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Intonation in German

DAFYDD GIBBON

1. Background

German is a West Germanic language, closely related to Dutch and English, with about 100 million native speakers in Germany, Austria and the northern parts of Switzerland, as well as small enclaves in Russia and neighbouring countries, in Romania, and in North and South America. Unlike other European standard languages, Standard German is not the language of a specific social stratum in a specific geographical dialect area. Rather, it is perhaps best identified in terms of the pronunciation of the written standard language as codified in the publications of the **Duden** dictionary publishers.

Standard German, **Hochdeutsch** (High German), should not be confused with **Hochdeutsch** as a technical term for the group of Southern German dialects which underwent the High German Consonant Shift in the early Middle Ages. The pronunciation of Standard German is sometimes called **Bühnenaussprache** (stage pronunciation). Standard German is a superstrate which is associated historically with the formal speech of the educated classes in the Lutheran areas of North Germany. However, the distinctive regional pronunciation of speakers in the major German cultural centres is also acceptable in public life.

The main regional standards are associated with Berlin, Hamburg, Hanover, Cologne, Frankfurt, Stuttgart, Munich, Leipzig. Vienna provides the standard for Austrian German and Zurich for Swiss German (see §3.1). A remarkable

feature of the German of educated speakers in many parts of Germany is socially triggered dialect switching, between a local dialect, the regional standard, and the standard superstrate. As in other countries, the mass media tend to support spreading of the standard superstrate.

Regional standard accents are characterised both by differences in the vowel and consonant systems, and also by a conspicuous variety of intonation patterns. The prosodic systems of the regional standards do not differ fundamentally from those of the standard superstrate, however. German pronunciation and its relation to other varieties is described by Kohler (1995).

1.1 General prosodic characteristics

The forms and structures of German prosody fall into three main hierarchical domains, the **syllable** and its consonant and vowel constituents, the **foot** and its role in accent and rhythm, and the domain of **phrase** intonation.

a. Syllable structure

In comparison with the other West Germanic languages, German has the most complex syllable structure. There are two main kinds of syllable (Carson-Berndsen 1993), which may be referred to as **major** and **minor** syllables.

Major syllables have the basic pattern, $C_I^3VXC_0^3$ *i.e.* between 1 and 3 consonants, followed by a vowel, a segment *X*, and between 0 and 3 consonants, where *X* is a sonorant or a glide or short vowel in a diphthong, or a vowel lengthening. A variant type of major syllable is $C_I^3VC_I^3$, that is, a closed syllable with a short (lax) vowel and at least one obstruent. Syllable-final obstruent clusters are always voiceless (which is not reflected in German spelling), resulting in neutralisation of the voicing contrast in obstruents. German shares this final devoicing with the major Slavic languages; it figures prominently in a "German accent" in other languages. An example[1] is /raõp – raõ.b´/ *Raub-Raube* (robbery-robberies). Major syllables may be argued to be **bimoraic**, *i.e.* with two timing elements, essentially *V* and *X*. Like English, German has a form of post-vocalic r-vocalisation known as the **a-schwa**: /ba:å/ *bar* (bar [*e.g.* pub]). There are two main points of interest about the analysis of main syllables. The first concerns whether the initial consonant cluster should be C_I^3 or C_0^3 because vowel-initial major syllables predictably start with a glottal stop: /?Èç ?E.s´ ?aÈ.n´n ?ap.f´l / *Ich esse einen Apfel* (contrast English /aÈ i:t ´n œp.l5/ *I eat an apple.*. The second concerns the proliferation of syllable-final voiceless alveolar obstruents and obstruent clusters /t/, /s/ which are either inflectional affixes or historically derived from inflectional affixes; these are generally described as **extrasyllabic**. Major syllables are prosodically rather stable, and tend not to be subject to rhythmic reduction.

Examples of major syllable structures where *C*, *G*, *V* are consonant, glide, vowel respectively, are: *CVG* /haÈ/ *Hai* (shark), *CCVV* /Sne:/ *Schnee* (snow), *CCCVGCCC* /StraÈfst/ *streifst* (you (singular-familiar) touch).

In words of Germanic origin, minor syllables in general contain an optional initial consonant and a weak vowel (the *e-schwa* /´/, with an optional final consonant, or the *a-schwa* /å/), which realises /r/ in syllable-final position. In combinations of schwa and sonorant /´l, ´n, ´m/, the schwa elides in fast speech, influencing the rhythmic pattern. A famous example of different fast speech elisions is /çbÈ.mÈm/ in /çbÈ.mÈm fa:.ra:t.g´.kOm/ for /Èç bÈn mÈt de:m fa:.ra:t g´.kO.m´n/ *ich bin mit dem Fahrrad gekommen* (I came by bicycle). In non-native words, minor syllables may contain other vowels, as in /te:.o/ *Theo* (Theo [male proper name]).

