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**From scenario to segment
The controlled elicitation, transcription,
segmentation and labelling
of spontaneous speech**

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Adrian Simpson**

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Preface

This volume of AIPUK gives a comprehensive account of the recording, processing and analysis platforms for spontaneous speech as they have been developed for German at IPDS Kiel. It is intended as a compendium for working with the speech data (signal and label files) of *The Kiel Corpus of Read Speech* (IPDS, 1994) and *The Kiel Corpus of Spontaneous Speech* (IPDS, 1995), which the IPDS is building up as a CD-ROM archive for phonetic research (1994ff.), and as part of a phonetic data bank of spoken North High German. Only data are incorporated into this data base that have been processed at the phonetic level, i.e. that have been annotated segmentally and in parts prosodically. The Kiel Corpora thus differ in basic orientation from the Bavarian Archive for Speech Signals (BAS), cf. Tillmann et al. (1995). This essential constraint on speech data archiving provides a powerful tool for systematic large-scale data bank search in the symbolic and signal domains, to investigate a wide spectrum of spontaneous German pronunciation at the word and utterance levels. This handbook lays the methodological and theoretical foundations for this research. Preliminary work, carried out with financial support from the German Ministry of Education, Science, Research and Technology (Bundesministerium für Bildung, Wissenschaft, Forschung und Technologie) in the framework of the Verbmobil Project under Grant 01IV101M7, was reported in Kohler et al. (1994a, 1994b), Pätzold and Simpson (1994), Pätzold et al. (1995). The writing and publication of this AIPUK number was made possible through University of Kiel funding.

Contents

I	Introduction	1
II	Data collection and elicitation	2
II.1	Recording environment and technical setup	2
II.2	Scenario	2
III	Transliteration	7
III.1	Objects to be symbolized	7
III.2	Transliteration file format and ASCII codification	8
III.2.1	Transliteration file format	8
III.2.2	ASCII codification	9
III.3	Lexical items	9
III.4	Reduced word forms	10
III.5	Interjections	12
III.6	Numerals	13
III.7	Abbreviations and spelling	13
III.8	Nonverbal productions	13
III.9	Punctuation	15
III.10	Nonwords	16
III.11	Truncations, interruptions, false starts	16
III.11.1	Truncations	17
III.11.2	Interruptions	17
III.11.3	False starts	17
III.11.4	Word fragments	18
III.11.5	Interruptions within the word	19
III.12	Stretches which are difficult or impossible to identify	19
III.13	Non-articulatory noises	19
III.14	Coincidence of acoustic events	20
III.15	Comments	21
III.16	Technical breaks in the recording	21
III.17	Overlapping talk	22
III.18	Symbol order	23

IV	Canonical transcription	25
IV.1	Canonical transcription of words	25
IV.2	Vowels	25
IV.3	Consonants	26
IV.4	Lexical stress	27
IV.5	Morphological and syntactic information	27
IV.6	Nonverbal and nonvocal signal portions	28
IV.7	Punctuation marks	29
IV.8	Overlaid stretches	29
V	Segmentation and labelling	30
V.1	Label generation	30
V.1.1	Canonical labels	30
V.1.2	Additional labels	33
V.2	Segmentation and labelling process	33
V.2.1	Label modifications	35
V.3	Segmenting and labelling the phonetics of words	37
V.3.1	Vowels	37
V.3.2	Plosives	41
V.3.2.1	General	41
V.3.2.2	Plosive release phase	41
V.3.2.3	Missing occlusion after a nasal	43
V.3.2.4	Plosives realized as strictures of open and close approximation	43
V.3.3	Nasals and nasalization	45
V.3.3.1	General	45
V.3.3.2	Nasalization	45
V.3.4	Fricatives	46
V.3.5	Lateral	47
V.3.6	Glottal stop and creak	48
V.3.6.1	General	48
V.3.6.2	Word-initial	49
V.3.6.3	Junctural creaky phonation, without a canonical glottal stop	49
V.3.6.4	In connection with plosives before and after nasals and laterals	50
V.3.7	Reduction and assimilation	57
V.3.8	Marking non-linear correlates	58

V.3.9	Marking uncertain segment boundaries	59
V.4	Segmenting and labelling interactional aspects of a turn	60
V.4.1	False start and truncation	60
V.4.2	Word-internal interruption	62
V.4.3	Hesitational lengthening	63
V.4.4	Hesitation particles	64
V.4.5	Problematic stretches of utterance	65
V.4.6	Neologisms and slips of the tongue	65
V.4.7	Punctuation	66
V.4.8	Nonverbal signal portions	66
V.5	Labelling nonvocal aspects of a turn	68
V.5.1	External noise	68
V.5.2	Technical breaks	71
VI	Prosodic labelling	75
VI.1	Prosodic phrasing	75
VI.1.1	General	75
VI.1.2	Phrasing markers	77
VI.2	Stress	80
VI.2.1	Lexical stress	80
VI.2.2	Sentence accent	80
VI.3	Intonation	83
VI.3.1	Intonation contours	83
VI.3.2	Peak and valley alignment	86
VI.3.3	Downstep and reset	90
VI.3.4	Upstep	91
VI.3.5	High pre-head	91
VI.4	Speech rate	92
VI.5	Prosodic labelling of word fragments	92
VI.6	Uncertainty	92
VI.7	Cyclic approach to prosodic labelling	92
VII	Lexicon generation	96
VII.1	Canonical lexicon	96
VII.2	Variants lexicon	97

VIII	Transliteration and labelling environment	99
VIII.1	Transliteration platform	99
VIII.2	Segmental labelling platform	99
VIII.3	Prosodic labelling platform	101
VIII.4	Checking segmental and prosodic labelling	101
	References	103
Appendix A	Elicitation materials	107
Appendix B	A transliterated dialogue subsession	131
Appendix C	A label file - segmental labels only	133
Appendix D	A label file - segmental and prosodic labels	135
Appendix E	Symbol inventory - segmental and prosodic labelling	137

I Introduction

Recent years have witnessed a growing interest in the controlled elicitation of spontaneous speech (Levelt, 1989; Swerts and Collier, 1992; Anderson et al., 1991). This method of data collection allows certain interactive and linguistic phenomena of spontaneous speech to be investigated without losing control over what participants in talk produce, as is so often the case in recordings of free, unscripted talk.

The degree of control can be varied. It can be relatively high, keeping a tight rein on the material produced. This is the case with the material gathered both by Levelt (1989) and Swerts and Collier (1992) where speakers are required to relate the position of coloured shapes in a network. Setups such as the map task (Anderson et al., 1991) are more complex involving two participants navigating across fictitious maps: it is the job of one of the participants, whose map contains a path, to describe this path to the other speaker. And it is a scenario of similar complexity to the map task, in the realm of appointment-making, that we employed to gather spontaneous speech in this study.

We describe our efforts at IPDS Kiel to elicit spontaneous speech between two dialogue partners in a controlled fashion, together with a description of the steps involved in providing various symbolic representations of the verbal and nonverbal content of the elicited speech material.

Some of the work in this study, in particular the conventions for segmenting and labelling speech signals, has its origins in extensive work carried out on the PhonDat90 and PhonDat92 databases (Kohler, 1992, 1994a). The elicitation platform together with the development of conventions for the transliteration of the elicited dialogues as well as the necessary elaboration of conventions to deal with the segmental and prosodic labelling of spontaneous speech has been carried out in the framework of the Verbmobil project (Karger and Wahlster, 1994).

We hope that this study will not only be of passive interest, but may serve in whole, or in part, as a manual for those who are considering embarking on a similar enterprise themselves.

II Data collection and elicitation

II.1 Recording environment and technical setup

All recordings are carried out in a quiet, sound-treated room. Two dialogue partners are placed in different rooms. They are unable to see each other and can communicate via headsets (Sennheiser HDM 410 or 414). This recording environment ensures high quality speech signals and good channel separation.

In an attempt to mimic the effects on talk brought about by interacting with a machine, speakers have to press a button whenever they wish to speak to their partner. Only when the button is pressed can a speaker be heard by the dialogue partner and recorded. The pressing of the button by one speaker also blocks the other speaker's channel. When the button is pressed a green lamp lights up, indicating to the speaker that s/he can talk. This set-up leads to a strict temporal delimitation of turns.

Signals are digitized at 16kHz straight to disc using a Loughborough LSI96002 board. For each dialogue there is a single file which is subsequently de-multiplexed and split into separate turn-files. Splitting into separate turn-files is made possible by recording a constant known signal onto the other channel while a speaker is holding her/his button pressed. A schematic representation of the recording setup is given in Figure 1.

To ensure against data loss during the recording session, signals are also recorded simultaneously on a digital cassette recorder.

II.2 Scenario

The spontaneous speech material has to contain the following features:

- names of months
- dates
- names of days
- names of holidays
- times
- deictic time expressions

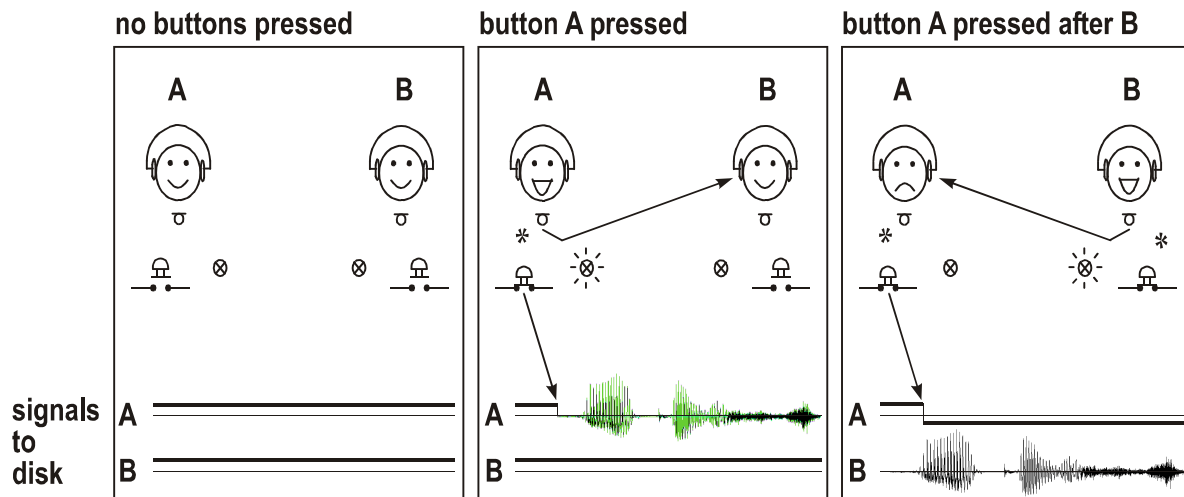


Figure 1. Recording setup showing the action of buttons in controlling turn-taking.

- unknown proper names
- names of towns
- spelling

In order to get as much material as possible from a single speaker, each dialogue session is divided into eight subsessions. For each of these subsessions participants receive fresh material. The material for each of the first seven subsessions comprises a calendar sheet and an academic timetable (see Figure 2)*. Each calendar sheet covers a two month period, the timetable covers a working week from Monday to Friday.

The first subsession is designed to allow participants to become accustomed to the recording environment and the appointment-making task. It is also used to set recording levels and ensure that the headsets are correctly positioned. Where at all possible the adjustments made during this first subsession are not changed during the rest of the recording session. The recording of the first subsession undergoes no further processing.

In the remaining six subsessions all the months of the year are covered. The calendar sheets contain the names of the months and the year. The weekdays are displayed next to the date in the usual abbreviated form, e.g. “Mo” = “Montag”. The calendar sheets also include the names of the most common bank holidays e.g. “Ostermontag” (“Easter

*A complete set of elicitation materials can be found in the Appendix.

Monday”). The timetables contain the days of the week and hourly divisions from 8a.m. to 7p.m. (see Figure 2). The contents of the calendar sheets and timetables are to elicit names of months, dates, names of days, names of bank holidays and times.

Areas on both the calendar sheets and timetables are shaded. These shaded blocks represent periods when speakers are otherwise engaged and therefore unable to make an appointment with their partner. The blocks are different for each speaker and are introduced to ensure that each appointment has to be negotiated.

One of the shaded areas on each calendar sheet is also associated with a fictitious appointment. Speakers can use this appointment as an excuse for rejecting a date offered by their partner. The fictitious appointments all contain names of the main German towns and cities. Apart from eliciting town names in this fashion, one of the appointments which has to be arranged is a week’s trip through Germany’s university towns.

Speakers have to make three appointments in each subsession. They are informed about the appointments at the start of each subsession. A concise version of each appointment is also placed at the bottom of the relevant calendar sheet. The appointments differ in length ranging from a short meeting to a week’s trip. Participants receive pens so that they can enter the appointments made into the sheets.

Two of the appointments to be arranged are aimed at eliciting the pronunciation of letters. This is done using abbreviations of the biggest German car show (“IAA in Frankfurt”) and a congress name (“ICPhS in Stockholm”). Two of the fictitious entries on the calendar sheets also contain names of institutions in Germany (“BMFT in Bonn”, “IDS in Mannheim”).

März 1994		April 1994	
Di 1		Fr 1	Karfreitag
Mi 2		Sa 2	Karsamstag
Do 3		So 3	Ostersonntag
Fr 4		Mo 4	Ostermontag
Sa 5		Di 5	
So 6		Mi 6	
Mo 7		Do 7	
Di 8		Fr 8	
Mi 9		Sa 9	
Do 10		So 10	
Fr 11		Mo 11	
Sa 12	ICPhS	Di 12	
So 13		Mi 13	
Mo 14		Do 14	
Di 15		Fr 15	
Mi 16		Sa 16	
Do 17		So 17	
Fr 18		Mo 18	
Sa 19		Di 19	
So 20		Mi 20	
Mo 21		Do 21	
Di 22	Besprechung in	Fr 22	
Mi 23	Kiel	Sa 23	
Do 24		So 24	
Fr 25		Mo 25	
Sa 26		Di 26	
So 27		Mi 27	
Mo 28		Do 28	
Di 29		Fr 29	
Mi 30		Sa 30	
Do 31			

6. Festlegen:

- eines gemeinsamen Besuchs der ICPhS in Stockholm
- einer fünftägigen gemeinsamen Dienstreise
- eines Wochenendes für das Abfassen eines Berichts über die Reise

	Montag	Dienstag	Mittwoch	Donnerstag	Freitag
08-09					
09-10					
10-11					
11-12					
12-13					
13-14					
14-15					
15-16					
16-17					
17-18					
18-19					

März 1994		April 1994	
Di 1		Fr 1	Karfreitag
Mi 2		Sa 2	Karsamstag
Do 3		So 3	Ostersonntag
Fr 4		Mo 4	Ostermontag
Sa 5		Di 5	
So 6		Mi 6	
Mo 7		Do 7	
Di 8		Fr 8	
Mi 9		Sa 9	Dienstreise nach
Do 10		So 10	Berlin
Fr 11		Mo 11	
Sa 12	ICPhS	Di 12	
So 13		Mi 13	
Mo 14		Do 14	
Di 15		Fr 15	
Mi 16		Sa 16	
Do 17		So 17	
Fr 18		Mo 18	
Sa 19		Di 19	
So 20		Mi 20	
Mo 21		Do 21	
Di 22		Fr 22	
Mi 23		Sa 23	
Do 24		So 24	
Fr 25		Mo 25	
Sa 26		Di 26	
So 27		Mi 27	
Mo 28		Do 28	
Di 29		Fr 29	
Mi 30		Sa 30	
Do 31			

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	Montag	Dienstag	Mittwoch	Donnerstag	Freitag
08-09					
09-10					
10-11					
11-12					
12-13					
13-14					
14-15					
15-16					
16-17					
17-18					
18-19					

Figure 2. Calendar sheets and timetables for one subsession.

1			
8.00			
9.00			
10.00			
11.00			
12.00			
13.00			
14.00			
15.00			
16.00			
17.00			
18.00			
19.00			
20.00			

2			
8.00			
9.00			
10.00			
11.00			
12.00			
13.00			
14.00			
15.00			
16.00			
17.00			
18.00			
19.00			
20.00			

8. Festlegen von 3 Terminen an je einem Tag für Arbeitstreffen

8. Festlegen von 3 Terminen an je einem Tag für Arbeitstreffen

Figure 3. Timetable used in final subsession to elicit deictic time expressions.

The elicitation of deictic time expressions, “heute, “morgen” and “übermorgen” (“today”, “tomorrow”, “the day after tomorrow”), requires the construction of separate materials. A three-day timetable (see Figure 3) is used which contains only hourly divisions and no names of weekdays. Speakers are told that the timetable represents a three-day period from “today” until the “day after tomorrow”, and that they are to arrange three appointments, one on each of these days. As with the calendar sheets and other timetables, these timetables also contain shaded areas representing times when appointments cannot be made. Other methods of eliciting deictic time expressions, such as providing speakers with a reference date (e.g. “today is 8th March”) at the beginning of a subsession proved unsuccessful.

The dialogue partners are requested to address each other with the formal second person pronoun “Sie”, even if they would otherwise employ the informal pronoun “du”. They are also asked to introduce themselves at the beginning of the session so that they are able to address each with a surname during the recordings.

III Transliteration

In this chapter we describe the conventions used to provide the orthographic transliteration of a dialogue. We make a distinction between a symbolic representation of the content of a speech signal which is based on conventional orthography and a representation based on a phonetic/phonological symbol inventory. We refer to the former as *transliteration*, to the latter as *transcription*.

III.1 Objects to be symbolized

The following verbal and nonverbal objects are symbolized:

- lexical items (III.3, also for the treatment of compounds and heterophonic homographs)
- reduced word forms (III.4)
- interjections, agreement and negation particles (III.5)
- numerals (III.6)
- abbreviations and spellings (III.7)
- nonverbal productions (III.8):
 - hesitation particles
 - laughing, coughing, lip-smacking etc.
 - lengthening of articulation while lexical search is carried out
 - breathing
 - pauses
- syntactic-semantic structure (III.9)
- non-words: neologisms and slips of the tongue (III.10)
- truncations, interruptions, false starts (III.11)
- stretches of utterance that are either poorly understood or not understood at all (III.12)
- non-articulatory noises, e.g. finger-tapping, rustling of paper, door-slamming, telephone-ringing (III.13)
- comments about particular events (III.15)
- technical breaks in the recording (III.16)
- overlapping talk (III.17).

III.2 Transliteration file format and ASCII codification

III.2.1 Transliteration file format

The transliteration files have the following make-up:

- All of the turns belonging to one subsession are contained in one text file.
- Each turn receives an index, the first three letters representing the speaker, followed by three numbers identifying the chronological order of the turn (counting begins at 000).
- The text of each turn begins with the index at the beginning of the line, delimited by a colon.
- The actual transliteration is separated from the turn index by a blank and all further lines of the turn are indented by eight blanks.
- Each line of comment, i.e. each line not containing transliterated text begins with a semi-colon and is placed without indentation at the beginning of a line. Global comments are placed before the first turn and separated from it by an empty line. Comments about a single turn are placed on a separate line directly after the relevant turn and are also separated from what follows by an empty line (see III.15).
- An empty line is placed between two turns.
- An empty line is placed at the end of each file.
- Each non-empty line ends with a blank.
- Punctuation marks, i.e. “. , ?” are separated from the preceding and the following word by a blank.
- Words are never split across lines.

Examples:

```
ABC001: am Mittwoch , den dreiundzwanzigsten , habe ich  
        leider "uberhaupt keine Zeit .
```

```
XYZ002: wie w"ar's dann am Freitag ?
```

```
;Die Aufnahme ist teilweise stark "ubersteuert.  
;Sprecher XYZ spricht sehr leise und undeutlich.
```

```
XYZ000: ...
```

IJK089: ...
;genuschelte Sprechweise

III.2.2 ASCII codification

The codification of the transliteration is in 7-bit ASCII. The T_EX convention is used to represent umlaut and “ß”, i.e. "a, "s etc. However, for a range of further processing stages, including the automatic generation of canonical transcription from the orthography, a 7-bit ASCII-standardization for German is used, whereby “[{}]\~” are reserved and should not be used to symbolize other features. Rather than redefine these reserved symbols in the transliteration it was decided to exempt them from use in transliteration altogether.

III.3 Lexical items

The transliteration of words generally follows Duden conventions. This also applies to the use of word-initial capital and small letters depending on the morphological word-class. This difference is also maintained even with words in sentence initial position.

The nominal forms of the formal address “Sie” and “Ihnen”, as well as the possessive form “Ihr” (including any inflectional ending) are also written with an initial capital letter. This ensures a differentiation between the pronouns for 2nd and 3rd person, i.e. “Sie” - “sie”; “Ihr” - “ihr”. The 2nd person informal pronoun “du” does not have to be differentiated in the same fashion and is therefore kept small.

In most cases compounds are written in accordance with Duden conventions, e.g. elements of a compound are also written together when a junctural element is present (“Besprechungsraum”). Duden conventions are also followed when using hyphens in compounds, e.g.

- “EDV-Programme”, “USA-Reise”, “D-Zug”
- “in- und auswendig”, “Ankunfts- und Abfahrtzeiten” (despite the presence of a junctural element)
- “Hamburg-Harburg”

Hyphens may also be employed to make the structure of compounds more transparent. This is the case when they become too long or structurally complex, e.g.

- “Personalvertretungs-Gesetz” (despite junctural “s”)
- “Handschuh-Macher”
- “Vier-Uhr-Termin”
- “Dreißig-Grad-Wäsche”.

The use of initial capital and small letters as well as the judicious use of hyphens can serve to differentiate words which would otherwise be heterophonic homographs, e.g.

- “Weg”, “weg” (/ve:k/, /vɛk/); “Rast”, “rast” (/rast/, /ra:st/); “Flucht”, “flucht” (/flʊxt/, /flu:xt/); “Bucht”, “bucht” (/bʊxt/, /bu:xt/)
- “Wach-Stube”, “Wachs-Tube”; “Lehr-Erfolge”, “Lehrer-Folge”

In other cases the different pronunciations of heterophonic homographs can only be made clear using a phonetic transcription, e.g.

- “modern” (/mɔ'dɛən/, /'mɔ:ɪdɛn/); “rasten” (/rastən/, /ra:stən/)

If a transcription is given it is placed after the word as a comment (see III.15).

Dialectal words which neither have a separate entry in Duden, nor represent the dialectal pronunciation of a word listed in Duden, are transcribed orthographically without any special marking. If need be, a comment can be used to clarify the meaning (see III.15).

Examples:

ja mei

moin , moin <; norddeutsche Gru"sformel>

III.4 Reduced word forms

Reduced word forms are represented in a more systematic fashion than they are by Duden, and the number of forms allowed is more restricted. The orthographic representation of reduced word forms can at best only coarsely reflect the complex phonetic and phonological processes at work in such reductions and these can be dealt with in a more comprehensive and systematic fashion at the segmentation and labelling stage.

The loss of final “-e” in verbal and nominal inflections is represented by replacing “-e” with an apostrophe. The deletion of the initial vowel in “es” and “ein, eine, einem, einen, einer” is also indicated using an apostrophe in place of the relevant letters representing

the vowel. If such a reduced form of a function word follows another word, which has also lost its final “-e” then both are written together and only one apostrophe is used.

The final syllable “-en” is always written out in full, e.g. “guten”, even if the pronunciation is [gu:t̩]. This also applies to the reduced form of the indefinite article “einen” which is written as “nen” even if only a nasal is produced.

The contractions of prepositions and definite articles leading to a reduction in the number of syllables have normalized orthographic forms laid down in Duden, which can be used in the transliteration, and in certain cases the contracted form has a different meaning, e.g. “Er geht zur Schule.” vs. “Er geht zu der Schule.” The form “fürn” is also used although this is not part of the Duden inventory. The following contracted forms are used:

Prep. + das	Prep. + dem	Prep. + den	Prep. + der
ans	am	–	–
aufs	–	–	–
–	beim	–	–
durchs	–	–	–
fürs	–	fürn	–
hinters	hinterm	hintern	–
ins	im	–	–
übers	überm	übern	–
ums	–	–	–
unters	unterm	untern	–
vors	vorm	vorn	–
–	zum	–	zur

Combinations of a preposition and definite article in which the number of syllables is not reduced are represented, in accordance with Duden, with an apostrophe, e.g.:

“aus’m”, “auf’n”, “durch’n”, “in’n”, “mit’m”, “nach’m”

There are certain cases where Duden conventions do not differentiate between a combination of preposition plus indefinite article and preposition plus definite article, e.g. “auf’m”, “auf’n”, “aus’m” for “auf einem”/“auf dem”, “auf einen”/“auf den” and

“aus einem”/“aus dem”. To guarantee the unequivocal reconstruction of a preposition and article from such combinations, the reduced form of preposition and indefinite article are written with the appropriate apostrophed form of the indefinite article separated from the preposition with an intervening blank. This provides a clear differentiation of “aus ’nem” (=“aus einem”) and “aus’m” (= “aus dem”). If it is not clear from the context whether the speaker has produced a definite or indefinite article then the preposition and definite article combination, i.e. without blanks, is transliterated.

Reductions other than those listed are only admitted in the form of pronunciation variants appropriately enclosed in “<! >” (see III.15).

Examples:

“für einen Termin”	f"ur 'nen Termin
“für ein Treffen”	f"ur 'n Treffen
“für eine Stunde”	f"ur 'ne Stunde
“er hat es gemacht”	er hat 's gemacht
“ich gebe es dir”	ich geb's dir
“ich habe ihn getroffen”	ich hab' ihn getroffen
“ich trete dir auf die Füße”	ich tret' dir auf die F"u"s'
“unter dem Tisch”	unterm Tisch
“auf dem Tisch”	auf'm Tisch
“auf dem Tisch”	auf 'nem Tisch
“auf einem Tisch”	

Reduced forms of negation and tag particles, e.g. “nee” (= “nein”), “ne”, “nä” (= “nicht wahr”) are treated as special cases. In these examples no attempt is made to reconstruct the forms they are thought to derive from. The same applies to reduced forms of greetings, such as “Morgen” (=“guten Morgen”), “n Abend” (=“guten Abend”), “Tag” (=“guten Tag”). Reductions such as “n Abend” and “n Tag” are indicated by replacing the blank with an apostrophe: “n’Abend”, “n’Tag”.

III.5 Interjections

Interjections such as “au”, “ah”, “oh”, “aha”, “mhm” (agreement), “mm” (negation) are transliterated as such without any additional symbolization. The majority are already listed in Duden.

III.6 Numerals

Numerals are not symbolized using numbers, but are written out in full, keeping in part to regulations laid down by Duden. In order to maintain relatively short lexical entries without neglecting the phonetic cohesion in particular compound numbers, numerals from 13 to 99 are written together. The same applies to multiples of one hundred from “ein” to “neunzehn”, i.e. including years. All other number combinations are written apart.

