communication.

I think that this observation also makes sense intuitively. If a learner has to master a structure which he cannot get right, then it is quite probable that he will begin to avoid the structure in order not to become frustrated. This seems to be what happened in the experiment. And in the case just described we can see

Table 12: Relative frequency of adverbs preposing (ADV) (all sentences)

	Hidden rec.	Interview 1	Interview 2	Interview 3	Hidden rec.	Hidden rec.
		(Teaching: copula)	*(Teaching: inversion)*			
Carmine	/	0.	0.	0.	/	/
Monica	/	0.56	0.53	0.11	/	/
Mimmo	0.08	0.07	0.17	0.15	0.28	/
Teresa	0.20	0.25	0.24	0.06	/	/
Giovanni	0.13	0.14	0.18	0.11	/	/

Table 13: Adverb—initial vs. final position (all PPs)

	Hidden rec.	Interview 1	Interview 2	Interview 3	Hidden rec.	Hidden rec.
Carmine	/	/	/	/	/	/
Monica	/	0.56	0.47	0.20	/	/
Mimmo	0.25	0.27	0.28	0.31	0.35	/
Teresa	0.38	0.44	0.37	0.18	/	/
Giovanni	0.41	0.43	0.39	0.32	0.36	/

(Teaching: copula) *(Teaching: inversion)*

quite clearly that such a strategy of avoidance does nothing to promote the acquisition process, but rather limits the expressiveness of the learner's language.

4. FINAL REMARKS

In the introduction to this paper I stressed that my research on the teachability of second languages is not related to any new or existing teaching method. This is not to say that it does not have any consequences for the structure of formal input. On the contrary: it obviously has very serious implications for teaching. What I want to point out here, however, is that the Teachability Hypothesis does not contain any built-in 'recipes' for teaching methodology. It is rather a set of psycholinguistic background information on which teaching methods should be based.

Thus I consider a testable set of teachability hypotheses a definition of an overall margin within which teaching can be effective. The structure of the teaching process itself, however, has to be substantiated with ideas and information from a theory of teaching, which should include more than the basic conditions of teachability and which should be motivated from a pedagogical perspective.

In a separate article (Pienemann 1984b), I made pedagogical recommendations concerning syllabus construction. This is an example of an application of SLA research to language teaching. It is important to note in this context that SLA research is neutral towards the structural-versus-communicative dichotomy, because these main approaches to syllabus construction are not motivated on psycholinguistic grounds (for details cf. Pienemann 1984b).

If teachability conditions are given this importance in language teaching, they can only become relevant in practice if they are specified for a certain range of linguistic phenomena. It should be noted in this context that the Teachability Hypothesis is based on the same set of psycholinguistic principles which allowed Pienemann and Johnston (1985) to explain the order of acquisition of English and German as second languages for a wide range of morphological and syntactical phenomena. A description of these developing interlanguage grammars of English and German is available in Pienemann and Johnston (1985). Thus the Teachability Hypothesis can theoretically be extended to all these structures, for which it can also be tested empirically.

A further application of SLA research to practice has also emerged from Pienemann and Johnston's work on interlanguage development, namely a psycholinguistically motivated assessment procedure for ESL development (cf. Pienemann and Johnston 1986). A parallel procedure for German is under way. Both are easy-to-administer observation-type procedures. For the SLA research context which requires a more precise and more sophisticated tool for interlanguage analysis, I have developed a computer-aided profile analysis of German interlanguage development (Pienemann 1987b).

(Revised version received November 1987)

NOTES

[1] Henceforth the masculine pronoun set will be used to refer to both genders.

[2] From the large and growing body of findings I will select just a limited number of structures which can be conveniently referred to throughout the paper to illustrate my points. For descriptions of the development of English and German as second languages, I refer to Clahsen, Meisel, and Pienemann (1983); Pienemann (1981); Felix (1978); Wode (1981); Johnston (1985); Huebner (1983), and Hatch (1978).

[3] The German data cited in this study come from either Pienemann (1981), or Clahsen, Meisel, and Pienemann (1983).

[4] The fact that learner 1 does not apply SEP appears to be a gap in the data, since the total number of sentences analysed in this study seems to be fairly small, and there are no obligatory contexts for the application of SEP documented for this particular learner.

[5] This study was sponsored by a Special Research Grant from the University of Sydney.

[6] It should be noted that this does not necessarily have to be the main aim of second language teaching. In some contexts—for instance university courses—knowledge of linguistic structures may be given preference over language use.

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