1THE PHONETIC MANIFESTATION OF WORDS IN SPONTANEOUS SPEECH

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RESUME

Nous présentons des données de la parole spontanée**,** en particulier de l'allemand, qui montrent la grande variabilité dans la manifestation phonétique des mots, ainsi que l'affaiblissement ou même la disparition de signaux qui puissent les différencier et délimiter uniquement. Ces processus de la communication parlée constituent une phonologie au niveau de la phrase, dont les études empiriques et théoriques à travers les langues sont d'une très grande importance et actualité**.**

1. INTRODUCTION

On 13 December 1953 the French newspaper 'Dauphiné Libéré' had the following headline:

L'exil doré mais nostalgique
de l'ex-sultan du Maroc et de son harem

BEN YOUSSEF PARMI SES NEGRESSES
caresse les plus noirs desseins [1]

This example, which is representative of a whole class of accidental and intentional puns in French and other languages, depends for its humorous effect on the disappearance of word boundaries in connected speech and an ensuing semantic ambiguity between different words and phrases (*desseins, des seins*). In spite of such cases attesting to the fuzziness of words in context, which may be multiplied manifold from a variety of languages, the category of the word retains its time-honoured dominant position in metalanguage pursuits, especially in linguistics. It is the basis for the development, over centuries, of the methods of lexicography, which have produced various types of lexica, including pronunciation dictionaries, e.g. [9]. The latter take canonical phonetic representations of word citation forms in a language as their point of departure.

This concept is built on the idea of the independent existence of individual words in an utterance, which in turn results in the assumption that words are units that can be defined and delimited phonetically. The word also constituted the frame of reference for the development of phonology: phonemes are the sound units that differentiate words, and boundary signals mark their beginnings and ends phonetically. As a consequence of this focus on word phonology the level of segmental sentence or utterance phonology has largely been excluded from the study of sound patterns in languages.

Typical, often cited examples of phonetic markers for morphological structure are the palatal fricative in German *"Frauchen"* (noun *"Frau"* + diminutive *"-chen"*) vs. the velar fricative in *"rauchen"* (stem *"rauch-"* + verbal ending *"-en"*) and the dark lateral in (Southern British) English *"coolish"* (adjective *"cool"* + loose derivative *"-ish"*) vs. the clear one in *"foolish"* (stem *"fool-"* + integrated suffix *"-ish"*). Lehiste's classic study of 'internal open juncture' of 1960 [25] also belongs to this field of word phonology (e.g. *"nitrate"* vs. *"night-rate"* or *"a name"* vs. *"an aim"*).

Nevertheless it has been known from historical linguistics for a long time that potential phonetic boundary markers for word separation may be ignored at any time. In this connection we may compare *"Natter"* and *"Otter"* in German, and refer to English *"adder"*, *"apron"* (as against *"napkin"*), or - with the opposite direction of sound change - *"newt"* (besides *"eft"*), *"nickname"* (as against *"eke"*): in all these cases the sequence of indefinite article and noun receives a new phonetic parsing.

This word orientation also determined a phonetic research paradigm which highlighted the word frame in experimental analysis still further, e.g. by the use of systematically varied nonsense words or of word contrasts in a constant utterance environment of the type *"It's a .... (Say...) again."* Although it is a reasonable assumption that the word is a language reality, at least for speakers, it reaches different degrees of awareness according to the demands of the communication situation, i.e. the word as a unit of speech will be particularly prominent in data collection under lab conditions, but far less so in spontaneous interchange. An investigation of the former kind uncovers coarticulatory effects and assimilations that stress the integrity of word units much more strongly, e.g. in the lack of complete labial/dorsal assimilation of coronal plosives and nasals at word boundaries, as in English *"hat pin"* or in German *"Schrottplatz"*.

The experiments by Nolan [27] and Kühnert [24] using EGP and EMA techniques, respectively, are cases in point. Analysing apparent place assimilations across word boundaries Nolan proposed in the interpretation of his data that differences in lexical phonological form always result in distinct articulatory gestures, even if overlapped and/or reduced or not discernible in the instrumental record. This is the complete reification of the phonetic word. But there is a good deal of evidence that the word boundary can be overridden in such cases, resulting in complete assimilation, especially

frequent in, but not limited to, the reduction of function words, as in German *"mit dem"* with **[mɪpm], [mɪm̩m]** or **[mɪm]**, besides **[mɪtm]**.

The few examples quoted so far will have demonstrated that words may be identifiable as phonetic units but that they may also lose this phonetic identity, either by the change or the disappearance of boundary signals or by the entire fusion with other words. The phonetic manifestation of words thus oscillates on a scale from distinct separation to complete integration. The conditions for this phonetic variability of word identity depend on a number of factors:

- the general articulatory strategies in human language
- the individual language concerned
- the word class as well as the morphological and syntactic structures
- sentence accent, position in the utterance and general phonetic environment
- and, above all, the demands of the communicative situation as regards the balance between articulatory ease and auditory distinctivity, which is adjusted differently for different speaking styles - lab speech, read speech, spontaneous dialogue etc.

