

## Phonetica

Editor: E. ZWIRNER, Münster in Westfalen  
S. KARGER – BASEL/NEW YORK (Printed in Switzerland)  
SEPARATUM

Phonetica 22: 1–10 (1970)

### The Prosodic Formatives of Modern German<sup>1</sup>

H. WITTMANN

McGill University, Montreal

The reality of stress and pitch may be seen on two intersecting levels, competence-performance and syntactic-morphological. SAUSSURE had been the first to distinguish a *linguistique de la langue* from a *linguistique de la parole* and particularly a syntagmatics below from one above the level of the formative<sup>2</sup>. This conception of language was mostly rejected in America and has come only recently into the forefront of serious debate. Up until then, discussions of stress and pitch had moved largely around the theoretical framework of BLOCH and TRAGER [1942] and its application to English by TRAGER and SMITH [1951]. Since 'taxonomic' phonemics in America has had great difficulty lately to convince of any inherent adequacy in its tenets, it should not be unexpected that its conceptions of stress and pitch for German should come under critical review.

The work most representative of any phonemic structure of German is the one by MOULTON [1947, 1962]. He *does* recognize morphological and syntactic levels for stress, and implicitly a syntactic level for pitch<sup>3</sup>, but lumps all discrete units isolated on these levels into one category of 'suprasegmental phonemes'. CHOMSKY *et al.* had been able to distinguish suprasegmental phonemes from suprasegmental morphemes as far back as 1956, and had presented reasonable proof that similar conditions were to be expected for English, German, and

<sup>1</sup> This research was supported by grants from McGill University 943-00-26 (1966) and 943-00-9 (1968).

<sup>2</sup> For a review of SAUSSURE's conception of language, cf. WITTMANN [1967].

<sup>3</sup> Thus implicitly excluding the possibility of pitch phonemes operating on root morphemes which reflects, of course, the actual situation for German.

Yiddish, i.e. one stress phoneme and a number of stress and pitch morphemes. MOULTON's [1962] extensive comparison of the phonemic structures of English and German does not account in any way for the grammatical status of syntactic stress and intonation. As might be expected, the langue-parole-issue is nowhere given a serious analysis. MOULTON's stand cannot be described as explicitly 'antimentalistic', an accusation that would be fashionable to level against him. In spite of his claim that only the audible is acceptable as evidence for analysis, his position is better characterized by a complete lack of interest in the issue than a genuine stand on mentalism. Consequently, his description offers neither a model of performance nor one of competence but something which is neither-nor and a little bit of both. His contrastive study cannot therefore be compared to straight-forward phonetic accounts like DELATTRE's [1965].

In the meantime, an adequate presentation of syntactic stress and intonation in German on the level of *linguistique de la parole* has been provided by ISAČENKO and SCHÄDLICH [1966]<sup>4</sup>. Henceforth, any attempt to abstract a German speaker's prosodic performance into a model of competence will have at least to account for the *faits de parole* recorded in their treatment of the matter. There are actually two such attempts, one by ANTONSEN [1966], the other by BIERWISCH [1966]<sup>5</sup>.

ANTONSEN neatly simplifies MOULTON's taxonomy into one stress phoneme // and four suprasegmental morphemes { °, |, †, ‡ }. Though this inventory of elements is doubtlessly beyond reproach, his syntagmatic treatment contains a number of inadequacies. Any single utterance, for instance, is said to be able to contain more than one syntactic accent. Examples include:

- (1) *Sie besitzt °viele °Kléider‡*
- (2a) °*éin* °*Hórn‡* (one horn)
- (2b) but: *éin* °*Hórn‡* (a horn)
- (2c) °*Einhórn‡* (unicorn)
- (3) *Es °régnet °jétzt‡*

<sup>4</sup> «Die Verfasser haben im Bereich der prosodischen Lauteigenschaften ein Testverfahren entwickelt, welches sich auf die Beurteilung *künstlich erzeugter* und deshalb in allen relevanten Parametern kontrollierbarer Signale durch Normalhörer stützt» [7].

<sup>5</sup> Though the former didn't benefit from the insights gained by ISAČENKO and SCHÄDLICH.

For the first sentence, ANTONSEN fails to point out that we don't have here a single sentence but an embedding transformation operating on the kernel.

(4) *Sie besitzt °Klédier↓*

He develops nowhere the concept of a kernel sentence, and his discussion of the co-occurrence of suprasegmental morphemes with segmental ones evolves outside of any reference to the syntactic structure of the sentences involved. He fails to show that the prosodic markings of constituents in larger sentences reflect the derivational history of that sentence. The markings of (2a) and (3), on the other hand, do not bear any relation to fact or fancy<sup>6</sup>.

