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PROCESSABILITY IN SCANDINAVIAN SECOND LANGUAGE ACQUISITION

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This paper reports on a test of the validity of Pienemann's (1998) Processability Theory (PT). This theory predicts that certain morphological and syntactic phenomena are acquired in a fixed sequence. Three phenomena were chosen for this study: attributive adjective morphology, predicative adjective morphology, and subordinate clause syntax (placement of negation). These phenomena are located at successive developmental stages in the hierarchy predicted by PT. We test whether they actually do appear in this predicted hierarchical order in the L2 of Danish, Norwegian, and Swedish learners. The three languages mentioned are very closely related and have the same adjective morphology and subordinate clause syntax. We can, therefore, treat them as one language for the purposes of this study. Three analyses have been carried out: The first follows Pienemann's theory and is concerned only with syntactic levels; the second is a semantic analysis of the acquisition of number versus that of gender; the third analysis studies the various kinds of mismatches between the inflection of the noun, the controller, and the adjective. The results are the following: The first test supports PT as it has been described by Pienemann. The second analysis shows that there is an acquisitional hierarchy such that number is acquired before gender (in adjectives), and the mismatch analysis raises questions about the fundamental assumptions of the theory.

From the time Clahsen, Meisel, and Pienemann published their seminal study from the ZISA (Zweitspracherwerb Italienischer und Spanischer Arbeiter) project (1983), the idea of a fixed acquisitional sequence for grammatical phenomena in a second language has been widely addressed. Pienemann's later work, which has built on the insights from the ZISA study, is a reorientation of the Multidimensional Model (1993). This reorientation, known as Processability Theory (PT), uses components from Levelt's speech model (Levelt, 1989); the grammatical framework utilized is a unification grammar, Lexical Functional Grammar (Kaplan & Bresnan, 1982). PT deals with the development, or emergence, of a learner grammar and spells out processing prerequisites that are posited as necessary for the acquisition of grammatical rules at different developmental stages, thereby establishing an acquisitional hierarchy. The acquisition process can be described as a gradual construction of a mental grammar in which each stage of development is built on the acquisition of the preceding stages. An explanation of the core premises of PT is found in Pienemann and Håkansson (1999, pp. 386–397), and a more thorough treatment is provided in Pienemann (1998).

PT has been used to study and explain second language acquisition sequences for a number of languages, including German, English, Swedish, and Japanese (Pienemann, 1998; Pienemann & Håkansson, 1999, for Swedish). In

Pienemann and Håkansson's study, several earlier corpora of Swedish L2 data from hundreds of informants were used as a basis for evaluating PT. According to Pienemann and Håkansson, the results showed support for PT in that all findings related to the hierarchy of processability confirmed the predictions. In the present study we formulate predictions based on PT for the acquisition order of certain phenomena in the Scandinavian languages and test the predictions against second language data collected specifically for this purpose. We initially relied on Pienemann (1993) as the theoretical framework for the study, but we also draw on Pienemann's more recent work on PT (Pienemann, 1998; Pienemann & Håkansson, 1999).

We have limited our study to three phenomena that can be clearly assigned to distinct acquisition stages, and we wanted to include both syntactic and morphological phenomena, given that one of the main points of Pienemann (1993, 1998) is that morphology and syntax can be brought together into the same framework. The three phenomena we have chosen to focus on are adjective agreement in NPs, agreement between noun and predicative adjectives, and placement of negation in subordinate clauses. The grammatical form of these phenomena in the Scandinavian languages will be described in the section entitled "The Grammatical Structures to be Analyzed."

Exchange of information and *perceptual saliency* (Pienemann, 1998, p. 78) are important concepts of PT, and in selecting phenomena for testing the theory we first intended to take both into account. The concept of perceptual saliency is borrowed from experimental psychology (Kintsch, 1974; Murdock, 1962; Sridhar 1988), though in a linguistic context it refers to ways of drawing attention to a part of an utterance by means of position, stress, intonation, or other prosodic features. In PT, however, perceptual saliency relates more specifically to the insights from psychological experiments on the effects of an item's position in a linear sequence on one's memory, with the first and last position being the most salient positions for retrieval of an item in a sequence of words. The relationship between perceptual saliency and exchange of information has not been spelled out in the description of the theory, and it does not seem totally clear to us how they are supposed to interact. We therefore chose to disregard saliency in the present study. We have therefore focused on the concept "exchange of information," which builds on the construct "unification of features" from Lexical Functional Grammar (Kaplan & Bresnan, 1982, pp. 173–281).

The basic idea that we have tested is whether grammatical rules requiring unification of features that occur at a short distance from each other in an utterance are easier to acquire than those requiring unification of features that occur at a greater distance from each other. Distance is defined here through traditional grammatical hierarchies (phrase, clause, complex sentence), wherein features that are found within a phrase are considered to have a shorter distance from each other than features found in separate phrases, and features that occur within the same clause are considered to have a shorter distance between them than features that occur in different

Table 1. Implicational hierarchy of processing prerequisites and structural target language outcomes predicted by processability theory (from Pienemann and Håkansson, 1999)

Level	Processing prerequisites	Structural outcome
5	Clause boundary	Main and subordinate clause
4	S-procedure	Interphrasal information exchange
3	Phrasal procedure	Phrasal information exchange
2	Category procedure	Lexical morphemes
1	Word/lemma	"Words"

clauses, regardless of the number of words that separate them. Before presenting our hypotheses more precisely, we will spell out some of the predictions of the theory in greater detail and give some background on the Scandinavian languages.

Following Pienemann and Håkansson (1999), crucial processing procedures in the acquisitional hierarchy are (a) the lexical categories of lemmata (word classes); (b) grammatical features such as tense, number, and gender attributed to words in the sentence; (c) syntactic procedures that build constituent structures using such grammatical information; and (d) word order rules. These are hierarchically ordered by their very nature: The learner must have assigned words to word classes to be able to mark them for the relevant grammatical information. This information must be present for syntactic procedures (such as agreement in phrases or clauses) and word order rules to operate. The syntactic procedures involve the exchange of grammatical information between constituents of the phrase, clause, or sentence (e.g., agreement between adjective and noun, or concord of subject and verb). Here the constituent hierarchy is significant; thus, exchange of information within a phrase is predicted to be acquired before exchange of information between phrases. As a result, implicational acquisition sequences are hypothesized for all learners; see Table 1. According to this prediction, acquisition proceeds in an obligatory order from level 1 up to level 5. PT further predicts that none of these stages can be skipped, and the order of stages cannot be changed.

According to PT the learner at level 1 identifies words, but the words are not yet equipped with any grammatical information, nor are there any rules for word order. At level 2, the learner categorizes the items in the lexicon, and grammatical information may be added to words (e.g., tense to verbs, number to nouns). At level 3, phrasal procedures may operate, such as agreement in the noun phrase, which requires exchange of grammatical information between the head noun and the adjective or determiner. At level 4, grammatical information may be exchanged across phrases, allowing, for example, subject-verb agreement in languages like English or subject-predicate agreement in the Scandinavian languages. Level 5 allows main and subordinate clause structure to be handled differently—for example, placing the negation in subordinate clauses in Danish, Norwegian, or Swedish differently from main clauses.

THE SCANDINAVIAN LANGUAGES

General Background

Danish, Norwegian, and Swedish are the official languages of Denmark, Norway, and Sweden, respectively, but the spoken vernaculars form a continuum throughout Scandinavia. Given that the Scandinavian countries have a long history of cultural and political coexistence, there is a high degree of mutual intelligibility within the Scandinavian speaking area. All three languages have SVO and V2 orders. All have about the same amount of inflectional and derivational morphology—less than German, but more than English. Their syntax and morphology are very similar. These similarities make it natural for us to join forces in testing a theory on the developmental sequences of syntax and morphology. (For a general survey of the Nordic languages, see Haugen, 1987, and Barðdal, Jörgensen, Larsen, & Martinussen, 1997.)

The Grammatical Structures to Be Analyzed

As already mentioned, we have selected two areas of grammar where Danish, Norwegian, and Swedish have structures that are suitable for testing PT. One area is adjective agreement, which can be investigated both in attributive position within the NP and in predicative position in the clause. We can thus compare how the same morphological features are handled in both a phrasal and an interphrasal (clausal) domain. The other area is a purely syntactic phenomenon—namely, the placement of negation (Neg). All three languages place Neg in one position in main clauses and in a different position in subordinate clauses. This is typologically uncommon (Dahl, 1979). Our concern here is with Neg placement in subordinate clauses (with a check on the corresponding main clauses for comparison). Thus three different syntactic levels are represented that, according to PT, are connected with different stages of acquisition: the phrasal level (attributive agreement), the interphrasal level (predicative agreement), and a level where the learner has to handle the clause hierarchy in complex sentences (Neg placement in subordinate clauses) (see Table 1).