In order to be able to come to grips with the wide array of phonetic manifestations of words we must go beyond the prevalent pattern of word phonology and consider the sound structures above the word at the sentence and utterance levels. This phrase level phonology has been a focus of research at IPDS Kiel since the early 1970's. It was picked up as the theme of a project supported by the EU under its HCM program in 1993 and was also mirrored in a German Research Council funded International Symposium on "Sound Patterns of Connected Speech", organised at Kiel in June 1996 [35]. Finally, this ESCA Workshop on "Sound Patterns of Spontaneous Speech" demonstrates how the interest in this research question is gaining ground internationally. As regards German, there is now a suffiently large, phonetically annotated acoustic data base of read and spontaneous speech, of altogether 70,000 running words, completely transcribed segmentally and in part also with prosodic labels: 'The Kiel Corpus of Read/Spontaneous Speech' on four CD-ROMs so far [4,5,6,7,21]. Together with a data bank environment and appropriate search as well as analysis tools it provides the necessary facilities [8,20,22,28] for large-scale corpus studies of connected speech processes in German [3,10,12,13,14,15,16,23,29,30,33,34].

2. THE DISAPPEARANCE OF WORDS AS DELIMITABLE UNITS IN SPEECH PRODUCTION

2.1. Function words: from separation to integration

2.1.1.Disappearance of syntagmatic and paradigmatic phonetic word distinctions

The interference with phonetic word identity is particularly frequent in (sequences of) function words, e.g. in German *"Hast du einen Moment Zeit?"* **[haspm mom'ɛn ts'aɪt]**, *"**Hast du den Bericht** über die letzte Sitzung endlich geschrieben?"* **[haspm bəʁ'ɪçt]**. The same phonetic form **[m]** in the strongly reduced sequence of three function words *"hast du einen/den"* can be uniquely identified with *"einen"* in one context and with *"den"* in another, although the solely remaining nasal (with labial adjustment to the following con-sonant) can no longer trigger the phonetic identification of the word. The separation of these words is further hampered when instead of **[pm]** a glottalized nasal **[m̩]** is produced, which signals the article and the plosive residual of *"du"* at the same time.

But the reduction can go further and eliminate all traces of *"du"* in **[hasm̩ mom'ɛn ts'aɪt]**, with a syllabic nasal**,** which may in turn follow the general German geminate reduction, especially in unstressed position and fast speaking rate**,** resulting in **[has mom'ɛn ts'aɪt]**, where the reflex of *"einen"* has also disappeared in the phonetic manifestation. The verbal paradigm as well as the idiomatic phrasing make the decoding of the intended meaning of the utterance unique, and the listener therefore does not depend on the signal detection of every word.

2.1.2. Emergence of new words through syntagmatic fusion

The disappearance of words in context is not restricted to the loss of all phonetic traces but may also take the form of the appearance of new lexical items through the complete fusion of others. This is particularly common for prepositions + articles, as in French *"au"*, *"du"* or German *"im"*, *"ins"*, *"zum"*, *"zur"*. In today's usage, German *"er geht zur Schule"* and *"er geht zu der Schule"*, *"er kommt zum Schluß"* und *"er kommt zu dem Schluß"* have different meanings although both forms are historically related on a scale of articulatory reduction.

Compare also English **[aɪŋənə]** for *"I am going to"* and **[dːʒə]** for *"did you"*, as in the joke *"Jamaica?" - "No. She wanted to."*

Similarly, subject pronouns in enclitic position to function verbs form a scale from separation into two items to fusion into a single new one in e.g. German *"haben wir"*, *"sind wir"*, *"hat er"*, *"habt ihr"*:

[haːbən viːɐ] [zɪnt viːɐ] [hat ʔeːɐ] [hapt ʔiːɐ]
[ha(ː)m̩ vɪɐ] [zɪm̩(pᵛ) vɪɐ] [hat (ʔ)ɛɐ] [hapt(ʔ)ɪɐ]
[ha(ː)m̩ vɐ] [zɪm̩ vɐ] [hatʰ ɐ] [haptʰ ɐ]
[ham̩ ɐ] [zɪm̩ ɐ] [hat ɐ] [hapt ɐ]
[hamɐ] [zɪmɐ] [hadɐ] [haḇḍɐ].

The same subject pronouns in proclitic position and the indirect object *"ihr"* (in e.g. *"er hat ihr geholfen"*) reduce less, the possessive pronoun *"ihr"* (in e.g. *"sie hat ihr Kleid*

gewaschen") least: in these cases fusion does not occur. So the disappearance of words in context and the appearance of new ones is not only situationally determined but also morphologically and syntactically.

2.1.3. Incomplete word fusion

A third type of the integration of words is illustrated by some of the reduced phonetic variants in
"die könnten wir uns abholen" vs. *"die können wir uns abholen"* vs. *"die können uns abholen*
[dɪ kœɱʸ ɱʸ ʊnʸs] vs. **[dɪ kœɱʸ ɱʸ ʊnʸs]**
vs **. [dɪ kœnn ʊns].** (See figures 1a - c.)

Here words neither disappear without trace nor are they fused to new units: the sequential articulatory movements are greatly reduced, but components of labial-/velarization and glottalization (fig.1a) or labial-/velarization (1b), versus pal-atalization (1c), are kept as long residual traces of the eli-minated elements, overlaying the remaining ones. In these instances the tendency towards integration by articulatory fusion is counteracted by the opposite tendency to maintain phonetic word identity through **articulatory prosodies** [11].