Examples:

neunzehnhundert

drei Millionen neunundvierzig tausend sechshundert

vierzehn

dreihundert und neunundvierzig

III.7 Abbreviations and spelling

Acronyms are written in the usual fashion, e.g. “DIN”, “Benelux”, “OPEC”, “AStA”, “CeBIT”. The pronunciation of letters in abbreviations and in spelling names and other words is symbolized with a capital letter prefixed with “\$”. “\$” is preceded by a space, except in compounds when it is preceded by a hyphen.

Examples:

“ICPhS”	\$I \$C \$P \$H \$S
“USA-Reise”	\$U \$S \$A-Reise
“D-Zug”	\$D-Zug
“Vitamin-C-Mangel”	Vitamin-\$C-Mangel
“Gauß” (spelt out)	\$G \$A \$U \$SZ \$G \$A \$U scharfes \$S
“Auszeit” (spelt out)	\$A \$U \$S \$Z \$E \$I \$T

Expressions such as “und so weiter” and “zum Beispiel” must not be transliterated using their usual written abbreviations “usw.” and “z.B.”.

III.8 Nonverbal productions

Nonverbal productions, such as hesitations, articulatory productions such as laughing, clearing of the throat etc., hesitational lengthening, breathing and pauses are transliterated.

Hesitations, i.e articulations that interrupt the normal flow, are split into four categories:

- If the hesitation involves only a vocalic articulation, then it is transliterated using “<ah>”, regardless of the quality of the vowel.
- A hesitation particle comprising a vocalic and a nasal portion is transliterated with “<ahm>”, again regardless of the vowel quality.
- A hesitation particle which consists of a nasal portion is symbolized with “<hm>”.
- Other types of hesitation, not belonging to any of the above, such as “brtt”, “pf”, “puh”, etc. are captured collectively with “<has>” (“Häsitation”).

Other articulatory nonverbal productions are divided into six categories.

- “<Husten>”, (coughing)
- “<Lachen>”, (laughing)
- “<R"auspern>”, (clearing the throat)
- “<Schlucken>”, (swallowing)
- “<Schmatzen>”, (lip-smacking; clicking)
- “<Ger"ausch>”, (noise)

“<Ger"ausch>” is again a residual category used to symbolize all those nonverbal articulatory noises, which do not fit into the other five categories.

Hesitational lengthening of the preceding articulation is symbolized with “<Z>” (= “Zögern”). “<Z>” can refer to a whole word or any part thereof and is placed directly after the lengthened portion of the word without any intervening space.

Breathing, with or without any accompanying pauses, is symbolized using “<A>” (= “Atmen”). No distinction is made between inbreaths and outbreaths.

Pauses are indicated with “<P>” (= “Pause”). “<P>” is defined as a period of silence within a speaker's turn which is not linked with breathing. Silences in sequence with the latter are subsumed under “<A>”. Punctuation marks may not be used to indicate pauses. If pauses occur at the same place as a punctuation mark then “<P>” is placed after the punctuation mark.

“<A>” and “<P>” can both occur word-internally. If this happens then proceed as described in III.11.5.

Examples:

am<Z> Dienstag

n<Z>ein

dienstlich <A> , aber

Anfang Mai , gleich <P> am vierten

III.9 Punctuation

A reduced inventory of punctuation marks (. , ?) is used in accordance with Duden conventions to provide some indication of the syntactic and semantic structure of an utterance. It is hoped that by adopting such a codified system familiar to the transcriber a relatively systematic application to the text can be guaranteed. Punctuation marks are not used to indicate pauses or prosodic phenomena (pitch contours, final lengthening, etc.). A blank is placed both before and after each punctuation mark.

The semantic-syntactic placement of punctuation marks prescribed in Duden is taken as a basic notational framework. The primary semantic-syntactic conventions demand, e.g.

- “ , ” in “er sagt , daß es ihm gleichgültig ist .”, even if no pause or prosodic marker is present after “sagt”.
- “ ? ” in “wer war das ?” or “kommst du ?”, regardless of whether the pitch is rising or falling finally.

Of course, information provided by pauses, intonation and length may be used to decide:

- between “ . ” in the statement “er kommt .” with a slight rising or a final falling intonation, and “ ? ” in the question “er kommt ?” with a high rise.
- between “ . ” in “am besten Mittwoch . <P> und zwar vormittags” with a strong break, and “ , ” in “am besten Mittwoch , und zwar vormittags .” with a weaker break .
- between no punctuation mark and “ . ” or “ , ” where different degrees of (syntactic) cohesion are involved, e.g. in “er kommt morgen .”, “er kommt , morgen.” and “er kommt . <P> morgen.”.

Examples:

ich wollte Sie fragen , was Sie von Mittwoch halten .

ich wollte Sie fragen , was halten Sie von Mittwoch ?

Sie sagten , am Mittwoch , den dreizehnten .

But if this is produced with a rise inquiring about the content of a prior statement or questioning the day or date:

Sie sagten , am Mittwoch , den dreizehnten ?

Truncations (“/–”, see III.11.1) and technical breaks (“<T>”, see III.16) are placed in the transliteration without any further punctuation.

Examples:

im Dezember/– ach so , wir brauchen noch einen Termin
wir brauchen noch einen Ter<T>

III.10 Nonwords

Adopting the philological practice of indicating reconstructed forms, nonwords created by slips-of-the-tongue and neologisms are indicated by prefixing them with “*”, e.g. “*Einfachhalt” instead of “Einfachheit” (see example under III.11.3).

“*” should not be used to indicate slips-of-the-tongue in utterances such as “Beim Gongschlag ist es sechs Mark dreißig.” (“At the tone it will be six pounds thirty.”). “*” is only used to mark those items between blanks, whose occurrence in the German lexicon would not be expected and should therefore not be included in it. This symbolization can also be used for *ad hoc* neologisms produced by a speaker as well as loan words and foreign names.

III.11 Truncations, interruptions, false starts

An utterance which has been broken off by a speaker can be continued in three possible ways:

- The speech act is not continued and a new speech act may be started. This is a truncation.
- Following a pause and/or a hesitation the speech act is continued without any repetition or repair. This is an interruption.
- The speech act is continued after a simple repetition or repair (of a part) of what has already been said. This is a false start.

Apart from the syntactic-semantic break the speech may also contain phonetic indicators of such dysfluencies. This is of particular importance in the case of a false start. Simple repetition, even with modification of what has been said, may be a necessary condition, but is still not a sufficient condition for the transliteration conventions laid down here, since in a dialogue a speaker may repeat any uttered thought or discard it, modify it or

expand on it, without any dysfluency arising. What is crucial here, is that the execution of the speech plan has been disrupted, whereas in the other cases an undisturbed plan has been repeated, complemented, corrected or discarded by another plan.

III.11.1 Truncations

“/-” is placed at the breakpoint without any intervening spaces (see also III.11.4 for the use of “=”). No punctuation mark is placed after “/-”.

Example:

INH067: im Dezem=-/ - <P> ach so , wir brauchen ja noch
einen im November .

INH017: <A> gut . dann/-

III.11.2 Interruptions

An interruption is not symbolized as it is already clearly indicated by the presence of pauses or breathing.

Example:

THW138: dann <P> in der zweiten H"alfte <P> <hm> <A> ,
also <P> ich kann vom dreizehnten <P> bis zum<Z>
f"unfundzwanzigsten .

III.11.3 False starts

“/+” is placed at the breakpoint without any intervening spaces. The resumption begins with the next lexical item. The left edge of the reparandum is marked with “+/-”, although the choice of a location may at times be arbitrary. In the case of a truncation or an interruption no bracketing can be undertaken as there is no resumption which could indicate textual smoothing over. In the case of a multiple false start the left edge is only marked once with “+/-”, whereas every break point is indicated with “/+” (see also III.11.4 for the use of “=”).

Examples:

INH027: <A> und dann , wie w"ar's +/-um/+ <P> um den
f"unfzehnten rum <P>

THW022: ja , dann <P> k"onnen wir ja wieder ein/- <A>
+vielleicht nehmen wir der *Einfachhalt/+
<Lachen> vielleicht nehmen wir der Einfachheit
halber den<Z> dritten ?

INH069: erst so +/ab achten/+ <P> acht=/+ <P> zwischen dem achten und dem achtzehnten <A> .

Apart from lexical material only “<Z>” or “<A>”, if an outbreath is involved, may precede “/-” or “/+”. Hesitation particles, pauses, laughing etc. at the breakpoint are placed after “/-” or “/+” with an intervening space.

III.11.4 Word fragments

If the utterance is broken off in the middle of a lexical item then “=” is placed between the word fragment and “/-” or “/+”. It may be necessary to consider the grammatical structure of the context in order to determine whether one is dealing with a word or a word fragment. The orthographic representation of a word fragment should also orient itself to the following lexical item if they are thought to correspond to each other. This means, for example, choosing between the use of a capital or small letter word-initially or the choice between “f” and “v”, which can both correspond to a voiceless labiodental fricative.

If a letter sequence preceding a breakpoint can represent a meaningful lexical item and no decision can be made on the basis of the context whether “=” should be inserted, then it is left out. The procedure for dealing with repairs occurring within a lexical item is described in III.11.5 below.

A letter sequence which is already marked with “=” need not be marked with “*” to indicate that it is a nonword.

Examples:

+/f<Z>=/+ f"ahrt

+/Univerti=/+ Universit"atsst"adte

vor dem +/*But und/+ Bu"s- und Bettag

III.11.5 Interruptions within the word

An interruption in the form of a pause, breathing, hesitation or repair which occurs within a word is symbolized by placing an underscore “_” after the first and before the second part of the word. The intervening material constituting the interruption is symbolized as usual.

Examples:

Lebens_ <P> _mittel
Maria Himmel_ +/*f"ahrt/+ _fahrt
da_ +/*nak/+ _nach
Haupt_ +/ausga=/+ <"ah> _eingang

III.12 Stretches which are difficult or impossible to identify

Portions which the transcriber considers to be lexical, but whose content is uncertain are indicated by prefixing the suspect item with “%”. If a whole stretch is incomprehensible then “<%>” is used.

Examples:

als wenn ich %zu %Ihnen %mu"s
der +/ist/+ <%> pa"st mir ausgezeichnet

III.13 Non-articulatory noises

The names for non-articulatory noises are kept symbolically distinct from articulatory objects by prefixing them with “#”. The following categories are recognized:

- “<#Klicken>” - “clicking”: used primarily to describe the noise caused by pressing and releasing the turn button.
- “<#Klingeln>” - “ringing” (of a telephone)
- “<#Klopfen>” - “knocking”
- “<#Mikrobe>” - (= “Mikrofonberührung”) “microphone touching”: caused when contact is made with the microphone
- “<#Mikrowind>” - (= “Mikrofonwind”) “microphone wind”: caused by blowing into the microphone
- “<#Quietschen>” - “squeaking”
- “<#Rascheln>” - “rustling” of paper
- “<#>” - a residual category for all other noises not falling into any of the other categories.

III.14 Coincidence of acoustic events

Non-articulatory or nonverbal articulatory productions, such as the rustling of paper or laughing, which coincide with the production of verbal material, are symbolized before the verbal material which they coincide with and the overlaid portion is enclosed in “< :>”. The symbolization of overlaying noise is placed directly after the opening “<:”. The closing “:>” must always be directly preceded by a sequential event. Sequential events are words, hesitation particles, nonverbal articulatory productions (and even other non-articulatory acoustic events). The bracket pair “< :>” always refers to specific events. If these change a further bracket pair “< :>” must be used. If the overlaid portion begins with a nonverbal sequential event, then this must be enclosed in its own bracket pair and a new pair begun for subsequent sequential events overlaid by the same noise. Several overlaying events occurring at once are notated in the following order: non-articulatory noises precede articulatory nonverbal productions. Events from either of these categories occurring together are placed in alphabetical order within each category.

Examples:

```
da <:<#Klopfen> k"amen mir die Monate:> April , Mai
da <:<Lachen> k"amen mir die Monate:> April , Mai
<Lachen> <:<Lachen> wer wei"s:> <Lachen>
```

‘Knocking’ (<#Klopfen>) and ‘laughing’ (<Lachen>) overlay “kämen mir die Monate”:

```
da <:<#Klopfen> <Lachen> k"amen mir die Monate:>
April , Mai
```

‘Knocking’ (<#Klopfen>) overlays ‘laughing’ (<Lachen>) and “kämen mir die Monate”:

```
da <:<#Klopfen> <Lachen>:> <:<#Klopfen> k"amen mir
die Monate:> April , Mai
```

‘Knocking’ (<#Klopfen>) and ‘paper rustling’ (<#Rascheln>) overlay “kämen mir die Monate”:

```
da <:<#Klopfen> <#Rascheln> k"amen mir die Monate:>
April , Mai
```

‘Laughing’ (<Lachen>) overlays “ich habe”, followed by ‘knocking’ (<#Klopfen>) and ‘laughing’ (<Lachen>) overlaying “heute”:

```
<:<Lachen> ich habe:> <:<#Klopfen> <Lachen> heute:> keine
Zeit .
```

III.15 Comments

Global comments about a whole dialogue or about all the turns by a particular speaker are placed before the transliteration of the dialogue. A line comment begins with a semi-colon and is separated from the first turn by an empty line. Global comments about one turn are placed on a separate line directly after the text of the turn. The line of comment begins with a semi-colon.

Local comments are inserted at the relevant point in the transliterated text. The comments begin with a semi-colon followed by a blank and are enclosed in “< >”.

Examples:

```
am Donnerstag <; "Übersteuerung">
vielleicht <; sehr leise>
```

Comments can be used to give details regarding dialectal, stylistic or other aspects (e.g. “Deutschlands” with non-canonical junctural “s”), which would not necessarily be expected from the standardized orthographic form. These details are given an orthographic representation which is prefixed with “!”, enclosed in “< >” and placed after the standardized transliteration of the word in question. A number is placed after “!” indicating how many lexical items preceding the comment are being referred to. The orthographic representation of the pronunciation comment is separated from the “!n” prefix by a blank.

Examples:

```
anders <!1 anderscht>
wir <!1 mir> sind <!1 sann>
haben wir <!2 hamer>
machen wir mal <!3 mama> den
```

III.16 Technical breaks in the recording

The use of buttons by the participants in the dialogue to control the recordings means that portions of utterance at the beginning and end of turns may be “cut off”. Such a technical break can also occur in the middle of a turn if the speakers accidentally release their button. The technical break is symbolized using “<;T>”. The details of the symbolization of a technical break depend upon the type of material in which a break occurs.

A technical break at the beginning or end of a turn is only marked when a lexical item or a hesitation particle is involved. It is not used in connection with other articulatory productions and non-articulatory noises. “<;T>” is placed directly after or before the hesitation particle or what is left of the symbol sequence of the lexical item involved.

Turn-internally “<;T>” is always used to indicate a technical break. In the case of interrupted lexical items or hesitation particles “<;T>” is placed directly before/after the relevant word or portion thereof. A blank is placed between two adjacent “<;T>”. If the lexical item or hesitation particle before and/or after the break is not interrupted, then a blank is placed in the usual fashion before or after “<;T>”. In such cases “<;T>” can include a pause. Other (nonverbal) items are separated from “<;T>” using blanks.

Examples:

```
<;T>e Woche sp"ater  
da m<;T>  
Donner<;T> <;T>woch  
Donner<;T> <;T><"ah>  
Donner<;T> Mittwoch  
Donnerstag <;T>woch  
Donnerstag <;T> Mittwoch  
Donnerstag <;T> <Lachen>  
Donner<;T> <Lachen>  
<A> <;T> <#>
```

III.17 Overlapping talk

Overlapping talk in the button-pressing elicitation we have described cannot occur. However, other dialogues not involving the use of button-pressing to control the dialogue will have overlapping talk. Overlapping talk is transliterated as follows:

Overlapping portions of talk are enclosed in parentheses for both speakers. The notation of overlap is only carried out on the basis of whole words. In order to indicate which bracketed portions are in overlap:

- “@” is placed before the right bracket, i.e. “(...@)” if the overlap is with the following turn, or
- after the left bracket, i.e. “(@...)” if overlap is with the preceding turn.

This ensures a clear association of bracketed portions.

If there are a number of overlapping portions in two consecutive turns, the association of each bracketed portion is to be carried out in the order in which they appear, i.e. the first bracket pair of the first turn “(...@)” and the first bracket pair of the second turn “(@...)” form one portion of overlap, etc.

Examples:

The turn portion “für die nächsten” overlaps “ja gerne”:

PEG004: wollen wir mal die Termine ausmachen , (f"ur die
n"achsten@) Monate ?

CLK005: (@ja gerne) . gerne .

The turn portion “fünfzehnten <A>” overlaps “fünfzehnten” and “achtundzwanzigsten” overlaps “genau <A>”:

CLK087: nee, nicht den elften , den<Z>
(f"unfzehnten <A>@) .

PEG088: (@f"unfzehnten) und den (achtundzwanzigsten@) .

CLK089: (@genau <A>) .

III.18 Symbol order

If stretches are defined by different characteristics, this can lead to a conflict in the placement and sequence of symbols. The following order of precedence (the higher the number, the higher the cohesion to the word) is used:

- (1) Punctuation marks . , ?
- (2) Overlap ()
- (3) Overlay <: :>
- (4) Verbal break /-, +/ /+, technical break <;T>
- (5) Word fragment operator =, underscore _
- (6) Lengthening <Z>

Coincidence and intersection of the symbol pairs in (2) to (4) are allowed, i.e. the symbols are transcribed in the order they occur. If a number of symbols have to be put at the same place, then the following sequence is used:

“(” before “<:” before “+” and “/+”, “/-” before “:>” before “)”

i.e. working outwards from the word, one places the symbols for a break, followed by those for overlay and finally those for overlap.

IV Canonical transcription

Once a dialogue has been successfully transliterated the next step is to provide a canonical transcription of the transliteration which can serve as the basis for the process of segmentation and labelling. The production of a canonical transcription is carried out automatically using the grapheme-to-phoneme converter within the RULSYS text-to-speech system for German (Kohler 1992) and is subsequently corrected by hand.

IV.1 Canonical transcription of words

The initial canonical transcription at the level of the word is based on a phonemic system of German which recognizes 46 units:

24 vowels (20 oral and 4 nasal vowels)

22 consonants

It is suitable for the transcription of what we might call a maximal Standard German as it includes both the half-open front unrounded vowel, [ɛ:], together with the full range of nasal vowels which can, but need not occur in loan words of French origin. The transcription system is in modified SAMPA (Wells et al. 1989), with a few additional symbols.

IV.2 Vowels

Vowels are divided into two categories: tense and lax. Both the quantitative and qualitative phonetic differences associated with this phonological distinction are reflected in the symbolization:

SAMPA	IPA	Example	
a: , a	a:, a	k'a:n , k'am	<i>Kahn, Kamm</i>
e: , E	e:, ε	b'e:t , b'Et	<i>Beet, Bett</i>
i: , I	i:, I	r'i:t , r'It	<i>riet, ritt</i>
o: , O	o:, ɔ	b'o:k , b'Ok	<i>bog, Bock</i>
u: , U	u:, ʊ	b'u:s@ , b'Us@	<i>Buße, Busse</i>
y: , Y	y:, Y	h'y:t@ , h'Yt@	<i>Hüte, Hütte</i>
E:	ɛ:	k'E:z@	<i>Käse</i>
2: , 9	ø:, œ	h'2:l@ , h'9l@	<i>Höhle, Hölle</i>

a~	ã	rEsto:r'a~	<i>Restaurant</i>
E~	Ë	t'E~	<i>Teint</i>
O~	Õ	se:z'O~	<i>Saison</i>
9~	œ	pa6f'9~	<i>Parfum</i>
aI	aI	tsv'aI	<i>zwei</i>
aU	aÜ	b'aUx	<i>Bauch</i>
OY	oY	n'OYn	<i>neun</i>
@	ə	l'e:z@n	<i>lesen</i> 6
		'e:z6,	<i>Leser, her, Herr</i>
	ɐ	h'e:6, h'E6	ɐl

IV.3 Consonants

The canonical consonant inventory recognizes 22 units, 3 of which (**x**, **C**, **Q**) have non-phonemic status, avoiding the need to include certain morphological information which would otherwise be needed to account adequately for the differences in the intervocalic dorsal friction in word pairs such as *Frauchen* [fʁaʊçən] and *rauchen* [ʁaʊxən] or the presence vs. absence of glottalization in pairs such as *vereisen* [fɛʔaizən] and *verreisen*. [fɛʁaizən].

SAMPA	IPA	Example	
b	b	b'aIn	<i>Bein</i>
d	d	d'u:S@	<i>Dusche</i>
f	f	fr'aI	<i>frei</i>
g	g	g'ast	<i>Gast</i>
h	h	h'ast	<i>Hast</i>
j	j	j'a:	<i>ja</i>
k	k	k'a:n	<i>Kahn</i>
l	l	l'ICt	<i>Licht</i>
m	m	m'an	<i>Mann</i>
n	n	n'OYn	<i>neun</i>
p	p	pl'ats	<i>Platz</i>
r	r	r'aUx	<i>Rauch</i>
s	s	l'a:s	<i>las</i>

t	t	t 'O6t@	Torte
v	v	v 'a :z@	Vase
z	z	l 'e :z@n	lesen
C	ç	z 'ICt	Sicht
x	x	d 'ax	Dach
S	ʃ	St 'at	Stadt
Z	ʒ	l 'o :Z@	Loge
N	ŋ	j 'UN@	Junge
Q	ʔ	Q 'axt	acht

IV.4 Lexical stress

Lexical stress is indicated by placing ' before the vowel of the stressed syllable. The secondary stress of syllables of non-initial elements of compounds is marked by placing " before the vowel of the relevant syllable. The vowel together with its stress-marking form a complex symbol. Function words have no lexical stress marked.

Examples:

<i>Osterwoche</i>	Q 'o :st 6#v "Ox@
<i>Ostermontag</i>	Qo :st 6#m 'o :nta :k
<i>für</i>	fy :6+

IV.5 Morphological and syntactic information

If the boundary of an element in a compound is bound up with particular phonetic characteristics (temporal structure or segmental aspects, such as strong aspiration) then the boundary is marked using #, and the syllable carrying secondary stress is indicated as above.

Examples:

<i>Rücksicht</i>	r 'Yk#z "ICt	(= "rear view")
<i>Rücksicht</i>	r 'YkzICt	(= "consideration")
<i>Freitag</i>	fr 'aI#t "a :k	(= "free day")
<i>Freitag</i>	fr 'aIta :k	(= "Friday")

The symbol + is placed after the last segment of a function word to indicate its status as a function word, and the extreme reductions which such a word can undergo in connected speech.

Examples:

mit **mIt+**
für **fy: 6+**

IV.6 Nonverbal and nonvocal signal portions

Table 1 illustrates the symbols and symbol complexes used to transcribe nonverbal and nonvocal portions of a turn.

Table 1. Transcription of nonverbal and nonvocal signal portions.

Transcription	Transliteration equivalent(s)	Description
/+ and =/+	+/ ... /+ and +/ ... =/+	false start (only break and not left edge of reparandum is marked in transcription)
/- and =/-	/- and =/-	truncation (without subsequent repair)
—	—	edges of intraword interruption
%	<%> and %	stretches of utterance either unidentified or difficult to identify
z:	<Z>	hesitational lengthening
v:		prefixed to hesitation particles
n:	*	neologisms, non-words
p:	<P>	pause
h:	<A>	breathing and accompanying pauses
l:	<Lachen>	laughing
q:	<Husten>	coughing
r:	<R"auspern>	throat-clearing
s:	<Schmatzen>	clicking/lip-smacking

Transcription	Transliteration equivalent(s)	Description
w:	<Schlucken>	swallowing
g:	<Ger "ausch>	other
:k	<#Klicken>, <#Klingeln>, <#Klopfen>, <#Mikrobe>, <#Mikrowind>, <#Quietschen>, <#Rascheln>, <#>	external noise of various kinds
i	<i;T>	technical break

IV.7 Punctuation marks

Punctuation marks are taken over from the transliteration and retain their syntactic-semantic interpretation.

IV.8 Overlaid stretches

The most convenient way we found to provide a canonical transcription of stretches of utterance which are overlaid with noise or nonverbal activity such as laughing is to prefix each affected object, i.e. word, breathing, pause, etc., with the relevant symbol.

Examples:

l:dOx+ l:nOx+

<:<Lachen> doch noch:>

:kl:dan+

<:<#Klopfen> <Lachen> dann:>

V Segmentation and labelling

This chapter discusses in detail the labelling of signals at the segmental level. Section V.1 describes the generation of a list of labels from the canonical transcription. In V.2 a brief outline of the segmentation and labelling is given. Sections V.3-V.5 then describe in depth how the various phonetic and non-phonetic aspects of the acoustic signal are segmented and labelled. Section V.3 deals with the ‘bread and butter’ segmentation of words, V.4 with nonverbal and interactional aspects and, finally, V.5 examines the labelling of nonvocal aspects and technical artefacts in the signal which are unavoidable in such a complex recording set-up.

As we will show the type of labelling we carry out is most akin to Barry and Fourcin’s (1992: 10) “broad-phonetic”. The label inventory is essentially phonological with a small number of phonetic additions.

The majority of the examples we provide in this chapter are real and we have made every attempt to include examples which are contained on our CD-ROM, *The Kiel Corpus of Spontaneous Speech Vol. I* (IPDS, 1995). In the few cases where this was not possible, we have fallen back on examples taken from the read corpus, *The Kiel Corpus of Read Speech Vol. I* (IPDS, 1994). Examples are taken straight from the appropriate label file. The number in the lefthand column represents the sample number associated with the label. The inclusion of sample numbers is designed to fulfil two functions. First, they can be used along with the reference in the rightmost column to indicate the turn which the example has been taken from. Second, they make clear the temporal alignment of the various labels with the signal, a relationship which may not always be apparent from the text.

V.1 Label generation

V.1.1 Canonical labels

The canonical transcription described in the previous chapter provides the basis for creating a list of labels which can be time-aligned with the speech signal. Going from a linear transcription to a list of labels can lead to a loss of structural information previously provided by blanks. To avoid this problem a label is created by prefixing a symbol from the canonical transcription with one of three prefixes, **##**, **\$** or **#** depending on its place in the structure of a word or sentence:

##	word-initial label, e.g. ##d
\$	word-internal label, e.g. \$I , \$#k (compound-initial k)
#	punctuation and nonverbal labels, e.g. #p: , #l: , #; , #.

When a number of nonverbal labels are to be placed at the same point in time only the first of these retains **#**, all others are prefixed with **\$**. This facilitates the reconstruction of a linear transcription from the labels at a later stage (e.g. lexicon generation, VII) where the temporal information is lost.

One further modification is carried out when converting canonical symbols to labels. In many varieties of German the phonetic correlates of vowel+/r/ are very often a more or less diphthongized vocalic portion. Problems foreseen in attempting to segment such a vocalic portion in order to align it with two labels corresponding to the biphonematic sequence were avoided at the outset. A single label is created by amalgamating the biphonematic sequence, and this label is aligned with the vocalic portion as a whole.