Adjectives in Danish, Norwegian, and Swedish agree with the noun in gender, number, and definiteness. Gender and number forms are distinct only in indefinite contexts. The definite form is invariably like the indefinite plural. For this reason we excluded definite contexts in this study. The system of number and gender marking in indefinite contexts is shown in Tables 2 and 3. A distinction between uter (common gender) and neuter gender is expressed in the singular by the use of the base form for uter and a *-t* suffix for neuter. The number distinction is expressed in the plural by a vowel suffix on the base form. Thus no gender distinction is expressed in the plural.[1] Gender and number agreement applies in both the attributive position within the noun phrase and in predicative position in the clause. The patterns in the three languages are closely parallel, as shown in Table 3.[2]

Table 2. Paradigm of number of gender suffixes in Scandinavian adjectives

	Danish/Norwegian		Swedish	
Number	Uter	Neuter	Uter	Neuter
Singular	Ø	-t	Ø	-t
Plural	-e	-e	-a	-a

Table 3. Scandinavian adjectives in attributive and predicative contexts

Gender/ Number	Danish	Norwegian	Swedish	Gloss
Attributive contexts				
Uter	*en gul bil*	*en gul bil*	*en gul bil*	a yellow car
Neuter	*et gult hus*	*et gult hus*	*ett gult hus*	a yellow house
Plural	(*to*) *gule biler*	(*to*) *gule biler*	(*två*) *gula bilar*	(two) yellow cars
	(*to*) *gule huse*	(*to*) *gule hus*	(*två*) *gula hus*	(two) yellow houses
Predicative contexts				
Uter	*bilen er gul*	*bilen er gul*	*bilen är gul*	the car is yellow
Neuter	*huset er gult*	*huset er gult*	*huset är gult*	the house is yellow
Plural	*bilerne er gule*	*bilene er gule*	*bilarna är gula*	the cars are yellow
	husene er gule	*husene er gule*	*husen är gula*	the houses are yellow

The negation is expressed in Scandinavian by a noninflected word, Danish and Norwegian *ikke*, Swedish *inte*, which is placed after the finite verb in main clauses but before the finite verb in subordinate clauses. The finite verb may be either a main verb or an auxiliary. The pattern is illustrated by the examples in (1) from Swedish:

(1) a. *Annika gillar inte jordgubbar.*
Annika likes not strawberries
"Annika does not like strawberries."
b. *De som inte gillar jordgubbar . . .*
those who not like strawberries . . .
"Those who don't like strawberries . . ."
c. *Annika vill inte äta jordgubbar.*
Annika wants not eat strawberries
"Annika doesn't want to eat strawberries."
d. *De som inte vill äta jordgubbar . . .*
those who not want eat strawberries . . .
"Those who don't want to eat strawberries . . ."

RESEARCH QUESTIONS

The predicted sequences for target language development were described in the first section in a way that is in principle non–language specific. Applied to

the Scandinavian languages as described above, the predictions for the order of acquisition of the three structures can be stated as follows: According to the processability hierarchy outlined in Table 1, attributive adjective agreement in NPs (for gender and number) should be acquired at stage 3; agreement in predicatives should come at stage 4; and both of these features should be acquired before subordinate clause word order, which should appear at stage 5. Thus the following two predictions for the Scandinavian languages will be tested:

1. Attributive agreement in adjectives is predicted to be acquired before predicative agreement.
2. Predicative agreement in adjectives is predicted to be acquired before Neg placement in subordinate clauses.

METHOD

Participants

Data were collected from a total of 47 subjects (16 in Denmark, 10 in Norway, and 21 in Sweden), 23 men and 24 women, all of them adults taking part in language classes. We tried to find subjects who had reached the point of producing subordinate clauses in their Swedish, Danish, or Norwegian L2. All 21 learners of Swedish and 8 of the Danish learners were students from an intensive language course (with 3–4 hours per day) that was a prerequisite to their admittance to university. The remaining Danish learners and all of the Norwegian learners were enrolled in other types of adult education.

A majority of the learners had an Indo-European language as their mother tongue: 19 learners spoke a Germanic language, 12 Slavic, 9 Romance, and 1 Farsi. The remaining 6 spoke Turkish, Japanese, Arabic, or Tagalog. In all, 19 different mother tongues were included among the subjects. All learners except one knew some English; four learners with English as their mother tongue knew no other language than English and the Scandinavian language they were in the process of learning. The remaining learners had some knowledge of a third language, and no fewer than 25 of the 47 learners also mentioned a fourth language, and some even a fifth, as part of their background.

Data Collection

We elicited adjectives in one task for attributive adjectives, a second for predicative. In both tasks only color adjectives were used. The subjects were first shown a series of color samples and asked to name the colors. This introduction had two purposes. We focused the attention of subjects on color identification, and we checked their knowledge of the color terms in the target language. To make this task seem a bit less simplistic to adult subjects, two less-frequent color terms that were not actually used in the later tasks were included.

In the task given to elicit predicative adjectives, the informants were given a sheet with many small, scattered color illustrations. The informants were asked to tell the color of the illustrated item with a sentence (e.g., [Question from test administrator:] *Hvad farve er de små kopper?*—[Expected answer:] *De er brune*. "What color are the small cups?—They are brown."). Because there were many items on each sheet and the sequence of questions was not predictable, the informants had to concentrate on holding the information in memory while searching for the right item. This was intended to make them focus on the identification of items and colors rather than on the morphological forms of the adjectives. The predicative adjective test contained 15 items, consisting of 5 singular uter, 5 singular neuter, and 5 plural items.

Similar sheets with illustrations were given to the informants in the tasks given to elicit attributive adjectives, but this time each illustration had just two items. In response to a stimulus question (e.g., *Hvad er der foran det lille grønne hus?* "What is there in front of the little green house?"), the informants were to locate the right illustration and answer according to the picture (e.g., *Et grønt træ* "A green tree"). To solve the task, the participants would have to include the color terms in their answers. In the attributive adjective test there was a slight variation between the language versions, resulting in 3–6 singular uter, 5–7 singular neuter, and 5 plural items, totaling 15–16 items.

The placement of negation in main and subordinate clauses was elicited in a communicative game known as the LOTTO-game (Håkansson & Hansson, 2000). This game is played with 36 illustrated cards, placed upside down, that depict the performance, or nonperformance, of various activities. There are also six larger pieces of cardboard, each containing six pictures that match those on the separate cards. The players draw cards in alternative turns and place them on top of the matching illustrations on the boards. The person who gets his or her board(s) filled up first wins the game. As an introduction to the game and to the vocabulary used, the activities on the cards were described by the interviewer (e.g., *Den mannen sjunger* "That man is singing"). The informant was then expected to give the negated counterparts (e.g., *Den mannen sjunger inte* "That man is not singing"). This introduction enabled us to check whether the subjects knew the placement of Neg in main clauses at the same time as the rules of the game were introduced. The participants then drew a card and were asked to describe its content (e.g., *Vilket kort fick du?* "Which card did you get?"—*Mannen som sjunger* "The man who is singing"). Then the interviewer drew a card and asked the informant to describe that card (e.g., *Vilket kort fick jag?* "Which card did I get?"—*Mannen som inte sjunger* "The man who is not singing"). Using this method, the subjects produced 18 negated subordinate clauses, 6 clauses with main verbs, and 12 clauses with auxiliary and main verb. The use of problem solving and a game to elicit the relevant structures had the advantage of diverting the subjects' attention from the formal aspects of language by engaging them in a communicative situation.

The main clause test, which is not our prime concern here, was carried out to check whether the subjects had reached a stage where they had acquired

postverbal Neg placement in main clauses. According to PT this should take place at a stage before the learner is ready to process interclausal information—that is, before the acquisition of correct Neg placement in subordinate clauses. Earlier research (for Swedish see Bolander, 1988; Colliander, 1993; Hyltenstam, 1977; Håkansson & Dooley Collberg, 1994; for Danish see Holmen, 1990; Lund, 1996, 1997) also indicated that learners commonly acquire postverbal Neg placement before differentiating placement in main and subclauses. We carried out the tests in a parallel fashion in Copenhagen, Oslo, Lund, and Stockholm, being careful to use identical procedures in the four locations.