An extreme case is found in the sequence of four function words of *"nun wollen wir mal kucken",* for which the Kiel Corpus of Spontaneous Speech provides **[nũː õnᵛ ẽ ɱa kʰˈʊkŋ] (OLV g122a009);** see spectrogram in [35], p. 2; also figures 2a, b, which compare precise and reduced pronunciations of this phrase by the author.

The four initial function words of the sentence*"**da hat er auch** keine Zeit"* (with the sentence accent on *"Zeit"*), which are clearly separated in the precise pronunciation **[daː hat ʔeːɐ ʔaʊχ]**, may reach the stage of complete fusion in **[daːdɐ ɑχ]**, where **[daːdɐ]** approaches a new lexical (phrasal) item as part of a paradigm **[daːβɪç] [daːst] [daːts] [daːmɐ] [daːptɐ] [daːmz]**. But the componential element of breathy voice control may be kept as a residue of /h/, superimposed on the vowel of **[daː]** preserving the identity of the word *"haben"*, as in the following example from the Kiel Corpus of Spontaneous Speech: *"**da haben Sie** auch wieder recht natürlich"* **(HAHg071a019)**; see spectrogram in [34], p. 140.

2.2. Componential residues of segmental deletions

In all these residue cases the componential features have to be represented in a phonetic transcription, even if it is basically segmental, because they mark phonological contrasts at the level above the word. In our labelling system in the Kiel Corpus, we have adopted the symbol **-MA**, inserted into the canonical transcription before symbolically deleted segments [21]. Its use may be illustrated by the following example (see spectrogram in [34], p. 157 and figure 3).

TIS g071a004		***wahrscheinlich ein bißchen***
canonical	**SAMPA**	**v a:6 #S 'aI n l I C Q aI n+ b ' I s C @ n**
variant	**SAMPA**	**v a:6 #S 'aI n -MA l- I- C- Q- aI- n-m+ b -h ' I s C @- n**
	IPA	**[vɑʃaɪŋ m bɪs͡ççn]**

The syllable **l I C** is characterized by palatality**,** i.e. by a high elevation of the tongue dorsum, which is obvi-ous for **I C** but also applies to the clear (palatalized) **l**. **I** before **C** is, moreover, produced with a higher tongue position than before non-palatal consonants, e.g. in the suffix *"-nis"*. So the difference between **I** and **C** is one of vibrating and open glottis with very similar tongue heights; these phonation differences together with similar oral strictures generate laminal versus turbulant airflow at the tongue-palate opening, resulting in approximant and fricative articulation, respectively.

- **l** and **I** are articulatory opposites in their central and side tongue-palate contacts, which puts high demands on the execution of speech gesture chaining.
- The tongue tip/blade gesture is subordinated to tongue dorsum and lip movements; therefore, under these sequential constraints, the palatalized **l** loses its central coronal contact in the dental/alveolar area by adjusting to the purely dorsal gesture of **I**. This is found generally in the suffix *"-lich"*, e.g. in *"selbstverständlich"*, *"natürlich"*, particularly when words are unstressed and non-final in the utterance.
- In unstressed syllables all articulatory gestures are probably reduced in their magnitude, including subglottal pressure and glottal opening for **C**. The result is the transformation to an approximant with the possibility of voicing: **j**.
- The dorsality of the reduced final syllable may then also be extended to the preceding nasal, due to the higher rating of dorsum over tip/blade gestures in articulatory sequencing, resulting in a palatal.
- With the desynchronization of velic movement, especially between two nasals, i.e. before **m**, which originates from the reduction and assimilation of *"ein bißchen"*, the dorsal approximant is nasalized as well.
- If the closing of the lips for **m** occurs early enough there will not be an approximant stricture between the nasal of *"wahrscheinlich"* and the nasal **m**.
- So we end up with the pronunciation found in the spontaneous speech example as a consequence of natural constraints on articulatory gestures: a componential residue of palatality remains although segmental units corresponding to a canonical form can no longer be separated.

Another few examples from spontaneous speech in the Kiel Corpus are to give illustrations of the variety of componential residues (spectrograms in [22], pp. 14-17).

KAE g197a011		***könnten***
canonical	**SAMPA**	**k 9 n t @ n+**
variant	**SAMPA**	**k -h ' '9 -~ n- t-q @- n+**
	IPA	**[k'œ̃n̰n]**

- The first nasal consonant is deleted as a sequential element, but a residue of nasalization is still manifest in the preceding vowel as a componential feature.
- The plosive **t** is realized as glottalization somewhere in the sonorant context (vowel, nasal), without precise temporal and segmental alignment.
- In both cases the articulatory components require a non-linear symbolization, i.e. markers that do not receive durations:
  - **-~** refers to nasalization
  - **t-q** to glottalization;
  - both are aligned to the same point in time as the following, non-deleted segment **n**,
  - indexing phonetic parameters in the segmentally labelled environment (further details in [21]).

HAH g074a010		***nicht zu spät***
canonical	**SAMPA**	**n I C t+ t s u:+ S p 'E: t**
variant	**SAMPA**	**n I C t-+ t s -MA u:-+ S p -h 'E:-'e: t**
	IPA	**[nɪç t̪^{w}s^{wɣ}u̯ʃ^{wɣ}p'eːt]**

- The voiced vocalic stretch of **u:** is absent;
- its lip rounding, and presumably its tongue position, remain as componential residues of labialization and velarization in the surrounding fricatives.

