

## PARTICLES AND PREPOSITIONS IN SCANDINAVIAN CHILD LANGUAGE DEVELOPMENT: EFFECTS OF PROSODIC SPOTLIGHT?

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### ABSTRACT

The syntactic and prosodic properties of particles and prepositions vary within the group of the Scandinavian languages in ways that offer a testing ground for the Prosodic Spotlight Hypothesis. This hypothesis predicts that elements that are made perceptually prominent by virtue of prosodic traits (stress, pitch, duration, rhythmic patterns etc) will be focussed on earlier in language development than elements not so spotlighted. The paper discusses evidence from Danish, Icelandic and Swedish child language development.

### INTRODUCTION

The world's languages all employ pitch, duration, and some kind of rhythm in their individual prosodic systems. These tonal and temporal characteristics not only give shape to utterance contours, and perform discourse-related functions, they also interact with grammar in ways that may have interesting consequences for both processing by adult speakers and learning by children. The specific kinds of interrelations between prosodic features on the one hand and aspects of lexical and grammatical structure on the other, vary a good deal across languages, however.

In an earlier study [11] two of us (Peters and Strömquist) explored the idea that the prosodic patterning characteristic of a particular language can indeed serve to draw the attention of language learners to the presence of certain elements of the linguistic system

(see also [10]). Awareness of the *presence* of such a form may then help focus the learner's attention on its other attributes, including exactly what it sounds like and what functional role(s) it has. More specifically, we proposed the following "Spotlight Hypothesis":

Perceptually salient prosodic patterns, including pitch contours, rhythm, and increased duration, may serve as "spotlights" on any phonological forms that are regularly associated with these patterns; if such forms happen to be grammatical morphemes, learners will focus on them earlier than on morphemes not so spotlighted.

The Spotlight Hypothesis thus concerns children's *perception* of salient prosody that fortuitously coincides with grammatical morphemes, with evidence to be drawn from what children *produce* and from the parental input they receive. The Spotlight Hypothesis represents an attempt to bridge the gap between studies of infant perception (focusing on the first year of life) on the one hand and studies of early grammatical development (typically, from 18 months and onwards) on the other.

In our earlier study we explored in some detail the interaction between the Swedish grave word accent contour, i.e., the marked member of the Swedish tonal word accent distinction (see [2]; [3]; [4]), and the first inflectional morphemes in the early language

development of a Swedish child between 15;19 and 30;20. In the adult target language, the distribution of the Swedish tonal word accents (acuteness versus graveness) can, to a large extent, be predicted from morphological information, that is, the phonetic gestures interact with grammatical information.

During a first phase, the child (re)produced inflectional morphology predominantly in utterance-final position and he overgeneralized the grave accent, especially the post-stress rise/high pitch, to most word forms with a post-stress syllable, including those forms where the post-stress syllable encoded an inflectional morpheme. In a second phase, starting around the same time as the child had productively acquired his first small set of inflectional morphemes, he withdrew the grave accent from these forms (resulting in an undergeneralization). During this second period, he produced inflectional morphemes with increasing frequency in the less salient non-utterance-final positions. In a third phase, the child acquired a distributional pattern of graveness which approximated that of the adult target.

These observations, especially the findings from the first phase of the longitudinal case study, are in accordance with Engstrand et al. [5], who, on the basis of an experimental study of children's early production data, argue that Swedish children already begin to master the phonetic aspects of the Swedish grave accent, especially the high pitch on the post-stress syllable, around 17 months of age, that is, well before they start acquiring inflectional morphology. The grave contour, especially the perceptually salient high pitch/post-stress rise, thus represents a phonetic gesture which is established both in the child's perception and production during his pre-grammatical development. It is therefore available to serve as a spotlight on elements which can be useful in the extraction and construction of morphosyntactic patterns.

Faced with the task of learning a lan-

guage with a fair amount of grammatical morphology located at the ends of words, the Swedish-learning child does well to attend to prosodic salience which spotlights what goes on in this position. Such a strategy has been described by Slobin [12], p 335, in his Operating Principle "pay attention to the ends of words". On the basis of the findings from one longitudinal case study [11] we concluded that Swedish is a particularly felicitous language for learners to apply this principle because of the presence of prosodic spotlighting (increased duration and high pitch) on final syllables which also happen to be segmentable grammatical morphemes. The increased duration is due to the cross-linguistically attested final lengthening effect (see [7]; [6]), whereas the high pitch is due to the particularly Swedish grave post-stress rise.