Analysis

We used the following procedures in scoring the adjective elicitation tasks. We counted an item as displaying exchange of information for the singular if there was agreement between the indefinite article, which marks gender, and the morphological marker of gender in the adjective. For the plural, the exchange of grammatical information would have to be displayed through numerals and endings on the adjective. The reasons for comparing the adjective with the article or numeral rather than the noun itself are that (a) gender is not marked in indefinite nouns, and number marking is sometimes also lacking; and (b) the choice of plural form in nouns involves other learning problems, which makes these forms less reliable as criteria. Answers that did not have two forms that could be matched, like singular phrases without an article, were discarded. Thus, the scoring was handled as in the examples in (2).

(2) "a yellow car"

a.	*en gul bil*	counted as agreement (singular uter)
b.	*et gult bil*	counted as agreement (singular neuter)
c.	*et gul bil*	counted as nonagreement (singular neuter)
d.	*gul bil*	discarded

As the examples in (2) show, matching forms are counted as showing agreement whether or not their forms matched the gender of the target norm. (*Bil* is uter in the target languages.) It also became increasingly evident in the course of our study, as we will explain later, that we had to distinguish carefully between the three morphological categories—singular uter (base form), singular neuter, and plural—even in cases of nonagreement. Here, we used the article or numeral as indicator of the subject's choice of gender or number.

For predicative adjectives the form of the subject (a pronoun or full noun in the definite form displaying gender or number) was matched against the form of the adjective in the predicative. See the examples in (3).

(3) "it/the car is yellow"

a.	*Den/bilen er gul*	counted as agreement (singular uter)
b.	*Det er gult*	counted as agreement (singular neuter)
c.	*Det er gule*	counted as nonagreement (singular neuter)
d.	*Gul*	discarded

The Neg placement tasks were scored for pre- or postverbal negation with both finite main verbs and auxiliaries and in both subordinate and main clauses.

We needed a criterion for when a structure should be judged as acquired by the learner. Meisel, Clahsen, and Pienemann (1981, pp. 111ff.) argued against the criterion of "correct use in 90% of obligatory contexts" that was used by Brown (1973) and his associates in their morpheme studies. Instead Meisel, Clahsen, and Pienemann relied on emergence of a structure rather than mastery. In the words of Pienemann (1984):

> The main purpose is not to describe the point in time during the process of language development when a structure is *mastered* (in terms of correct use of target norms), because this is only to pinpoint the *end* of acquisition of a certain structure. Rather, the above criterion is intended to define the *first systematic use* of a structure, so that the point in time can be located when the learner has—*in principle*—grasped the learning task [. . .] (p. 191, his emphasis)

The emergence criterion, defined as the first systematic use, is considered to be the acquisition criterion. However, this criterion is not always easy to apply in practice. In a synchronic elicitation study like ours, it would of course be very difficult to find a criterion corresponding to "the first systematic use," that is, to decide what minimal proportion of test answers would attest that the learner has started using a particular structure systematically. One possible way is to perform a parallel analysis of the same test data using alternative criteria of varying strictness and compare the results. This will tell us to what extent the various criteria actually yield different pictures of the developmental pattern, and it will to some extent reveal the dimension of gradual acquisition. As the following sections will demonstrate in greater detail, we have applied this method, comparing the scores by a criterion of (a) one occurrence, (b) 50% use, and (c) 80% use of the structure in question.

To arrive at a scale for emergence we have analyzed the production from each learner. The analysis shows that there is some variation in a single learner's performance, as well as variation between learners. To capture those variational patterns we have chosen to present the results by means of implicational scales. (On implicational scaling, see Hatch & Lazaraton 1991, pp. 204ff.)

Results

Table 4 presents the results of the data analysis in three implicational scales based on the evaluation criteria mentioned above: one occurrence, 50% use, and 80% use, respectively. As the analysis showed that there was little difference between the acquisitional profiles for Danish, Norwegian, and Swedish,

Table 4. Implicational scales for attributive agreement (Attr), predicative agreement (Pred), negation (Neg)

One occurrence[a]				50% occurrence[b]				80% occurrence[c]			
Informant	Attr	Pred	Neg	Informant	Attr	Pred	Neg	Informant	Attr	Pred	Neg
d 10	+	–	–	d 10	–	–	–	d 1	–	–	–
s 8	+	( )	–	d 12	+	–	–	d 10	–	–	–
s 5	+	+	( )	d 14	+	–	–	d 12	–	–	–
d 15	+	–	+	d 15	+	–	–	d 15	–	–	–
d 6	+	+	–	d 16	+	–	–	d 14	–	–	–
d 9	+	+	–	d 5	+	–	–	n 4	–	–	–
d 12	+	+	–	n 4	+	–	–	n 7	–	–	–
d 16	+	+	–	s 8	+	( )	–	s 8	–	( )	–
n 1	+	+	–	s 9	+	–	–	d 5	+	–	–
n 6	+	+	–	d 1	+	+	–	d 6	+	–	–
n 7	+	+	–	d 6	+	+	–	d 9	+	–	–
n 9	+	+	–	d 9	+	+	–	d 16	+	–	–
s 1	+	+	–	d 11	+	+	–	n 1	+	–	–
s 2	+	+	–	n 1	+	+	–	n 6	+	–	–
s 3	+	+	–	n 3	+	+	–	s 1	+	–	–
s 4	+	+	–	n 6	+	+	–	s 7	+	–	–
s 9	+	+	–	n 7	+	+	–	s 9	+	–	–
s 11	+	+	–	n 8	+	+	–	s 12	+	–	–
s 12	+	+	–	n 9	+	+	–	s 20	+	–	–
s 19	+	+	–	s 1	+	+	–	n 3	–	+	–
d 1	+	+	+	s 2	+	+	–	n 8	–	+	–
d 2	+	+	+	s 3	+	+	–	d 4	+	–	+
d 3	+	+	+	s 4	+	+	–	d 8	+	–	+
d 4	+	+	+	s 5	+	+	( )	n 10	+	–	+
d 5	+	+	+	s 6	+	+	–	d 11	+	+	–
d 7	+	+	+	s 7	+	+	–	n 5	+	+	–
d 8	+	+	+	s 10	+	+	–	n 9	+	+	–
d 11	+	+	+	s 11	+	+	–	s 2	+	+	–
d 13	+	+	+	s 12	+	+	–	s 3	+	+	–
d 14	+	+	+	s 13	+	+	–	s 4	+	+	–
n 2	+	+	+	s 19	+	+	–	s 5	+	+	( )
n 3	+	+	+	s 20	+	+	–	s 6	+	+	–
n 4	+	+	+	d 2	+	+	+	s 10	+	+	–
n 5	+	+	+	d 3	+	+	+	s 11	+	+	–
n 8	+	+	+	d 4	+	+	+	s 13	+	+	–
n 10	+	+	+	d 7	+	+	+	s 16	+	+	–
s 6	+	+	+	d 8	+	+	+	s 18	+	+	–
s 7	+	+	+	d 13	+	+	+	s 19	+	+	–
s 10	+	+	+	n 2	+	+	+	d 2	+	+	+
s 13	+	+	+	n 5	+	+	+	d 3	+	+	+
s 14	+	+	+	n 10	+	+	+	d 7	+	+	+
s 15	+	+	+	s 14	+	+	+	d 13	+	+	+
s 16	+	+	+	s 15	+	+	+	n 2	+	+	+
s 17	+	+	+	s 16	+	+	+	s 14	+	+	+
s 18	+	+	+	s 17	+	+	+	s 15	+	+	+
s 20	+	+	+	s 18	+	+	+	s 17	+	+	+
s 21	+	+	+	s 21	+	+	+	s 21	+	+	+

Note. d = Danish L2, n = Norwegian L2, s = Swedish L2.
[a]Scalability: .913
[b]Scalability: 1.00
[c]Scalability: .773

the data for the three languages were combined and are presented together here. In each of the three sections of the table, the tested structures are arranged from left to right according to the processability hierarchy—that is, attributive agreement then predicative agreement then Neg placement. The rows represent the individual informants. A plus indicates that the learner's production meets the criterion—that is, contains the required proportion of the structure. A minus means that it does not. Missing answers are marked with parentheses in the tables (e.g., subject s8 gave no answers on predicative agreement, and s5 gave no answers on subclause negation). In calculating the scalability coefficients, missing answers have been equated with a minus. The scalability values are given below each table. For judgment of scalability and thus verification of an implicational hierarchy, we follow Hatch and Lazaraton (1991, p. 212) and claim that there is scalability with a coefficient above .60.