TIS g072a015		***kann Ihnen das***
canonical	**SAMPA**	**k a n+ Q i: n @ n+ d a s+**
variant	**SAMPA**	**k -h a n+ -MA Q- i:- n @ n-+ %d-n a s+**
	IPA	**[k^{h}an n^{j} nas]**

- The segment **i:** is deleted;
- its dorso-palatal tongue elevation remains as a componential residue of palatalization in the nasal consonants.

HAH g074a000		***Universitätsstädte***
canonical	**SAMPA**	**Q U n I v E6 z I t 'E: t s #S t ''E t @**
variant	**SAMPA**	**%Q U n I-i: v E6 z -MA I- t -h 'E: t s-S #%S t -h ''E-''e: t-d @**
	IPA	**[ʔʊnivɛɐzt'ɛːtʃt̪^{h}ˌeːdə]**

- The segment **I** after the fricative **z** is deleted;
- its dorso-palatal elevation remains as a componential residue of palatization in **z**, which, moreover, keeps its voicing as in intervocalic position although it now occurs before **t**.

2.3. Content words: degrees of articulatory adjustment

The three types of interference with the phonetic unit of a word are not limited to function words. For example, in German numerals *"-zehn"* may be realized as **[tsn]**, and, over and above that, *"-zehnhundert"* (as in *"neunzehnhundert vierundneunzig"*) may even be pronounced **[tsɐt]**, as long as the word refers to a year and *"hundert"* is not stressed. In the Kiel Corpus, for instance, we find the following variant (in SAMPA notation) for *"neunzehnhundert vierundneunzig"* **(BACg142a005)**; see spectrogram in [34], pp. 162 and figure 4:

n 'OY n t s e:- n- #h- ''U- n- d- 6 t f 'i:-'i:6 r- U- n t- #%n ''OY n t s I C .

It is, on the one hand, a strongly reduced variant, linked to the citation form pronunciation

n'OYntse:n#h''Und6t f'i:rUnt#n''OYntsIC ,

on the other hand, it does not represent the end of the reduction scale because there may be further articulatory simplification, namely

- voiceless vowels in the voiceless obstruent environments
- **t** deletion before **s**
- deletion of nasal consonants and nasalization of the preceding vowels, resulting in the variant

n 'OY -~ n- t- s e:- n- #h- ''U- n- d- -MA 6- t f 'i:-'i:6 r- U- n t- #%n ''OY -~ n- t- s -MA I- C.

Filling in possible further variants between the canonical form, the corpus example and the most integrated pronunciation we get the following set of IPA-transcribed word sequences from most separated to most fused:

[n'ɔɪntseːnhˌʊndɐt f'iːʁʊntnˌɔɪntsɪç]
[n'ɔɪntsənɦˌʊndɐt f'iːɐnnˌɔɪntsɪç]
[n'ɔɪntsn̥ɦˌʊnnɐt f'iːɐnnˌɔɪntsɪç]
[n'ɔɪntsn̥ˌʊnnɐt f'iːɐnnˌɔɪntsɪç]
[n'ɔɪntsn̥ənɐt f'iːɐnnˌɔɪntsɪç]
[n'ɔɪntsnənɐt f'iːɐnnˌɔɪntsɪç]
[n'ɔɪntsnnɐt f'iːɐnnˌɔɪntsɪç]
[n'ɔɪntsnɐt f'iːɐnnˌɔɪntsɪç]
[n'ɔɪntsɐt f'iːɐnnˌɔɪntsɪç]
[n'ɔɪnsn̥t f'iːɐnnˌɔɪnsɪ̯ç]
[n'ɔ̃ĩsn̥t f'iːɐnnˌɔ̃ĩsɪ̯ç]

The ordinal numbers ending in *"-zehnten"* provide further instances for the disappearance of phonetic words. Starting from canonical **[tsentən]**, the following articulatory reductions occur:

[tsentn] with **ə**-elision,

[tsenn̰n] with additional glottalization instead of velic elevation to signal a stop articulation,

[tsenn̥n] with breathy phonation in the nasal instead, to mark this break,

[tsenn] with the complete disappearance of the plosive reflex, which is possible in an unstressed syllable in nonfinal phrase position, e.g. before *"November"*, where we then

get, for example, **[dʁ'aɪtsen nov'ɛmbɐ]**. This means the cardinal and ordinal numerals in *"dreizehn No-vembertage"* and *"dreizehnten November"* may coalesce.

In a labial context before, e.g., *"Mal"* we may find the variants with labial assimilation **[tsempm] [tsem̟m] [tsem̟̩m] [tsemm]**. *"das hat er **dreizehn Mal** gemacht"* and *"das hat er zum **dreizehnten Mal** gemacht"* may coalesce in the form **[tsem maːl]**. The cardinal number can, however, have the further reductions **[tse maːl]** and **[tsm maːl]**, which seem to be impossible for the ordinal number. But the latter may be **[tsm̟ maːl]**.