The present paper extends the testing of the Spotlight Hypothesis to the acquisition of particles and prepositions in Scandinavian languages. Particles and prepositions belong to a small set of phenomena where these languages, which are otherwise typologically very similar, differ in terms of syntactic distribution and prosodic prominence. "The natural linguistic laboratory" of Scandinavian languages has, as it were, set slightly different scenes for young language learners in the area of particles and prepositions. In order to explore the possible effects of these differences, data were drawn from a current inter-Nordic project, "Language Development — a Scandinavian Perspective" (see [14]).<sup>1</sup> The contrastive developmental anal-

<sup>1</sup>More precisely, the analyses presented in this paper relate to two Danish, two Swedish and one Icelandic longitudinal case studies, all collected in everyday situations in the home. The Danish and Swedish material is accessible in CHILDES/CHAT format (see [9]; [8]). Users of Internet can access a large set of CHAT-files from the Danish and Swedish child language corpora through anonymous ftp to poppy.psy.cmu.edu, where they are stored in the tar files "Danish.tar" and "Swedish.tar" under the direc-

yses were confined to particles and prepositions with a spatial (as opposed to temporal or general grammatical) meaning, all in order to reduce the number of factors that might influence the structure of acquisition. And in all five children alike, the first handful of particles and prepositions that emerged in development were chosen from the same narrow range of options — 'in', 'on', 'up', 'down', 'out', 'off' — encoding the same or very similar spatial concepts. However, the children varied considerably in terms of timing of acquisition as well as in terms of how many items they had acquired at an early age. Moreover, this variation showed language specific effects. Our evidence comes from two separate substudies, the first concerned with the acquisition of verb particles in Danish and Swedish, the second with the acquisition of prepositions in Icelandic and Swedish.

### PARTICLES: DANISH VERB-SUS SWEDISH

The minimal variation between the Mainland Scandinavian languages (Danish, Norwegian and Swedish) includes systematic differences in the syntax and prosody of the VERB + PARTICLE construction (see [13]). If we focus on transitive verb phrases where the object is a pronoun, we get the situation summarized in table 1. The phrase used to illustrate the variation is TAKE (*ta*) IT (*det*) OUT (*ud/ut*).

Now, if we focus only on the first parameter in the table, syntactic contiguity of the particle with its verb, we would predict (a) that Swedish children will have an easier time (than Danish or Norwegian children) of perceiving the close connection between particle and verb, since the two are delivered together in the input to the child. If, however, we focus on the second and third parameters, we predict (b) that the particle will be maximally easy to attend to in the Danish case, where it

properties of PRT	SWEDISH	DANISH	NORWEGIAN
	<i>ta út det</i>	<i>ta det ud</i>	<i>tå det ut</i>
Contiguity with V	+	-	-
Phrasal stress	+	+	-
Phrase final position	-	+	+

Table 1: Differences in the VERB + PARTICLE construction between the minimally different languages Swedish, Danish, and Norwegian

receives both stress and extra prosodic prominence by virtue of its phrase final position. And in cases where this phrase final position coincides with utterance final position, the Danish child can also profit from the final lengthening effect which gives him extra time to perceive the particle. In contrast, Norwegian children are expected to have the hardest learning task according to the first and second parameters in the table.<sup>2</sup>

For the purpose of empirical testing, the syntactic distribution of the first six grammatical morphemes encoding spatial relations (that is, 'in', 'on', 'up', 'down', 'out', 'off') in the two Danish case study materials ("Jens" and "Anne") were compared to the corresponding distributions in the two Swedish case studies ("Markus" and "Harry"). The distributional analyses were made 1) in terms of timing (age of appearance across available data points) and 2) in terms of whether the grammatical morphemes occurred as one-word utterances or as elements of multi-word utterances. The analyses focussed on the first 20 data points (transcripts) available from each child/case study material. The results are presented in table 2.

(Insert table 2 here)

<sup>2</sup>We have not yet started to analyse Norwegian data, but this is a priority for our future research.