The left section of Table 4 displays the results for the one occurrence criterion. It shows a clear implicational relationship between attributive agreement, predicative agreement, and subordinate-clause word order in the learners. With the exception of one learner, d15, all learners who use predicative agreement also use attributive agreement, whereas they do not all use subordinate-clause word order. Learner d15 uses subordinate-clause word order but not predicative agreement. We have no explanation for this.

The middle section shows the results when using the 50% occurrence criterion. The tendency is the same as in the previous table, except that learner d15 is no longer an exception to the pattern, given that his subordinate-clause word order does not exceed 50% correctness. As expected, the proportion of successful answers (pluses in the table) is lower when this stricter evaluation criterion is applied.

The results when applying the 80% occurrence criterion are shown in the right section. Here again, the stricter criterion yields a still lower proportion of plus values, yet the main tendency is still the same as in the previous tables: Subordinate-clause word order is not used in 80% of obligatory contexts until predicative agreement is used, predicative agreement is not used until attributive agreement is used. In this case the scalability is lower than before, although it is sufficient to verify an implicational scale. Five learners displayed deviant patterns. Learners n3 and n8 do, in fact, have 80% correct predicative agreement but not 80% attributive agreement. Learners d4, d8, and n10 have 80% correct subordinate-clause word order but not 80% correct predicative agreement. Again we have no plausible explanation for this.

Taken as a whole, the analyses show that phrasal adjective agreement is used more frequently than interphrasal adjective agreement, which in turn is used more frequently than subordinate-clause negation placement. This tendency holds through all three measures. If this cross-sectional pattern is assumed to reflect a developmental hierarchy, these results are in accordance with the predictions of PT. Thus, summarizing the quantitative results so far, we have found evidence for the predicted implicational relationship: attributive agreement > predicative agreement > subordinate-clause word order.

A SEMANTIC APPROACH

Category Differentiation

In the previous section we presented the test results from the perspective of the predictions derived from PT, and these predictions were confirmed. There were a few individual exceptions but not enough to disrupt the general picture of the predicted hierarchy. However, the constructions that we investigate are not internally homogeneous categories. With adjective agreement, the difference between gender and number categories cuts across the phrasal and interphrasal levels. Of these categories, number has semantic content whereas gender does not. In the clauses with Neg, the negated finite verb is sometimes an auxiliary (a function word) and sometimes a main verb (a content word). Thus, within the sets of utterances we have studied for adjective agreement and Neg placement, the grammatical features we have investigated do not all have the same semantic weight. The method we have applied so far cannot capture the possible impact of this semantic differentiation on acquisition (as attested in Hammarberg, 1996; Lund, 1996, 1998). Because there is little difference between the acquisition of Neg in subordinate clauses with auxiliaries and with finite main verbs, we will disregard this distinction in the present section. We will concentrate here on the area of adjective agreement.

The basic difference between number and gender is that number is chosen on the basis of the conceptual content of the message, whereas gender is a morphological property of the noun itself. Pienemann (1998, p. 11) touched on this in connection with German morphology without, however, pursuing the issue. In the Scandinavian languages, the number distinction usually has a clear and straightforward semantic content expressing "one" or "more than one." The conceptual structure underlying the utterance will contain the information needed to specify for singular or plural.

The gender of nouns, on the other hand, has only a feeble conceptual basis. The semantic grounds for determining the gender of nouns in the Scandinavian languages are mostly vague and to a large extent inconclusive. The safest general principle is that nouns that refer to animates, especially humans, are uter (with few exceptions). Some tendencies at a general level, summarized by Thorell (1973, p. 24) for Swedish, are that uter often applies to something individual and concrete, with a fixed and clearly delimited form, whereas neuter expresses a collective, a material, or something abstract that is not clearly shaped or delimited. In some cases the gender can be inferred from the form of the noun, especially from the presence of certain derivational suffixes, but for most nouns the gender has to be learned for each word (see Holmes & Hinchliffe, 1994; Teleman, Hellberg, & Andersson, 1999). The nouns we have used as test items in the present study refer to nonhuman physical objects and are all simplex words of a shape that does not in itself suggest a gender. Three times as many Swedish nouns have uter gender than neuter, both in the lexicon and in terms of text frequency, according to a count based on newspaper texts (Allén, 1971, p. 1079). For nouns referring to physical ob-

jects, uter dominates at large, but cannot be safely predicted in individual cases.[3]

In sum, number agreement and gender agreement present the learner with different tasks, owing to the different nature of these morphological categories. Whereas learners can *intend* singular or plural, they have to *know* whether the noun is uter or neuter. Unlike the number category, the lexical gender of most nouns (including the ones we have used) has no simple and obvious semantic basis.

Semantically Differentiated Implicational Scales

Tables 5–8 show the results of distinguishing the number and gender categories in the implicational scaling. The tables all display two comparable cases of adjective agreement together with the subclause Neg placement, according to the three criteria—one occurrence, 50%, 80%—that we used in our analysis. In Tables 5 and 6 we keep the morphological category constant but vary the syntactic domain, as we did earlier in Table 4. In Tables 7 and 8 the syntactic domain is kept constant and the semantic category is varied.

A first observation is that the one-occurrence criterion yields poor or even insufficient scalability values for an implicational hierarchy to be established. The criteria of 50% and 80% occurrence yield higher scalability values for each type of scale and show a consistent trend. The 50% occurrence criterion spreads the subjects out well and shows high scalability throughout. We conclude that the criterion of one occurrence is not very reliable (see our earlier discussion), but we still feel that with the three analyses combined we have a sufficiently clear picture of the acquisitional profiles and a basis for conclusions about implicational relationships.

Tables 5 and 6 compare the phrasal, interphrasal, and interclausal syntactic domains separately for plural and neuter agreement, thus focusing on one morphological category at a time. The result is basically the same as before—that is, attributive agreement, predicative agreement, and subclause Neg placement are ranked in an implicational hierarchy in this order, which lends further support to PT in this area.

Tables 7 and 8 compare plural agreement with neuter agreement separately for the phrasal and the interphrasal domain and relate these to the task of negation placement. Here a new pattern emerges. Partly crosscutting the scale found in the previous comparisons, there is a consistent implicational ranking between plural, neuter, and negation, in this order.

What is remarkable about these results is that they provide simultaneous support for two different acquisitional hierarchies. On the one hand, the syntactically based predictions of the processability hierarchy are supported in Tables 5 and 6, which confirms our earlier findings. On the other hand, an equally clear implicational hierarchy based on the difference between the morphological categories number and gender emerges in Tables 7 and 8. We thus obtain support for two different accounts of developmental order, one

Table 5. Implicational scales for attributive plural (AttrP), predicative plural (PredP), negation (Neg)