The disappearance of an independent phonetic word and the creation of a new lexical item is also illustrated by the greeting *"n Abend"* instead of *"guten Abend"*. This extreme reduction of an adjectival form is only possible in cases of semantic "bleaching", as in this formula of phatic communion; it does not occur if the word retains its meaning, as in *"guten Appetit"*. A case from English would be *"St. Paul"* **[sm]** vs. *"a saint man"* **[seɪnt]**; similarly , Swedisch **[nas]** for *"naturligtvis"*.

Two examples of word fusion from the Kiel Corpus of Read Speech are (in SAMPA notation):
dlms 091: *"**geben Sie mir** die Verbindung"* **g 'e: b- @- n- z i:- m i:6+**;
dlms 001: *"**morgen** vormittag"* **m 'O6 -~ g- @- n-** .

3. BALANCE BETWEEN ARTICULATORY ECONOMY AND AUDITORY DISTINCTIVITY AS A FUNCTION OF THE COMMUNICATIVE SITUATION

The examples presented in the preceding sections suggest that word production is a compromise between articulatory economy for the speaker and acoustic distinctivity for the listener. Economy of effort in speech production is governed by a number of anatomical, physiological and temporal constraints in the speech producing apparatus that introduce directionality into reductions, such that they are not chaotic. Not just any changes, but only certain types are possible, which occur over and over again in the languages of the world and in historical sound change. For instance the development of nasal vowels is tied to the position before nasal consonants, which are in turn deleted; stops may become fricatives and approximants, and the latter may even disappear in inter-sonorant position, but the reversal of this chain is not possible.

These physically constrained tendencies to reduce effort are in their turn controlled by linguistic structures at all levels, from phonology to syntax and semantics, and therefore have different manifestations and distributions in different languages, although basic types can be generalized. Furthermore the degree of articulatory effort is governed by the precision the listener needs in order to understand, and this need is different in different speaking environments, for acoustic reasons as well as for reasons of redundancy in form and content. This redundancy is determined by the common core of linguistic context and context of situation in the widest sense between speaker and hearer, ranging from world knowledge through culture and society to the individual discourse setting.

The balance between articulatory effort and perceptual distinctivity is thus solved differently in various communication situations (cf. Lindblom's H&H theory [26]). In lab speech the effect of the principle of articulatory economy is small and consequently the preservation of word identity is much greater than in read texts and even greater than in spontaneous speech taking place within delimited scenarios. This means that the study of different speaking styles [12] may be expected to yield different frequencies and different degrees of articulatory reductions or reinforcements, and are consequently a research area of great potential for gaining insight into human communication, an area that has been too much neglected for too long to the detriment of linguistic science. Modern phonetics has the theoretical and methodological tools to get on with the task and to put spoken language performance into its proper perspective vis-à-vis the linguistic imperialism of written language competence.

Because of this tug-of-war between production effort and perception ease it is an important and interesting question how listeners manage - or why they do not manage - to decode various forms of spoken language, which, in the case of casual spontaneous dialogue, may be extremely "distorted" from the point of view of canonical word forms. The examples quoted in this paper can all be understood immediately by native speakers of German in the contexts in which they are uttered; even the strongly reduced version of *"nun wollen wir mal kucken"*, spoken by itself is quite intelligible. So listeners do not need complete phonetic signals for all the words that make up an utterance.

On the other hand, utterances that do contain all the phonetic word information may not be comprehensible because they lack the necessary (non-phonetic) context of situation cues. An example is the following German sentence (in IPA transcription without word divisions, but with punctuation marks to indicate sentence prosodies): **[m'ɛːənɡ̟ptəh'ɔɪ]? [n'eː]. [m'ɛːkdəm̩ɛːənh'ɔɪ]! [ɡ̟ptəb'eːtn].** German listeners are usually not able to decode it - or at least not without repetition - as the pronunciation corresponding to the spelling *"Mähen Äbte Heu? Nee. Mägde mähen Heu, Äbte beten."*

The hearer thus gets along with a lot less phonetic word signalling, but also needs a lot more contextual cues; how much less of the one and how much more of the other in what phonetic, linguistic and situational contexts is a question to be answered by future research.

A further, very important factor for utterance intelligibility is its prosody. What may look like a list of unconnected words on paper, may be a perfectly structured utterance when given the right temporal, accentual and intonational properties. Jokes and English crossword puzzles thrive on this. This phenomenon may also be exploited across languages, as in the following example:

Un petit d'un petit	**[œ̃ptidœ̃pti]**
S'étonne au hall	**[setɔnoɔl]**
Un petit d'un petit	**[œ̃ptidœ̃pti]**
Ah! degrés de folles	**[adəgʁeḍfɔl]**
Un dol de qui ne sort cesse	**[œ̃dɔldəkinsɔʁsɛs]**
Un dol de qui ne se mène	**[œ̃dɔldəkinsmɛn]**
Qu'importe un petit d'un petit	**[kɛ̃pɔʁtœ̃ptidœ̃pti]**
Tout Gai de Reguennes.	**[tugɛdʁəgɛn]**

Humpty Dumpty
Sat on a wall,
Humpty Dumpty
Had a great fall,
And all the king's horses,
And all the king's men,
Could not put Humpty Dumpty
Together again.
(Adapted from *Mots d'Heures: Gousses, Rames"*, London: Angus & Robertson (1968))

The orthographic text looks French and it also sounds French with the segmentally transcribed pronunciation and with the appropriate French utterance prosodies added to it, but it does not make sense in French, because it is simply a string of unstructured words. But anybody familiar with the English nursery rhyme will immediately recognise it as pronounced with a heavy French accent.