Danish, Jens, first 20 data points		
Period	1-word utterances with spat adv/prt	multi-word utterances with spat adv/prt
12;26	0	0
13;23-18;26	8	0
19;14-22;14	11	7
22;28-24;02	0	31

Danish, Anne, first 20 data points		
Period	1-word utterances with spat adv/prt	multi-word utterances with spat adv/prt
13;01-18;20	49	1
19;04-22;17	69	44
23;18-23;26	1	22

Swedish, Markus, first 20 data points		
Period	1-word utterances with spat adv/prt	multi-word utterances with spat adv/prt
15;19-20;05	0	0
21;07-22;25	0	18 <sup>a</sup>
23;00-27;28	2	360

Swedish, Harry, first 20 data points		
Period	1-word utterances with spat adv/prt	multi-word utterances with spat adv/prt
18;20-23;18	0	0
24;16-32;27	0	181 <sup>b</sup>

Table 2: The distribution of particles on one-word vs multi-word utterances in the early language development of two Danish and two Swedish children

<sup>a</sup>12 (67%) of which occur immediately after a verb

<sup>b</sup>104 (57%) of which occur immediately after a verb. 100% of the tokens of *in* and *upp* occur immediately after a verb.

child	language	period	data points	particles (tokens)	% utterances with particles	% prt in final pos.
Anne	Danish	13;01-18;20	11	539	11.4%	15.8%
Markus	Swedish	15;19-23;00	10	293	14.3%	7.1%

Table 3: Distribution of particles in the early input to Anne (Danish) and Markus (Swedish)

tory "/noneng".

The analysis shows that particles first emerge as one-word utterances in the Danish children (13-18 months of age). And when the Danish children begin to produce them in multi-word utterances, they tend to combine them with words other than verbs. In contrast, particles almost never occur as one-word utterances for the two Swedish children, and they are initially combined just with verbs in a clear majority of cases.<sup>3</sup> These two results render support to our first prediction (a).

The analysis further shows that particles emerge much earlier in the development of the two Danish children (around 1 year of age) than in the development of the two Swedish children (around 2 years of age). This finding renders support to our second prediction (b).<sup>4</sup>

Predictions (a) and (b) above rely on the assumption that the structural contrasts summarized in table 1 for VERB + PARTICLE constructions are reflected in the input heard by the Danish and Swedish children in our study. We have just started to test this assumption and results are available for Anne (Danish) and Markus (Swedish). Table 3 shows the distribution of particles in the input to Anne and Markus in the early phase(s) of acquisition evidenced in the two case studies. The table summarizes the number of data points analysed for each child, the number of particles found in the input utterances, the percentage of input utterances that contain a

<sup>3</sup>During a first phase, 67% of the particles used by Markus occur immediately after a verb. In Harry, the distribution of particles in contexts with verbs is more governed by the particular morphemes: 100% of the tokens of *in* 'in<sub>dir</sub>' and *upp* 'UP<sub>dir</sub>' occur immediately after a verb, whereas only 15% of the tokens of *i* 'in<sub>loc/dir</sub>' occur with a verb.

<sup>4</sup>An additional factor which probably contributes to the precocious emergence of particles in the Danish children is recency: since the particle occurs in phrase final position in Danish, it is subjected to the so-called recency effect, which makes it easier to remember elements occurring at the end of linear structures (see, e.g., [16]).

particle, and the percentage of particles that occur precisely in utterance final position.

(Insert table 3 here)

The table shows that

- for the Danish and Swedish case studies the proportions of input utterances that contain particles are very similar, and that
- there is a higher proportion of particles in utterance final position in the Danish input

These observations thus provide support for our assumption that this minimal but crucial syntactic difference between Danish and Swedish is already reflected in speech to children at an early stage of acquisition.

## PREPOSITIONS: ICELANDIC VERSUS SWEDISH

In Danish and Swedish, just as in English, prepositions are unstressed and verb particles are stressed. The phonological forms occurring as particles are thus prosodically spotlighted and can, in effect, be expected to be attended to and internalized earlier by the child than forms occurring as prepositions. Further, some phonological forms can occur both as prepositions and as particles, e.g., *i* 'in' and *pá* 'on'. And we find across the two Danish and the two Swedish case studies we have analysed so far, that, indeed, the first prepositions to emerge in the children's production are forms that also occur as particles in the specific input to these children. Let us assume that children first establish the phonological form of a particle/preposition on the basis of its occurrences in stressed (i.e., particle) position. They can then use this information to help them recognize these forms when they occur as unstressed phrase-internal prepositions. On this account we would expect that it is precisely these dual particle-prepositions that will be the first

prepositions produced in early grammatical development.