One occurrence[a]				50% occurrence[b]				80% occurrence[c]			
Informant	Attr P	Pred P	Neg	Informant	Attr P	Pred P	Neg	Informant	Attr P	Pred P	Neg
d10	+	–	–	d10	–	–	–	d10	–	–	–
d12	+	–	–	d12	–	–	–	d12	–	–	–
s8	+	( )	–	d14	–	–	–	d14	–	–	–
s9	+	–	–	s8	–	( )	–	s8	–	( )	–
d9	+	+	–	d15	–	–	–	d15	–	–	–
n7	+	+	–	d5	+	–	–	d5	–	–	–
d16	+	+	–	d9	+	–	–	d9	+	–	–
s12	+	+	–	s9	+	–	–	s9	+	–	–
n1	+	+	–	d16	+	–	–	n7	+	–	–
s4	+	+	–	n7	+	+	–	d16	+	–	–
d6	+	+	–	s12	+	+	–	s12	+	–	–
s1	+	+	–	n1	+	+	–	n1	+	–	–
s2	+	+	–	s7	+	+	–	s7	+	–	–
s3	+	+	–	s4	+	+	–	s4	+	+	–
s5	+	+	( )	d6	+	+	–	d6	+	+	–
s11	+	+	–	s1	+	+	–	s1	+	+	–
s19	+	+	–	s2	+	+	–	s2	+	+	–
n9	+	+	–	s3	+	+	–	s3	+	+	–
d14	+	–	+	s5	+	+	( )	s5	+	+	( )
d15	+	–	+	s11	+	+	–	s11	+	+	–
d5	+	–	+	s19	+	+	–	s19	+	+	–
s7	+	+	+	n9	+	+	–	n9	+	+	–
n8	+	+	+	n8	+	+	–	n8	+	+	–
d1	+	+	+	d1	+	+	–	d1	+	+	–
d11	+	+	+	d11	+	+	–	d11	+	+	–
s10	+	+	+	s10	+	+	–	s10	+	+	–
s13	+	+	+	s13	+	+	–	s13	+	+	–
s20	+	+	+	s20	+	+	–	s20	+	+	–
n4	+	+	+	n4	+	+	–	n4	+	+	–
n5	+	+	+	n5	+	+	–	n5	+	+	–
n6	+	+	+	n6	+	+	–	n6	+	+	–
s6	+	+	+	s6	+	+	–	s6	+	+	–
d2	+	+	+	d2	+	+	+	d2	+	–	+
n3	+	+	+	n3	+	+	+	n3	+	+	–
d8	+	+	+	d8	+	+	+	d8	+	–	+
s18	+	+	+	s18	+	+	+	s18	+	+	–
s16	+	+	+	s16	+	+	+	s16	+	+	–
s15	+	+	+	s15	+	+	+	s15	+	+	+
d7	+	+	+	d7	+	+	+	d7	+	+	+
d3	+	+	+	d3	+	+	+	d3	+	+	+
d4	+	+	+	d4	+	+	+	d4	+	+	+
d13	+	+	+	d13	+	+	+	d13	+	+	+
s14	+	+	+	s14	+	+	+	s14	+	+	+
s17	+	+	+	s17	+	+	+	s17	+	+	+
s21	+	+	+	s21	+	+	+	s21	+	+	+
n2	+	+	+	n2	+	+	+	n2	+	+	+
n10	+	+	+	n10	+	+	+	n10	+	+	+

Note. d = Danish L2, n = Norwegian L2, s = Swedish L2.
[a]Scalability: .760
[b]Scalability: 1.00
[c]Scalability: .879

Table 6. Implicational scales for attributive neuter (AttrN), predicative neuter (PredN), negation (Neg)

One occurrence[a]				50% occurrence[b]				80% occurrence[c]			
Informant	Attr N	Pred N	Neg	Informant	Attr N	Pred N	Neg	Informant	Attr N	Pred N	Neg
d9	–	–	–	d9	–	–	–	d9	–	–	–
d10	–	–	–	d10	–	–	–	d10	–	–	–
d12	–	–	–	d12	–	–	–	d12	–	–	–
d16	–	–	–	d16	–	–	–	d16	–	–	–
s8	–	( )	–	s8	–	( )	–	s8	–	( )	–
s9	–	–	–	s9	–	–	–	s9	–	–	–
n1	–	–	–	n1	–	–	–	n1	–	–	–
s1	+	–	–	d6	–	–	–	d6	–	–	–
n6	+	–	–	d14	–	–	–	d14	–	–	–
d6	–	+	–	n4	–	–	–	n4	–	–	–
d14	–	–	+	d15	–	–	–	d15	–	–	–
n4	–	–	+	d1	–	–	–	d1	–	–	–
d15	–	–	+	d5	–	–	–	d5	–	–	–
d1	+	–	+	d11	+	–	–	d11	–	–	–
d5	–	+	+	s1	+	–	–	n9	–	–	–
d11	+	–	+	n7	+	–	–	s10	–	–	–
n7	+	+	–	s20	+	–	–	s1	+	–	–
n9	+	+	–	n6	+	–	–	n7	+	–	–
s20	+	–	+	n9	+	+	–	s20	+	–	–
s12	+	+	–	s7	+	+	–	s7	–	+	–
d3	–	+	+	s12	+	+	–	s12	+	–	–
n3	–	+	+	d3	–	+	+	d3	–	–	+
d8	+	–	+	n3	–	+	+	n3	–	+	–
n10	+	–	+	s10	+	+	–	n6	+	–	–
s2	+	+	–	d8	+	–	+	n8	–	+	–
s3	+	+	–	n10	+	–	+	s6	–	+	–
s4	+	+	–	s2	+	+	–	s2	+	+	–
s5	+	+	( )	s3	+	+	–	s3	+	+	–
s11	+	+	–	s4	+	+	–	s4	+	+	–
s19	+	+	–	s5	+	+	( )	s5	+	+	( )
s7	+	+	+	s11	+	+	–	s11	+	+	–
s10	+	+	+	s19	+	+	–	s13	+	+	–
n8	+	+	+	n8	+	+	–	s19	+	+	–
s6	+	+	+	s6	+	+	–	n5	+	+	–
d4	+	+	+	d4	+	–	+	s18	+	+	–
s13	+	+	+	s13	+	+	–	s16	+	+	–
n5	+	+	+	n5	+	+	–	d8	+	–	+
s18	+	+	+	s18	+	+	+	n10	+	–	+
s16	+	+	+	s16	+	+	+	d4	+	–	+
d7	+	+	+	d7	+	+	+	d13	+	–	+
d13	+	+	+	d13	+	+	+	d7	+	+	+
d2	+	+	+	d2	+	+	+	d2	+	+	+
s15	+	+	+	s15	+	+	+	s15	+	+	+
s14	+	+	+	s14	+	+	+	s14	+	+	+
s17	+	+	+	s17	+	+	+	s17	+	+	+
s21	+	+	+	s21	+	+	+	s21	+	+	+
n2	+	+	+	n2	+	+	+	n2	+	+	+

[a]Scalability: .500 (not scalable)
[b]Scalability: .804
[c]Scalability: .678

Table 7. Implicational scales for attributive plural (AttrP), attributive neuter (AttrN), negation (Neg)

One occurrence[a]				50% occurrence[b]				80% occurrence[c]			
Informant	Attr P	Attr N	Neg	Informant	Attr P	Attr N	Neg	Informant	Attr P	Attr N	Neg
d10	+	–	–	d10	–	–	–	d10	–	–	–
d12	+	–	–	d12	–	–	–	d12	–	–	–
s8	+	( )	–	d14	–	–	–	d14	–	–	–
d9	+	–	–	s8	–	( )	–	s8	–	( )	–
d6	+	–	–	d15	–	–	–	d15	–	–	–
d16	+	–	–	d9	+	–	–	d5	–	–	–
s9	+	–	–	d5	+	–	–	d9	+	–	–
n1	+	–	–	d6	+	–	–	s9	+	–	–
d14	+	–	+	d16	+	–	–	n7	+	–	–
d15	+	–	+	s9	+	–	–	d16	+	–	–
d5	+	–	+	n1	+	–	–	s12	+	–	–
n4	+	–	+	n4	+	–	–	n1	+	–	–
n9	+	+	–	d1	+	–	–	s7	+	–	–
n3	+	–	+	n9	+	+	–	s4	+	+	–
n7	+	+	–	n3	+	–	+	d6	+	+	–
d3	+	–	+	s7	+	+	–	s1	+	+	–
s1	+	+	–	d11	+	+	–	s2	+	+	–
s2	+	+	–	n7	+	+	–	s3	+	+	–
s3	+	+	–	n8	+	+	–	s5	+	+	( )
s4	+	+	–	s10	+	+	–	s11	+	+	–
s5	+	+	( )	d3	+	–	+	s19	+	+	–
s11	+	+	–	s1	+	+	–	n9	+	+	–
s12	+	+	–	s2	+	+	–	n8	+	+	–
s19	+	+	–	s3	+	+	–	d1	+	+	–
d1	+	+	+	s4	+	+	–	d11	+	+	–
s7	+	+	+	s5	+	+	( )	s10	+	+	–
d11	+	+	+	s11	+	+	–	s13	+	+	–
n8	+	+	+	s12	+	+	–	s20	+	+	–
s10	+	+	+	s19	+	+	–	n4	+	+	–
s6	+	+	+	s6	+	+	–	n5	+	+	–
s13	+	+	+	s13	+	+	–	n6	+	+	–
s20	+	+	+	s20	+	+	–	s6	+	+	–
n5	+	+	+	n5	+	+	–	d2	+	–	+
n6	+	+	+	n6	+	+	–	n3	+	+	–
s18	+	+	+	s18	+	+	–	d8	+	–	+
d2	+	+	+	d2	+	+	+	s18	+	+	–
s16	+	+	+	s16	+	+	+	s16	+	+	–
d7	+	+	+	d7	+	+	+	s15	+	+	+
d13	+	+	+	d13	+	+	+	d7	+	+	+
d8	+	+	+	d8	+	+	+	d3	+	+	+
s15	+	+	+	s15	+	+	+	d4	+	+	+
d4	+	+	+	d4	+	+	+	d13	+	+	+
s14	+	+	+	s14	+	+	+	s14	+	+	+
s17	+	+	+	s17	+	+	+	s17	+	+	+
s21	+	+	+	s21	+	+	+	s21	+	+	+
n2	+	+	+	n2	+	+	+	n2	+	+	+
n10	+	+	+	n10	+	+	+	n10	+	+	+