The foregoing discussion will have made it quite clear that the word may but certainly need not be a phonetic unit since it is very flexible in its phonetic manifestation.

4. CONCLUSION AND OUTLOOK

Our knowledge about words as phonetic units in lab speech is fairly comprehensive for quite a number of languages, in-cluding English, French and German in particular. Phonetics has of late also been able to come to grips with the scale of decreasing word signalling from read sentences to read texts and to different types of spontaneous speech, as the data presented and interpreted in this paper testify. They show that the realisation of words by speakers is a constant interaction between phonetic integration for economy of effort on the part of the speaker, and phonetic separation for distinctivity on the part of the listener.

But this domain of phonetics above the word still requires a great deal of research, and it needs, above all, a new paradigm [19] for asking questions about pronunciation in a language. **Word phonology** has outlived itself. We have to look much more closely at the regularities of production and perception processes at the **utterance level** in actual speech communication, and this goal goes beyond the word as a phonetic unit and beyond the collection of phonetic variants lexica, because we should not just deal with the question of how the words of a language are pronounced, we also need to give answers why the pronunciations are the way they are under the constraints of the utterance in communicative context. This scientific perspective also demands a thorough integration of the symbolic domain of phonological structures with the signal domain of phonetic speech dynamics. At IPDS Kiel we have been working very intensively on the question of ***utterance*** phonology and phonetics overlapping, and interfering with, ***word*** phonology and phonetics. A research grant from the German Research Council that has recently been allocated to IPDS for this type of investigation will allow us to continue this work within a framework of fundamental research to gain deeper scientific insight into how speech works. The focus is on German but we are ultimately aiming at a comparative treatment of European languages [2,17,18,31,32].

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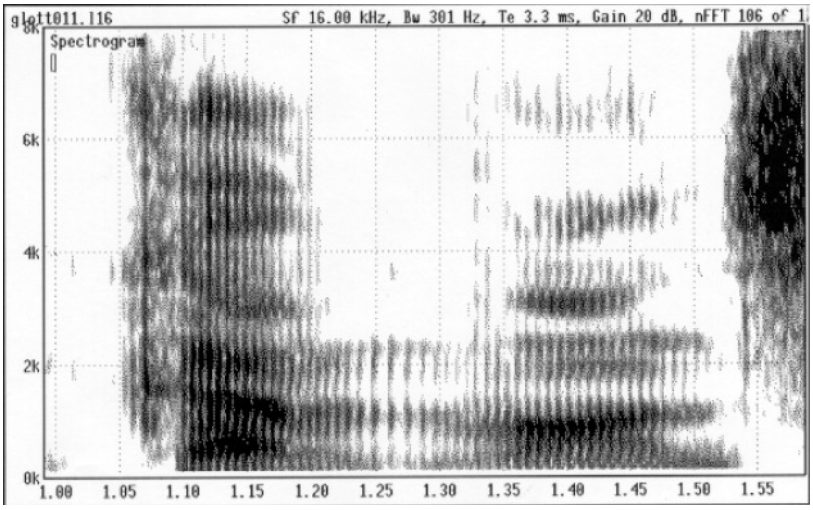
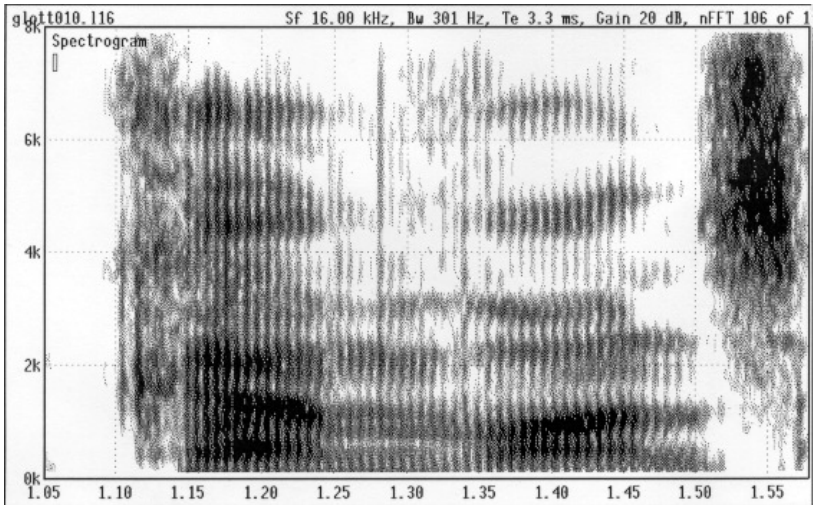
a)



b)