Examples:

Canonical transcription	Label	Example
E 6	\$E6	<i>Herr</i>
E: 6	\$E:6	<i>leer</i>
2: 6	\$2:6	<i>hört</i>

#c: marks the beginning of a sentence which is bounded by a full stop or question mark, and is always placed at the same point as the first segment of the sentence.

Figure 4 shows a complete label file prior to segmentation. At this stage the file comprises four parts:

1. filename
2. transliteration of the turn, delimited by **oend**

```

g091a005.s1h
ANS005: wie sieht es denn bei Ihnen aus sp"ater in der Woche <A> ?
oend
  v i:+ z 'i: t Q E s+ d E n+ b aI+ Q i: n @ n+ Q 'aU s
  S p 'E: t 6 Q I n+ d e: 6+ v 'O x @ h: ?
kend

hend
1600000 #c:
1600000 ##v
1600000 $i:+
1600000 ##z
1600000 $'i:
1600000 $t
1600000 ##Q
1600000 $E
1600000 $s+
1600000 ##d
1600000 $E
1600000 $n+
1600000 ##b
1600000 $aI+
1600000 ##Q
1600000 $i:
1600000 $n
1600000 $@
1600000 $n+
1600000 ##Q
1600000 $'aU
1600000 $s
1600000 ##S
1600000 $p
1600000 $'E:
1600000 $t
1600000 $6
1600000 ##Q
1600000 $I
1600000 $n+
1600000 ##d
1600000 $e:6+
1600000 ##v
1600000 $'O
1600000 $x
1600000 $@
1600000 #h:
1600000 #?

```

Figure 4. A label file prior to segmentation.

3. canonical transcription, delimited by **kend**
4. list of labels, with a future time in samples

V.1.2 Additional labels

In addition to the labels created directly from the symbols of the canonical transcription a number of other labels are made available to label phonetic aspects of the signal which it would otherwise be impossible to capture using an inventory based on the canonical transcription alone:

- \$-h** plosive release phase: burst and any aspiration (see V.3.2.2)
- \$-q** creaky voice (see V.3.6)
- \$-~** nasalization (see V.3.3)
- \$-MA** indicates the presence of phonetic correlates of labels which have been deleted (see V.3.8)

(The use of the hyphen – indicates that the label has been inserted (see V.2.1)).

V.2 Segmentation and labelling process

Segmentation and labelling of the acoustic speech signal is carried out using both visual (scaleable spectrogram and oscillogram displays) and auditory (hearing the signal over headphones) information to align, and where necessary modify, the labels offered to the operator one by one, in the order they occur in the canonical transcription of the utterance. Details of the segmentation and labelling platform are given in VIII.

The first label is placed at the start of audible articulatory activity in a turn-file, the last when such activity has ceased. A label is placed at the beginning of the portion of utterance containing the chief phonetic correlates of the phonological or phonetic unit represented by the label. Segmentation is exhaustive and linear: the placement of one label temporally delimits the previous label. A segmented and labelled portion of spectrogram is shown in Figure 5.

One consequence of this type of exhaustive labelling is that labels are temporally discrete and it is not possible to show cotemporality of phonetic correlates by having labels in overlap. Instead the coincidence of the phonetic correlates of two phonological elements is shown in certain circumstances by placing two labels at the same point in time.

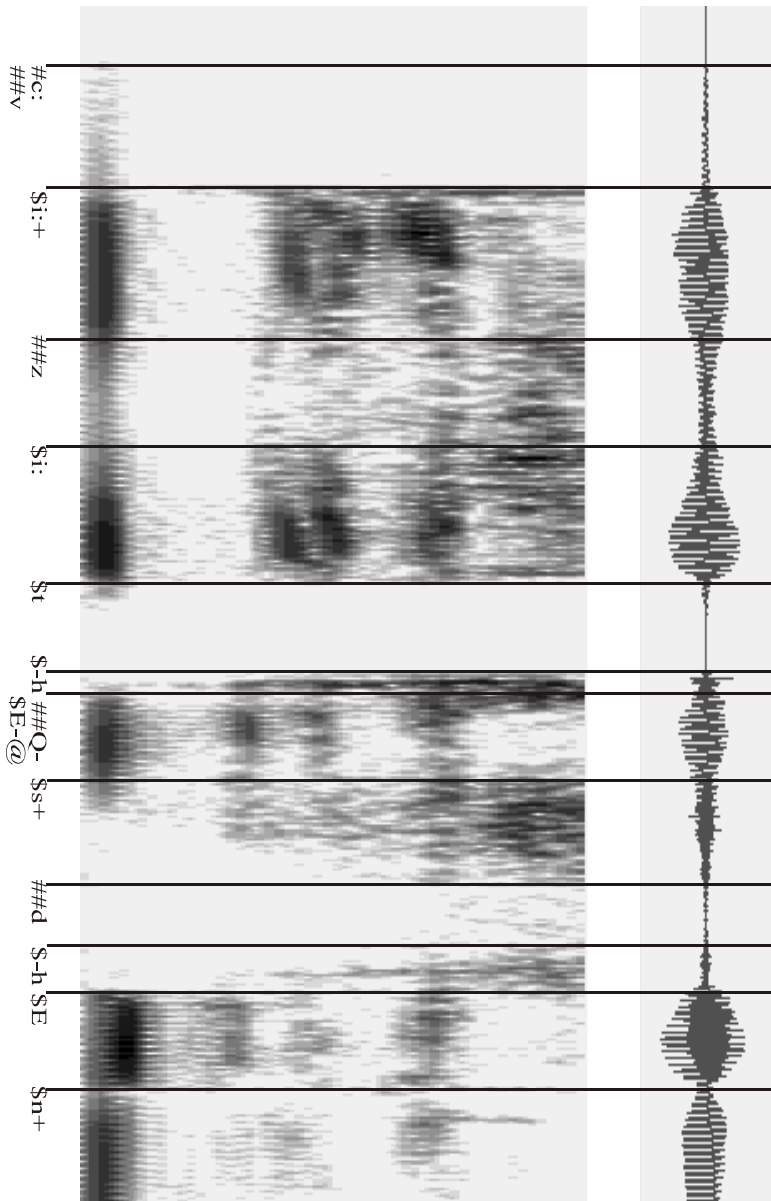


Figure 5: A segmented and labelled portion of signal.

One of the labels therefore has no duration and is temporally indeterminate. Two examples of this are creak (**\$-q**) and nasalization (**\$-~**). Both of these labels are placed at the same point in time as another label, and are to be interpreted as indicating creak or nasalization on adjacent material. Figure 6 illustrates the use of both of these labels in labelling glottalization and nasalization accompanying the first syllable of the word *eigentlich*. We deal with these features in more detail in V.3.3 and V.3.6 below.

V.2.1 Label modifications

Confronted with a portion of signal the segmenter must make a decision with respect to the next label on offer:

- the label can be aligned without modification with the beginning of that portion.
- the start of the portion corresponding to the label in question cannot be ascertained; **uncertainty** in the segment's boundary must be indicated.
- the portion cannot be assigned to the phonetic correlates of the previous label, or that on offer. A label, taken from the inventory has to be **inserted**.
- the phonetic correlates of the portion are no longer accurately described by the label on offer. A **replacement** is made.
- the phonetic correlates of the label on offer are absent. The label on offer is marked as **deleted**.

If the segmenter is unsure of a segment boundary % is inserted after the prefix. The actions of inserting, replacing and deleting are indicated by placing a hyphen – at various places in the label. The various modifications are illustrated in Table 2.

Table 2. Possible label modifications.

Modification	Example	
Uncertainty	\$%k	not possible to ascertain the beginning of velar closure
Insertion	\$-t	alveolar plosive, not present in the canonical form of <i>als</i>
Replacement	\$n-m	an assimilation of n to m in bilabial context, e.g. <i>in Bonn</i>
Deletion	\$@-	vowel absent in the second syllable of <i>morgen</i>

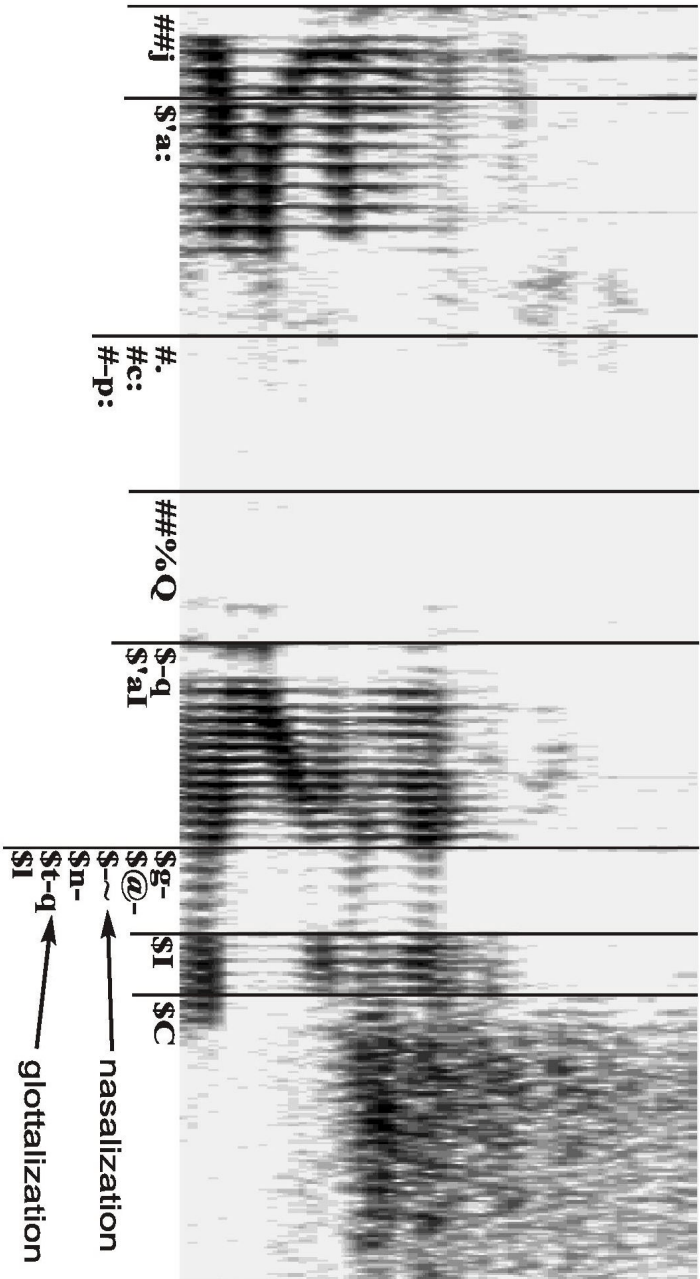


Figure 6: A portion of signal containing both glottalization and nasalization.

So, although deletion and replacement as phonological processes are not monotonic the symbolization employed to indicate them is.

The following shows a number of modifications carried out in the segmentation and labelling of the word *irgendwo*:

	Canonical labels	Time	Modified labels	
Deletion	##Q	75735	##Q-	<i>irgendwo</i> realized as [ɪʁg ⁿ ŋkvo:]
Insertion		75735	\$-ɣ	
	\$'I6	75735	\$'I6	
	\$g	76919	\$g	
Deletion	\$@	77282	\$@-	
Replacement	\$n	77282	\$n-N	
Replacement	\$t	78229	\$t-k	
	##v	78479	##v	
	\$"o:	79808	\$"o:	Reference: g071a014

V.3 Segmenting and labelling the phonetics of words

This section deals with one of the most important aspects of segmenting and labelling a turn: the phonetics of the lexical items.

V.3.1 Vowels

Vowel labels are aligned with the beginning of the vocalic portion representing the chief phonetic correlates of the vowel in question. In unproblematic cases the vocalic portion will be a voiced stricture of open approximation flanked by periods of consonantal stricture. The first diphthong of *dreißigsten* (at A) and the vowel of *paßt* (at C) in Figure 7 illustrate such cases. Included in the vowel are also any transitions away from or into adjacent consonantal strictures, but periods of aspiration following plosive release are segmented and labelled separately (see V.3.2.2)

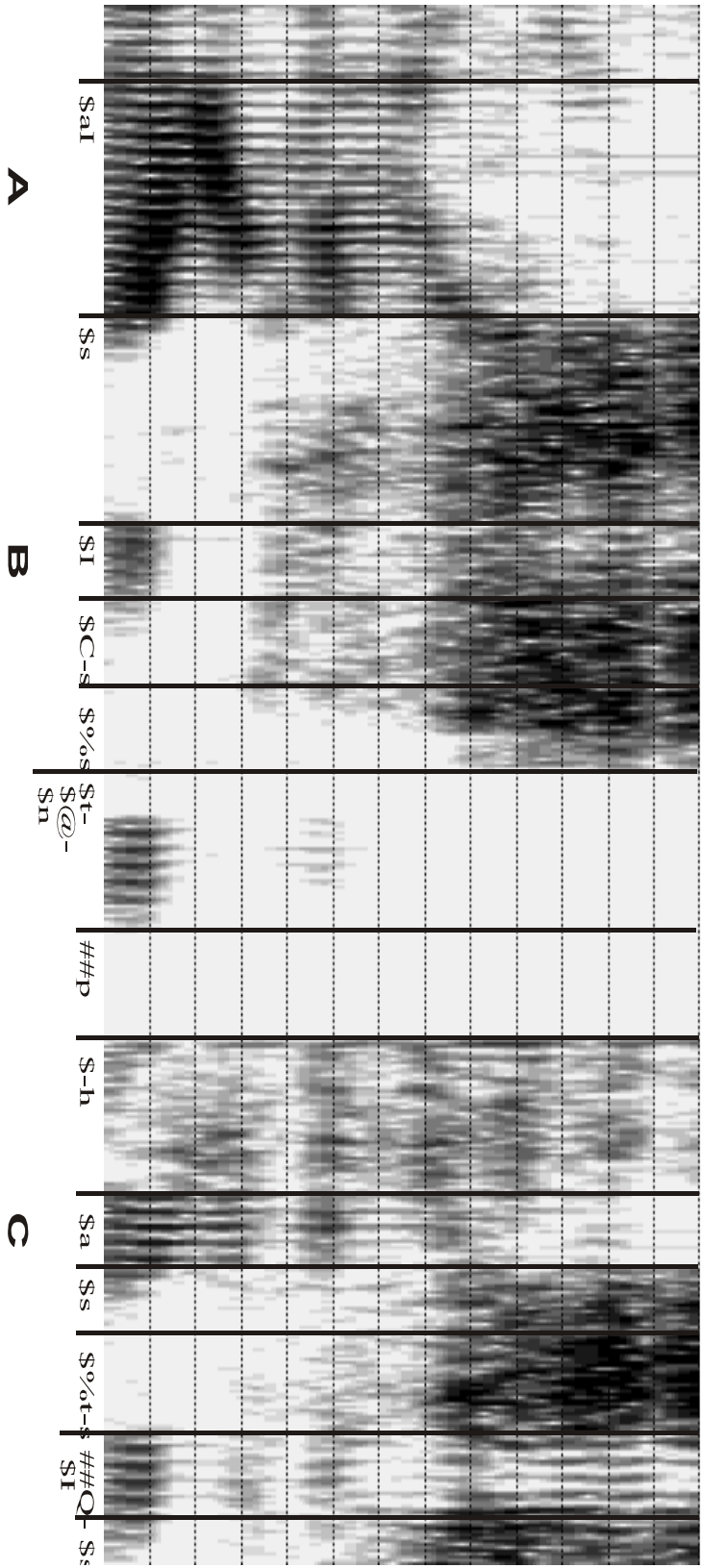


Figure 7: Different realizations of vowels. At A and C, strictures of open approximants; at B a stricture of close approximation. (Reference g074a010).

The vowel label is also retained in certain cases where the correlates of the vowel are no longer strictly vocalic. So, for instance, short, non-open vowels in unaccented syllables, when flanked by fricatives (e.g. [s],[z],[ç]), are often realized as short periods of voiced or voiceless friction themselves, an example of which can be seen in the second syllable of *dreißigsten* (at B) in Figure 7.

Variations in vowel quality are only shown by modifications to the canonical transcription if the quality is more like that of another phonemic quality. Such phonemic changes include the change from tense vowels and diphthongs to lax vowels or schwa in accordance with the empirically supported hypothesis that reductions from a full form are in the direction of lax vowels and schwa.

Quality changes in the opposite direction, i.e. from a lax vowel to a tense vowel, as in e.g. *sich*, are not indicated as no category change is considered to take place, but simply a contextual adjustment before [ç]. Differences in phonemic distributions across speakers are also captured, as in, e.g. *Physik* produced as **fy:z'Ik** or **fy:z'ik**.

Contextual quality changes of schwa or vocalic /r/ and of the combinations /Vø/ are not captured.

Examples of valid modifications:

\$u:	becomes	\$u:-U
\$I	becomes	\$I-@
\$aU	becomes	\$aU-O

Example:

112415	##v	Wochenendseminar	realized as
113328	\$'O	[vɔχŋɛntzɛ:mi:narɐ]	
114061	\$x		
115209	\$@-		
115209	\$n		
116710	##Q-		
116710	\$-q		
116710	\$"E		
117809	\$n		
118416	\$t		
119111	##z		
119918	##E-e:		
120516	\$m		
121851	##I-i:		
122258	\$n		
123275	\$"a:6		

Reference: g073a008

In function words, the expected reduction in vowel duration and quality is already indicated in the canonical transcription by the use of +. For this reason only syncope, monophthongization of diphthongs and schwa reductions are indicated. This means for a function word such as *nach* that the canonical vowel **a:** remains unchanged. In a word such as *Nachmittag*, however, the quantity of the vowel has to be assessed, and if necessary modified.

Examples:

20154	##Q-	monophthongization: auch	realized as [ɔχ]
20154	\$aU-O		
20752	\$x+		Reference: g094a027
235370	##Q-	schwa reduction: es	realized as [ɐs]
235370	##E-@		
235999	\$s+		Reference: g077a000

A disyllabic realization of a canonically monosyllabic word is labelled as follows.

Example:

8967	##f	disyllabic realization of <i>früher</i>	
9938	\$r	= indicates the origin of 6 in the previous line.	
10826	\$'y:		
12367	\$=6		Reference: g197a002

V.3.2 Plosives

V.3.2.1 General

In unproblematic cases the closure phase of a plosive is labelled with a canonical plosives: **b, d, g, p, t, k**. Any voiced periods of transition into or away from the places of articulation associated with these plosives are treated as part of a neighbouring vowel (see V.3.1).

V.3.2.2 Plosive release phase

If a central oral aspiration or plosive release is measured **\$-h** is inserted. It is placed at the burst and annotates the period of friction (and aspiration) normally attributed to the release phase of a plosive.

Example:

13884	##n	<i>nicht</i> realized as [niçt ^h]	
14805	\$I	Note that the function word marker + is suffixed to	
15736	\$C	\$-h which is now the last label.	
16850	\$t		
17624	\$-h+		Reference: g087a006

In sequences of plosives and fricatives, e.g. /tʒ/ in *hat sie*, the plosive release phase is generally assigned to the duration of the fricative. Only cases in which a separate central oral release is observable is the release marked separately.

Example:

26181	##Q-	abfassen	realized as [ap ^h fasŋ]
26181	\$-q		
26181	\$'a		
28246	\$p		
29854	\$-h		
30050	\$#f		
31750	\$"a		
33930	\$s		
36358	\$@-		
36358	\$n		

Reference: g195a011

The release phase of plosives released nasally or laterally is always attributed to the following nasal or lateral.

In a sequence of two plosives the second plosive begins by definition with release of the first, even if it is clear from the airstream mechanism used for the release of the first plosive that the closure for the second plosive has already been made earlier. So, for instance, the **Q** in *acht Uhr* begins after the release of the alveolar plosive, even though it is clear from the ejective release of the apical plosive that the glottal stop has begun earlier.

Example:

106411	##Q	acht	Uhr
106827	\$-q		
106827	\$'a		
108231	\$x		
109337	\$t		
109732	\$-h		
110121	##Q		
110567	\$-q		
110567	\$'u:6		

Reference: g071a007

V.3.2.3 Missing occlusion after a nasal

If in a nasal-plosive-vowel sequence no plosive occlusion is identifiable, but there is a clear oral release of the plosive, the plosive is deleted and a plosive release is inserted in the usual fashion.

Example:

247603	##Q	Although a clear oral release of the plosive in Ende was identified a period of plosive closure separate from the preceding nasal could not be ascertained.
248159	\$-q	
248159	\$'E	
249269	\$n	
250846	\$d-	
250846	\$-h	
250901	\$@	

Reference: g095a006

V.3.2.4 Plosives realized as strictures of open and close approximation

Between vowels and fricatives 'plosives' are often realized as strictures of close or open approximation. If the fricative or frictionless approximant is better described using another label from the inventory then a replacement is made (see V.2.1), otherwise the canonical plosive label is retained. The next example shows the labelling of such a fricative realization and Figure 8 illustrates an intervocalic bilabial approximant in *aber* and an intervocalic dorsal approximant in *schlag' ich*, both of which are annotated using the canonical plosive labels, i.e. **\$b** and **\$g**.

Example:

54431 ##Q-
54431 \$a
55128 \$l
55569 \$s+
56777 ##1:
56777 \$Q-
56777 \$-q
56777 \$'e:6
59031 \$s
59905 \$%t-s
60569 \$@
61452 \$s

als erstes realized as [als̥ɛ:əs:əs]. The long alveolar fricative in *erstes* is treated in part as a fricative realization of /t/ and the appropriate replacement is made.

Reference: g071a001

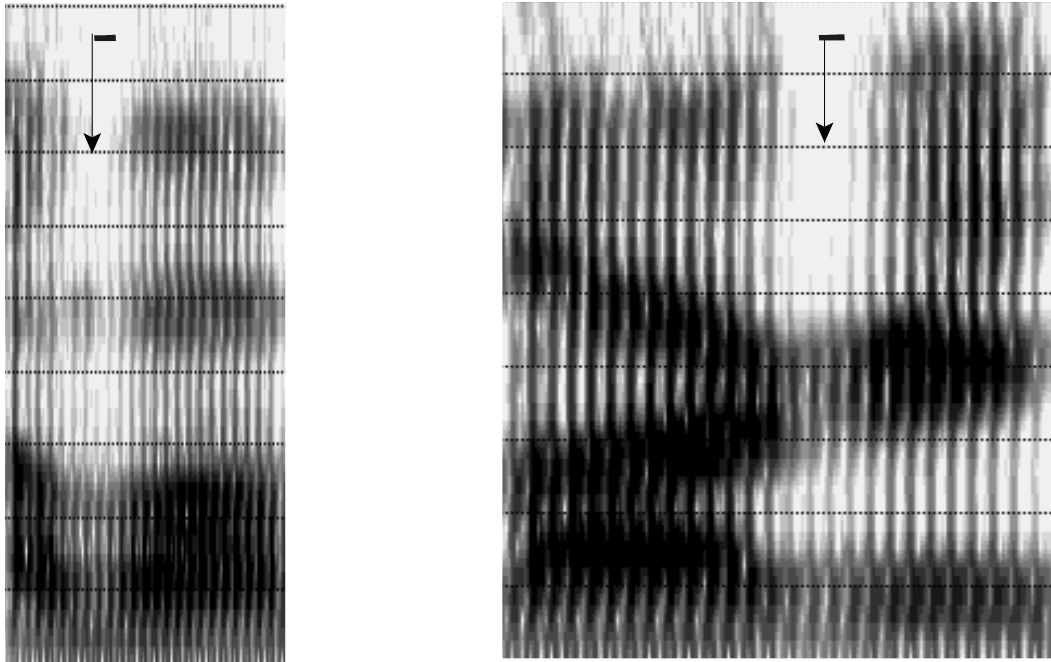


Figure 8. Intervocalic strictures of open approximation in *aber* and *schlag'ich* (Reference: g081a002)

V.3.3 Nasals and nasalization

V.3.3.1 General

In unproblematic cases the closure phase of a nasal is labelled with a canonical nasal: **n**, **m**, **N**. Any transitional periods away from or into the closure are treated as part of the adjacent vowel.

V.3.3.2 Nasalization

Nasalization observed in material adjacent to a nasal consonant is not marked separately. Only in cases in which a nasal consonant has been deleted, but nasalization is still present is this annotated using $\$-\sim$.

If the nasalized material precedes the deleted nasal, $\$-\sim$ is placed before the latter in the label sequence, and after it if the nasalization affects the post-nasal sequence. If nasalization is present both before and after the deleted nasal, $\$-\sim$ is placed before the deleted nasal.

In all cases \$-~ and the deleted nasal are placed at the same point in time and have zero duration. \$-~ is also placed next to a deleted nasal when a more distant vowel has been nasalized due to other consonant and vowel elisions (see Figure 6).

Examples :

72952	##Q-	uns realized as [ũs]	
72952	\$U		
73254	\$-~		
73254	\$n-		
73254	\$s+		Reference: g071a005

6007	##Q-	es nicht realized as [əʃĩç]	
6007	\$E-@		
6494	\$s+		
8056	##n-		
8056	\$-~		
8056	\$I		
8379	\$C		
9109	\$t-+		Reference: g094a013

15554	##-:k	wollen wir realized as [vɔ̃viʁ]	
15554	\$v		
16234	\$O		
16795	\$l		
17371	\$@-		
17371	\$-~		
17371	\$n-+		
17371	##-:k		
17371	\$v		
18055	\$i:6+		Reference: g085a007

V.3.4 Fricatives

A fricative label annotates the period of friction associated with the fricative in question. Voiced transitional periods away from and into the fricative are assigned to the adjacent vowel.

Possible aspiration following the widening of the oral stricture of close approximation and before the onset of voice as can be found in word-initial fortis fricatives such as /f/ and /ʃ/ is not marked separately but assigned to the fricative.

V.3.5 Lateral

At syllable onset the lateral correlate of /l/ is generally easy to identify and delimit. The phonetic correlates of coda /l/ can be problematic for two reasons:

- if laterality is present it can be more difficult to delimit because of a different tongue configuration from that used in onset /l/. The spectral shape associated with this type of laterality is more vowel-like and any spectral changes are smoother.
- laterality can be absent and the only remaining correlate of /l/ is a mid to half-close vowel quality.

In both of the last two cases the lateral symbol is often preceded by % to indicate uncertainty in delimiting the beginning of the phonetic correlates of /l/.

Figure 9 shows representative examples of onset and coda laterality in the words (a) *hinlegen* and (b) *halt*. One can see quite clearly the different spectral characteristics of the laterals. The distinct spectrum of the onset lateral in *hinlegen* and the abrupt spectral change which takes place as the lateral is released. The lateral in *halt*, on the other hand, does not exhibit such an abrupt spectral change.