[a]Scalability: .625
[b]Scalability: .882
[c]Scalability: .907

Table 8. Implicational scales for predicative plural (PredP), predicative neuter (PredN), negation (Neg)

One occurrence[a]				50% occurrence[b]				80% occurrence[c]			
Informant	Pred P	Pred N	Neg	Informant	Pred P	Pred N	Neg	Informant	Pred P	Pred N	Neg
d10	–	–	–	d10	–	–	–	d10	–	–	–
d12	–	–	–	d12	–	–	–	d12	–	–	–
s8	–	( )	–	s8	–	( )	–	s8	–	( )	–
s9	–	–	–	s9	–	–	–	s9	–	–	–
d14	–	–	+	d14	–	–	–	d14	–	–	–
d9	+	–	–	d9	–	–	–	d9	–	–	–
d15	–	–	+	d5	–	–	–	d15	–	–	–
d16	+	–	–	d16	–	–	–	d16	–	–	–
n1	+	–	–	d5	–	–	–	d5	–	–	–
s1	+	–	–	n1	+	–	–	1	–	–	–
d5	–	+	+	n7	+	–	–	n7	–	–	–
n7	+	+	–	s1	+	–	–	s12	–	–	–
s12	+	+	–	d6	+	–	–	s1	+	–	–
d6	+	+	–	d1	+	–	–	d6	+	–	–
d1	+	–	+	d11	+	–	–	d1	+	–	–
d11	+	–	+	s20	+	–	–	d11	+	–	–
s20	+	–	+	n4	+	–	–	s20	+	–	–
n4	+	–	+	n6	+	–	–	n4	+	–	–
d8	+	–	+	s12	+	+	–	d8	–	–	+
n9	+	+	–	d8	+	–	+	s7	–	+	–
s4	+	+	–	s7	+	+	–	n6	+	–	–
n10	+	–	+	n9	+	+	–	n9	+	–	–
s2	+	+	–	s4	+	+	–	s10	+	–	–
s3	+	+	–	n10	+	–	+	s4	+	+	–
s5	+	+	( )	s2	+	+	–	n10	+	–	+
s11	+	+	–	s3	+	+	–	s2	+	+	–
s19	+	+	–	s5	+	+	( )	s3	+	+	–
s7	+	+	+	s11	+	+	–	s5	+	+	( )
n6	+	+	+	s19	+	+	–	s11	+	+	–
s10	+	+	+	s10	+	+	–	s19	+	+	–
d4	+	+	+	d4	+	–	+	d4	+	–	+
s13	+	+	+	s13	+	+	–	s13	+	+	–
n5	+	+	+	n5	+	+	–	n5	+	+	–
n8	+	+	+	n8	+	+	–	n8	+	+	–
s6	+	+	+	s6	+	+	–	s6	+	+	–
n3	+	+	+	n3	+	+	+	n3	+	+	–
s18	+	+	+	s18	+	+	+	s18	+	+	–
d2	+	+	+	d2	+	+	+	d2	–	+	+
d3	+	+	+	d3	+	+	+	d3	+	–	+
s16	+	+	+	s16	+	+	+	s16	+	+	–
s15	+	+	+	s15	+	+	+	s15	+	+	+
d7	+	+	+	d7	+	+	+	d7	+	+	+
d13	+	+	+	d13	+	+	+	d13	+	+	+
s14	+	+	+	s14	+	+	+	s14	+	+	+
s17	+	+	+	s17	+	+	+	s17	+	+	+
s21	+	+	+	s21	+	+	+	s21	+	+	+
n2	+	+	+	n2	+	+	+	n2	+	+	+

[a]Scalability: .561 (not scalable)
[b]Scalability: .841
[c]Scalability: .755

related to the processability of syntactic structures and the other to the presence or absence of a conceptual basis for formal categories. Obviously, because the phrasal-interphrasal and the number-gender variables are not mutually dependent, the validity of one does not rule out the validity of the other. For the processability hierarchy this means that, although it still receives support in our data, it cannot claim to explain the developmental order at the exclusion of other, especially conceptually related, scales of acquirability.

In all cases, the Neg placement in subordinate clauses comes later than the various types of morphological agreement. The question may be raised whether this is due solely to the high level of processing resources that is generally required to unite features across the interclausal domain, in accordance with PT, or whether there are other factors at play here. This is, however, beyond the scope of the present investigation.

A Closer Look at Patterns of Agreement and Nonagreement

As we mentioned in the section on category differentiation, number agreement and gender agreement present the learner with different tasks, owing to the different nature of these morphological categories. When number and gender agreement were separated and compared by means of implicational scaling (previous section, Tables 7 and 8), we were able to demonstrate a striking difference in the learners' handling of number and gender. Plural agreement was achieved more often than neuter agreement, and we found an implicational hierarchy both in the phrasal and the interphrasal domain: The achievement of neuter agreement implied the achievement of plural agreement. In the present section we look more closely at the various types of agreement and nonagreement that occur in the data.

Management of grammatical agreement involves two things for the language learner: (a) the learner must find out which are the relevant morphological features of the agreement controller, and (b) he or she must find the matching form of the agreement target. Thus, in our present context, the learner has to identify the number and, in the case of singular, the gender of the nominal and then find the matching form of the adjective. So far, we have disregarded the basis of the agreement operation—namely, determining the morphological feature of the controller that has to be reflected in the adjective. In the following discussion, we will examine the distinct morphological features that form the basis for the agreement.

We will distinguish three key elements in the items of each of the two tests on adjective agreement that are involved in the learner's task. As mentioned earlier, the items in the attributive test are formed as in this Danish example: *Hvad er der foran det lille grønne hus? — Et grønt træ*; "What is in front of the little green house?—A green tree." In this example, the tested category, neuter gender, is to be shown in the answer by the indefinite article and the adjective. In examples like this, the key elements for the present analysis are:

(a) the noun illustrated on the picture sheet, for which the informant has to establish the relevant morphological features (in this example, the neuter noun *træ*; "tree" in the singular); (b) the overt marker, which we have taken to represent the chosen morphological feature of the noun, usually an article or numeral (in this example, the article *et*); and (c) the adjective (here *grønt*).

In the predicative test, the items are formed as in this Danish example: *Hvad farve er de små kopper? — De er brune.* "What color are the small cups?—They are brown." In this test the category is given in the question and is to be reflected in the learner's answer. The key elements here are: (a) the antecedent noun, which is given in the test question in a phrase that shows the relevant number or gender; (b) the anaphoric subject pronoun in the learner's answer, which is to agree with the given noun and show the same number or gender (pronominal agreement); and (c) the adjective that is to agree with the subject. Sometimes the informants repeat the full noun phrase in position (b) instead of using a pronoun.

Thus in both tests we distinguish:

1. The nominal element given in the test item. Note that we identify the relevant morphological category of this element as that which applies in the target language. We refer to it as the *tested category* of that test item.
2. The element representing or constituting the agreement controller for the adjective.
3. The element constituting the agreement target, that is, the adjective.

In sum, we identify the key elements shown in (4).

(4)

	Given nominal (tested category)	Controller	Target
Attributive:	Noun illustrated by picture	Article/numeral	Adjective
Predicative:	Antecedent noun	Subject	Adjective

Each of these elements can occur in the base form, neuter, or plural.[4] Ideally, the test stimuli and the answers should yield matching combinations of these elements. The learners, of course, produced a variety of matching and nonmatching responses. Our focus here will be on examining the various patterns of match or mismatch between these elements that occur in the test data. These are displayed in Tables 9–11.

