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ABSTRACT

An experiment was conducted to gain insight into the demarcative function of stress and intonation by testing the effectiveness of these features in resolving structural ambiguity. The responses of native speakers were analyzed both in the production and in the recognition of 68 pairs of potentially ambiguous sentences. Special care was taken to duplicate spontaneous language behavior by providing contextual clues for the identification of the constructions by the recording as well as by the listening informants. The statistical analysis of the performance of the speakers and the listeners showed varying degrees of positive correlation between syntactic type and prosodic feature pattern, depending on the syntactic constructions involved. A closer examination of the phonetic, grammatical, and semantic nature of the tasks which the informants faced as well as the differences between the performance of speakers and listeners in the several categories suggested that some prosodic features have a demarcative function inherently, while others only incidentally, the latter being the manifestations of rules whose domains coincide with certain syntactic boundaries. (Author/DO)

AN EXPERIMENT ON STRESS AND INTONATION AS SYNTACTIC MARKERS IN HUNGARIAN

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Paper read at the Annual Meeting of the
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The series of experiments which I conducted were aimed at shedding some light on the relationship between prosodic features, and syntactic constructions in Hungarian. The following questions were asked: What is the nature and the form of this relationship? Which intonation contours and stress patterns are associated with which syntactic constructions? Are the former in a one-to-one relationship with the latter? Are there specific prosodic markers for specific syntactic constructions? Is a given syntactic construction always signalled by a given prosodic marker, and is every occurrence of that prosodic marker also an occurrence of the same construction?

It seemed that a paired utterance test might provide an insight into these problems. Utterances were found, each of which, apart from the hypothesized prosodic content, was the manifestation of two syntactic constructions; they were structurally ambiguous, and the ambiguity was expected to be resolved by intonation and stress. Let us first see the sources of structural ambiguity in Hungarian.

Well definable morphological phenomena serve to identify succeeding sequences of morphemes in a sentence as the manifestations of various syntactic constituents, phrases of the sentence. The string of these phrases in a simple sentence will contain only one finite verbal form, identifiable by a proper suffix and any number of nominal phrases, each marked at the end by a proper final case suffix.

(1.)

Det	N	N	Det	N	N Sf	V	N Sf
A	legkisebb	lány	egy	rövid	szoknyát	kapott	karácsonyra.
"The	most-smaller	girl	one	short	skirt (acc.)	received	Christmas-for"

'The smallest girl got a short skirt for Christmas.'

The nominals used attributively within each phrase have zero final suffixes, and consequently in deciphering the structure of the string the hearer may interpret each nominal as attributive to the next, until he finds a final suffix which would signal the end of that phrase, and so on.

The nominative suffix marking the subject phrase, however, is zero, as can be seen also on the previous example. The boundary between the two successive phrases would then be obliterated if no determiner follows and such a string of nominals may be the manifestation of either one or two phrases as shown in the next example.

(2.)

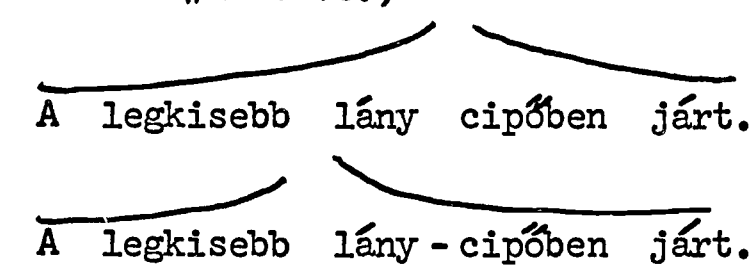
Det	N	N	N	Sf	V
A	legkisebb	lány	cipőben		járt.

"The most-smaller girl shoe-in walk-ed."

(a) 'The smallest girl walked in shoes.'
(b) 'The smallest one walked in girls' shoes.'

The hypothesis is that, at least in certain cases, the structural interpretation is not ambiguous, because prosodic phonological constructional markers are als present.

In certain cases only. If the ambiguity is explained to a native speaker he may very well differentiate the two sentences like this: (Refer to #2 above.)



There is little doubt again that if the set of sentences so pronounced and presented in succession to another motive, with the proper explanation in grammatical terms, he would be able to assign each

rendition to the originally intended structure. He will say that in the first rendition the first two nominals constitute one phrase, in the second rendition they constitute two. In a sense then the conditions of the paired utterance test are satisfied: distinctive utterances are evoked and they are recognized as distinctive.

But in another sense we are not satisfied.

Let us take another kind of ambiguity, the well-known and quite unexciting case of consonant assimilation in Hungarian. The feature of voicing in a cluster is determined by the last member of that cluster which is distinctively marked in that respect.