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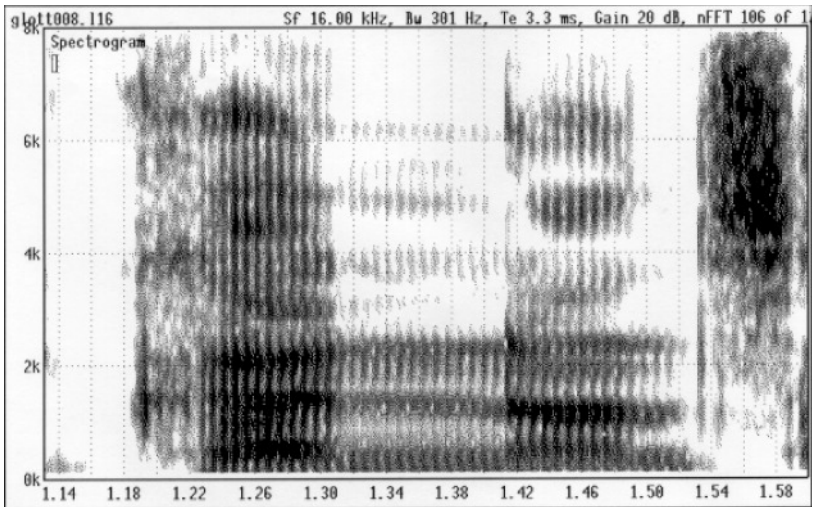

Figure 1. Spectrograms of **a)***"(Die) könnten wir uns (abholen)."* **b)** *"(Die) können wir uns (abholen)."* **c)** *"(Die) können wir uns (abholen)."*; read speech, speaker KJK.

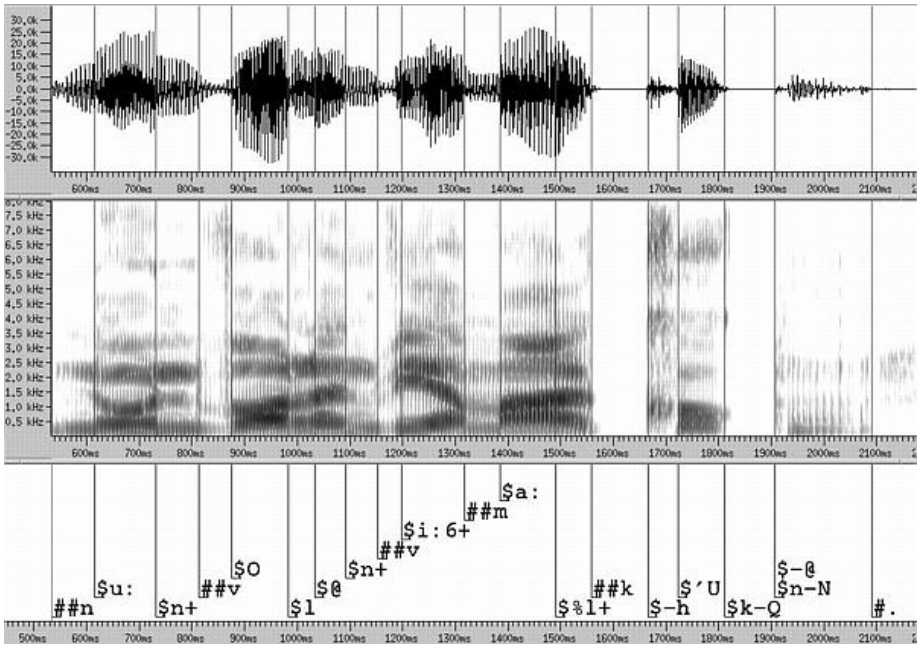

Figure 2a. Speech wave, spectrogram and labels of *"nun wollen wir mal kucken"*; precise pronunciation, speaker KJK.

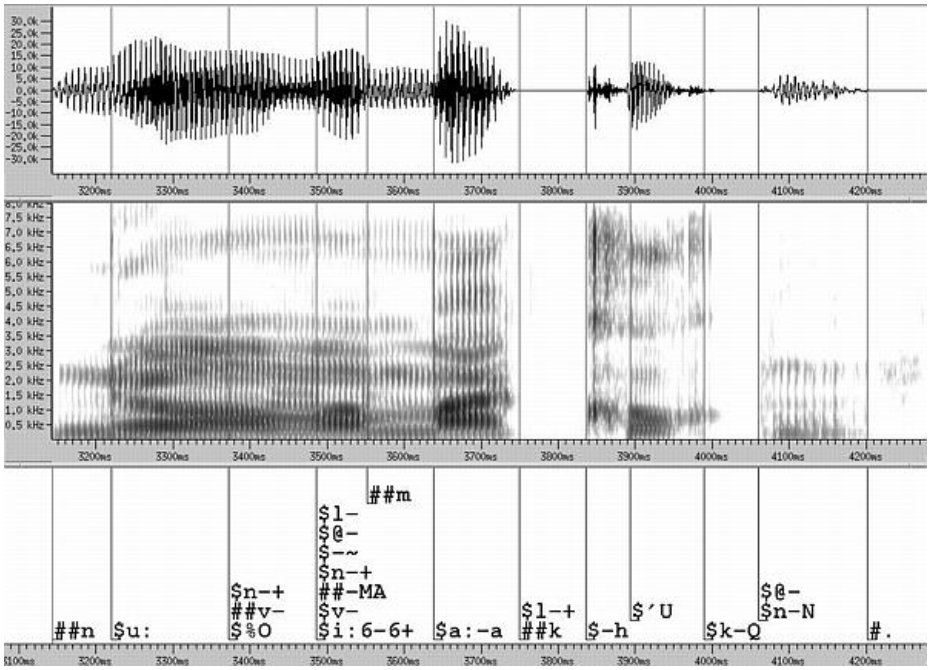

Figure 2b. Speech wave, spectrogram and labels of *"nun wollen wir mal kucken"*; reduced pronunciation, speaker KJK