Table 9 covers those types in which the adjective agrees with the controller. In our earlier analysis, these were all counted as cases of agreement. The three-letter formulae that express the different types of (mis)match represent the combinations of (a) the tested category, (b) the agreement controller, and (c) the agreement target, in this order (B = base form [singular uter form], N = singular neuter form, and P = plural form). In the first three rows of Table 9, in which all the three key elements agree, we note a striking asymmetry in the test results. Whereas a very high proportion of agreement is regularly achieved for BBB and PPP, the percentage for NNN is markedly lower in each test. In other words, whereas singular uter and plural test words usually pro-

Table 9. Patterns of agreement and nonagreement in the attributive and predicative tests: Agreement controller and adjective are matched

	Danish				Norwegian				Swedish			
	Attr		Pred		Attr		Pred		Attr		Pred	
Type	F	%	F	%	F	%	F	%	F	%	F	%
BBB	90/96	94	63/80	79	50/58	86	44/50	88	66/66	100	101/105	96
NNN	30/80	38	27/80	34	27/51	53	29/50	58	92/147	63	74/105	70
PPP	60/80	75	51/80	64	49/50	98	44/50	88	102/105	97	96/105	91
BNN	—	—	2/80	3	2/58	3	1/50	2	—	—	1/105	1
NBB	32/80	40	18/80	23	10/51	20	3/50	6	45/147	31	9/105	9

Note. F = frequency of the listed type over total number of items of this tested category; % = F expressed as percentage; B = baseform (singular uter); N = singular neuter, P = plural.

Table 10. Patterns of agreement and nonagreement in the attributive and predicative tests: Tested category and agreement controller are matched, but adjective is not matched

	Danish				Norwegian				Swedish			
	Attr		Pred		Attr		Pred		Attr		Pred	
Type	F	%	F	%	F	%	F	%	F	%	F	%
BBN	—	—	1/80	1	1/58	2	1/50	2	—	—	—	—
BBP	3/96	3	1/80	1	4/58	7	—	—	—	—	—	—
NNB	16/80	20	31/80	39	9/51	18	17/50	34	6/147	4	19/105	18
NNP	1/80	1	—	—	1/51	2	—	—	—	—	—	—
PPB	19/80	24	24/80	30	1/50	2	—	—	3/105	3	5/105	5
PPN	—	—	2/80	3	—	—	2/50	4	—	—	—	—

Note. F = frequency of the listed type over total number of items of this tested category; % = F expressed as percentage; B = baseform (singular uter); N = singular neuter, P = plural.

duce test answers with agreement for the tested category, this is less often the case for the corresponding singular neuter test words. (The fact that the scores are also somewhat lower for PPP in the Danish tests may have a special cause. Most of the missing agreement here is due to the type PPB, which we will comment on later.)

Among the types in which the adjective agrees with the controller but deviates from the tested category (in the last two rows of Table 9), one type, NBB, dominates. It occurs in 40% of the Danish, 20% of the Norwegian, and 31% of the Swedish attributive test answers with N as the tested category. It is also the dominant type in the predicative test, although with lower frequency. In other words, with the singular test words, where gender is to be differentiated, there is a strong tendency for the learners to use the uter form. This

Table 11. Patterns of agreement and nonagreement in the attributive and predicative tests: Agreement controller is not matched with the tested category, and adjective is not matched with controller

	Danish				Norwegian				Swedish			
	Attr		Pred		Attr		Pred		Attr		Pred	
Type	F	%	F	%	F	%	F	%	F	%	F	%
BNB	—	—	13/80	16	1/58	2	4/50	8	—	—	3/105	3
NBN	1/80	1	2/80	3	3/51	6	1/50	2	3/147	2	3/105	3
PBP	1/80	1	1/80	1	—	—	—	—	—	—	—	—
PNP	—	—	—	—	—	—	2/50	4	—	—	1/105	1
BNP	3/96	3	—	—	—	—	—	—	—	—	—	—
NBP	—	—	2/80	3	1/51	2	—	—	1/147	1	—	—
PNB	—	—	2/80	3	—	—	2/50	4	—	—	3/105	3

Note. F = frequency of the listed type over total number of items of this tested category; % = F expressed as percentage; B = baseform (singular uter); N = singular neuter, P = plural.

applies not only in the attributive test in which the learners themselves had to supply the gender, but also in the predicative test where the gender was given in the test question. This can be explained in two different ways: Either it is a matter of choice of gender category, a preference for uter, or it is a matter of structural simplification, reducing inflection. The high proportion of the pattern NBB cannot, however, be explained as a mere reduction of inflection in the adjective because even the controller shows uter gender. Note that plural test items are not affected in the same way: There are no instances of the type PBB. Obviously the problem here is with gender and not with number, and the prevailing tendency is to overuse uter gender and to underuse neuter. This is consistent with the low figures for the pattern NNN.

The remaining types found in our test data have all been counted in our previous analysis as cases of nonagreement, given that controller and adjective do not match. Table 10 shows those cases in which the controller agrees with the tested category, but the adjective does not. In Table 10 the strong dominance of the types NNB and PPB over other combinations indicates overuse of the base form (singular uter) of the adjective also in cases where the controller matches the tested nominal. With the learners of Danish this applies both to singular neuter test words (type NNB) and to plural test words (type PPB), whereas the learners of Norwegian and Swedish mostly limit this overgeneralization to singular neuter cases. There may be a phonological explanation for this difference. The adjectival plural suffix *-e* in standard Danish is prosodically and segmentally more reduced, and hence perceptually less salient, than is the case with the corresponding Norwegian and Swedish plural suffixes. This may have a negative effect on the acquisition of the plural *-e* in Danish.

The patterns NNB and PPB confirm the earlier finding that the singular uter

form is overused but also show that this tendency can affect the adjective even if the controller is not treated as uter. This can be interpreted either as another effect of a preference for the uter gender category, or as a simplifying reduction of adjective inflection, or as an interaction of both.

Finally, there are a number of patterns in which the controller deviates from the tested category and the adjective deviates from the controller. They are listed in Table 11. Here, too, a certain systematicity can be observed. Out of the seven occurring types, four (listed in the first four rows) are cases in which the adjective matches the tested nominal—that is, the first and third element show the same category, whereas the controller in the noun phrase or clause (i.e., the second element) differs: BNB, NBN, PBP, and PNP. Logically, there are six possible letter combinations of this symmetrical kind, and six nonsymmetrical ones that would fit in Table 11. A clear majority of the occurring instances of mismatch that belong here are of the symmetrical kind. This suggests that there are a number of cases in which the adjective agrees not with the controller element in the immediate syntactic domain but with the (expressed or illustrated) antecedent element. This observation is noteworthy, considering that according to PT it should be easier to exchange information at a shorter distance (as defined earlier), and exchange of information across syntactic boundaries (in this case, even a turnshift) should decrease processability. This kind of long-distance agreement thus constitutes counterevidence to the proposed processability hierarchy.

A further type of systematicity can be noted if we focus on the controller element, the second position in the three-letter formula. In Table 11, this element is B or N, never P. Plural controllers occur in our data only when the tested category is plural (type PPP, PPB, or PPN), as shown in Tables 9 and 10. The fact that B is overrepresented as controller (types NBN, PBP, and NBP in Table 11) is in accordance with the earlier observation that there is a tendency to overgeneralize uter. But why then is N also overused in the controller position (types BNB, PNP, BNP, and PNB)? Table 11 shows that this happens mainly in the predicative constructions. These items usually have the form "What color is . . . ? – It is . . . " Here, it seems that the neuter anaphoric pronoun *det* "it, that" is sometimes used indiscriminately in the test answers with only a vague reference to the thing spoken about and does not reflect the number or lexical gender of the tested noun (see the remarks on neutral agreement in note 3). This use of the pronoun *det* is frequent in native speech. Similar cases in native and learner Swedish conversational data are extensively discussed by Hammarberg (2000).

To sum up, we have found some systematic patterns in the learners' handling of agreement that were not visible in our earlier analysis and that may shed some light on the complex implicational relationships discussed in the section entitled "Semantically Differentiated Implicational Scales." First, we saw that it is the gender distinction rather than the number distinction that causes problems for the learners. Plural agreement is less problematic. The controller always matches the tested category here. Mismatch between a plu-

ral controller and the adjective is mostly due to the type PPB, which occurs mainly with the learners of Danish, possibly for phonological reasons. What, then, causes number agreement to be acquired more readily than gender agreement? We believe it may be related to the different nature of these morphological categories, which we discussed in the section on category differentiation. Number is intended by the speaker, and it has relevance for the meaning of the utterance. Hence, in a language that has number agreement in adjectives, such morphological marking contributes in a straightforward way to the clarity of the utterance. Lexical gender, on the other hand, lacks this clear conceptual basis, it has to be known by the speaker, and it has little relevance, if any, for the meaning of the utterance. With this in mind, the priority of number marking over gender marking in learner production should not be surprising. Although Pienemann (1998, p. 11) touched briefly on the role of the conceptual structure in connection with number and gender, we cannot see that this aspect is really addressed in PT. Our results suggest that a conceptual dimension needs to be taken into consideration along with morphosyntactic processability and that the possible interactions of these aspects in L2 development deserve further investigation.