(3.)	ég	[ēg]	'sky'	[ēkserű]
	ék	[ēk]	'wedge'	(a) 'sky-like'
	szerű	[serű]	'similar'	(b) 'wedge-like'

E. g. Let us take the three morphemes [ēg] 'sky', [ēk] 'wedge', and [serű] 'similar'. Either the first [ēg] or the second [ēk] may form a word with the third [serű] yielding [ēkserű] meaning either 'sky-like' or 'wedge-like'.

The linguist hears only one phonetic form. The educated layman, if his attention is called to it, insists that he is producing two. Typically he will say: "The first one is not [ēkserű] but [ēkserű]," but if hard enough pressed, or if inventive enough, he may produce the ungrammatical [ēgserű] contrasted to [ēkserű].

The following assumptions have been made:

1) There is a way to disambiguate almost any structurally ambiguous sentence.

2) The speaker is normally unaware of the ambiguity if only one version is presented.

Consequently, the disambiguation of ambiguous sentences sheds light on the occurrence of prosodic construction markers only if they are not presented in contrasting pairs to the informant.

Putting it another way: If lack of distinctiveness is suspected, this information should be kept from the informant,or he may "manufacture" phonetic distinctiveness.

If we want to find out whether two constructions have identical or different phonetic manifestations, we would want to control to our satisfaction the construction and see what the phonetic manifestation is, without suggesting to the informant the possible presence of a phonetic symbol.

To achieve this goal the ambiguous sentence was inserted in an environment which allows only one specific interpretation. The sentence was recorded alone and eventually it was submitted to an informant for listening and assignment to one of two outlined situational contexts.

For example:

The ambiguous item:

(4.) A másik papucsban még az előszobába se megy ki.

"The other slipper-in even the fore-room-in not goes out"

(a) 'He (or she) does not even go out into the hall in the other slippers.'

(b) 'The other one does not go out even to the hall in slippers.'

Following the definite article a we have a sequence of two nominals. The first one másik meaning 'other' is a kind of indefinite pronoun, which may function either as attribute as other does in English or as head in a phrase, as the other one would in English. The second, papucsban 'in slipper' or 'in slippers', is an adverbial, consisting of the noun papucs 'slipper' (or 'pair of slippers') and the suffix ban 'in, inside'.

Accordingly, the first reading would be: 'He (or she) does not go out even to the hall in the other slippers.' And the second: 'The other one does not go out even to the hall in slippers.'

The first reading is elicited from the informant by the following context (given here in translation only): 'He (or she) wears only the new slippers in front of strangers.' Then the item: which should be interpreted as: 'He (or she) does not even go out to the hall in the other slippers.'

The elicitation of the second reading: 'One of the two sisters always walks in slippers, even on the street.' The item: 'The other one does not go out even to the hall in slippers.'

For the reasons stated above, both readings of this item were elicited and recorded on separate occasions, and again played back on separate occasions. When each of the readings was played back, the listening informant had to indicate which of the two possible interpretations he heard. In this case a choice between the two contrastive items present was allowed, because the extent of agreement of the informant with either of the interpretations would otherwise have no reference point.

To continue the above example: the item heard:

A másik papucsban még az előszobába se megy ki. The choices offered in writing:

(a) "We are talking about two men."
(b) "We are talking about two slippers."

After this procedure was completed we had two recordings of 68 potentially ambiguous items by each of five native speakers, and the interpretations of each of these recordings by six native speakers. At this point we could find out if the interpretations of the listeners of each recording were in line with the conditioning context which was supposed to present the item for recording as a manifestation of a specific one of two possible constructions.

Again going back to our example, what we want to find out is if the listeners interpreted the item as "talking about two men" when that particular recording was indeed made in a context suggesting that construction, or not.

(5.)

	recorder		listener		composite	
	r_t	%	r_t	%	r_t	%
comp 2	.84	100	.93	88	.86	88
N + N 3	.79	85	.87	76	.68	89
N+N+X 4			.50	84	.53	92
N + N 5			.78	94	.58	94
N+N+X 6	.45	61	.84	49	.37	88
N+N+N 7	.64	84	.81	74	.35	88
N+N+X 8	.73	66	.75	48	.25	85
S + S 9					.98	

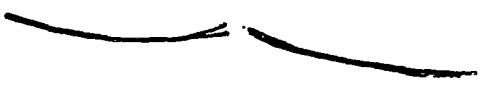
The column "%" indicates the percentage of clearcut responses to which the correlation coefficient, "r_t" applies.

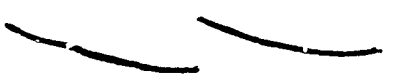
The correlations are presented here broken down into eight groups set up on the basis of the environment of the two nominals in the sentence. On the above table, underlining stands for the grammatical category of "emphasis". As can be seen, the correlation figures with a theoretical optimum value of 1, range from a moderately high 0.68 for a sentence manifested by a sequence of two nominals to a low 0.25 for a sequence of two nominals followed by some other emphasized part of the sentence.