Though the place of the syntactic stress is more or less implicitly stated, there is no rule that could explicitly take care of °*Póstbóte* by predicting which of the two stressed syllables will ultimately co-occur with the syntactic stress. Co-occurrence on the second element would render the entire sequence unacceptable to the native speaker<sup>7</sup>. The question which of the two // is to be selected can only be answered if these two // have been graded relative to each other [cf. KIPARSKY, 1966].

Another structural fact that has to be stated unambiguously is the reciprocal conditioning between {°} and the terminal {↓} and {↑}. ANTONSEN explains (589): 'Some speakers of German normally lower the pitch for syntactic accent, and all speakers do so at times, especially in utterances ending in a rising terminal.' All these 'some', 'normally', 'at times', 'especially' allow for considerable latitudes, such as falling {°} with {↓} and rising {°} with {↑}. Nothing could be further from the truth. A rising terminal always correlates with a falling-rising tone for the syllable with syntactic stress; a falling terminal correlates with a rising-falling tone. ANTONSEN continues: 'Since this is a free variation without linguistic significance, all that need be noted in a phonemic transcription is the point at which the *change* occurs; this is accomplished by the symbol for the syntactic accent.' One might want to agree with him there. The same cannot be said when he analyses the possible realizations of the emphatic

<sup>6</sup> I suspect that the author tried to introduce some sort of grading of the stress phoneme in *ein* and *Hörn* in the vein of KIPARSKY [1966], but avoided to contradict his binary *accented-unaccented* opposition.

<sup>7</sup> Cf. some of the tests in ISAČENKO and SCHÄDLICH [1966].

accent (597): 'These extra height and stress features are clearly allophonic variants of the first syntactic accent in an utterance. A rendition with these features does not alter the linguistic meaning of the utterance, ...' It is impossible to substantiate this claim. If, for the utterance *Sie liebt ihn heiß*, we had decided to syntactically stress *ihn*, the following possibilities would become apparent:

- (5a) *Sie liebt* °*ihn* héiβ↓
- (5b) *Sie liebt* ↑°*ihn* héiβ↓
- (6a) *Sie liebt* °*ihn* héiβ↑
- (6b) *Sie liebt* ↓°*ihn* héiβ↑

Sentences (5b) and (6b) have obviously an added element of surprise. Though the pitch contours for *ihn* between 5a/5b and 6a/6b are similar, respectively rising-falling and falling-rising, they are by no means identical. It is unreasonable to think that the extra effort in (5b) and (6b) does not correlate to anything tangible in the deep structure, especially since it is a rule-governed process, highly predictable. Indeed, (5a, 5b, 6a, 6b) can be neatly collapsed into a single rule by utilizing a simple alpha-switching device. There is total economy as far as the number of symbols is concerned: The terminals {↓, ↑} are also used to co-occur with {°}; they cannot be mistaken for terminals in that position, since they precede the segment they modify. This might indeed be more of a 'striking simplicity of the system' than ANTONSEN originally bargained for.

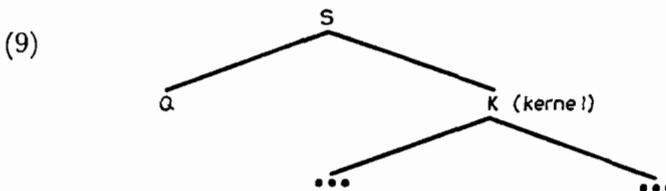
What ANTONSEN lacks in complexities, BIERWISCH lacks in simplicity. The latter considers the question intonation as some sort of reflex of the element Q in the deep structure. As an effect of Q, [rise] does not have 'meaning' proper. Consequently, he doesn't need to give it the status of a formative; they remain phonemes. The element E = {°} constitutes the only suprasegmental morpheme in BIERWISCH's system. This view may be taken to be exactly opposite to the one taken here. BIERWISCH does not consider {↓ ↑} to be alternative choices of formatives obligatory to the mapping out of a kernel sentence. He reduces effectively the kernel-transform hierarchy into a number of binary oppositions (166).