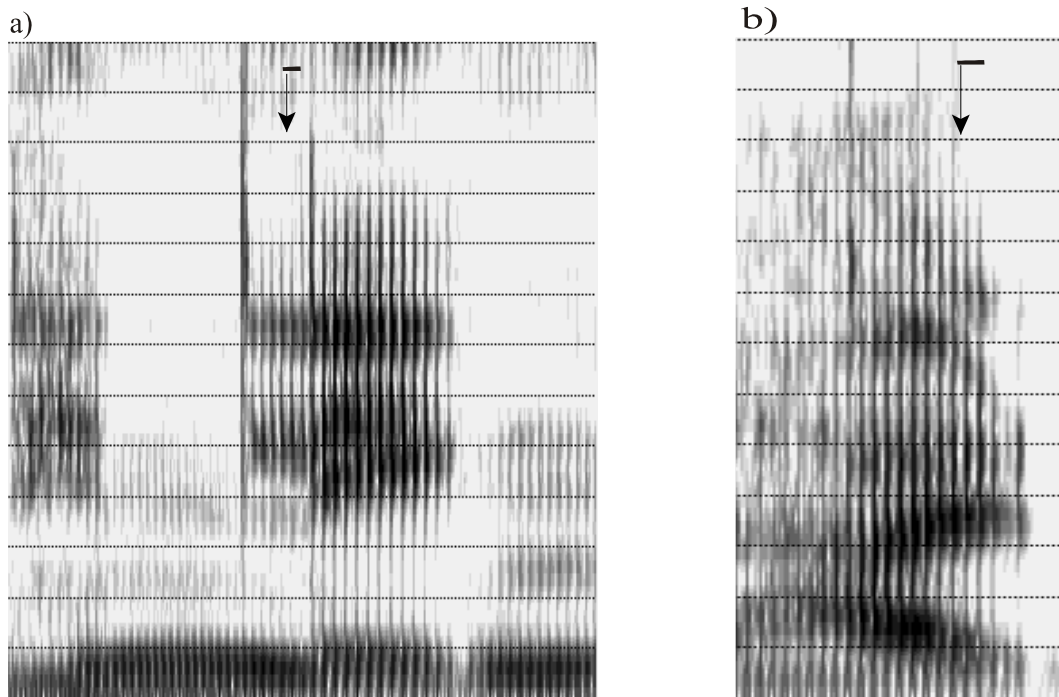


Figure 9. Different spectral characteristics of (a) onset and (b) coda laterality in the words (a) *hinlegen* and (b) *halt*. (Reference: g074a003)

V.3.6 Glottal stop and creak

V.3.6.1 General

In the canonical transcription of an utterance \mathcal{Q} represents a glottal stop, and is used to label periods of glottal closure. The release of glottal closure before the onset of voice can take the form of a short period of tight whisper. This release phase is not marked separately, but is treated as part of the following vowel.

One of the common features which can accompany, if not be produced instead of, glottal closure in German is creaky phonation. Creaky phonation is also a possible realization of plosives in contexts of sonorants (nasals and laterals). The rest of this section deals with the places in utterance where creak can occur and how it is segmented and labelled.

V.3.6.2 Word-initial

If the phonation of a word-initial vowel is irregular at any point the $\$-q$ is inserted at the same point in time as the label for the vowel. The label $\$-q$ always has zero duration. The following constellations can occur.

A canonical glottal stop is not realized, but creaky voice is present.

Example:

192766	##Q-	in realized without glottal stop but with creaky
192766	$\$-q$	voice: [ɪ̰n]. The labels ##Q- and $\$-q$ are placed
192766	$\$I$	at the same point in time as $\$I$.
193409	$\$n+$	Reference: g071a014

A glottal stop is produced and the following vowel is also creaky.

Examples:

34840	##Q-	über/+ in realized as [y:ɪ̰vəʔɪ̰n]
34840	$\$y:$	
35568	$\$b-v$	
36590	$\$6+$	
38682	$\$/+$	
38682	##Q	
40384	$\$-q$	
40384	$\$I$	
42213	$\$n+$	Reference: g076a010

V.3.6.3 Junctural creaky phonation, without a canonical glottal stop

If a vowel in the canonical transcription is not preceded by a glottal stop and this vowel is nevertheless produced with junctural glottalization, $\$-q$ is inserted.

Example:

27288	##Q-	eventuell	realized as [ɛvɛnt ^h u:ɐl]
27288	\$-q		
27288	\$E		
28173	\$v		
28921	\$E		
30068	\$n		
30903	\$t		
31221	\$-h		
31727	\$u:		
32221	\$-q		
32221	\$'E		
33220	\$l		

Reference: g091a020

Further, if this constellation occurs at a morpheme boundary not marked in the canonical transcription, then \$#-q is inserted.

Example:

31143	##n	nacheinander	realized as [naχaenandə]
32216	\$a		
33426	\$x		
34221	##-q		
34221	\$aI		
35783	\$n		
36864	##-q		
36864	\$'a		
38674	\$n		
39983	##d-n		
41126	\$6		

Reference: k04be075

V.3.6.4 In connection with plosives before and after nasals and laterals

Fortis and lenis plosives occurring in the context of nasals and laterals can be realized as glottal stops or periods of creaky voice. In a nasal-plosive-nasal sequence this enables the percept of a plosive closure to be maintained without carrying out the work needed to raise and lower the velum (Kohler 1994b, 1995a). The next two examples illustrate

instances of glottal stop realizations of fortis and lenis stops. In this case a normal replacement modification is made.

Examples:

69733	##k	könnten realized as [k ^h œnʔn].	
70271	\$-h		
70773	\$' '		
70773	\$9		
72081	\$n		
72470	\$t-Q		
73360	@-		
73360	\$n+		Reference: g075a002

12648	##Q-	einverstanden realized as [aɪnfɛʃt ^h anʔn].	
12648	\$-ɣ		
12648	\$' aI		
14336	\$n		
14982	\$#f		
16190	\$6		
16902	\$S		
17688	\$t		
18602	\$-h		
18852	\$"a		
19545	\$n		
20746	\$d-Q		
21490	\$@-		
21490	\$n		Reference: g072a019

A good deal more common than the glottal stop in such contexts is the occurrence of a stretch of creaky voice accompanying the nasal or lateral articulation. As with junctural creak the label \$-ɣ is also used to indicate the glottalized realization of plosives.

The temporal coordination of the creaky phonation and nasality originating from nasal-plosive-nasal sequences can vary quite considerably, as is illustrated in the following transcription of the word *könnten*:

[k^hœn̥n̥]

[k^hœn̥]

[k^hœn̥n̥]

[k^hœn̥]

[k^hœn̥]

In all of these cases \$**t-q** is placed at the same point of time as the second nasal of the canonical form.

Examples (see also Figure 10):

132628	##k	könnten realized as [k ^h œn̥n̥]
133441	\$-h	\$ t-q , \$@- and \$ n are placed at the same point in time as the start of the creaky voice.
134891	\$9	
135357	\$n	
137060	\$ t-q	
137060	\$@-	
137060	\$n+	Reference: g086a004; see Figure 10(a)

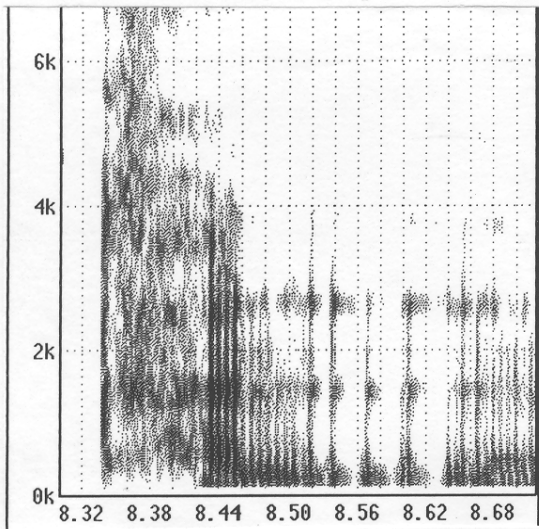
252404	##k	könnten wir realized as [k ^h œ̃n̥v̥i:ɐ]
253118	\$-h	\$ t-q , \$@- and \$ n-m+ are placed at the same point in time, at the beginning of the creaky voice.
253675	\$9	
254170	\$n	
254982	\$ t-q	
254982	\$@-	
254982	\$ n-m+	
256133	##v	
257209	\$i:6+	Reference: g077a002; see Figure 10(b)

90846	##k	könnten realized as [k ^h œ̃n̥]
91612	\$-h	\$ t-q , \$@- and \$ n are placed after the creaky voice.
92740	\$' '	
92740	\$9	
93557	\$n	
94799	\$ t-q	
94799	\$@-	
94799	\$n+	Reference: g074a000; see Figure 10(c) & (d)

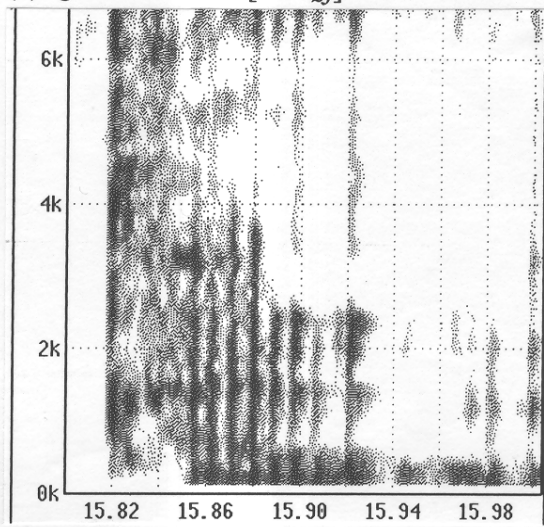
19294	##k	könnten realized as [k ^h œ̃n̥n̥]
20725	\$-h	\$t-q, \$@- and \$%n are placed together at the
21250	\$9	beginning of the second syllable.
22171	\$n	
22821	\$t-q	
22821	\$@-	
22821	\$%n+	Reference: g091a014; see Figure 10(e)

15950	##k	könnten realized as [k ^h œ̃n̥]
17380	\$-h	\$t-q, \$@- and \$n- are placed together after the
18166	\$9	creaky voice at the beginning of the next word.
18842	\$n	
19622	\$t-q	
19622	\$@-	
19622	\$n-+	Reference: g072a014; see Figure 10(f)

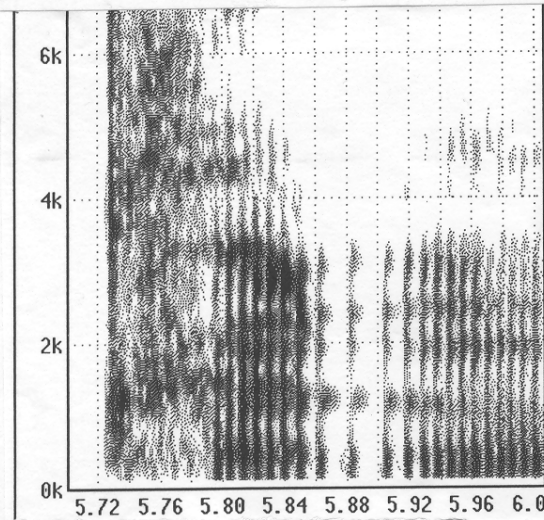
(a) g086a004 KAK [ænn̥n]



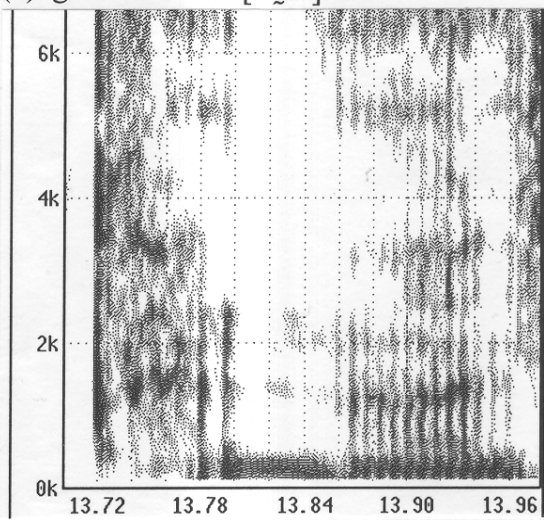
(b) g077a002 TIS [ãnn̥]



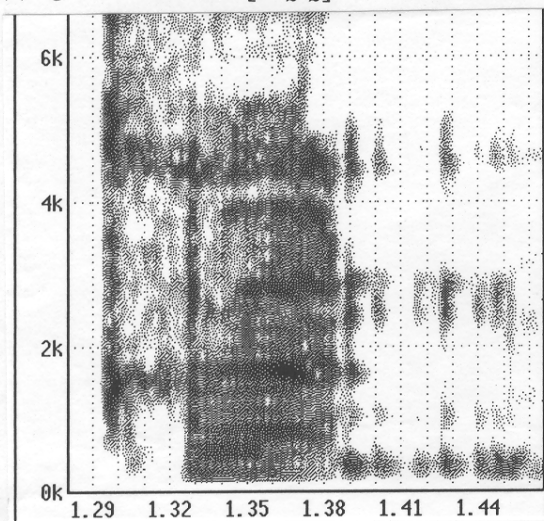
(c) g074a000 HAH [ãnn̥]



(d) g075a008 TIS [h̥nn̥]



(e) g091a014 FRS [ãnn̥]



(f) g072a014 HAH [ãnn̥]

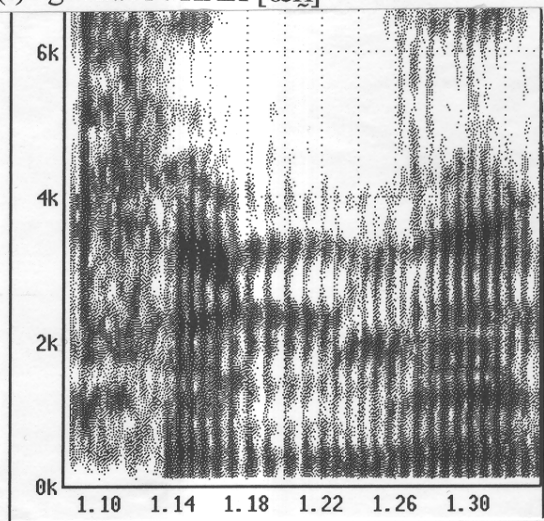


Figure 10. Different manifestations of glottalization in *könnten*.

Creaky voice is also a possible realization of lenis plosives, as shown in the next example:

21112	##Q-	einverstanden realized as [aɪnfɛʃtʰanɪn]
21112	\$-q	[ɪ] produced instead of [d]. \$d-q, \$@- and the
21112	\$'aI	following \$n are placed together at the end of the
23289	\$n	glottalization. Both \$d-q and \$@- have zero
23642	\$#f	duration.
25001	\$6	
25475	\$S	
26867	\$t	
27276	\$-h	
27531	\$"a	
28700	\$n	
29448	\$d-q	
29448	\$@-	
29448	\$n	Reference: g074a003

Creaky realization of plosives at other places of articulation are less common, but also documented. So, for instance, a common North German pronunciation of words such as *Verbindung* still retains a final plosive, which in turn can be realized as creaky voice in the appropriate contexts.

Example:

32687	##f	Verbindung nach realized as [fəbɪnnʊŋna:χ]
34059	\$6	The labels \$-kq and \$n are placed at the
35017	\$b	beginning of the following nasal.
36291	\$-h	Note that \$-kq indicates the insertion of a velar
36387	\$'I	plosive, not present in the canonical transcription, as
37144	\$n	well as its creaky realization.
37981	;%d-n	
38638	\$U	
39493	\$N	
40072	\$-kq	
40072	##n	
41230	\$a:	
41876	\$x+	Reference: rtds016

In all of the examples up until now creaky voice has been the realization of a plosive whose place of articulation is the same as that of surrounding material. There has therefore been no problem keeping **\$-q** insertions and replacements durationless. In the next example however, the place of articulation of the creaky stretch is different from that of the preceding lateral and the following nasal. In order to maintain a zero duration for **\$-q** here as well, a plosive-nasal replacement, **\$p-m**, is carried out and **\$-q** is inserted to indicate that the stretch is glottalized*.

32681	##h	halb neun realized as [halm̥nɔʏn]
33669	\$'a	
34524	\$l	
35240	\$-q	
35240	\$p-m	
36133	##n	
37232	\$'OY	
39599	\$n	Reference: g071a017

*The decision to label this example in this fashion was made following the release of *The Kiel Corpus of Spontaneous Speech Vol. I*, hence the different labelling of this example found there.

V.3.7 Reduction and assimilation

If one or more segments offered by the canonical transcription are missing due to reduction and assimilation phenomena, then deletions (see V.2.1) of the segments are carried out in the following order:

- a postvocalic segment in a word-final syllable
- intersyllabic, word-medial segment
- word-initial segment

This hierarchy has no theoretical function, but rather ensures that certain patterns are labelled in a uniform fashion.

Examples:

einen neuen with one medial /n/: the word-initial **##n** (in *neuen*) receives a duration.

The two other nasals and schwa are deleted and have zero duration:

\$n	becomes	\$n-	(2. deletion)
\$@		\$@-	
\$n+		\$n+	(1.deletion)
##n		##n	(remains)

einen with one /n/: the **\$n** after **\$aI** is retained and receives a duration. The second nasal and schwa are deleted and have zero duration:

93410	##Q-	<i>einen Vorschlag</i> realized as [amfo:ɐ]la:χ]
93410	\$aI	
94276	\$n	(remains)
94753	\$@-	
94753	\$n+	(1. deletion)
94753	##f	
96612	\$'o:6	
98026	\$#S	
99058	\$l	
99651	\$"a:	
100530	\$k-x	

Reference: g072a014

einem realized with one final /m/: **\$@** and the final nasal **\$m+** are deleted. The postvocalic nasal in the first syllable undergoes replacement:

60656	##Q-	einem Besuch realized as [aɪmb zu:x]	
60656	\$aI		
61727	\$n-m	(2. replacement)	
62537	\$@-		
62537	\$m-+	(1. deletion)	
62537	##b		
62751	\$-h		
62877	\$@		
63450	\$z		
64636	\$'u:		
65528	\$x		Reference: g072a008

In a canonical sequence of plosive followed by a nasal syllable (P N), the plosive is often absent but its place of articulation is retained in the remaining nasal. In such cases the replacement of the plosive with the appropriate nasal is made, and \$@ and the canonical nasal are deleted:

142998	##m	morgen abend realized as [mɔɐŋa:mt]	
143711	\$'O6		
144951	\$g-N	(2. replacement)	
145775	\$@-		
145775	\$n-	(1. deletion)	
145775	##Q-		
145775	\$-q		
145775	\$'a:		
147799	\$b-m	(2. replacement)	
148825	\$@-		
148825	\$n-	(1. deletion)	
148825	\$t		Reference: g077a002

V.3.8 Marking non-linear correlates

There are times when it is not possible to temporally delimit the phonetic correlates of one or more phonological elements even though the correlates can be identified in neighbouring segments. So, for instance, in a word like *zum*, nasal closure often follows immediately after friction and, although there is no vocalic portion, rounding and velarization can be identified in the fricative and nasal. In such cases the label(s) cannot

be aligned with the signal and therefore must be marked as deleted in the usual manner. However, the presence of the phonetic correlates associated with the deleted labels are marked by placing **\$-MA** or **##-MA** at the beginning of the deleted label sequence.

Example:

101988	##v	wahrscheinlich ein realized as [vafajɪnm]
102671	\$a:6-a	
103726	\$#S	
104979	\$'aI	
106756	\$n	
107370	\$-MA	
107370	\$l-	
107370	\$I-	
107370	\$C-	
107370	##Q-	
107370	\$aI-	
107370	\$n-m+	Reference: g071a004

V.3.9 Marking uncertain segment boundaries

If a segment boundary cannot be identified with any certainty % is placed directly after the label prefix (##, \$# or \$). This marker is commonly used in connection with utterance initial plosives and in sequences of plosives in which the first plosive is not audibly released.

Examples:

1517	#c:	tja in sentence initial position
1517	##%t	#c: and ##%t are at the same point in time.
2064	\$j	
2818	\$'a:	Reference: g076a014

187255	##t	Zeit brauchen realized as [tsaɪ̯tʰʊ̯ʁaʊxŋ]
187622	\$s	
189051	\$'aI	
189988	\$t	
190535	##%b	
191127	\$r	
192029	\$'aU	
193414	\$x	
194285	\$@-	
194285	\$n-N	Reference: g077a003

In most cases an uncertain boundary will be associated with segments having non-zero duration. It can however be used with punctuation marks (#. #?) and the truncation label (\$/-) when the segmenter is uncertain of the point of time at which the turn ended. Of course, in the middle of a turn this problem will not arise as ‘uncertainty’ will be associated with the segments having non-zero duration only.

V.4 Segmenting and labelling interactional aspects of a turn

V.4.1 False start and truncation

Two types of break are distinguished: with and without subsequent repair. \$/+ (break at a word boundary) and \$=/+ (word-internal break) mark verbal breaks followed either by a repair, or a continuation of what went before. \$/+ and \$=/+ both have zero duration and are placed at the point at which the break is made.

Example:

201051	##d	denn<Z> <A>/+ wie
202385	\$-h	
202615	\$E	
204382	\$n+	
208905	\$z:	
208905	#h:	
215287	\$/+	
215287	##v	
215835	\$i:+	Reference: g091a000

16711	\$#d	Dienstag t=/+ könnte ich
17747	\$-h	
17953	\$'i:	
18953	\$n	
19893	\$s	
21259	\$t	
21773	\$-h	
22153	\$a:	
23919	\$k-x	
26290	##t	
27304	\$-h	
27662	\$=/+	
27662	##k	
28488	\$-h	
28998	\$' '	
28998	\$9	
29867	\$n	
29906	\$t-d	
30771	\$-h	
30970	\$@-+	
30970	##Q-	
30970	\$I	
31341	\$C+	

Reference: g092a009

\$/- (break after a word) and **\$/-** (word-internal break) mark breaks without subsequent repair. They have zero duration and are also placed at the point of the break.

Example:

30511 ##d das/- dann
31459 \$-h
31763 \$a-@
32390 \$s+
40293 \$z:
40293 \$/-
40293 ##d
41636 \$-h
41966 \$a
42684 \$n+

Reference: g071a016

15448 ##h ha=/+ ha=-/ verstehen Sie
17125 \$'a: with and without repair
17522 \$=/+
17522 ##h
18173 \$'a:
20556 \$=-/
20556 ##f
23101 \$6
23952 \$S
24387 \$t
25268 \$-h
25557 \$'e:
26517 \$@-
26517 \$n
27168 ##z
27726 \$i:+

Reference: g072a003

V.4.2 Word-internal interruption

If a break occurs within a word, but is subsequently continued, the boundaries of the word material to the left and right of the intervening material are indicated using \$_ at the left and ##_ at the right boundary. The initial segments of the intervening material are prefixed with # or ## appropriate to their linguistic status.

Example:

```
32500 ##Q-      an_ gemes<Z>=/+ _ gemessenene Zeit
32500 $'a
34203 $n
35572 $_
35572 ##g
36053 $@
36707 $m
37742 $"E-"e:
39109 $s
41633 $z:
41633 $=/+
41633 ##_
41633 $#g
43231 $-h
43416 $@
43909 $m
45097 $"E
46126 $s
47385 $@-
47385 $n
48291 $@
```

Reference: g094a026

V.4.3 Hesitational lengthening

z: indicates portions of a word which are lengthened due to lexical search and the like. The label **\$z**: has zero duration and is placed after the segment which is lengthened. It is therefore placed at the same time as the following segment.

Example:

```
137019 ##Q      eine<Z>
138273 $aI
140292 $n
142907 $@+
144809 $z:
```

Reference: g081a000

V.4.4 Hesitation particles

Four hesitation particles are recognized. Their shared categorial status is shown by introducing each particle with **v** : .

v:m	all nasal
v:QE:	all vowel
v:QE:m	vowel plus nasal particle
v:	'other', e.g. bilabial friction

v : is placed alongside the first articulatory segment of the particle. Only in the fourth type ('other') does **v** : receive a non-zero duration as it must alone label the portion of the signal associated with the hesitation. As **v** : is primarily word-initial it usually receives the **##**-prefix.

Examples:

22121	#h:	<A> <ähm> <P>	
39285	##v:		
39285	\$Q-		
39285	\$-q		
39285	\$E:		
45153	\$m		
46834	#p:		Reference: g081a001
29646	##Q-	es sehr	
29646	\$E	Hesitation, not noticed in transliteration, has been	
30578	\$s+	inserted during labelling.	
33770	##-v:		
35554	##z		
38014	\$'e:6		Reference: g085a009

As the quality of vowels in hesitation particles should not be associated with the phonology of lexical items, the use of **E:** to symbolize the vowels in these particles should only be thought as representing a not further specified vocalicity. Any aspects of quality, which the segmenter may notice should not be reflected in any symbolic modifications of the canonical vowel (see also V.3.1).

V.4.5 Problematic stretches of utterance

Analogous to the use of % to mark uncertain segment boundaries (cf. V.2.1), % is also used to mark stretches of utterance which could not be identified or words which the person carrying out the transliteration was unsure of. Problematic words receive ##% as their initial label. This receives zero duration and is placed alongside the first articulatory segment of the word.

Example:

```
25287 ##m      mir %sehr
25936 $i:6+
26866 ##%
26866 $z
28314 $'e:6
```

Reference: g083a004

Stretches of utterance which could not be identified at all are marked using #%, which receives the duration of the unidentified stretch.

Example:

```
75374 ##Q-     ist/+ <%> paßt
75374 $-q
75374 $I
76433 $s
81504 $-z:
81504 $t-+
81504 $/+
81504 %#
84886 ##p
86681 $-h
87170 $'a
88133 $s
88865 $t
```

Reference: g072a003

V.4.6 Neologisms and slips of the tongue

The special status of neologisms and slips of the tongue is indicated by introducing them with ##n:. This label is placed coterminally with the first articulatory segment and has zero duration.

Example:

60489 ##n: *einteigigen
60489 \$Q
61218 \$-q
61218 \$'aI
63654 \$n
64564 \$#t
65272 \$-h
67009 \$"aI
68456 \$g
69170 \$I
70484 \$g
71196 \$@-
71196 \$n-N

Reference: g081a006

V.4.7 Punctuation

The end of a sentence or clause in the canonical transcription is indicated using punctuation marks taken directly from the transliteration. Each punctuation mark is converted into a label by prefixing it with #. Punctuation labels receive zero duration; they may not be used to annotate silent or 'filled' pauses.*

V.4.8 Nonverbal signal portions

Nonverbal aspects of the signal, such as pauses, breathing, laughing, swallowing, coughing, etc. can occur as sequential events in the midst of lexical material. In such cases the appropriate symbol from the canonical transcription (see Table 1, pp. 28f) is prefixed with # to form a label.

*In the material on *The Kiel Corpus of Read Speech Vol. I.* (IPDS, 1994) punctuation marks can subsume silent or filled pauses. As pauses, breathing, etc. are explicitly marked in the spontaneous material, punctuation need no longer fulfil this dual function of marking syntactic and interactional information.