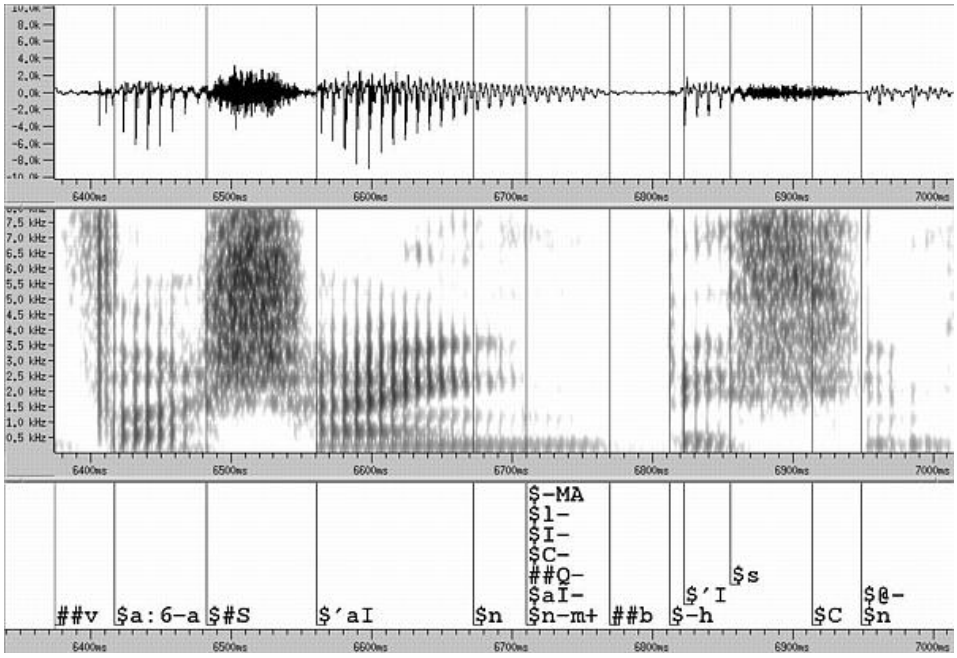

Figure 3. Speech wave, spectrogram and labels of *"wahrscheinlich ein bißchen"*; spontaneous speech, speaker TIS.

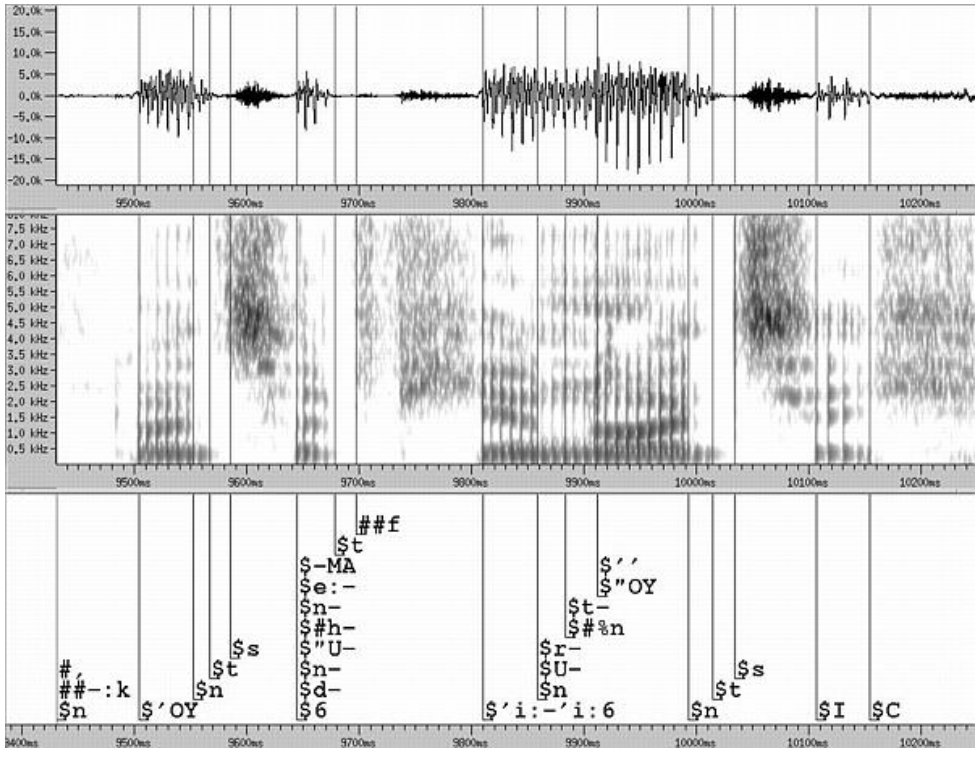

Figure 4. Speech wave, spectrogram and labels of *"neunzehnhundert vierundneunzig"*; spontaneous speech, speaker BAC.