Type	Question word	Question inton.	SN/FV invers.	Alternative
(7) (a)	+	+	-	-
(b)	+	-	-	-
(c)	-	+	+	-
(d)	-	+	-	-
(e)	-	-	+	+
(f)	-	-	+	-
(g)	-	-	-	-

These types correspond to the following sample sentences:

- (8) (a) *Wen hast du getroffen* [rise]  
           1                  4  
 (b) *Wen hast du getroffen* [fall]  
           2                  1  
 (c) *Hast du Klaus getroffen* [rise]  
                   2          1  
 (d) *Du hast Klaus getroffen* [rise]  
                   1          4  
 (e) *Hast du Klaus oder Sabine getroffen* [fall]  
                   1          1          3  
 (f) *Hast du Klaus getroffen* [fall]  
                   2          1  
 (g) *Du hast Klaus getroffen* [fall]  
                   2          1

Our kernels (5a) and (6a) are included here under (8g) and (8d)<sup>8</sup>. Thus, question sentences are conceived as having the basic structure



<sup>8</sup> BIERWISCH does not account for the regular possibilities of (5b) and (6b), since they are already excluded from the report by ISAČENKO and SCHÄDLICH [1964, see note on page 59], on which BIERWISCH based his knowledge of the relevant faits de parole.

where the constituent Q may be zero which is the case for (7g) only. The basic structure of the sentence however, BIERWISCH continues, cannot be specified without relating the possible question sentences to all the regularly possible responses. The basic structure of a possible response is determined by the kernel of its corresponding question sentence<sup>9</sup>. The question word is substitutable with a lexical constituent, and *Ja* und *Nein* + Neg. are possible constituents under explicit conditions. It seems to me that BIERWISCH distinguishes between two types of basic structures: the basic sentence and the kernel proper. Q and R are equivalent constituents which make up the difference between the kernel K and the basic sentence S. Intonation is only one of the constituents and the only obligatory one of both Q and R, whereas K does not contain any intonational constituents. This view is inconsistent with the principle of simplicity in the ordering of rules, if the latter is to reflect the relative chronology, i.e. the ontogenetic history of these rules<sup>10</sup>. The position taken here is that kernels reflect restructurations of earlier one-word sentences. The earliest one-word sentences contain prosodic specifications; the transition from one-word sentence to kernel is characterized by the process of syntagmatic blending<sup>11</sup>. If blending may be seen as a type of recoding below the level of the kernel, a syntactic transformation corresponds to the type of recoding above the kernel. In this view, a German kernel must contain at least the prosodic specifications of 5a/6a; a syntactic transformation operating on such a kernel must also specify the structural change undergone by any of the kernel's prosodic constituents. Whereas, in the case of German, {<sup>o</sup>} is always retained, [↓, ↑] may be neutralized as {↓} or be retained. Under certain circumstances, a lexical formative co-occurring with {<sup>o</sup>} and terminal {↓} may be replaced with a grammatical formative containing the semantic isolate Q, if the {↓} is concurrently replaced with {↑}; in this instance, the actual [rise] may be optional in the surface structure. The 'sustaining' {↓} doesn't necessarily correspond to anything audible in the surface structure. As a matter of fact,

<sup>9</sup> BIERWISCH excludes evasive responses such as *Ich weiß es nicht* from consideration.

<sup>10</sup> Cf. H. ISENBERG [1965, 154] with references.

<sup>11</sup> On blending, see BOLINGER [1961] and HOCKETT [1968, 89-98], though the latter adds [1968, 98, fn. 35]: '... the paleo-transformationalist notion of a phrase-structure "kernel" must be viewed as, at best, a descriptive convenience.' Cf. also WITTMANN [1967, 6 and fn. 9].

- (10a) *Das sind* °*hübsche Beine*↓  
 (10b) *Das sind* |°*hübsche*| °*Beine*↓

have almost identical surface structures but have different transformational histories. (10a) is the transform of *Die Beine sind* °*hübsch* ↓, whereas (10b) is the transform of  $S_1$  (*Das sind* °*Beine* ↓) +  $S_2$  (*Sie sind* °*hübsch* ↓).

There remains the problem of 'juncture' below the level of the kernel. Here, MOULTON's authority for German has not been challenged in any systematic way. Implicit criticisms are voiced by LEOPOLD [1948] and in the articles by ANTONSEN and BIERWISCH. The following comments are motivated by DWIGHT L. BOLINGER's 1963 article which influenced considerably my views on the subject.

In MOULTON's view, (internal) open juncture represents a way to give audible clues to the grammatical structure of utterances [1962, 139]. There appear to be two ways in which open junctures may be audible: (a) by an actual pause; (b) by a phonetic feature characterizing the phoneme standing in open juncture with the preceding one. The only minimal pairs offered for the former seem to be

- (11) *kau* °*Flachs*↓ : *kauf* °*Lachs*↓  
 (12) °*Bundesfähre* : °*Bundessphäre*

The characterizing features are aspiration in the case of / p t k / and glottalization in the case of a vowel.