Example:

105904	##Q-	Arbeits<Z>_ <P> _besu<;T>
105904	\$-q	#p:-h: in isolation word-internally; what was
105904	\$'a6	transliterated merely as a pause is identified as
108348	\$b	breathing at the labelling stage.
108846	\$-h	
108951	\$aI	
110677	\$t	
111833	\$s	
115854	\$z:	
115854	\$_	
115854	#p:-h:	
122810	##_	
122810	\$#%b	
123597	\$-h	
123804	\$@	
124409	\$z	
125556	\$"u:	
126935	\$;	

Reference: g081a007

Certain nonverbal activities, such as laughing and coughing can also accompany verbal articulation. In such cases the symbol for the overlaying activity receives the ##-prefix and is placed before the first segment of the word at the same point in time. The label therefore has zero duration. The next example illustrates the labelling of laughing occurring both between and at the same time as lexical material.

Example:

33277	##1:	<:<Lachen> leider:>	<Lachen>
33277	\$1	<:<Lachen> im:>	
34370	\$'aI	#1:	in isolation between two words and ##1:
36270	\$d		accompanying verbal articulation.
36496	\$-h		
36671	\$6		
37363	#1:		
40195	##1:		
40195	\$Q-		
40195	\$I		
40636	\$m+		

Reference: g086a012

V.5 Labelling nonvocal aspects of a turn

V.5.1 External noise

All noises not originating in the vocal tract are symbolized using **:k**. As external noises and sound originating in the vocal tract usually occur independently of each other, this can lead to unnecessary problems in the segmentation of portions of signal containing both types of sound. For the purposes of segmentation it was decided to remove any sequential status which an external noise may have in the orthographic record. Any portion of signal containing external noise is segmented on the grounds of articulatory activity, and the occurrence of external noise parallel to this is indicated by placing **:k** at the same time as the relevant articulatory label, meaning that **:k** has zero duration.

If an external noise occurs during a word, **##:k** is placed at the same time as the word-initial articulatory segment, and the label for the first articulatory segment is prefixed with a **\$** instead of **##**. If an external noise occurs during a pause, breathing or other nonverbal activity then **#:k** is placed at the beginning of that nonverbal activity containing the external noise, at the same time as the label for the activity involved. This label in turn is prefixed with **\$** instead of **#**.

An external noise occurs during a word:

3977	##j	ja , <:<#Klopfen> dann:>
5296	\$'a:	'Knocking' during the production of dann. The
7334	#,	labels ##:k and \$d are placed at the same point in
7334	##:k	time.
7334	\$d	
8238	\$-h	
8461	\$a	
9386	\$n+	

Reference: g071a016

An external noise occurs during a pause, laughing or breathing:

32313	#:k	<:<#Klopfen> <A>:> <"ahm>
32313	\$h:	'Knocking' during 'breathing' prior to the production
50146	##v:	of <"ahm>. The labels #:k and \$h: are placed
50146	\$Q	at the same point in time.
51295	\$-q	
51295	\$E:	
55873	\$m	

Reference: g073a005

External noise occurring prior to the onset of utterance at the beginning of a turn, or following the cessation of utterance after a turn are treated separately. External noise occurring prior to an audible articulatory activity at the beginning of a turn is indicated by placing #:k at the same time as the sentence-initial label #c:, preceding it in the ordering. Likewise, external noise at the end of a turn, following the cessation of utterance, is indicated by placing #:k at the same time as any turn-final punctuation (#. or #?) or labels for verbal or technical breaks: \$/- and \$; (cf. V.4.1 and V.5.2) following them in the ordering.

Examples:

An external noise occurs after the cessation of utterance at the end of a turn:

29293	##j	ja <#Klicken> .
29930	\$'a:	The labels #. and #:k are placed at the same
31686	#.	point in time.
31686	#:k	

Reference: g073a011

An external noise occurs at the same time as a technical break at the end of a turn:

##d dann<;T> <#Klingeln>
\$a The labels **\$;** and **#:k** are placed at the point
\$n+ where the technical break occurs.
\$;
#:k

An external noise occurs prior to the onset of utterance:

1517 #:k <#Klicken> tja
1517 #c: The labels **#:k**, **#c:** and **##%t** are placed at the
1517 ##%t same point in time.
2064 \$j
2818 \$'a: Reference: g076a014

An external noise occurs during breathing or laughing at the beginning of a turn:

1 #c: <:<#Klopfen> <A>:> ja
1 #:k The labels **#c:**, **#:k** and **\$h:** are placed at the
1 \$h: same point in time.
5817 ##j
6946 \$'a: Reference: g075a004

If an external noise is the only signal occurring between two elements other than **p:** or **h:**, the noise cannot be bound to either of the elements involved. To ensure that **:k** retains its zero duration the symbol for a pause **p:** is inserted when creating the canonical transcription, thus providing **:k** with a temporal anchor. In effect, then, a turn-internal portion of signal containing nothing other than an external noise is treated as a pause overlaid with external noise.

Although all external noises are labelled with **:k**, the occurrence of more than one symbol at a particular point in time does not mean that the label **:k** is allocated only once. Rather, the number of external noises is reflected in the number of **:k**. However, because **:k** always has zero duration, any information as to the sequential ordering of external noises in relation to each other or to nonverbal activity is lost in the label file.

This means that a number of different orthographic representations can lead to the same canonical transcription and label sequence:

#:k	<:<#Rascheln> <A> <#Klopfen>:> dann	or
\$:k	<:<#Rascheln> <A>:> <#Klopfen> dann	or
\$h:	<#Klopfen> <:<#Rascheln> <A>:> dann	
##d	The labels #:k and \$:k and \$h: are placed at	
\$a	the same point in time.	
\$n+		

V.5.2 Technical breaks

Technical breaks in the signal receive different orthographic representations, depending on the context in which they occur (see III.16). A technical break which begins and ends in lexical material (including hesitation particles) is indicated using two **<;T>**, e.g. Donner**<;T>** **<;T>**woch. If a technical break begins or ends in nonverbal material then this is shown using only a single **<;T>**, e.g. Donner**<;T>** <Lachen>. This difference in treatment is continued in the canonical transcription and label file. The technical break is symbolized using **##;**, **#;** or **\$;** depending on the structural context.

A technical break in lexical material is indicated by placing **\$;** at the beginning and **##;** at the end of the break. Included in this are also those breaks which can begin or end a turn.

Example:

77212	##Q-	ab<;T> <;T>Montag
77212	\$-q	\$; is placed at the start of the technical break and its
77212	\$' '	duration is that of the break. ##; is placed at the
77212	\$a	same point in time as the following segment and
78442	\$p-m+	therefore has zero duration.
79793	\$;	
81973	##;	
81973	\$m	
84717	\$' o:	
86119	\$n	
86471	\$t	
86688	\$-h	
86859	\$a:	
88513	\$-MA	
88513	\$k-	Reference: g194a002

1	#c:	<;T>auf Wiederseh<;T>
1	##;	Technical break at the beginning and at the end of a
1	\$Q-	turn. ##; is placed at the same point in time as \$Q-
1	\$aU	and has zero duration. \$; is placed at the point where
532	\$f+	the technical break begins and, as the label for the last
1502	##v	segment of a turn, receives zero duration.
2183	\$' i:	
2777	\$d	
3197	\$6	
4370	\$#z	
5448	\$"e:	
6387	\$;	Reference: g095a017

94183	##d	den <;T>vom
94957	\$-h	##; is placed at the point where the technical break
95097	\$e:	begins and has its duration.
96242	\$n+	
97911	##;	
99978	\$f	
101558	\$O	
101949	\$m+	

Reference: g202a007

A technical break beginning in lexical material and ending in nonverbal material such as laughing is indicated by placing \$; at the start of the break. The end of the break is marked implicitly with the placement of the label for the nonverbal material.

Example:

33780	##r	Reise<;T> <Schmatzen>
34558	\$'aI	\$; is placed at the start of the technical break and
37173	\$z	has its duration.
37819	\$@	
38310	\$;	
50660	#s:	

Reference: g094a028

Similarly, if the technical break begins in nonverbal material and ends in lexical material then ##; is placed at the beginning of the break and has the duration of the break.

Example:

29505	#h:	<A> <;T>an würde
38830	##;	##; is placed at the beginning of the break and has as
47658	\$' '	its duration the length of the break.
47658	\$a	
47906	\$n+	
48760	##v	
50002	\$Y6	
50763	\$d-	
50763	\$@-+	

Reference: g147a003

A technical break occurring in the middle of nonverbal material is labelled with #; placed at the beginning of the break. Its end is marked implicitly with the placement of the next label.

Example:

1 #c: <A> <;T> <A>

1 #h: #; is placed at the beginning of the break.

1684 #;

3664 #h:

Reference: g096a003

VI Prosodic labelling

The prosodic labelling system described in this chapter is based on the Kiel Intonation Model (KIM). For further details see Kohler (1991, 1995a,b,c). This system differs from ToBI (Silverman et al., 1992) and its German derivatives (e.g. Grice and Benz Müller, 1995) in both formal and descriptive aspects. Prosodic labelling is not carried out on separate tiers, but is incorporated into the segmental label tier to support easy and efficient analysis of segment-prosody interaction. To differentiate prosodic labels from the labels of chapters IV and V they are prefixed with **&**, which is in turn preceded by **#** for labels outside, or by **\$** for those inside words, according to general labelling practice (see V.1.1). All non-segmental prosodic labels are without duration; they are put on the same time mark as the beginning of the next segmental unit (usually word beginning) or at the end of the last segmental unit in a speech file. As there is no canonical prosodic transcription yet available, the introduction of prosodic labels always represents an insertion, which strictly speaking should be symbolized by prefixing each label with **-**. This would be superfluous and cause unnecessary work for segmenters and is therefore not done.

VI.1 Prosodic phrasing

VI.1.1 General

The syntagmatic structuring of utterances into prosodic phrasal units is indicated by prosodic phrasing markers **#&PG**, a generic label which will be further specified below (VI.1.2).

Potential prosodic phrasing is already indicated in the segmental labelling by **#p**: **#h**: **\$z**: and other nonverbal articulatory events (IV.6). These events can of course be employed to fulfil functions other than marking phrasal boundaries. In particular the reinforcement of sentence stress can be brought about with strong lengthening and/or a preceding pause. On the other hand prosodic phrasing may also be indicated by the temporal and/or intonational structure alone, in the absence of pause, breath, other nonverbal events or other dysfluencies.

Prosodic phrasing can but need not coincide with a syntactic-semantic phrasing. These two types of phrasing can interact in three possible ways:

- prosodic and syntactic phrasing converge
- prosodic phrasing is present, where syntactic phrasing is absent or structured differently
- prosodic phrasing is absent at strong syntactic boundaries.

The incongruence of prosodic and grammatical phrasing has a particular interpretative value for the hearer and must therefore be captured in the description in just the same way as the congruence of the two levels. This means that determination of the prosodic and the syntactic phrasing must be carried out in parallel without allowing the latter to predetermine the former. The next example illustrates both the coincidence and divergence of both levels:

das heißt , **#&PG #p:** Moment , **#&PG a\$z:** llerdings erst**\$z:**
#&PG nachmittags **#h:** .

Reference: g071a004

The first two **#&PG** are located at positions of syntactic boundaries, whilst the third **#&PG** splits up a syntactic and semantic grouping of lexical items. The cooccurrence of **\$z:** and **#&PG** (signalled by subsequent pitch reset) at this position indicates a disturbance in the fluency while **\$z:** on its own (with pitch reset on *erst*) would indicate an overly lengthened production in an emphatic pronunciation of *erst*.

In the following example, the prosodic phrasing marker in the middle of the compound resolves its ambivalent membership of two separate syntactic constructions:

fehlt jetzt noch ein **#&PG #p:** T=/+ Wochen_ **#&PG #p:**
 _endtermin war das , glaub' ich . nicht ?

The grammatical ill-formedness of this example can only be structured and understood by the hearer with the help of the prosodic phrasing, which is manifested, above all, in the strong sentence accent and the beginning of a new intonation contour on *_endtermin*, as well as the preceding pause.

VI.1.2 Phrasing markers

In order to capture at least one of the main interactional possibilities of the prosodic and syntactic structure discussed in the previous section, generic **#&PG** is initially divided into two types of prosodic phrasing markers, considered relevant for prosodic labelling, **#&PG1** and **#&PG2**. The two subcategories are employed as follows:

#&PG1 delimits prosodic phrases coinciding with syntactic-semantic clause boundaries.

#&PG2 marks off prosodic phrases, which do not covary with grammatical clause boundaries.

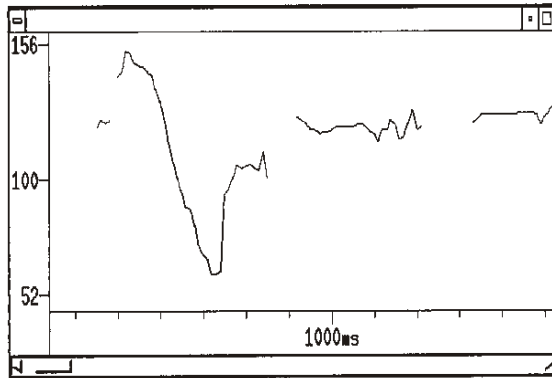
To start with, the distinction between the two cannot be made on the basis of measured phonetic properties, as these are not yet known in sufficient detail. On the contrary, these features are to be defined more precisely as a result of empirical labelling and analysis. There is no other way than to draw on the global perceptual and interpretative judgements of a competent German hearer, which are directed simultaneously by components of meaning and form. The example given above (VI.1.1) is repeated here with the subcategorized phrasing markers.

das heißt , **#&PG2** #p: Moment , **#&PG2** a\$z: llerdings erst\$z:
#&PG2 nachmittags #h: . **#PG1**

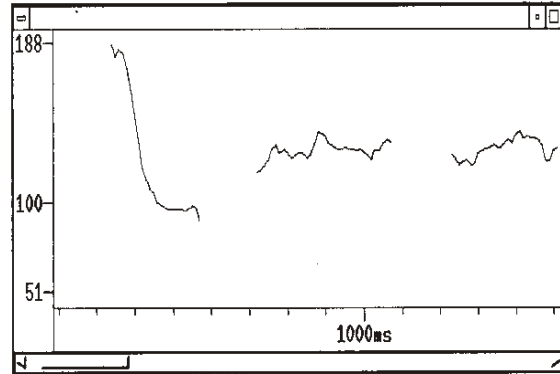
Reference: g071a004

And in the following example (see Figure 11) the **#&PG1** - **#&PG2** subcategorization will be made, as indicated (although the same low-falling pitch contours occur on ja) because in the second there is syntactic-prosodic coincidence which is lacking in the first.

The two types of prosodic phrasing markers are provisionally and somewhat loosely defined as differentiating between structurally high (**#&PG1**) and low (**#&PG2**) phrasing nodes. Just as grammatical phrase structure is hierarchically organized, prosodic phrasing must recognize at least two hierarchically different units, which we might refer to as the prosodic clause (**#&PG1**) and the prosodic phrase (**#&PG2**).



ja , **#&PG2** also
Reference: g075a000



ja\$z: , **#&PG1 #p:** also\$z:
Reference: g077a006

Figure 11. Examples of **#&PG1** and **#&PG2**.

The prosodic phrase can be further subdivided into words of differing coherence (default and various degrees of cliticization), but many of the details of the structuring are already captured at the segmental level. There are perhaps higher prosodic units to be recognized above the level of the prosodic clause, such as paragraphs, but the grouping is likely to be a good deal weaker and, above all, is not well understood. So it will be excluded from the discussion here.

A prosodic clause may be interrupted by a grammatically and prosodically well-formed parenthetical piece. The parenthesis is delimited using **&PG1<** at the beginning and **&PG1>** at the end.

Example:

#h: ja\$z: **#h:** , **#&PG2** also für\$z: den **#&PG2 #p:** eintägigen
 , **#&PG1< #p:** wenn wir den als erstes **#&PG2** erledigen
 wollten , quasi , **#&PG1> #h:** wäre mir ganz recht **#&PG2**
 Montag , der achte November . **#&PG1**

Reference: g071a001

Phrasing caused by truncations and false starts (see V.4.1) can also not be adequately accommodated within the suggested subcategorization of **#&PG1** or **#&PG2**. Therefore the marking of prosodic phrasing in such cases is indexed as **#&PG/**.

Example:

Dienstag , mittwochs\$z: . #&PG2 <äh> #&PG2 #p: is=/+ #&PG/
sieht das bei mir\$z: sch=/+ #&PG/ schwierig aus . #&PG1

Reference: g071a004

Similarly, if a speech turn is interrupted or terminated by a technical break (see V.5.2) an artefact phrasing boundary is marked: **#&PG;**

Examples:

wäre mir rech<;T> **#&PG;**

Reference: g076a010

und ich freue mich auf unsere Reise<;T> **#&PG;** #s: ich
freue mich auf unsere Reise #h: . #&PG1

Reference: g094a028

#&PG is placed at the same point in time as the **#(#)** prefixed segment or nonverbal event which follows the juncture of prosodic phrasing units, ascertained auditorily as well as in the acoustic signal representation.

If the auditory evaluation has established prosodic phrasing at the locations already segmentally labelled with **#p:**, **#h:**, **\$z:** and other nonverbal articulatory events, the phrasing marker **#&PG** is introduced in the following order:

- before **#p:**
- before **#h:** that, as a clear inbreath, belongs to the following phrasal unit
- after **#h:** in other instances of breathing
- after **\$z:** when it refers to the preceding word
- before **\$z:** when it is associated with the beginning of the following word and
- before other nonverbal events.

In addition, if prosodic labelling is to be carried out on material which has already been labelled at the segmental level, **#&PG** is placed:

- after **#. #, #?**
- before **#c:.**

VI.2 Stress

VI.2.1 Lexical stress

Lexical stress is already integrated in the segmental notation of vowels (IV.4). The primary lexical stress marks identify potential locations where sentence accent manifests itself phonetically. If the lexical stress position in a word varies from the canonical transcription, the usual replacement modification (see V.2.1) is made at this place: the canonical sequence of stress mark and vowel symbol is changed to the appropriate sequence without ' or ", and at the new point of lexical stress the reverse modification is made.

Example:

97128	##d	dazu	receives a different lexical stress from that
97489	\$-h		assigned in the canonical transcription
97730	\$a-'a:		
98829	\$t		
97863	\$s		
100589	\$'u:-u:		Reference: g073a000

This modification only captures variations in lexical stress, not rhythmic or prosodic stress shifts, as, for example, the shift from the third syllable of the citation form of *Intercity* to the first syllable in the phrase *Intercity oder Eurocity*. The latter shift is not a lexical stress shift, but a stress shift at the sentence level, i.e. the accent is attributed to a different vowel than the one that bears lexical stress. In a case like this a clear distinction between the levels of lexical stress and sentence accent has to be maintained.

VI.2.2 Sentence accent

Sentence accent is an attribute of a word as a whole and is therefore indicated by attaching the appropriate symbolization to the word on which it is phonetically manifested.

Four levels of sentence accent are recognized. They are symbolized as follows:

&0	unaccented
&1	partially accented
&2	accented
&3	reinforced

To illustrate different levels of sentence accent we use a number of constructed examples:

#&2 Max **#&0** hat+ **#&0** einen+ **#&2** Brief **#&2** geschrieben.

All non-function words accented, all function words unaccented (geschrieben is focussed).

#&2 Max **#&0** hat+ **#&0** einen+ **#&2** Brief **#&1** geschrieben.

geschrieben partially accented, all other non-function words accented, all function words unaccented (may be treated as a neutral stress pattern: neither Brief nor geschrieben are in focus)

#&2 Max **#&0** hat+ **#&0** einen+ **#&2** Brief **#&0** geschrieben.

geschrieben deaccented, all other non-function words accented, all function words unaccented (Brief is focussed).

#&2 Max **#&0** hat+ **#&0** einen+ **#&3** Brief **#&0** geschrieben.

Brief reinforced, geschrieben unaccented, Max accented, all function words unaccented (emphatic reinforcement of focussed Brief).

Examples:

#&0 da **#&0** ich **#&2** vorher **#&3** keine **#&1** Zeit **#&0** habe .

#&PG1

Reference: g075a005

#&1 acht **#&2** Uhr ? **#&PG1**

Reference: g071a007

#&2 acht **#&2** Uhr , **#&PG1**

Reference: g071a011

Sentence accent markers are usually placed before the word and are prefixed with **#**. If the word carries some degree of accent (**&1**, **&2**, **&3**), the markers by default refer to the vowel that is specified for the primary lexical stress position. However, the symbol **\$ ' '** is introduced as a new position indicator for accent attachment

- if the sentence accent falls on lexical items which have been given no lexical stress, namely function words,

- or if, in a word, the phonetic accent manifestation is associated with a vowel other than that carrying the primary lexical stress, either instead of or in addition to the latter.

\$ ' ' is placed immediately before the vowel symbol, at the same time mark, to indicate the position of accent. At the same time, this overrules the association of the lexically stressed vowel with the accent if there is only one accent in the word; for the treatment of words with more than one accent see below. Hesitation particles neither receive a lexical stress mark, nor \$ ' ', but they are annotated with sentence accent symbolizations.

Examples:

40083 #&2 auch is accented

40083 ##Q-

40083 \$-q

40083 \$ ' '

40083 \$aU

42477 \$x+

Reference: g071a005

40169 #&2

40169 ##d

40471 \$-h

40584 \$ ' i :

41445 \$s

42148 \$m

43350 \$ ' '

43350 \$a :

44779 \$l

Sentence accent realized on the second syllable of *diesmal*, i.e. on a vowel other than that marked for primary lexical stress.

Reference: g071a017

If a word carries more than one accent, word internal accent markers (digits) are introduced, prefixed with \$. These are placed at the compound boundary, if one is present, or before the accented vowel in all other cases. The accented vowels must also be marked with \$ ' ' if no primary lexical stress is present.

Example:

43294	#&2^	Accents realized on three syllables in the word
43294	##t	Terminwünsche.
43841	\$-h	
44652	\$E6	
45602	\$m	
46888	\$'i:	
48279	\$n	
49548	\$&2^	
49548	\$#v	
51301	\$' '	
51301	\$"Y	
52183	\$n	
53689	\$S	
56474	\$&2^	
56474	\$' '	
56474	\$@	
59841	\$z:	Reference: g076a006

In a compound word with more than one primary lexical stress, an accent marker has to be provided for each stress present, regardless of whether the component parts are accented or not. A constructed example illustrates this:

#&2 f'unke1\$&2\$#n'age1\$&2\$#n'eu (three accents)

#&2 f'unke1\$&0\$#n'age1\$&2\$#n'eu (two accents: no accent on nagel)

VI.3 Intonation

VI.3.1 Intonation contours

The following are to be marked between successive accents within the prosodic phrase as well as at the end of a prosodic phrase, if it contains an accent:

falling contour:	#&.	indicating a peak or hat pattern
low, narrow rising contour:	#&,	indicating a valley
high, wide rising contour:	#&?	indicating a valley
fall-rise (low rise):	#&.,	
fall-rise (high rise):	#&.?	

At present we assume that **#&?** and **#&.?** only occur before a prosodic phrasing marker and not between two accents in a single phrase.

The falling intonation contour **#&.** is further subcategorized into the following:

- terminal, i.e. a fall to the bottom of the speaker's range: **&2.**
- mid, i.e. slight fall: **&1.**
- level, i.e. no fall at all, treated as the boundary case of the fall: **&0.**
(phrase-internally this leads to the so-called hat pattern)

The subdivisions **&1.** and **&2.** also apply to **&.,** and **&.?**. They cover the range of the peak section of the fall-rise.

In general (see below for exceptions), the symbols are placed

- before the accent marker of the second item in each accent pair,
- before **#&PG1** (obligatory)
- before **#&PG2** (but not when preceded by a hesitation particle)
- before **#&PG/** and **#&PG;** (if sufficient information is available)
- after orthographic punctuation markers (prefixed with simple **#**).

Pre-head, i.e. the unaccented syllables up to, but not including, the first accented syllable within a prosodic phrase, is symbolized separately from these intonation markings (see VI.3.5). Intonation markers cannot always be set before **#&PG;** because vital information may be lost due to the technical break.

Examples:

#h: #&2 j'a , #&2. #&PG2 #&2 g'ut\$z: , #&1. #&PG1

Reference: g073a008

#&2 j'a . #&2. #&PG1

Reference: g072a010

#h: #&2 j'a , #&0. #&2 g'ut . #&2. #&PG1

Reference: g075a004

**#&1 h\$''aben #&0 Sie #&1. #&2 d\$''a #&, #&1 'irgendwelche
#&1. #&2 V'orschlage ? #&? #&PG1**

Reference: g073a004

#s: #h: #&2 j\$z:'a #h: . #&2., #&PG1

Reference: g085a003

#&0 am\$z: #&PG2 #p: #&2 M'ontag , #&0 dem #&1. #&2
f'ünfzehnten ? #&1.? #&PG1

Reference: g071a005

In cases where accent has been marked word internally, the preceding intonation marker has to be prefixed with \$.

Example:

#&0diesen #&2 V'ierzehn-\$&1.\$&1'Uhr-\$0.\$&2Term\$''in #&0.
#&PG2 #&2 b'ei\$&0.\$&1beh\$''alten . #&2. #&PG1

Reference: g077a002

Theoretically, in the case of a sequence of peaks or valleys the labels can be placed at the beginning of any word between two accents. They could thus indicate different intonational shapes between accents, for example, different turning points in a sequence of peaks or valleys, or a low-pitched stretch on unaccented syllables between peaks. At present, however, intonation contour markers are placed as described above except when a valley contour is present on the second item in the pair. In this case the intonation markers are placed before the word on which the valley contour begins, even if this word is unaccented (i.e. early valley, see VI.3.2).

Examples:

#&0 an #&2 b'eiden #&, #&2 T'agen #&1. #&0 'acht #&2 'Uhr
? #&, #&PG1

Reference: g071a012

#&2 V'orschlag #&0 daz'u #&1. #&0 m'achen #&2 d\$''arf .
#&? #&PG1

Reference: g075a009

Further empirical work will show whether prosodic phonological differentiation requires other positions to be taken into account. A decision about symbolization will then also have to be taken in the case of a word that begins with unaccented syllables, which means that such a turning point could occur within the word.

VI.3.2 Peak and valley alignment

Three types of synchronization of an intonation peak and an accented syllable are recognized:

- mid: the peak is synchronized with the centre of the accented syllable nucleus; this is labelled ^
- early: the peak occurs before the accented syllable nucleus; this is labelled)
- late: the peak occurs late in the syllable nucleus, or in the following syllable; this is labelled (.

In the case of intonation valleys only early and non-early synchronizations are recognized.

In order to differentiate peak and valley alignments in the notation

-] for early valleys and
- [for non-early valleys

are used.