Second, we found that uter was overused at the expense of neuter, both in the agreement controller and in the adjective. The low proportion of the type NNN and the high proportion of the type NBB in the test data show that, even in cases in which the controller and the adjective match in form, there is a tendency to underrepresent neuter. The type NBB, where neuter is avoided although the controller and the adjective agree in form, represents a gender problem that is not reflected in the implicational tables. There are also numerous instances of the type NNB, in which the adjective fails to agree with a neuter controller. In the absence of specific knowledge of a noun's gender, learners need some principles to guide their choice. Uter has the advantage of being more frequent in target language use and is structurally unmarked in singular adjectives (i.e., rendered by the base form). The fact that the learners do not often miss plural agreement suggests that a general tendency toward reductive simplification of inflection is not the only, or even the main, reason. Rather, the learners seem to be opting for a default category. Establishing one gender as the default category is in line with Andersen's (1984) One-to-One Principle, according to which "an IL system should be constructed in such a way that an intended underlying meaning is expressed with one clear invariant surface form (or construction)" (p. 79). A default form will increase the amount of invariance, notably in unpredictable cases. Default gender is certainly a complex and ambiguous concept (see Corbett & Fraser, 2000, pp. 55–97), yet it seems logical that learners will identify uter as the basic or default gender for nouns to be used unless they specifically know or suspect that a noun is neuter. It can be argued that uter is the default gender for nouns also for target language speakers, but the learners are seen to overexploit this.

Third, several cases of long-distance agreement were observed, in which the adjective agrees not with the immediate controller element but with the

antecedent in the test question. This suggests that the phrasal or clausal boundary does not always effectively restrict the domain of adjective agreement. This finding is a problem for PT, which claims a strict order of processability, and thus of acquisition, of the phrasal, clausal, and interclausal domains.

Finally, we have noted a tendency for the learners to use the neutral pronoun *det* as subject in predicative constructions irrespective of the morphological features of the given nominal. This is in line with native usage, but it seems to interfere with subject-predicative agreement in the learners' test responses.

SUMMARY AND CONCLUSION

In the present study, we selected three grammatical phenomena in three structurally similar Scandinavian languages—Danish, Norwegian, and Swedish—to test the validity of Pienemann's (1998) processability hierarchy: attributive adjective agreement, predicative adjective agreement, and subclause negation placement. Because they represent different levels of processing procedures (phrasal, interphrasal, and main-subclause, respectively), they are located at successive developmental stages in the hierarchy proposed by Pienemann, and our aim was to test whether they would actually appear in learners' L2 in this predicted hierarchical order. As in earlier research on the PT framework, we assumed that the order of appearance in the learners' production would reflect the order of acquisition. A set of eliciting tests were used, and the results were subjected to three kinds of analysis.

In the first analysis, implicational scales were established for the three phenomena. We applied three alternative criteria to determine when a phenomenon can be regarded as acquired in the learner language: one occurrence, 50% use, and 80% use. The results here were found to support the predictions of PT as given by Pienemann (1998): Phrasal morphology is acquired before interphrasal morphology, which again is acquired before the preverbal position of the negation in subordinate clauses. This holds for all three criteria.

We then studied the acquisition order within adjective morphology, separating number and gender. First, we found the one-occurrence criterion to be problematic, yielding poor scalability values. Robust implicational scales could only be established for the 50% and 80% criteria. This suggests that adopting a single emergence criterion may be too unreliable and also that application of a combination of criteria in the analysis of the data may give more reliable results. Second, and of more direct significance for our research question, we found that the phrasal-interphrasal hierarchy was paralleled by a number-gender hierarchy. Thus, whereas the processability hierarchy again was supported when we investigated number and gender separately, the acquisition of these two morphological categories also followed a fixed order. This result can be explained by the conceptual nature of number versus the largely nonconceptual nature of (lexical) gender in Scandinavian. According to

our results, although the processability hierarchy seems to be basically valid for phrasal versus interphrasal agreement acquisitional patterns, it cannot account for the acquisition order of the two conceptually different morphological categories in the adjectives.

The third analysis sheds further light on the learners' processing of agreement. Here the form of the agreement controller and the adjective in the learner's answer was related to the tested category in the target language for each test item, and the various types of matches and mismatches between these three elements were studied. One finding was that learners tended to overrepresent uter gender at the expense of neuter, both in the controller and the adjective, thus establishing and overexploiting uter as a default gender. Other findings include a tendency to use long-distance agreement, which violates the boundaries of the phrasal and clausal processing domains, and a tendency to ignore predicative agreement, particularly in combination with discourse-referential use of the neutral anaphoric pronoun in answers. These latter observations suggest that cross-sentence discourse factors may also influence the processing of agreement, which complicates the picture of a processability hierarchy.

In sum, the present study supports the validity of a hierarchy of processability between a phrasal, a clausal, and a main-subclause domain but indicates that this is not the only factor conditioning the order of acquisition of the grammatical structures that we investigated. The evidence for a number-gender hierarchy suggests that the conceptual basis for the morphological features involved has to be taken into account. We also found cases where reference cross-sententially in the discourse appears to violate the processability hierarchy. Whether these factors can be integrated into the processability theory of L2 development is a question left for future research.

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NOTES

1. Due to phonological conditions, some adjectives are uninflected for neuter singular, and some are uninflected throughout. Only fully inflected adjectives have been included among the test items.

2. Norwegian differs from Danish and Swedish in one respect that should be noted here, although it does not actually complicate our present study. It has a three gender system with masculine, feminine, and neuter, which is mainly reflected in the form of the articles. In the adjective inflection, masculine and feminine together correspond to the uter category and will be subsumed under this term in the present cross-Scandinavian comparison. Because there is no difference in the adjective morphology for masculine and feminine, only examples for masculine are given in Table 3.

3. It should be noted that we have excluded from the present study one type of systematic, conceptually based, singular neuter in predicative adjectives – namely, that which Corbett (1991, pp. 204ff.) refers to as "neutral agreement." This type includes cases in which agreement is controlled not by the lexical features of a noun in the clausal subject, but rather by the type of entity that constitutes the subject's referent. Neuter is here used by default. Examples (from Swedish) with a nominal subject are: *Kattungar är roligt* "Kittens are fun" (in contrast to *Kattungar är roliga* "Kittens are funny"); *Grammatik är svårt* "Grammar is difficult" (in contrast to *Grammatiken är svår* "The grammar is difficult"). In Scandinavian grammatical treatments, this phenomenon is commonly referred to as nonagreement, due to the fact that the adjective does not reflect the morphological number and gender features of the subject noun (cf. Faarlund, 1977, for Norwegian; Källström, 1993, for Swed-

ish); still it is clear that the choice of the singular neuter form of the predicative is conditioned by the subject's type of reference, that is, the subject controls the inflection of the predicative. The noun in these cases often represents some state or event: having kittens, studying grammar, and so forth. Related cases of neutral agreement contain a nonnominal subject: *Att ha kattungar är roligt* "To have kittens is fun"; *Att dom har fått kattungar är roligt* "That they have got kittens is fun." Similarly, pronominal neutral agreement occurs when an anaphoric neuter pronoun *det* refers to some referent in the previous discourse, for example, *Dom har fått kattungar. Det är roligt* "They have got kittens. That is fun." Such discourse referents may consist of some event, proposition, fact, and so forth, or some larger complex of such entities, which is "hypostatized" and referred back to by the singular neuter pronoun (Fraurud, 1992, 2000). If this pronoun is the subject of a predicative adjective, it in turn controls singular neuter in the adjective, as in the last example above.

Our main point here is that the nonlexical kind of neuter gender that occurs in neutral agreement is, in fact, like the singular-plural distinction, conceptually conditioned. Instances of the type of reference that conditions neutral agreement are found to be highly frequent in speech (Hammarberg, 2000). A previous study (Hammarberg, 1996, pp. 75–88) indicated that L2 learners of Swedish pick up neutral agreement at an early stage and start using this type of adjective inflection in the predicative earlier than the lexical neuter type.

4. Note, however, that the tested category in the attributive test is not overtly expressed.

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