In order to test the first assumption, four more pairs were added to (11, 12):

- (13) °*Fallschur* : °*falsch nur*  
 (14) °*hätt' sich* : °*hetzig*  
 (15) *herrscht* °*weiß* : *Herr* °*Schweiß*  
 (16) °*hat's wo* : °*hat zwei*

The segments of all the pairs (11–16) were recorded in connected speech, then cut to make up the pairs on the test tape. The resulting test material was subjected to spectrography analysis and a listening experiment<sup>12</sup>. Except for (12) in the spectrographic analysis<sup>13</sup>, there

<sup>12</sup> I am indebted here to ANDRÉ RIGAULT of McGill University who offered me the facilities of his laboratory; to a group of German expatriates living in Stockholm for considerable enthusiasm in the listening experiment.

<sup>13</sup> The 'ss' showed up 'long'.

wasn't anything in the results that could have suggested anything like a 'juncture'. I don't think any criteria of 'sloppy' speech can be invoked here. As a matter of fact, the 'subjects' tested in the listening experiment came up with a few examples of their own.

(17) °*Hirsch heißt mein Vater*↓

(18) °*Hirz hielt man*↓

If the opinions voiced in LEHISTE [1960] and BOLINGER [1963] reflect the actual surface structure in English<sup>14</sup>, then German may be said to resemble French and Spanish more closely than English<sup>15</sup>.

The second of MOULTON's assumptions necessitates also assuming a number of exceptions. Indeed, [pap'í:r] *Papier* and [pak'é:t] *Paket* have non-aspirated initials and aspirated medials; [re:ʔá:l] *real* and [ruʔí:nə] *Ruine* have glottalization in medial position. The argument that 'foreign' words don't qualify for consideration does not hold. If we were to apply this criterion to English, we would be left with barely 40% of its vocabulary to work with. Even if we were to rule out these 'foreign' words, what does the data of MOULTON's second assumption imply? Simply that a native speaker of German 'knows' the surface structure of German morphemes, the same knowledge that allows him to differentiate \**Brick* from both *Blick* and \*\**Bnick*. Having a conception of the phonological word is a prerequisite to speech recognition; this is just as true for speakers of French and Spanish.

Speech recognition, as well as speech production, are both faits de parole rather than faits de langue. If we are interested in the abstract structure of competence rather than performance, then MOULTON's assumptions need not concern us any longer. As far back as 1938, MARTINET<sup>16</sup> held 'open juncture' as non-distinctive on the surface structure level (level of the second articulation); deep structure boundaries could manifest themselves as possible pauses optionally in the surface structure. This was called a 'procédé expressif' with 'valeurs expressives' for the possible pauses. This differentiates what is incidental in parole from what is planned in langue. Breath groups are

<sup>14</sup> BOLINGER sees open juncture present under two conditions: as an ontogenetic residue, or as a reversion.

<sup>15</sup> DELATTRE [1965, 36] in his comparison of the four languages seems to follow MOULTON on the latter's authority.

<sup>16</sup> Reprinted in 1965 (44 ff.).

mainly a physiological necessity and incidental to the system, though they *may* be used or *may* overlap with the sense groups of langue. The same is true of syllables and juncture which may or may not be used in a language as devices to identify (segmental) formatives and intra-segmental boundaries. Describing all the possible boundaries in a German kernel is outside the scope of this paper. Suffice it to indicate that pseudo-formatives may be expected to be marked differently from syntagmatic assemblages<sup>17</sup>.

### Summary

MOULTON's original model for the 'supra-segmentals' of German is contrasted to those of ANTONSEN and BIERWISCH respectively. All these conceptions fail to enumerate prosodic specifications as features inherent to the syntactic kernel. Moreover, prosodic formatives cannot be specified in any adequate way without a clear conception of intrasegmental boundaries. Here, MOULTON's authority for German has not been challenged in any systematic way. A closer look at the surface structure situation in German, however, reveals 'open juncture' to be less distinctive than MOULTON would have us believe.

### Zusammenfassung

#### Die prosodischen Merkmale im heutigen Deutsch

MOULTON'S Modell der «Suprasegmental-Phoneme» im Deutschen wird hier denen von ANTONSEN und BIERWISCH gegenübergestellt. Keine dieser Vorstellungen ist jedoch in der Lage, prosodische Gegebenheiten als Grundeigenschaften des syntaktischen Kerns nachzuweisen. Prosodische Merkmale lassen sich nicht bestimmen, wenn eine genauere Vorstellung der intra-segmentären Grenzsignale nicht vorliegt. Die Glaubwürdigkeit der Thesen MOULTON'S (betreffs der Situation im Deutschen) ist aber nie recht in Frage gestellt worden. Wenn man aber die Frage anhand der Oberflächenstruktur des Deutschen näher berücksichtigt, dann ergibt sich, daß den «internen» Grenzsignalen nicht die Rolle zugesprochen werden darf, die MOULTON ihnen zgedacht hat.