If, for instance, in the centre part of a ‘hat pattern’ consisting of more than two accents, it is impossible to allocate a pitch contour to any one of these synchronizations because of relatively flat F0, although the classification as a peak can be justified for formal consistency reasons, the symbolization - is used.

The characters ^,), (,], [and - are placed after the accent digit, with which they form label units. At present, no alignment is carried out with hesitation particles.

The following constructed examples illustrate some of the different synchronization possibilities on a simple declarative sentence:

medial peak:

#&0 sie+ #&0 hat+ #&0 ja+ #&2^ gel'ogen #&. #&PG1

early peak:

#&0 sie+ #&0 hat+ #&0 ja+ #&2) gel'ogen #&. #&PG1

late peak:

#&0 sie+ #&0 hat+ #&0 ja+ #&2(gel'ogen #&. #&PG1

early low valley:

#&0 hat+ #&0 sie+ #&2] gel'ogen #&, #&PG1

non-early low valley:

#&0 hat+ #&0 sie+ #&2[gel'ogen #&, #&PG1

early high valley:

#&0 hat+ #&0 sie+ #&2] gel'ogen #&? #&PG1

non-early high valley:

#&0 hat+ #&0 sie+ #&2[gel'ogen #&? #&PG1

Examples (see also Figure 12):

#h: #&2) j'a , #&2. #&PG2 #&2) g'ut\$z: , #&1. #&PG1

Reference: g073a008 - Figure 12(a)

#&2^ j'a . #&2. #&PG1

Reference: g072a010 - Figure 12(b)

#h: #&2(j'a , #&0. #&2) g'ut . #&2. #&PG1

Reference: g075a004 - Figure 12(c)

#&1^ h\$'aben #&0 Sie #&1. #&2] d\$'a #&, #&1^
'irgendwelche #&1. #&2[V'orschlage ? #&? #&PG1

Reference: g073a004 - Figure 12(e)

#s: #h: #&2) j\$z:'a #h: . #&2., #&PG1

Reference: g085a003 - Figure 12(d)

#&0 am\$z: #&PG2 #p: #&2(M'ontag , #&0 dem #&1. #&2^
f'unfzehnten ? #&1.? #&PG1

Reference: g071a005 - Figure 12(f)

#&0 diesen #&2^ V'ierzehn-\$&1.\$&1^'Uhr-\$&0.\$&2-Term\$'in
#&0. #&PG2 #2(b'ei\$&0.\$&1^beh\$'alten . #&2. #&PG1

Reference: g077a002

#&0 an #&2] b'eiden #&, #&2^ T'agen #&1. #&0 'acht #&2]
'Uhr ? #&, #&PG1

Reference: g071a012

#&2^ V'orschlag #&0 daz'u #&1. #&0 m'achen #&2] d\$'arf .
#&? #&PG1

Reference: g075a009

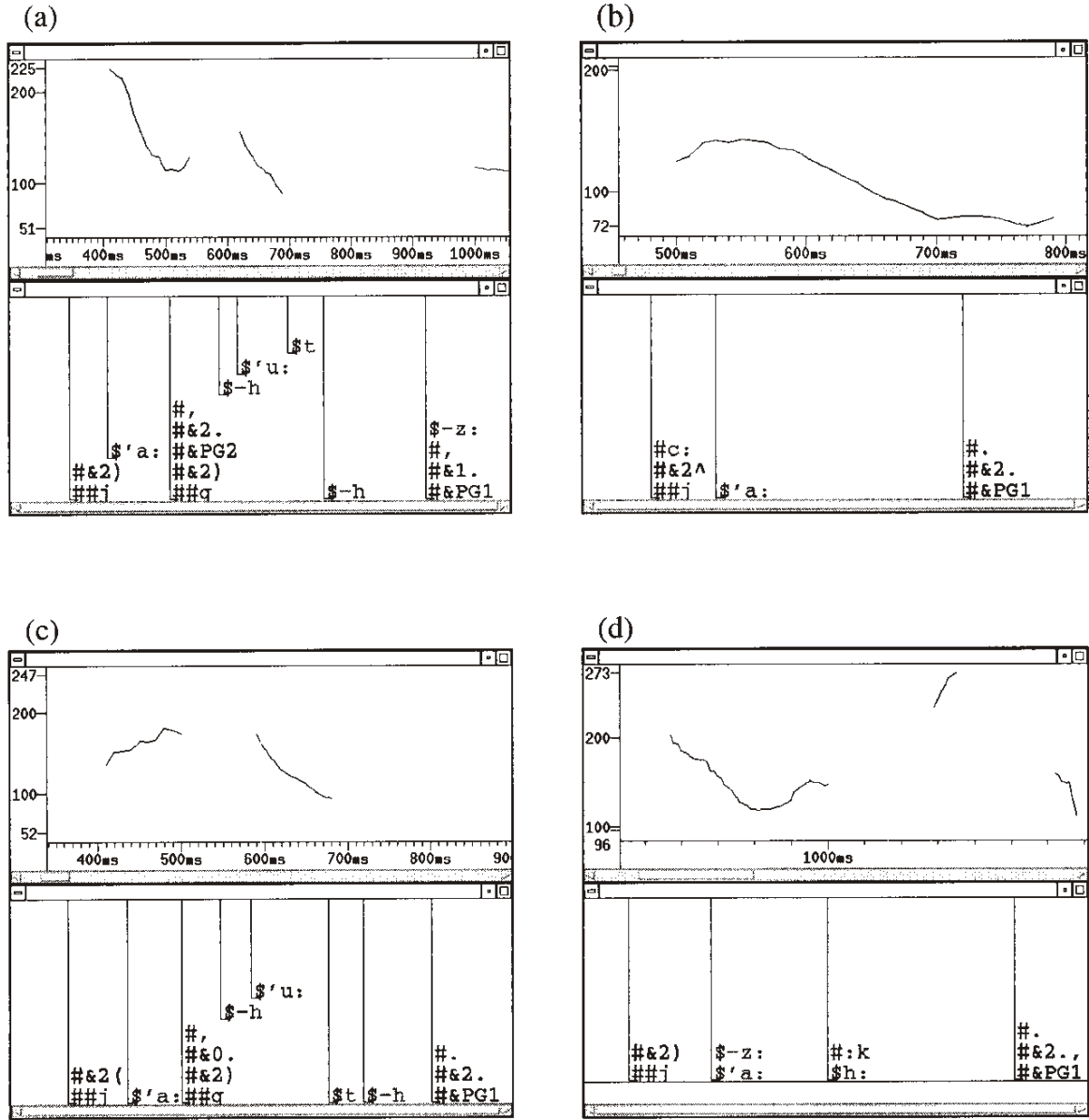
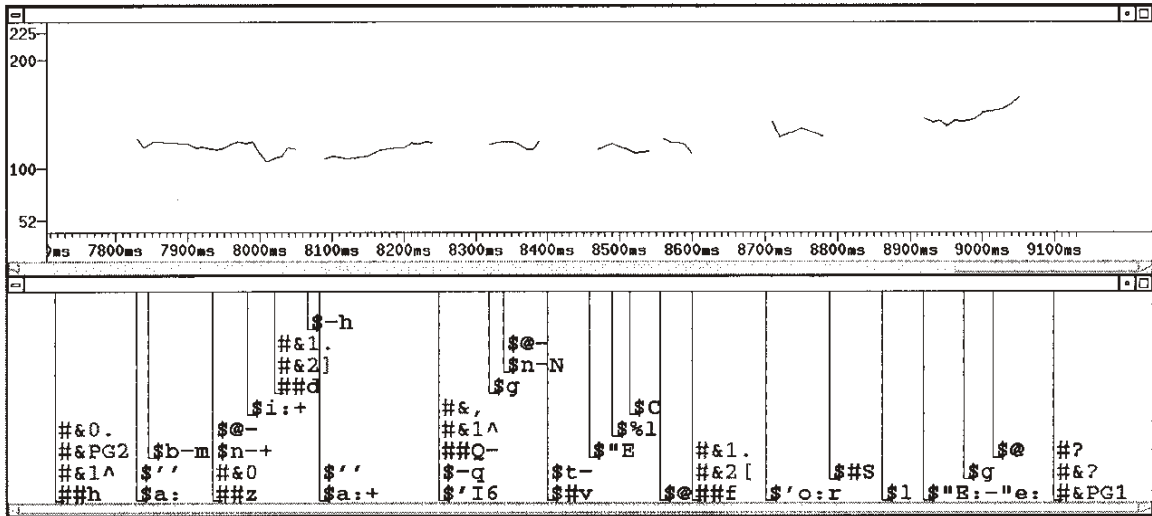
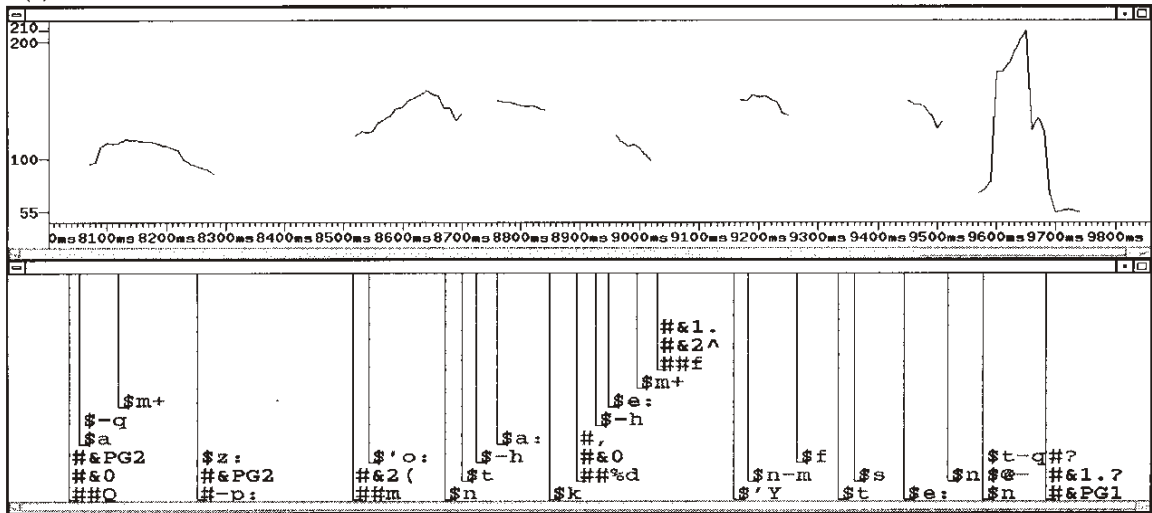


Figure 12. (a) - (f) show F0 contours and labels of the examples given on page 87.

(e)



(f)



VI.3.3 Downstep and reset

A drop in the F0 maximum and minimum values in peak and valley contours occurs from one accent to another in a sequence of aligned (i.e. not hesitation particles) **&2** accents within a prosodic phrase. This so-called 'downstep' is regarded as default and is not marked. Furthermore, a pitch reset takes place at the beginning of each prosodic phrase, therefore reset is implied by **#&PG**. Where such a reset is absent, **=** is prefixed to the phrasing marker: **#&=PG**. If reset takes place within the phrase, **+** is prefixed to the next accent digit: **#&+2**. In both cases the character forms a label unit with the prosodic symbol it is prefixed to.

The following constructed examples illustrate downstep and reset:

#&0 mit+ #&2 roten #&2 gelben #&2 blauen #&2 schwarzen #& . #&PG1

default downstep

#&0 mit+ #&2 roten #&2 gelben #&+2 blauen #&2 schwarzen #& . #&PG1

reset within prosodic phrase (at *blauen*), no preceding lengthening, i.e. absence of phrase boundary.

#&0 mit+ #&2 roten #&2 gelben #&PG2 #&2 blauen #&2 schwarzen #& . #&PG1

reset at prosodic boundary (at *blauen*), with preceding lengthening.

#&0 mit+ #&2 roten #&2 gelben #&=PG2 #&2 blauen #&2 schwarzen #& . #&PG1

no reset at prosodic boundary, which is, however, signalled by preceding lengthening.

Examples:

#&2 (j'a , #&0 . #&PG2 #&2^ d\$''as\$z: #&0 . #&2^ w\$''ürde #&0 mir\$z: #&1 . #&=PG2 #p: #&2 (g'anz #&0 . #&2^ herv'orragend #&1 . #&2) p'assen . #&2 . #&PG1

Reference: g073a006

#&0 da #&0 <häs> #&PG2 #&2 [bl'eibt #&0 mir #&, #&1^
'eigentlich #&0. #&+2 (w'enig #&0. #&2) Z'eit . #&1.
#&=PG1

Reference: g075a006

If phrasing markers are associated with technical breaks #&PG; there is no sense in making any statement about the presence or absence of reset and they do therefore not receive =.

VI.3.4 Upstep

Besides the interruption of downstep at any point by a controlled restart of the downstepping pattern (reset), we also have to take another systematic deviation from the default into account, namely the step-wise upward trend of peak or valley sequences: upstep. It is marked by |, prefixed to the digit of each relevant aligned (i.e. not hesitation particles) &2 accent that has a higher pitch peak or valley than the one preceding. Upstep and accent marker form a label unit.

Examples:

#&0 mit+ #&|2 roten #&|2 gelben #&|2 blauen #&|2 schwarzen
#&. #&PG1

constructed

#&2^ D'ienstag , #&1. #&|2^ m'ittwochs\$z: #&1. #&PG2

Reference: g071a004

#&2^ m'achen #&0 wir #&0 das #&1. #&|2] f'est ? #&? #&PG1

Reference: g071a006

VI.3.5 High pre-head

Unaccented syllables preceding the first accent in a prosodic phrase may be either low or high: they represent different types of pre-head. The low pre-head is treated as default and remains unmarked, the high pre-head is symbolized by #&HP, put at the beginning of the prosodic phrase, but following a phrasing marker and the sentence beginning marker #c:, if present (see example in VI.4).

Example:

nachmittags #h: . #&PG1 #&HP das wird dann wahrscheinlich
'n bißchen schwierig . #&PG1

Reference: g071a004

VI.4 Speech rate

Only speech rate changes in relation to the speed in the preceding prosodic phrasing unit are marked:

- #&RP (= 'rate plus') for a relative increase in tempo and
- #&RM (= 'rate minus') for a relative decrease in tempo.

An absolute rate judgement at the utterance onset may be added at a later labelling stage. These labels are put after #&PG1, #&PG2 or #c: and before #&HP.

Example:

nachmittags #h: . #&PG1 #&RP #&HP das wird dann
wahrscheinlich 'n bißchen schwierig . #&PG1

Reference: g071a004

VI.5 Prosodic labelling of word fragments

The individual parts of an interrupted word are treated in the prosodic labelling as though they were independent lexical items.

Example:

#&2 'Arbeits\$z:\$_ #&PG2 #p: #&2 ##_ fr\$''ühstück

Reference: g086a000

VI.6 Uncertainty

Just as in the segmental labelling, the symbol % is used to indicate uncertainty regarding the assignment of a particular prosodic category. % is suffixed to the prosodic label(s) concerned.

VI.7 Cyclic approach to prosodic labelling

The prosodic annotations described in VI.1-VI.4 are not carried out in one step, but sequentially in a number of passes over the same file. The following steps are recommended, but the details of an optimal progression through the various stages will grow out of more practical experience.

- (1) Prior to the prosodic labelling of data which have only been processed orthographically the following must first be carried out:
- pauses, breathing, hesitations and other nonverbal events (either in their orthographic or canonical form) must be introduced
 - the beginnings of words (including non-initial compound elements) and vowels must be ascertained from the signal
 - lexical stresses ' must be associated with the vowels.

If prosodic labelling is to be carried out on material which has already been labelled segmentally this information will be present.

- (2) The prosodic phrases are delimited and **#&PG1**, **#&PG2**, **#&PG/**, **#&PG;** inserted.
- (3) Accents are located and labelled.
- (4) Intonation contours at phrase boundaries are determined and labelled. Pitch movements between accents within prosodic phrases are determined.
- (5) The synchronization of each peak and valley is determined, and high pre-heads are marked.
- (6) Finally, downstep, reset, upstep and tempo changes are ascertained.

The extraction of information does not only happen cyclically during prosodic labelling, but also moves successively towards more detail.

Example of the cyclic approach and step-by-step progression in prosodic labelling (taken from g071a004):

step 1: lexical stresses, pauses, breathing, dysfluencies are added to the orthographic text.

step 2: add phrasing markers

<ähm> **#&PG2** D'ienstag würde mir g'ut p'assen , **#&PG1** <ähm> **#&PG2** das h'eißt , **#&PG2** **#p:** Mom'ent **#&PG2** 'allerdings 'erst**\$z:** **#&PG2** n'achm"ittags **#h:** **#&PG1** das wird dann wahrsch'einlich 'n b'ißchen schw'ierig . **#&PG1** D'ienstag m'ittwochs**\$z:** **#&PG2** <äh> **#&PG2** **#p:** is=/+ **#&PG/** s'ieht das bei m**\$''ir****\$z:** sch=/+ **#&PG/** schw'ierig 'aus . **#&PG1** da hab' ich t'agsüber Term'ine . **#&PG1** **#h:** <ähm> **#&PG2** wie s'ieht das bei **\$''Ihnen** am D'onnerstag 'aus ? **#&PG1**

step 3: add accents

#&2 <ähm> #&PG2 #&2 D'ienstag #&0 würde #&0 mir #&0 g'ut
#&2 p'assen , #&PG1 #&2 <ähm> #&PG2 #&0 das #&2 h'eißt ,
#&, #&PG2 #p: #&2 Mom'ent , #&PG2 #&2 'allerdings #&, #&2
'erst\$z: #&, #&PG2 #&2 n'achm"ittags #h: . #&PG1 #&0 das
#&0 wird #&0 dann #&2 wahrsch'einlich #&0 'n #&0 b'ißchen
#&2 schw'ierig . #&PG1 #&2 D'ienstag , #&2 m'ittwochs\$z:
#&PG2 #&0 <äh> #&PG2 #p: #&0 is=/+ #&PG/ #&0 s'ieht #&0
das #&0 bei #&2 m\$'ir\$z: #&0 sch=/+ #&PG/ #&2 schw'ierig
#&0 'aus . #&PG1 #&0 da #&0 hab' #&0 ich #&2 t'agsüber #&2
Term'ine . #&PG1 #h: #&2 <ähm> #&PG2 #&0 wie #&0 s'ieht
#&0 das #&0 bei #&2 \$'Ihnen #&0 am #&3 D'onnerstag #&0
'aus ? #&PG1

step 4: add intonation contours (peaks and valleys)

#&2 <ähm> #&PG2 #&2 D'ienstag #&0 würde #&0 mir #&0 g'ut
#&1. #&2 p'assen , #&2. #&PG1 #&2 <ähm> #&PG2 #&0 das #&2
h'eißt , #&, #&PG2 #p: #&2 Mom'ent , #&1. #&PG2 #&2
'allerdings #&, #&2 'erst\$z: #&, #&PG2 #&2 n'achm"ittags
#h: . #&2. #&PG1 #&0 das #&0 wird #&0 dann #&2
wahrsch'einlich #&0 'n #&0 b'ißchen #&0. #&2 schw'ierig .
#&2. #&PG1 #&2 D'ienstag , #&1. #&2 m'ittwochs\$z: #&1.
#&PG2 #&0 <äh> #&PG2 #p: #&0 is=/+ #&PG/ #&0 s'ieht #&0
das #&0 bei #&2 m\$'ir\$z: #&0 sch=/+ #&0. #&PG/ #&2
schw'ierig #&0 'aus . #&2. #&PG1 #&0 da #&0 hab' #&0 ich
#&2 t'agsüber #&1. #&2 Term'ine . #&1. #&PG1 #h: #&2 <ähm>
#&PG2 #&0 wie #&0 s'ieht #&0 das #&0 bei #&2 \$'Ihnen #&0
am #&1. #&3 D'onnerstag #&0 'aus ? #&2. #&PG1

step 5: add peak and valley alignment and high pre-head

#&2 <ähm> #&PG2 #&2(D'ienstag #&0 würde #&0 mir #&0 g'ut
#&1. #&2) p'assen , #&2. #&PG1 #&2 <ähm> #&PG2 #&0 das
#&2] h'eißt , #&, #&PG2 #p: #&2^ Mom'ent , #&1. #&PG2 #&2]
'allerdings #&, #&2] 'erst\$z: #&, #&PG2 #&2(n'achm"ittags
#h: . #&2. #&PG1 #&HP #&0 das #&0 wird #&0 dann #&2^
wahrsch'einlich #&0 'n #&0 b'ißchen #&0. #&2) schw'ierig .
#&2. #&PG1 #&2^ D'ienstag , #&1. #&2^ m'ittwochs\$z: #&1.
#&PG2 #&0 <äh> #&PG2 #p: #&0 is=/+ #&PG/ #&0 s'ieht #&0
das #&0 bei #&2^ m\$'ir\$z: #&0 sch=/+ #&0. #&PG/ #&2^
schw'ierig #&0 'aus . #&2. #&PG1 #&0 da #&0 hab' #&0 ich
#&2^ t'agsüber #&1. #&2^ Term'ine . #&1. #&PG1 #h: #&2
<ähm> #&PG2 #&HP #&0 wie #&0 s'ieht #&0 das #&0 bei #&2^
\$'Ihnen #&0 am #&1. #&3^ D'onnerstag #&0 'aus ? #&2.
#&PG1

step 6: add speech rate changes, downstep, reset and upstep

#&2 <ähm> #&PG2 #&2(D'ienstag #&0 würde #&0 mir #&0 g'ut
#&1. #&2) p'assen , #&2. #&PG1 #&2 <ähm> #&PG2 #&0 das
#&2] h'eißt , #&, #&PG2 #p: #&2^ Mom'ent , #&1. #&PG2 #&2]
'allerdings #&, #&2] 'erst\$z: #&, #&PG2 #&2(n'achm"ittags
#h: . #&2. #&PG1 #&RP #&HP #&0 das #&0 wird #&0 dann #&2^
wahrsch'einlich #&0 'n #&0 b'ißchen #&0. #&2) schw'ierig .
#&2. #&PG1 #&2^ D'ienstag , #&1. #&2^ m'ittwochs\$z: #&1.
#&PG2 #&0 <äh> #&PG2 #p: #&0 is=/+ #&PG/ #&0 s'ieht #&0
das #&0 bei #&2^ m\$'ir\$z: #&0 sch=/+ #&0. #&PG/ #&2^
schw'ierig #&0 'aus . #&2. #&PG1 #&0 da #&0 hab' #&0 ich
#&2^ t'agsüber #&1. #&2^ Term'ine . #&1. #&PG1 #&RM #h:
#&2 <ähm> #&PG2 #&HP #&0 wie #&0 s'ieht #&0 das #&0 bei
#&2^ \$'Ihnen #&0 am #&1. #&3^ D'onnerstag #&0 'aus ? #&2.
#&PG1

VII Lexicon generation

VII.1 Canonical lexicon

A **canonical lexicon** for a particular corpus is created automatically from the orthographic and canonical transcription files. Each entry in the lexicon comprises the orthographic representation of a word, its canonical form and its frequency in the corpus (see Figure 13). Each orthographic word entry has only one canonical form. The phonetic variants of a lexical entry are extracted automatically from the label files and compiled in a **variants lexicon**. Heterophonic homographs represent different words and therefore form separate lexical entries. The canonical lexicon is successively augmented to accommodate the growth of the corpus.

Plan	pl'a:n	1
Planung	pl'a:nUN	1
Prinzip	prInts'i:p	2
Problem	pro:bl'e:m	2
Probleme	pro:bl'e:m@	2
Programm	pro:gr'am	1
Referate	rEf6r'a:t@	1
Reise	r'aIz@	16
Revue	rEv'y:	1
Rhythmus	r'YtmUs	1
Routine	ru:t'i:n@	1

Figure 13. Extract from the canonical lexicon in *Kiel Corpus of Spontaneous Speech Vol. I* (IPDS, 1995). Each entry contains orthographic representation, canonical transcription and frequency of occurrence in corpus.

For the orthographic records of spontaneous speech data, a canonical transcription file is generated, containing not only lexical items (including interjections), but also word fragments (caused by technical breaks), lexical interruptions (the production of a word is broken off and only resumed following insertion of other material), hesitation particles, slips of the tongue, nonverbal material and external noise. These are compiled into a **special forms lexicon**, which forms a separate part of the canonical lexicon. This was created in particular for those involved in low-level signal processing, whereas the lexicon containing the proper word forms constitutes the main part of the canonical lexicon and serves a more general purpose.

However, in an ASCII-sorted lexicon in which words overlaid with noise need to be related to their normal counterparts, it is necessary to discard the relevant markings (e.g. <:#RascheIn> . . .:>). Only temporally discrete nonverbal and non-articulatory noises are included in the canonical lexicon containing the special forms.

VII.2 Variants lexicon

A **variants lexicon** is constructed automatically from the label files, using the orthographic and canonical transcriptions from the header of the file together with the segment labels, whose concatenation represents the transcription of a pronunciation variant. Each entry in the variants lexicon comprises:

- an orthographic form
- its canonical transcription
- a transcription of each pronunciation variant found in the corpus
- the frequency of occurrence of the word in the corpus
- the frequency of occurrence of each pronunciation variant in the corpus
- reference to turn label/signal file containing the variant
- the serial position of the word from the beginning of its turn file.

An example of the entries for the word “sind” is shown in Figure 14.

In the running transcription of the variants lexicon additional symbols are introduced to avoid ambiguities which otherwise arise from the simple concatenation of the segmented labels. One source of indeterminacy is the use of **-** symbolizing insertion when placed before, or deletion when placed after a segment. To avoid such indeterminacy, insertions are indicated with **=-** and deletions with **-:**. In running transcription the insertion **-** in the aspiration symbol **-h** is left out, since **h** can be interpreted as the release phase of a preceding plosive. In the extremely rare cases in which **h** follows a plosive and does not represent its release phase a ***** is inserted between the plosive symbol and **h** (e.g. **le:p*haft**). The **-** in the symbol for creaky phonation, **-q**, is also omitted when it follows a glottal stop.

The symbol ***** is also used to maintain a distinction between the use of **%** to mark difficult stretches of utterance and the use as an uncertain boundary marker. In the transcription of difficult stretches ***** is placed after **%**.

Examples:

%ihnen	%*Qqi : n@n	uncertainty about ihnen
ihnen	%Qqi : n@n	uncertainty about the start of glottal closure
%ihnen	%*%Qqi : n@n	uncertainty about ihnen and the start of glottal closure

sind	zInt+	zInth+	11	3	G091A006	20
sind	zInt+	zInth+	11	3	G094A000	43
sind	zInt+	zInth+	11	3	G094A002	11
sind	zInt+	zInt-:+	11	2	G076A013	1
sind	zInt+	zInt-:+	11	2	G091A006	26
sind	zInt+	%zInth+	11	1	G075A002	56
sind	zInt+	z''Int-:+	11	1	G094A010	5
sind	zInt+	z-sInt-:+	11	1	G072A006	5
sind	zInt+	zI-:nt-:+	11	1	G094A027	4
sind	zInt+	zI=-~n-:t-:+	11	1	G071A012	16
sind	zInt+	zIn-mt-:+	11	1	G074A016	8

Figure 14. Entries for “sind” in *The Kiel Corpus of Spontaneous Speech Vol. I* (IPDS, 1995). The columns represent, from left to right: orthographic representation; canonical transcription; variants transcription; frequency of word; frequency of variant; reference; number of word from beginning of turn file.