In the correlation figures we have an indication of the extent of the carry-over from the suggested construction of the item through its reading to its assignment to that construction. What mediates this carry-over is, of course, the reading of the item, more precisely, the prosodic features contained in the reading, which would be assumed to serve whatever disambiguation is taking place. If the listeners are able to indicate consistently the construction which was suggested to the reader, it means that the two readings differ in pronounciation, presumably in their prosodic context. Each "correct" indication is the result of two discrete performances, that of the speaker in choosing a certain prosodic marker, corresponding to the suggested construction, and that of the listener, indicating an interpretation corresponding to the prosodic content he heard. This is significant not only from the point of view of performance but also from the point of view of the linguistic system, because the very moderate correlation figures at least raise the possibility that the prosodic marking may not be bi-unique.

The highest degree of correlation was found when the intonation patterns of the recorded items were analyzed as concave, convex and interrupted-descending, depending on the shape of their angle at the border of the two constructions.

(6.) (a) concave 

(b) convex 

(c) interrupted descending 

It was found that a convex intonation curve turning point has high correlation with the presence of a phrase boundary, a concave intonation curve turning point with the absence of one, and the interrupted-descending was found to have no correlation either way. The correlation coefficients for the binominal sequences range from 0.45 to 0.79 for the recorders and from 0.50 to 0.87 for the listeners. Some of these figures show a substantial degree of correlation. It must be noted, however, that the correlation figures for the speakers were based only on the two non-neutral intonation contours, ranging from 61 to 85 per cent of the recorded sentences. Again the listeners could and did indicate "no preference" for either of the two indicated constructions. Clear preferences ranged from 48 per cent to 94 per cent of the observed items for the several structural types. (See table above.)

These data seem to indicate that for the structural types selected a speaker may use an intonation pattern which <u>does</u> signal a particular construction, and is recognized as such by the listener, but he may use another one which provides no clue for the interpretation of the construction involved.

From the point of view of the linguistic system we would say that at least for the types of constructions covered in this experiment no bi-uniqueness relation exists between syntactic construction and intonation patterns in Hungarian.

Certain details of the experimental results, however, force us to assume that the relationship between syntactic construction and prosodic marking is even more tenuous.

For the structural types bearing emphasis on the first nominal, the performance of the recorder was consistently lower than for similar types without the emphasis. It turns out that there is no way to show by intonation a main IC cut between an emphasized element (for example the subject) and the following predicate.

(7.)

Det	N	N
A	legkisebb	lány
"the	most-smaller	girl"

'The smallest one is a girl.'

For example: A legkisebb lány shows emphasis on the first N, but no IC cut. In this case intonation patterns can not, even optionally, signal the main IC cut.

Another observation: As the critical syntactic border moves away from the end of the sentence, the relationship between construction and intonation becomes weaker. An examination of the results shows that in just about every case when another element was added to the nominal - plus - nominal sequence, the correlation figures dropped quite significantly, mostly for the recorders.

It seems that in such a case there are just fewer occurrences of the convex intonation turning point which so clearly signals a main IC cut. The reasons for this appear to be the following:

If the second half of a convex intonation turning point is a steep falling contour its first half may be either rising or gently falling.

If the second half, however, is gently falling, the first half is always rising. A steep falling contour occurs at the end of the test sentences only, or rather it is always the last intonation curve in a sentence. When the ambiguous sequence of the two nominals is not within the domain of the sentence - final contour, the only way to get a convex contour turning point is if the first contour is rising and this is apparently not too terribly frequent.

The intonation contour turning points then, while they show substantial correlation with syntactic IC structure, turn out to be not independent entities, but accidental conglomerations, which when they do occur indicate structural boundaries somewhat in the manner of certain consonant clusters indicating external open juncture in someelanguages.

It turns out that the rising contour which was shown to have a disambiguating potential in that environment also has a separate function. It may signal what I would like to call the "topic" of the sentence as separate from the subject. It occurs to fulfill that function, and since the topic apparently does not cut across IC boundaries, wherever it occurs it does signal by its domain the boundaries of some syntactic construction.

I suspect that the prosodic marking of IC structure in Hungarian will turn out to be very much of this nature. Intonation contours may serve to outline such functions as topic, comment, emphasis, etc. for certain portions of the string; and to the extent that these portions constitute syntactic constructions, they signal the boundaries of these by their domains. The problem is inextricably bound up with word order in Hungarian, which probably has a similar relationship to syntactic structure.

Shane Eleanor 8 R