<sup>17</sup> A theory of the dictionary and the nature of possible entries has to allow for what might conveniently be called 'pseudoformatives', i.e. such items which are traditionally called 'compounds' and 'derivatives' but which *behave functionally like single formatives* [WITTMANN, 1964, 1968]. This may very well include 'idiomatic expressions' of the type *in Kraft treten*. Indeed, *in Kraft* cannot undergo a question transformation independently from *treten* (\**Wohin ist das Gesetz getreten?*). Therefore, it wouldn't be possible to consider *in Kraft* an independent constituent as *in die Stube*. Cf. the concept of teilbare and unteilbare Wortkörper in WITTMANN and FISCHER [1964].

*Résumé***Les traits prosodiques de l'allemand de nos jours**

Le modèle descriptif que MOULTON a tracé pour les faits prosodiques de l'allemand a été comparé ici aux élaborations d'ANTONSEN et de BIERWISCH sur le même sujet. Toutes ces conceptions de la question, cependant, n'arrivent pas à énoncer les spécifications prosodiques en tant que caractéristiques inhérentes au noyau syntagmatique. Il est bien impossible de spécifier de façon appropriée les traits prosodiques d'un syntagme sans en connaître les traits démarcatifs. Dans ce domaine-ci, l'autorité de MOULTON (pour l'allemand) n'a jamais été sérieusement mise en question. Pourtant, l'examen de la situation de l'allemand au niveau du signifiant indique que «la joncture interne» est beaucoup moins distinctive que MOULTON voudrait nous faire croire.

*References*

- ANTONSEN, E. H.: Suprasegmentals in German. *Language* 42: 587-601 (1966).  
 BIERWISCH, M.: Regeln für die Intonation deutscher Sätze. *Stud. grammat.* 7: 99-201 (1966).  
 BLOCH, B. and TRAGER, G. L.: *Outline of linguistic analysis* (Baltimore 1942).  
 BOLINGER, D. L.: Syntactic blends and other matters. *Language* 37: 366-381 (1961).  
 BOLINGER, D. L.: Length, vowel, juncture. *Linguistics* 1: 5-29 (1963).  
 CHOMSKY, N.; HALLE, M. and LUKOFF, F.: On accent and juncture in English. For Roman Jakobson, pp. 65-80 (The Hague 1956).  
 DELATTRE, P.: Comparing the phonetic features of English, French, German and Spanish. An interim report (Heidelberg 1965).  
 HOCKETT, C. F.: The state of the art (The Hague 1968).  
 ISAČENKO, A. V. und SCHÄDLICH, H. J.: Untersuchungen über die deutsche Satzintonation. *Stud. grammat.* 7: 7-67 (1966).  
 ISENBERG, H.: Diachronische Syntax und die logische Struktur einer Theorie des Sprachwandels. *Stud. grammat.* 5: 133-168 (1965).  
 KIPARSKY, P.: Über den deutschen Akzent. *Stud. grammat.* 7: 69-98 (1966).  
 LEHISTE, I.: An acoustic-phonetic study of internal open juncture. *Phonetica* 5 Suppl. (1960).  
 LEOPOLD, W. F.: German *ch*. *Language* 24: 179-180 (1948).  
 MARTINET, A.: *La linguistique synchronique. Etudes et recherches* (Paris 1965).  
 MOULTON, W. G.: Juncture in modern standard German. *Language* 23: 212-226 (1947).  
 MOULTON, W. G.: *The sounds of English and German* (Chicago 1962).  
 TRAGER, G. L. and SMITH, H. L.: *An outline of English structure* (Norman 1951).  
 WITTMANN, H.: The internal structure of the morpheme (Mimeo, University of Windsor 1964).  
 WITTMANN, H.: Saussure's theory of language. 10th int. Congr. Linguists, Bucharest (1967).  
 WITTMANN, H.: Zur Grundfrage der modernen Sprachwissenschaft. *Sprache* 14: 1-12 (1968).  
 WITTMANN, H. und FISCHER, H.: Die Verteilung des diminutivierenden /sə/ und /jə/ im Mittelfränkischen. *Et. german.* 14: 165-167 (1964).

Author's address: Dr. HENRI WITTMANN, McGill University, *Montreal 2, Quebec* (Canada).