For further details concerning the construction of the variants lexicon, see also Kohler (1994a).

VIII Transliteration and labelling environment

In this chapter we describe the labelling platforms used to carry out both segmental and prosodic labelling and the tools used to provide formal consistency checks of the text files produced at different stages in the symbolic processing of a dialogue.*

VIII.1 Transliteration platform

Orthographic transliteration is carried out by two transcribers working together. As well as being able to hear portions of the signal, they also have a visual representation of the signal. After a dialogue has been entered into a text editor the spelling is checked. The following formal consistency checks are also made:

- bracket ordering
- syntax and use of special symbols
- symbol legality.

Finally, each file is converted into a transliteration file by:

- numbering individual turns within a dialogue
- adding whitespace in appropriate places
- adding comment lines at the beginning of each file indicating when the file was last worked on.

VIII.2 Segmental labelling platform

Segmentation and labelling of the acoustic speech signal is carried out using a modified version of the waveform editor described in Carlson and Granström (1985) running on Apollo workstations. This editor allows a symbolic representation to be linked to an acoustic signal. The labeller has both a spectrogram and oscillogram display as well as auditory output.

Segmentation is done by successively aligning the labels offered from the canonical label file with the signal, carrying out any necessary modifications. Each aligned label appears next to the segment boundary set by the labeller and the next label to be aligned is shown at the right of the window. Labels are automatically placed at zero-crossing points, facilitating cutting and splicing of signal portions at a later stage.

*Many thanks are due to Dr. Michael Scheffers, Frank Bartels and Tobias Rettstadt who have been responsible for the software development of these tools.

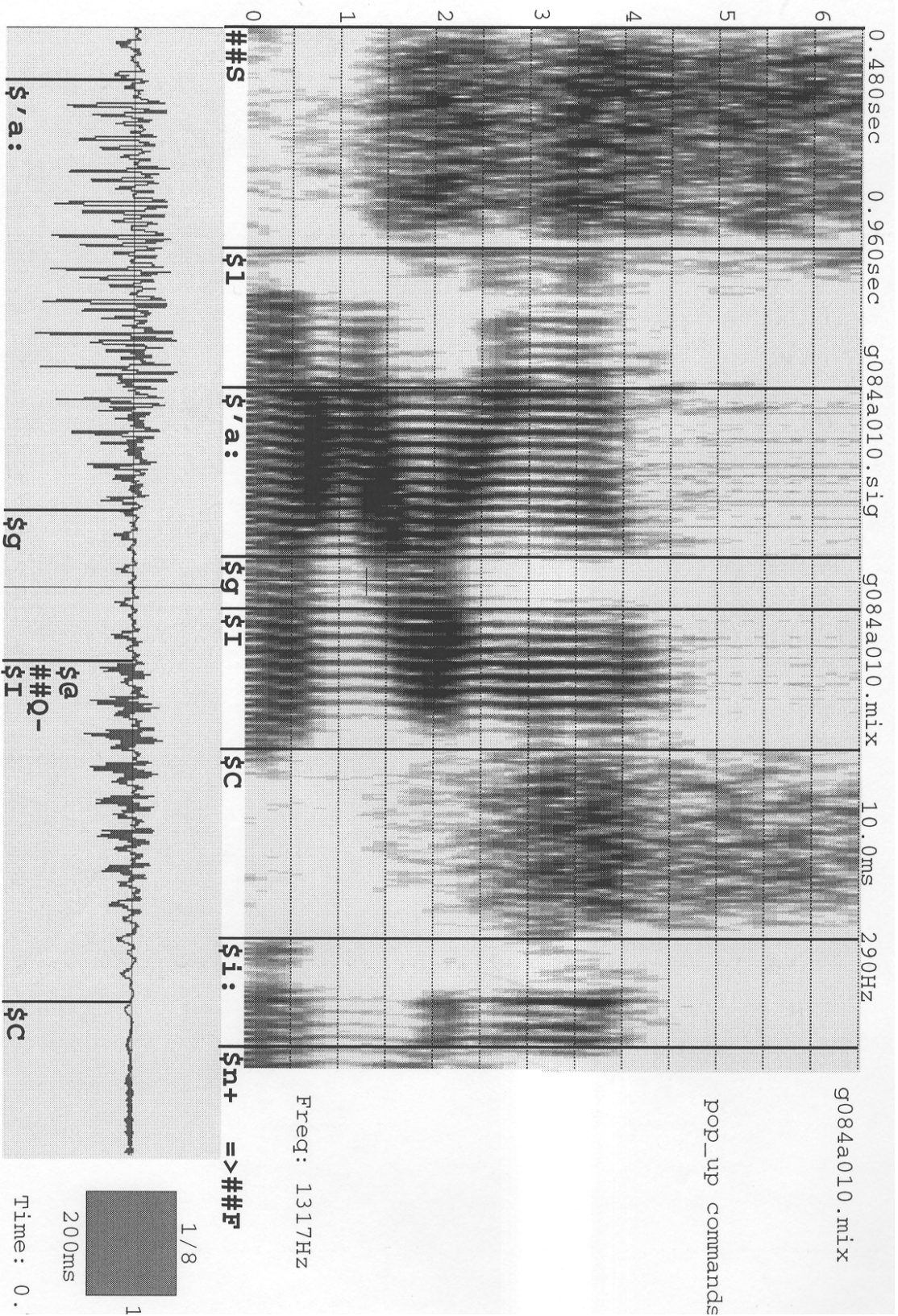


Figure 15. View of segmental labelling platform.

Aligned labels can be moved, edited and fresh labels can be inserted. A typical view of the segmental labelling environment is shown in Figure 15.

VIII.3 Prosodic labelling platform

The wave editor described in the preceding section is not suitable for prosodic labelling as it does not contain an F0 display. Prosodic labelling is carried out using the prosodic labelling module of *Xassp*, speech and signal processing software currently under development at the IPDS running under X11. The labeller can choose a selection of displays depending on the labelling stage. For the annotation of phrasing and stress the labeller should rely on auditory information alone, so only a speech signal and labels are displayed, whereas for the labelling of intonation an F0 display is used as well.

All labels are inserted manually as, at present, a lack of knowledge about the phonology of intonation of spontaneous speech prohibits the construction list of canonical prosodic labels. As the prosodic labels can only be bound to times already established during segmental labelling (i.e. word boundaries, beginnings of vowels) the prosodic labelling module does not allow segment boundaries to be moved. Labels can only be inserted and edited at boundaries which are already present. A typical view of the prosodic labelling environment is shown in Figure 16.

VIII.4 Checking segmental and prosodic labelling

The process of segmenting and labelling we have described in previous chapters guarantees a relatively high level of consistency within and across segmenters. Both the label inventory and the range of modifications which can be made to signals are restricted. Of course, the use of such a complex system and the process of labelling itself can lead to various types of error. In an attempt to minimize these errors, labelling is checked.

First, experienced labellers supervise the work of the less experienced. Second, a check of formal consistency is performed. The following points are checked:

- legality: label must be a member of the inventory.
- syntax: is a label in the wrong place, e.g. plosive release must follow a plosive, etc.
- duration: certain labels, e.g. those deleted must have zero duration. An upper limit is set on reasonable duration (at present 200ms).

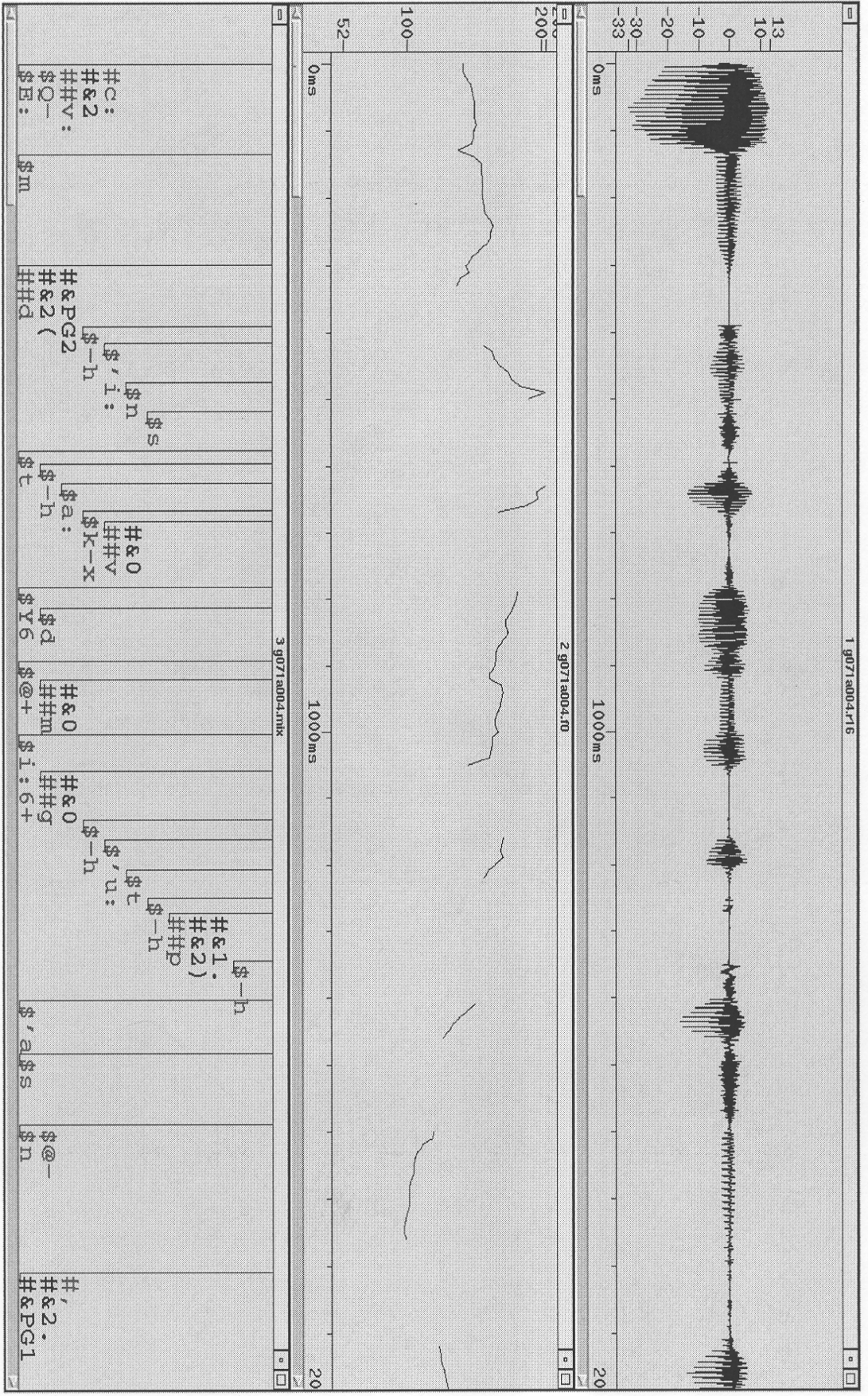


Figure 16. View of prosodic labelling environment (Xassp).

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Appendix A Elicitation materials

This appendix contains a complete set of materials for a dialogue session. The first sheet is the set of written instructions given to each speaker at the beginning of each dialogue session. Following this are the individual calendar sheets and timetables used in each subsession. The number (1 or 2) at the top of each calendar sheet refers to the speaker, the number at the bottom of each calendar sheet, before the instructions, refers to the number of the subsession. The number at the top of each timetable is a composite of these two numbers, e.g. timetable 2.4 was used by speaker 2 in subsession 4.

Dialogaufnahmen - Terminplanung

Die folgende Anleitung werden wir auch mündlich vortragen. Bitte fragen Sie uns, wenn etwas unklar ist!

Wir werden einige kleinere Dialoge zwischen Ihnen und einer anderen Person aufnehmen. Die Aufnahmen dienen als Datenmaterial für die Entwicklung eines Spracherkennungs- und Übersetzungssystems.

Sie sollen anhand von Kalendern und Wochenstundenplänen verschiedene Termine mit Ihrem Gesprächspartner ausmachen. In den Kalendern sind bestimmte Tage und Gruppen von Tagen schraffiert und zum Teil mit Einträgen versehen. An diesen schraffierten Tagen können Sie keine Termine ausmachen. Ähnliches gilt für Wochenstundenpläne, wobei hier gewisse Stunden schraffiert sind, und damit ausgeschlossen sind. Wenn ein mehrtägiges Treffen abgemacht werden soll, brauchen Sie nur die Monatskalender zu benutzen (die Einträge der Wochenstundenpläne gelten in diesem Falle also nicht). Bei der Absprache eines Termins können auch kurze Begründungen für das Ablehnen eines Terminvorschlags angegeben werden.

Welche Termine Sie mit Ihrem Partner in einem bestimmten Zeitraum ausmachen müssen, werden von der Versuchsleitung erklärt. Eine Kurzbeschreibung der Termine, die abgemacht werden sollen, finden Sie auch unten auf dem Kalenderblatt.

Bitte reden Sie Ihren Gesprächspartner mit "Sie" an, auch wenn Sie diese Person gewöhnlich duzen würden.

Wenn Sie wollen, können Sie den Stift benutzen, um die abgemachten Termine in den Kalender einzutragen. Bitte lassen Sie die Kalenderblätter in den Hüllen.

Auf dem Tisch vor Ihnen finden Sie einen Knopf. Wenn Sie sprechen wollen, müssen Sie diesen Knopf drücken und während Sie sprechen auch weiterhin gedrückt halten - solange die Birne aufleuchtet, können Sie sprechen (sonst nicht). Es kann immer nur eine Person auf einmal sprechen, und zwar immer die, die den Knopf zuerst gedrückt hat. Wenn Ihr Gesprächspartner vor Ihnen gedrückt hat, wird Ihr Licht beim Drücken des Knopfes nicht aufleuchten - Sie können also dann nicht sprechen.

Wir danken Ihnen für Ihre Mitarbeit.

ipds, CAU Kiel, September 1993

April 1994		Mai 1994	
Fr 1	Karfreitag	So 1	Maifeiertag
Sa 2	Karsamstag	Mo 2	
So 3	Ostersonntag	Di 3	
Mo 4	Ostermontag	Mi 4	
Di 5		Do 5	
Mi 6		Fr 6	
Do 7		Sa 7	
Fr 8		So 8	
Sa 9		Mo 9	
So 10		Di 10	
Mo 11		Mi 11	
Di 12		Do 12	Christi Himmelfahrt
Mi 13		Fr 13	
Do 14		Sa 14	Dienstreise nach Karlsruhe
Fr 15		So 15	
Sa 16		Mo 16	
So 17		Di 17	
Mo 18		Mi 18	
Di 19		Do 19	
Mi 20		Fr 20	
Do 21		Sa 21	
Fr 22		So 22	Pfingstsonntag
Sa 23		Mo 23	Pfingstmontag
So 24		Di 24	
Mo 25		Mi 25	
Di 26		Do 26	
Mi 27		Fr 27	
Do 28		Sa 28	
Fr 29		So 29	
Sa 30		Mo 30	
		Di 31	

- 1. Festlegen von 3 Terminen für Arbeitstreffen:**
- 1 unter der Woche
 - 2 am Wochenende

April 1994		Mai 1994	
Fr 1	Karfreitag	So 1	Maifeiertag
Sa 2	Karsamstag	Mo 2	
So 3	Ostersonntag	Di 3	
Mo 4	Ostermontag	Mi 4	
Di 5		Do 5	
Mi 6		Fr 6	
Do 7		Sa 7	
Fr 8		So 8	
Sa 9		Mo 9	
So 10		Di 10	
Mo 11		Mi 11	
Di 12		Do 12	Christi Himmelfahrt
Mi 13		Fr 13	
Do 14		Sa 14	
Fr 15		So 15	
Sa 16		Mo 16	
So 17		Di 17	
Mo 18		Mi 18	
Di 19	Besuch des DFKI	Do 19	
Mi 20	Saarbrücken	Fr 20	
Do 21		Sa 21	
Fr 22		So 22	Pfingstsonntag
Sa 23		Mo 23	Pfingstmontag
So 24		Di 24	
Mo 25		Mi 25	
Di 26		Do 26	
Mi 27		Fr 27	
Do 28		Sa 28	
Fr 29		So 29	
Sa 30		Mo 30	
		Di 31	

1. Festlegen von 3 Terminen für Arbeitstreffen:

- 1 unter der Woche
- 2 am Wochenende

1.1

	Montag	Dienstag	Mittwoch	Donnerstag	Freitag
08-09					
09-10					
10-11					
11-12					
12-13					
13-14					
14-15					
15-16					
16-17					
17-18					
18-19					

2.1

	Montag	Dienstag	Mittwoch	Donnerstag	Freitag
08-09					
09-10					
10-11					
11-12					
12-13					
13-14					
14-15					
15-16					
16-17					
17-18					
18-19					

November 1993		Dezember 1993	
Mo 1	Allerheiligen	Mi 1	
Di 2		Do 2	
Mi 3		Fr 3	
Do 4	Treffen	Sa 4	
Fr 5	in Köln	So 5	
Sa 6		Mo 6	
So 7		Di 7	
Mo 8		Mi 8	
Di 9		Do 9	
Mi 10		Fr 10	
Do 11		Sa 11	
Fr 12		So 12	
Sa 13		Mo 13	
So 14		Di 14	
Mo 15		Mi 15	
Di 16		Do 16	
Mi 17	Buß- und Betttag	Fr 17	
Do 18		Sa 18	
Fr 19		So 19	
Sa 20		Mo 20	
So 21		Di 21	
Mo 22		Mi 22	
Di 23		Do 23	
Mi 24		Fr 24	Heilig Abend
Do 25		Sa 25	1. Weihnachtstag
Fr 26		So 26	2. Weihnachtstag
Sa 27		Mo 27	
So 28		Di 28	
Mo 29		Mi 29	
Di 30		Do 30	
		Fr 31	Silvester

2. Festlegen von 2 zweitägigen und 1 eintägigen Arbeitssitzung

November 1993		Dezember 1993	
Mo 1	Allerheiligen	Mi 1	
Di 2		Do 2	
Mi 3		Fr 3	
Do 4		Sa 4	
Fr 5		So 5	
Sa 6		Mo 6	
So 7		Di 7	
Mo 8		Mi 8	
Di 9		Do 9	Kongreß in
Mi 10		Fr 10	München
Do 11		Sa 11	
Fr 12		So 12	
Sa 13		Mo 13	
So 14		Di 14	
Mo 15		Mi 15	
Di 16		Do 16	
Mi 17	Buß- und Betttag	Fr 17	
Do 18		Sa 18	
Fr 19		So 19	
Sa 20		Mo 20	
So 21		Di 21	
Mo 22		Mi 22	
Di 23		Do 23	
Mi 24		Fr 24	Heilig Abend
Do 25		Sa 25	1. Weihnachtstag
Fr 26		So 26	2. Weihnachtstag
Sa 27		Mo 27	
So 28		Di 28	
Mo 29		Mi 29	
Di 30		Do 30	
		Fr 31	Silvester

2. Festlegen von 2 zweitägigen und 1 eintägigen Arbeitssitzung

1.2

	Montag	Dienstag	Mittwoch	Donnerstag	Freitag
08-09					
09-10					
10-11					
11-12					
12-13					
13-14					
14-15					
15-16					
16-17					
17-18					
18-19					

2.2

	Montag	Dienstag	Mittwoch	Donnerstag	Freitag
08-09					
09-10					
10-11					
11-12					
12-13					
13-14					
14-15					
15-16					
16-17					
17-18					
18-19					

Mai 1994		Juni 1994	
So	1	Maifeiertag	Mi 1
Mo	2		Do 2
Di	3		Fr 3
Mi	4		Sa 4
Do	5		So 5
Fr	6		Mo 6
Sa	7		Di 7
So	8	Muttertag	Mi 8
Mo	9		Do 9
Di	10		Fr 10
Mi	11		Sa 11
Do	12	Christi Himmelfahrt	So 12
Fr	13		Mo 13
Sa	14		Di 14
So	15		Mi 15
Mo	16	Besuch	Do 16
Di	17	in Leipzig	Fr 17
Mi	18		Sa 18
Do	19		So 19
Fr	20		Mo 20
Sa	21		Di 21
So	22	Pfingstsonntag	Mi 22
Mo	23	Pfingstmontag	Do 23
Di	24		Fr 24
Mi	25		Sa 25
Do	26		So 26
Fr	27		Mo 27
Sa	28		Di 28
So	29		Mi 29
Mo	30		Do 30
Di	31		

3. Festlegen von 3 Terminen für wechselseitige Besuche:

- 2 im Mai
- 1 im Juni

Mai 1994		Juni 1994	
So 1	Maifeiertag	Mi 1	
Mo 2		Do 2	Fronleichnam
Di 3		Fr 3	
Mi 4		Sa 4	
Do 5		So 5	
Fr 6		Mo 6	
Sa 7		Di 7	
So 8	Muttertag	Mi 8	
Mo 9		Do 9	
Di 10		Fr 10	
Mi 11		Sa 11	
Do 12	Christi Himmelfahrt	So 12	
Fr 13		Mo 13	
Sa 14		Di 14	Dienstreise nach
So 15		Mi 15	Braunschweig
Mo 16		Do 16	
Di 17		Fr 17	
Mi 18		Sa 18	
Do 19		So 19	
Fr 20		Mo 20	
Sa 21		Di 21	
So 22	Pfingstsonntag	Mi 22	
Mo 23	Pfingstmontag	Do 23	
Di 24		Fr 24	
Mi 25		Sa 25	
Do 26		So 26	
Fr 27		Mo 27	
Sa 28		Di 28	
So 29		Mi 29	
Mo 30		Do 30	
Di 31			

3. Festlegen von 3 Terminen für wechselseitige Besuche:
 - 2 im Mai
 - 1 im Juni

	Montag	Dienstag	Mittwoch	Donnerstag	Freitag
08-09					
09-10					
10-11					
11-12					
12-13					
13-14					
14-15					
15-16					
16-17					
17-18					
18-19					

	Montag	Dienstag	Mittwoch	Donnerstag	Freitag
08-09					
09-10					
10-11					
11-12					
12-13					
13-14					
14-15					
15-16					
16-17					
17-18					
18-19					

September 1994		Oktober 1994	
Do	1	Sa	1
Fr	2	So	2
Sa	3	Mo	3
So	4	Di	4
Mo	5	Mi	5
Di	6	Do	6
Mi	7	Fr	7
Do	8	Sa	8
Fr	9	So	9
Sa	10	Mo	10
So	11	Di	11
Mo	12	Mi	12
Di	13	Do	13
Mi	14	Fr	14
Do	15	Sa	15
Fr	16	So	16
Sa	17	Mo	17
So	18	Di	18
Mo	19	Mi	19
Di	20	Do	20
Mi	21	Fr	21
Do	22	Sa	22
Fr	23	So	23
Sa	24	Mo	24
So	25	Di	25
Mo	26	Mi	26
Di	27	Do	27
Mi	28	Fr	28
Do	29	Sa	29
Fr	30	So	30
		Mo	31

4. Festlegen:

- eines gemeinsamen Besuchs der IAA in Frankfurt
- eines Besprechungstermins im Oktober
- eines Wochenendseminars

September 1994		Oktober 1994	
Do	1	Sa	1
Fr	2	So	2
Sa	3	Mo	3
So	4	Di	4
Mo	5	Mi	5
Di	6	Do	6
Mi	7	Fr	7
Do	8	Sa	8
Fr	9	So	9
Sa	10	Mo	10
So	11	Di	11
Mo	12	Mi	12
Di	13	Do	13
Mi	14	Fr	14
Do	15	Sa	15
Fr	16	So	16
Sa	17	Mo	17
So	18	Di	18
Mo	19	Mi	19
Di	20	Do	20
Mi	21	Fr	21
Do	22	Sa	22
Fr	23	So	23
Sa	24	Mo	24
So	25	Di	25
Mo	26	Mi	26
Di	27	Do	27
Mi	28	Fr	28
Do	29	Sa	29
Fr	30	So	30
		Mo	31

4. Festlegen:

- eines gemeinsamen Besuchs der IAA in Frankfurt
- eines Besprechungstermins im Oktober
- eines Wochenendseminars

1.4

	Montag	Dienstag	Mittwoch	Donnerstag	Freitag
08-09					
09-10					
10-11					
11-12					
12-13					
13-14					
14-15					
15-16					
16-17					
17-18					
18-19					

2.4

	Montag	Dienstag	Mittwoch	Donnerstag	Freitag
08-09					
09-10					
10-11					
11-12					
12-13					
13-14					
14-15					
15-16					
16-17					
17-18					
18-19					

Juli 1994		August 1994	
Fr	1	Mo	1
Sa	2	Di	2
So	3	Mi	3
Mo	4	Do	4
Di	5	Fr	5
Mi	6	Sa	6
Do	7	So	7
Fr	8	Mo	8
Sa	9	Di	9
So	10	Mi	10
Mo	11	Do	11
Di	12	Fr	12
Mi	13	Sa	13
Do	14	So	14
Fr	15	Mo	15 Mariä Himmelfahrt
Sa	16	Di	16
So	17	Mi	17
Mo	18	Do	18
Di	19	Fr	19
Mi	20	Sa	20
Do	21	So	21
Fr	22	Mo	22
Sa	23	Di	23
So	24	Mi	24
Mo	25	Do	25
Di	26	Fr	26
Mi	27	Sa	27
Do	28	So	28
Fr	29	Mo	29
Sa	30	Di	30
So	31	Mi	31

5. Festlegen:

- einer einwöchigen gemeinsamen Reise durch die bedeutendsten Universitätsstädte Deutschlands
- eines Vorbereitungstermins davor
- eines Treffens an einem Samstag oder Sonntag danach bei einem Glas Wein

Juli 1994		August 1994	
Fr 1		Mo 1	
Sa 2		Di 2	
So 3		Mi 3	
Mo 4		Do 4	
Di 5		Fr 5	
Mi 6		Sa 6	
Do 7		So 7	
Fr 8		Mo 8	
Sa 9		Di 9	
So 10		Mi 10	
Mo 11		Do 11	
Di 12		Fr 12	
Mi 13		Sa 13	
Do 14		So 14	
Fr 15		Mo 15	Mariä Himmelfahrt
Sa 16		Di 16	
So 17		Mi 17	
Mo 18		Do 18	
Di 19		Fr 19	
Mi 20		Sa 20	
Do 21		So 21	
Fr 22		Mo 22	
Sa 23		Di 23	
So 24		Mi 24	
Mo 25		Do 25	
Di 26		Fr 26	
Mi 27		Sa 27	
Do 28		So 28	Treffen im IDS
Fr 29		Mo 29	Mannheim
Sa 30		Di 30	
So 31		Mi 31	