We observed above that the first handful of particles in Scandinavian child language development also includes the adverbs *in* 'in<sub>dir</sub>', *upp* 'up', *ner* 'down', and *ut* 'out'. If we turn to Icelandic, the corresponding items are ambiguous between adverb and preposition and their status is determined by context. When they occur in a verb phrase like *hljóp út* 'ran out' they are classified as adverbs according to Icelandic grammatical descriptions (see, e.g., [15]). In this type of construction both the verb and the adverbial element receive stress, that is  $\acute{V} + \text{PRT}$ .<sup>5</sup> And when they occur in unstressed position before NP, they count as prepositions, for example *hljóp út ganginn* 'ran out (of) the corridor', that is,  $\acute{V} + \text{PREP} + \acute{\text{NP}}$ . A consequence of this set of distributional properties is that the great majority of phonological forms that can serve as prepositions (unstressed) can also appear in stressed position, namely when they are used as adverbs. In Swedish (or Danish) the class of items of which the same distributional properties are true constitutes but a minority (basically, it is confined to a subset of compound prepositions, such as, e.g., *framát* 'right-on-towards' and *igenom* 'in-through'). Again, on the assumption that children adopt the strategy of establishing the phonological forms in question on the basis of their occurrences in stressed (rather than unstressed) position, Icelandic children would be able to apply this strategy to a greater number of items than their Swedish or Danish peers.

To explore this hypothesis empirically, the set of prepositions which the longitudinal

<sup>5</sup>The diacritic signs in the Icelandic examples are there for orthographic reasons and are not related to stress.

<sup>6</sup>In Icelandic, the construction  $\text{V} + \text{PRT}$  (i.e., with phrasal stress on the particle) is reserved for lexicalized (non-compositional) meanings, for example, *lita út* 'look'.

subject "Markus" produced by 24 months of age was compared with the corresponding data from the Icelandic subject "Ari". Again we restrict our analyses to items encoding spatial relations.

The difference found in the production data from Ari (Icelandic) and Markus (Swedish) at 24 months is striking: 12 different prepositions for Ari and only 3 for Markus.<sup>7</sup> There is no corresponding difference in the input data to the two children; in fact, the input data are identical in terms of type frequency: 23 different prepositions in the input to Ari and 23 to Markus. There is a striking difference between the Icelandic and the Swedish input, however, in terms of how the 23 items are distributed over positions with and without stress. Out of the 23 Icelandic items 12 were also used as adverbs. That means that the phonological forms of 12 of the 23 prepositions occurred with stress. The corresponding figures for Markus is just 3 of 23 (3 out of 23 prepositions were also used as particles). The three prepositions in question were the same three as Markus produced in his own speech by 24 months of age, i.e., *i* 'in', *pá* 'on', and *till* 'to'.

## CONCLUSIONS

We interpret the precocious emergence of particles in the two Danish children and the likewise precocious acquisition of prepositions in the Icelandic child as effects of prosodic spotlight, — although not exclusively of prosodic spotlight. In a controlled

<sup>7</sup>Ari's 12 prepositions were *i* 'in', *inní* 'inside/into', *oni* 'down-inside/onto', *á* 'on', *nídrá* 'down-on', *uppá* 'up-on/onto', *af* 'of', *tíl* 'to', *frá* 'from', *hjá* 'by/with', *undir* 'under', and *yfir* 'over'. Markus's 3 prepositions were *i* 'in', *pá* 'on', and *till* 'to'. There are no indications that this difference follows from an overall difference in grammatical level between the two children such that Ari would be more advanced than Markus. Across the data points from Ari at 24 months, Ari's MLU in terms of number of words per utterance is 2.33, that is, indicative of Brown's "stage 2" speech [1]. The corresponding figure for Markus is MLU 3.11.

experiment in which the task is to learn a fragment of an artificial language and the subjects of the experiment group would profit from the presence of prosodic spotlight, it would be possible more clearly to disentangle such a spotlight from other determining factors (such as input frequency etc). Real language development, however, takes place in multidimensional environments where a host of factors interact to determine the structure of acquisition. The purpose of our particular crosslinguistic approach, the within-group approach, is to study aspects of language development in naturalistic settings, keeping as many factors as possible under control, while varying the particular determining factor under scrutiny. On the basis of our intra-Scandinavian contrastive analyses, we conclude, then, that prosodic spotlight can interact with other determining factors (such as cognitive development, input frequency, etc) in ways that facilitate the acquisition of particles and prepositions to a degree that is clearly observable. Our observations indicate that this facilitation process can already be evident at the beginning of the child's second year of life.

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