5. Festlegen:

- einer einwöchigen gemeinsamen Reise durch die bedeutendsten Universitätsstädte Deutschlands
- eines Vorbereitungstermins davor
- eines Treffens an einem Samstag oder Sonntag danach bei einem Glas Wein

1.5

	Montag	Dienstag	Mittwoch	Donnerstag	Freitag
08-09					
09-10					
10-11					
11-12					
12-13					
13-14					
14-15					
15-16					
16-17					
17-18					
18-19					

2.5

	Montag	Dienstag	Mittwoch	Donnerstag	Freitag
08-09					
09-10					
10-11					
11-12					
12-13					
13-14					
14-15					
15-16					
16-17					
17-18					
18-19					

März 1994		April 1994	
Di 1		Fr 1	Karfreitag
Mi 2		Sa 2	Karsamstag
Do 3		So 3	Ostersonntag
Fr 4		Mo 4	Ostermontag
Sa 5		Di 5	
So 6		Mi 6	
Mo 7		Do 7	
Di 8		Fr 8	
Mi 9		Sa 9	
Do 10		So 10	
Fr 11		Mo 11	
Sa 12	I C Ph S	Di 12	
So 13		Mi 13	
Mo 14		Do 14	
Di 15		Fr 15	
Mi 16		Sa 16	
Do 17		So 17	
Fr 18		Mo 18	
Sa 19		Di 19	
So 20		Mi 20	
Mo 21		Do 21	
Di 22	Besprechung	Fr 22	
Mi 23	in Kiel	Sa 23	
Do 24		So 24	
Fr 25		Mo 25	
Sa 26		Di 26	
So 27		Mi 27	
Mo 28		Do 28	
Di 29		Fr 29	
Mi 30		Sa 30	
Do 31			

6. Festlegen:

- eines gemeinsamen Besuchs der ICPHS in Stockholm
- einer fünftägigen gemeinsamen Dienstreise
- eines Wochenendes für das Abfassen eines Berichts über die Reise

März 1994		April 1994	
Di 1		Fr 1	Karfreitag
Mi 2		Sa 2	Karsamstag
Do 3		So 3	Ostersonntag
Fr 4		Mo 4	Ostermontag
Sa 5		Di 5	
So 6		Mi 6	
Mo 7		Do 7	
Di 8		Fr 8	
Mi 9		Sa 9	Dienstreise nach
Do 10		So 10	Berlin
Fr 11		Mo 11	
Sa 12	ICPhS	Di 12	
So 13		Mi 13	
Mo 14		Do 14	
Di 15		Fr 15	
Mi 16		Sa 16	
Do 17		So 17	
Fr 18		Mo 18	
Sa 19		Di 19	
So 20		Mi 20	
Mo 21		Do 21	
Di 22		Fr 22	
Mi 23		Sa 23	
Do 24		So 24	
Fr 25		Mo 25	
Sa 26		Di 26	
So 27		Mi 27	
Mo 28		Do 28	
Di 29		Fr 29	
Mi 30		Sa 30	
Do 31			

6. Festlegen:

- eines gemeinsamen Besuchs der ICPhS in Stockholm
- einer fünftägigen gemeinsamen Dienstreise
- eines Wochenendes für das Abfassen eines Berichts über die Reise

1.6

	Montag	Dienstag	Mittwoch	Donnerstag	Freitag
08-09					
09-10					
10-11					
11-12					
12-13					
13-14					
14-15					
15-16					
16-17					
17-18					
18-19					

2.6

	Montag	Dienstag	Mittwoch	Donnerstag	Freitag
08-09					
09-10					
10-11					
11-12					
12-13					
13-14					
14-15					
15-16					
16-17					
17-18					
18-19					

Januar 1994		Februar 1994	
Sa 1	Neujahr	Di 1	
So 2		Mi 2	
Mo 3		Do 3	
Di 4		Fr 4	
Mi 5		Sa 5	
Do 6	Hl. 3 Könige	So 6	
Fr 7		Mo 7	
Sa 8		Di 8	
So 9		Mi 9	
Mo 10		Do 10	
Di 11		Fr 11	
Mi 12		Sa 12	
Do 13		So 13	
Fr 14		Mo 14	Rosenmontag
Sa 15		Di 15	Fastnacht
So 16		Mi 16	Aschermittwoch
Mo 17		Do 17	
Di 18		Fr 18	
Mi 19		Sa 19	Treffen in
Do 20		So 20	Hamburg
Fr 21		Mo 21	
Sa 22		Di 22	
So 23		Mi 23	
Mo 24		Do 24	
Di 25		Fr 25	
Mi 26		Sa 26	
Do 27		So 27	
Fr 28		Mo 28	
Sa 29			
So 30			
Mo 31			

7. Festlegen von:

- 1 Termin für ein Arbeitsfrühstück an einem Samstag oder Sonntag
- 2 Arbeitstreffen unter der Woche beim Kaffee

Januar 1994		Februar 1994	
Sa 1	Neujahr	Di 1	
So 2		Mi 2	
Mo 3		Do 3	
Di 4		Fr 4	
Mi 5		Sa 5	
Do 6	Hl. 3 Könige	So 6	
Fr 7		Mo 7	
Sa 8		Di 8	
So 9		Mi 9	
Mo 10		Do 10	
Di 11		Fr 11	
Mi 12		Sa 12	
Do 13		So 13	
Fr 14		Mo 14	Rosenmontag
Sa 15		Di 15	Fastnacht
So 16		Mi 16	Aschermittwoch
Mo 17		Do 17	
Di 18		Fr 18	
Mi 19		Sa 19	
Do 20		So 20	
Fr 21		Mo 21	
Sa 22		Di 22	
So 23		Mi 23	
Mo 24		Do 24	
Di 25	Kongreß in	Fr 25	
Mi 26	Dresden	Sa 26	
Do 27		So 27	
Fr 28		Mo 28	
Sa 29			
So 30			
Mo 31			

7. Festlegen von:

- 1 Termin für ein Arbeitsfrühstück an einem Samstag oder Sonntag
- 2 Arbeitstreffen unter der Woche beim Kaffee

	Montag	Dienstag	Mittwoch	Donnerstag	Freitag
08-09					
09-10					
10-11					
11-12					
12-13					
13-14					
14-15					
15-16					
16-17					
17-18					
18-19					

	Montag	Dienstag	Mittwoch	Donnerstag	Freitag
08-09					
09-10					
10-11					
11-12					
12-13					
13-14					
14-15					
15-16					
16-17					
17-18					
18-19					

8.00			
9.00			
10.00			
11.00			
12.00			
13.00			
14.00			
15.00			
16.00			
17.00			
18.00			
19.00			
20.00			

8. Festlegen von 3 Terminen an je einem Tag für Arbeitstreffen

8.00			
9.00			
10.00			
11.00			
12.00			
13.00			
14.00			
15.00			
16.00			
17.00			
18.00			
19.00			
20.00			

8. Festlegen von 3 Terminen an je einem Tag für Arbeitstreffen

Appendix B A transliterated dialogue subsession

;Dialog: G092A

;Zuletzt bearbeitet am: 21.02.95

- ANS000: <Schmatzen> <A> sch"onen guten Tag , Frau Schindel .
<Schmatzen> <A> ich freue mich sehr , +/da"s ich Sie<Z>/+ da"s
Sie mich eingeladen haben , +/sich zu<Z>/+ <P> <:<Lachen> Sie
zu besuchen . Entschuldigung:> . <A> haben Sie denn<Z> einen
Termin noch im Mai frei ?
- FRS001: <#Klopfen> <A> wenn es Ihnen recht ist , k"onnen wir gleich<Z>
am zweiten Mai beginnen .
- ANS002: <A> es tut mir leid . leider bin ich bis zum dritten Mai nicht
da . was halten Sie denn vom vierten Mai ?
- FRS003: wunderbar . dann<Z> haben wir das gleich<Z> erledigt<;T>
- ANS004: und da w"urde ich dann zu Ihnen kommen ?
- FRS005: ja , +/ist<Z>/+ ist mir sehr recht<;T>
- ANS006: <A> gut<Z> . und dann bestehe ich nat"urlich darauf , da"s Sie
mich ebenfalls besuchen kommen .
- FRS007: <;T>ann w"are Ihnen das denn recht ? nach Himmelfahrt etwa ?
- ANS008: <A> nach Pfingsten <A> ?
- FRS009: ja , den Pfingst<Z>dienstag +/t=/+ k"onnt' ich Ihnen anbieten
<#Klicken> .
- ANS010: das ist ein wunderbarer<Z> Termin . <#Rascheln> ich bin ganz
begeistert .
- FRS011: <;T>ch freu' mich +/auf Ihren B=/+ auf meinen Besuch bei Ihnen
.
- ANS012: <A> und ich freu' mich , da"s Sie kommen .
- FRS013: da m"ussen Sie nat"urlich noch einmal zu mir kommen , um<Z>
alles abzukl"aren <#Klicken> .
- ANS014: <A> wie kann ich Ihnen diesen Wunsch abschlagen <A> ? was
halten Sie denn von<Z> Mitte <P> Juni ?
- FRS015: zwischen dem neunten und dem siebzehnten kann ich leider<Z> Sie
nicht empfangen <#Klicken> .
- ANS016: <A> was halten Sie dann von<Z> dem achtzehnten Juni ?
- FRS017: st"ort es Sie nicht , da"s es ein Samstag ist ?
- ANS018: <Schmatzen> <A> wir k"onnen 's auch am Sonntag machen . dann
k"onnen wir das Ganze mit Kaffee und Kuchen <:<#Rascheln>
verbinden:> .
- FRS019: w"are Ihnen der Montag vielleicht auch genehm ?
- ANS020: <A> 's tut mir leid . da kann ich leider nicht <A> .

FRS021: <;T>ann belassen wir 's bei Sonntag . das<Z> <"ah> trifft sich
doch eigentlich recht gut <A> .

ANS022: <Schmatzen> <A> alles in Ordnung . dann<Z> um f"unfzehn Uhr <A> ?

FRS023: <;T>underbar .

ANS024: <A> bei Ihnen dann <A> ?

FRS025: ja <A> , zum Kaff<;T>

ANS026: <A> <Schmatzen> ich freu' mich schon sehr darauf <A> .
Wiedersehen .

FRS027: Wiedersehen .

Appendix C A label file - segmental labels only

g096a005.s1h

ANS005: <A> ich bin ganz Ihrer Meinung . halten wir das also fest ,
um<Z> <P> neun Uhr drei"sig ?

oend

h: Q I C+ b I n+ g 'a n t s Q i: r 6+ m 'a I n U N .
h 'a l t @ n v i: 6+ d a s+ Q a l z o:+ f 'E s t , Q U m+ z: p:
n 'O Y n Q 'u: 6 d r 'a I s I C ?

kend

c: h: Q- I C+ b I n+ g -h 'a n t s Q- i: r 6+ m 'a I n U N . c:
-p: h 'a l t -h @- n v i: 6+ d -h a s+ Q a l z o:+ f 'E s t -h ,
Q -q U m+ z: p: n 'O Y n Q- -q 'u: 6 d -h r 'a I s I C ?

hend

1 #c:
1 #h:
3899 ##Q-
3899 \$I
4386 \$C+
5448 ##b
6525 \$I
6881 \$n+
8028 ##g
8457 \$-h
8634 \$'a
9757 \$n
10533 \$t
10788 \$s
11776 ##Q-
11776 \$i:
13471 \$r
13984 \$6+
15243 ##m
16466 \$'aI
18663 \$n
19491 \$U
20128 \$N
21266 #.
21266 #c:
21266 #-p:
22753 ##h
24142 \$'a
24875 \$l
25505 \$t
26497 \$-h
26630 \$@-
26630 \$n
27266 ##v
27639 \$i:6+
28388 ##d
28666 \$-h
28808 \$a
29607 \$s+
30766 ##Q
31651 \$a
32240 \$l
32813 \$z
33736 \$o:+
34523 ##f
36784 \$'E
38324 \$s
41171 \$t

41716 \$-h
42077 #,
42077 ##Q
43453 \$-q
43453 \$U
45401 \$m+
52116 \$z:
52116 #p:
57864 ##n
62344 \$'OY
64802 \$n
65297 ##Q-
65297 \$-q
65297 \$'u:6
67272 ##d
67749 \$-h
67948 \$r
69090 \$'aI
70968 \$s
72387 \$I
73421 \$C
76252 #?

Appendix D A label file - segmental and prosodic labels

```
g076a014.s1h
HAH014: <#Klicken> tja , da bin ich<Z> Ihrer Meinung . wunderbar . <P>
        vielen Dank <A> .
oend
:k t j 'a: , d a:+ b I n+ Q I C+ z: Q i: r 6+ m 'aI n U N .
v 'U n d 6 b a: 6 . p: f 'i: l @ n d 'a N k h: .
kend
:k c: &2) %t j 'a: , &2. &PG1 &0 d -h a:+ &2^ b -h '' I n+
&0 Q- -q I C+ z: &1. &=PG2 &0 Q- -q i: r 6+ &2) -:k m 'aI n U N
. &2. &PG1 c: &2) v 'U n d-n 6 b -h '' a:6 . &2. &PG1 c:
p:-h: &1^ f 'i: l @- n &1. &2) d -h 'a -~ N- k -h h: . &1.
&PG1
hend
1517 #:k
1517 #c:
1517 #&2)
1517 ##%t
2064 $j
2818 $('a:
5419 #,
5419 #&2.
5419 #&PG1
5419 #&0
5419 ##d
6727 $-h
7333 $a:+
8427 #&2^
8427 ##b
9587 $-h
9670 $(''
9670 $I
10272 $n+
11032 #&0
11032 ##Q-
11032 $-q
11032 $I
11717 $C+
15015 $z:
15015 #&1.
15015 #&=PG2
15015 #&0
15015 ##Q-
15015 $-q
15015 $i:
16115 $r
16499 $6+
16917 #&2)
16917 ##-:k
16917 $m
17629 $('aI
18949 $n
19426 $U
20165 $N
20868 #.
20868 #&2.
20868 #&PG1
20868 #c:
20868 #&2)
20868 ##v
21800 $('U
```

22689 \$n
23502 \$d-n
23798 \$6
24852 \$b
25838 \$-h
25976 \$''
25976 \$a:6
28474 #.
28474 #&2.
28474 #&PG1
28474 #c:
28474 #p:-h:
37271 #&1^
37271 ##f
38557 \$'i:
39396 \$l
39781 \$@-
39781 \$n
40216 #&1.
40216 #&2)
40216 ##d
40516 \$-h
40684 \$'a
42701 \$-~
42701 \$N-
42701 \$k
43575 \$-h
43695 #h:
48391 #.
48391 #&1.
48391 #&PG1

Appendix E Symbol inventory - segmental and prosodic labelling

Below we have attempted to provide a simple grammar of possible segmental and prosodic labels in EBNF. To keep things relatively simple we have not excluded the possibility of symbols replacing themselves.

Syntax is specified in EBNF notation with the following conventions:

[a] means either nothing or “a”

(a | b) means either “a” or “b”

all terminals are enclosed in double quotation marks (“ ”)

label	=	(vowelLabel consonantLabel nonverbalLabel technicalArtefactLabel punctuationLabel prosodicLabel)
vowelLabel	=	wordInternalPrefix (vowel vowelModification)
vowel	=	[uncertainty] (vowelSymbol [functionwordMarker] lexicalStress stressableVowel)
vowelModification	=	(vowelReplacement vowelDeletion vowelInsertion)
vowelReplacement	=	[uncertainty] (vowelSymbol minus vowelSymbol [functionwordMarker] lexicalStress stressableVowel minus lexicalStress stressableVowel lexicalStress stressableVowel minus vowelSymbol)
vowelDeletion	=	(vowelSymbol minus [functionwordMarker] lexicalStress stressableVowel minus)
lexicalStress	=	(primary secondary)
primary	=	“ˈ”
secondary	=	“ˑ”
vowelInsertion	=	[uncertainty] minus vowelSymbol [functionwordMarker]
vowelSymbol	=	(monophthong nasalVowel diphthong rDiphthong schwa schwar)
stressableVowel	=	(monophthong nasalVowel diphthong rDiphthong)
rDiphthong	=	monophthong schwar
monophthong	=	(“i:” “I” “y:” “Y” “e:” “E” “ɛ:” “ɜ:” “ɹ” “a:” “a” “o:” “O” “u:” “U”)
nasalVowel	=	(“a~” “E~” “O~” “ɹ~”)
diphthong	=	(“aI” “aU” “OY”)
schwa	=	“ə”
schwar	=	“ɶ”
consonantLabel	=	(boundaryconsonant compoundconsonant nonboundaryconsonant nasalizationLabel maLabel)
boundaryconsonant	=	wordBoundaryPrefix (consonant consonantModification consonantcreak Modifikation)
compoundconsonant	=	compoundBoundaryPrefix (consonant

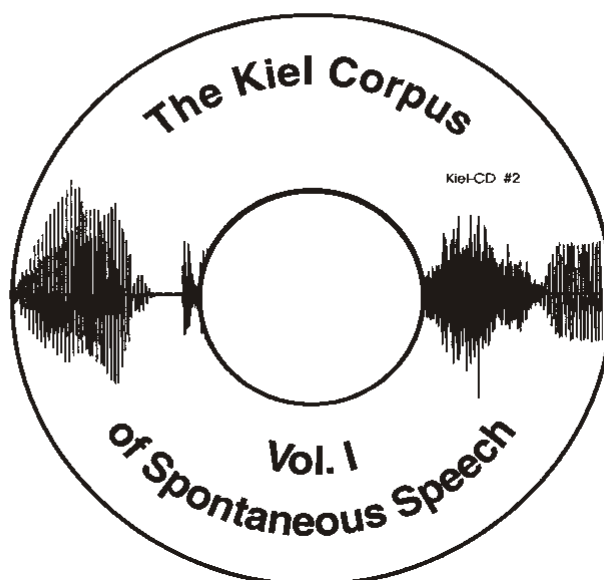
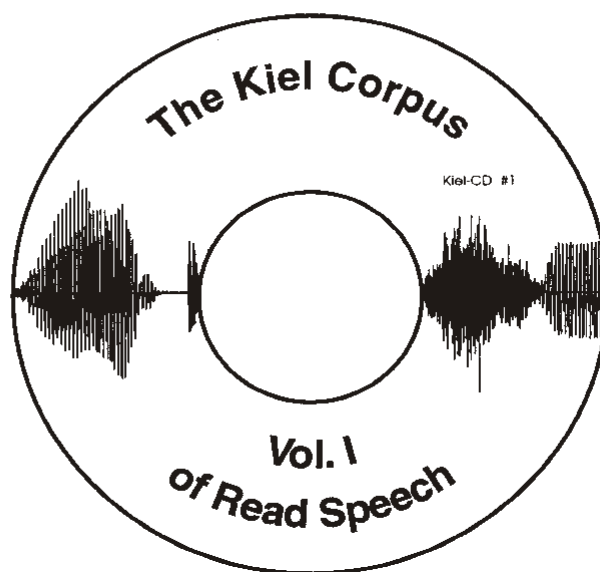
nonboundaryconsonant	=	consonantModification consonantcreakModifikation) (wordInternalPrefix) (consonant consonantModification consonantcreakModifikation) [functionwordMarker]
consonant	=	[uncertainty] consonantSymbol
consonantModification	=	(consonantReplacement consonantDeletion consonantInsertion)
consonantReplacement	=	[uncertainty] consonantSymbol minus consonantSymbol
consonantDeletion	=	consonantSymbol minus
consonantInsertion	=	[uncertainty] minus consonantSymbol
consonantcreak1Modifikation	=	(consonantcreak1Replacement
consonantcreak1Insertion)		
consonantcreak1Replacement	=	consonantSymbol minus creak1
consonantcreakModifikation	=	(consonantcreakReplacement consonantcreak1Insertion)
consonantcreakReplacement	=	consonantSymbol minus creak
consonantcreak1Insertion	=	minus creak1
consonantSymbol	=	(“p” “b” “t” “d” “k” “g” “Q” “f” “v” “s”
“z”		“S” “Z” “C” “j” “x” “h” “m” “n” “N” “l”
		“r”)
creak	=	(creak1 creak2)
creak1	=	(“q” “kq”)
creak2	=	(“pq” “tq”)
nasalizationLabel	=	wordInternalPrefix minus nasalizationSymbol [functionwordMarker]
nasalizationSymbol	=	“~”
functionwordMarker	=	plus
maLabel	=	(wordBoundaryPrefix wordInternalPrefix) minus maSymbol
maSymbol	=	“MA”
nonverbalLabel	=	(vocalNoiseLabel hesitationLabel neologismLabel uncertainStretchLabel verbalBreakLabel wordInterruptionLabel)
vocalNoiseLabel	=	(vocalNoise1Label vocalNoise2Label)
vocalNoise1Label	=	(wordInternalPrefix nonWordPrefix) (vocalNoise1 vocalNoise1Modification)
vocalNoise2Label	=	wordBoundaryPrefix (vocalNoise2 vocalNoise2Modification)
vocalNoise1Modification	=	(vocalNoise1Replacement vocalNoise1Deletion vocalNoise1Insertion)
vocalNoise2Modification	=	(vocalNoise2Replacement vocalNoise2Deletion vocalNoise2Insertion)
vocalNoise1	=	(vocalNoise1Symbol [uncertainty] silenceSymbol)
vocalNoise2	=	vocalNoise2Symbol

vocalNoise1Replacement	=	(vocalNoise1Symbol minus vocalNoise1Symbol silenceSymbol minus vocalNoise1Symbol [uncertainty] vocalNoise1Symbol minus silenceSymbol)
vocalNoise2Replacement	=	vocalNoise2Symbol minus vocalNoise2Symbol
vocalNoise1Deletion	=	(vocalNoise1Symbol silenceSymbol) minus
vocalNoise2Deletion	=	vocalNoise2Symbol minus
vocalNoise1Insertion	=	(minus vocalNoise1Symbol [uncertainty] minus silenceSymbol)
vocalNoise2Insertion	=	minus vocalNoise2Symbol
vocalNoise1Symbol	=	(“s:” “w:” “h:” “l:” “q:” “r:” “g:”)
silenceSymbol	=	“p:”
vocalNoise2Symbol	=	(“h:” “l:” “q:” “r:” “g:”)
hesitationLabel	=	(wordBoundaryPrefix wordInternalPrefix) (hesitation hesitationModification)
hesitation	=	[uncertainty] hesitationSymbol
hesitationModification	=	(hesitationDeletion hesitationInsertion)
hesitationDeletion	=	hesitationSymbol minus
hesitationInsertion	=	[uncertainty] minus hesitationSymbol
hesitationSymbol	=	“v:”
neologismLabel	=	(wordBoundaryPrefix wordInternalPrefix) neologismSymbol
neologismSymbol	=	“n:”
uncertainStretchLabel	=	(wordBoundaryPrefix wordInternalPrefix nonWordPrefix) (uncertainStretch uncertainStretchModification)
uncertainStretch	=	uncertainty
uncertainStretchModification	=	(uncertainStretchDeletion uncertainStretchInsertion)
uncertainStretchDeletion	=	uncertainty minus
uncertainStretchInsertion	=	minus uncertainty
verbalBreakLabel	=	wordInternalPrefix (truncation falseStart)
truncation	=	[uncertainty] [equals] verbalBreak minus
falseStart	=	[equals] verbalBreak plus
wordInterruptionLabel	=	(wordBoundaryPrefix wordInternalPrefix) wordInterruptionSymbol
wordInterruptionSymbol	=	“_”
technicalArtefactLabel	=	(wordBoundaryPrefix wordInternalPrefix nonWordPrefix) (technicalArtefact technicalArtefactModification)
technicalArtefactModification	=	(technicalArtefactDeletion technicalArtefactInsertion)
technicalArtefactDeletion	=	technicalArtefact minus
technicalArtefactInsertion	=	minus technicalArtefact

technicalArtefact	=	(nonVocalNoise technicalBreak)
nonVocalNoise	=	“:k”
wordBoundaryPrefix	=	“##”
compoundBoundaryPrefix	=	“\$#”
punctuationLabel	=	nonWordPrefix (sentencePunctuation comma)
sentencePunctuation	=	[uncertainty] (fullStop questionMark)
prosodicLabel	=	(phraseLabel contourLabel accentLabel accentPositionLabel preheadLabel tempoLabel) [uncertainty]
phraseLabel	=	nonWordPrefix prosLabelMarker (phrase phraseTechnicalBreak)
phrase	=	[phraseModifier] phraseSymbol (one two verbalBreak)
phraseModifier	=	equals
equals	=	“=”
verbalBreak	=	“/“
phraseTechnicalBreak	=	phraseSymbol technicalBreak
technicalBreak	=	“;”
phraseSymbol	=	“PG”
contourLabel	=	(nonWordPrefix wordInternalPrefix) prosLabelMarker (fall rise fallRise)
fallRise	=	fall rise
fall	=	(levelFall midFall terminalFall) fullStop
levelFall	=	null
midFall	=	one
terminalFall	=	two
fullStop	=	“.”
rise	=	(comma questionMark)
comma	=	“,”
questionMark	=	“?”
accentLabel	=	(nonWordPrefix wordInternalPrefix) prosLabelMarker (noAccent fullAccent otherAccent)
noAccent	=	null
null	=	“0”
fullAccent	=	([accentModifier] fullAccentSymbol synchronizer fullAccentSymbol)
accentModifier	=	(reset upstep)
reset	=	plus
plus	=	“+”
upstep	=	“ ”
fullAccentSymbol	=	two
two	=	“2”

otherAccent	=	(partialAccent reinforcement) synchronizer
partialAccent	=	one
one	=	“1”
reinforcement	=	three
three	=	“3”
synchronizer	=	(peak valley)
peak	=	(earlyPeak medialPeak latePeak noPeak)
earlyPeak	=	“)”
medialPeak	=	“^”
latePeak	=	“(“
noPeak	=	minus
minus	=	“-”
valley	=	(earlyValley nonearlyValley)
earlyValley	=	“]”
nonearlyValley	=	“[“
accentPositionLabel	=	wordInternalPrefix accentPositionSymbol
wordInternalPrefix	=	“\$”
accentPositionSymbol	=	“' ’”
preheadLabel	=	nonWordPrefix prosLabelMarker preheadSymbol
preheadSymbol	=	“ HP ”
tempoLabel	=	nonWordPrefix prosLabelMarker tempo
tempo	=	(rateplus rateminus)
rateplus	=	“ RP ”
rateminus	=	“ RM ”
uncertainty	=	“ø”
nonWordPrefix	=	“#”
prosLabelMarker	=	“&”

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