Fewer than 10^4 syllables are attested in lexical items, out of well over 10^5 theoretically possible syllables based on combinations of onset consonant clusters, syllable nuclei and syllable codas. Syllable nuclei are in general easy to identify but syllable boundary identification is not so easy. The following cases may be distinguished:

1. Lexical roots: in VCV contexts, the syllable boundary precedes the consonant. In VCCV contexts, etc., lack of syllable-final devoicing in the first consonant motivates syllable boundary placement before the consonant, e.g. /va:.gnå/ (Wagner), though the criterion may lead to strange onset clusters, as in /a:.dlå/ (eagle).
2. Compound words and derivational prefixes: the syllable boundary coincides with the morphological boundary (see examples in the text).
3. Derivational and inflexional suffixes: the syllable boundary is determined by the Maximal Onset Principle, not the morphological boundary ("re-syllabification", *e.g.* /fEå.bÈnd +. õN/ → /fEå.bÈn.d+õN/ *Verbindung* (connection). In C+C contexts, variation may occur, *e.g.* fast speech /vaÈ.b+lêç/ (female) vs. careful speech /vaÈp+.liç/ with syllable-final obstruent devoicing as criterion.

b. Word stress

Word stress, following Bolinger (1958), is the position in a word to which a phonetic accent may be assigned. In German, word stress is assigned on lexical and morphological grounds. In simplex words, stress is closely related to the two main types of syllable: minor syllables are unstressed (and are "hypercorrected" into major syllables if contrasted), and most analysts agree that major syllables may be assigned primary, secondary or no stress. Word stress is initial on native roots, final or penult on non-native roots. On monosyllabic and disyllabic roots, these criteria are indistinguishable, but inflected forms may distinguish the cases by stress-shifting in the more complex form: /d·Ok.toå/ – /dOk.t·o:.r´n/ *Doktor–Doktoren* (doctor–doctors).

Derivation falls into three main prosodic classes: with stress-shifting, stressed and stress-neutral affixes. The case of stress-shifting and stressed affixes is illustrated by /rE.f·Oåm - rE.fOå.m·i:.r´n - rE.fO.ma.tsj·o:n/ *Reform–reformieren–Reformation* (reform–to reform–reformation). Other affixes, mainly of Germanic origin, do not affect stress. Derivational prefixes are unstressed. The stress-shifting and stressed affixes are described at Level I in Lexical Phonology, stress-neutral affixes at Level II (see Wiese 1995).

Stress in nominal and verbal compounds is on the first element, more consistently so than in English: /Sr·aêp.têS/ *Schreibtisch* (writing desk), /v·a:.gner.Str··a:.s´/ *Wagnerstraße* (Wagner Street), /v·a:.gner.?a.l·e:/ *Wagnerallee* (Wagner avenue).

A systematic taxonomy of German word stress types is given by Bleiching (Bleiching 1992, for simplex words and Bleiching 1994, for compounds and derivations).

c. Phrasal stress and the prosodic hierarchy

The functions of prosody in phrases are characterised by complex interactions between word order and phrase stress (often called **sentence stress**). German is a highly inflecting language, with relatively free word order, and it has been suggested that this has consequences for the use of intonation. Unlike languages such as English, with few inflections and relatively fixed word order, in German word order is a major focalisation device, used for topicalisation and for marking new information in utterances. This means that the **functional load** on prosody in this connection may well be lower than in English (see Schubiger 1958, 1980 and Ehlich 1979).

Furthermore, word order in German, as in Dutch, is predominantly **Subject-Object-Verb**; this SOV order contrasts with the SVO order of English or French, or the VSO order of Welsh. Subordinate clauses are regularly SOV, but main clauses are hybrid: simple verbs or auxiliaries have SVO position and infinitives are in final position, with VOS in polar interrogatives, imperatives and some conditionals. These conditions lead to relatively complicated principles of phrasal stress assignment.

Finally, spoken German has many quasi-parenthetic discourse particles, such as the modal particles like *ja* (yes; as we both well know) *doch* (yes on the contrary; as you well know) *wohl* (presumably) *also* (thus) and focus particles like *sogar*, *auch* (even), whose functions are to convey kinds of information which may be characteristic of intonation in other languages, such as "obviousness", "imputed shared presupposition", or "contradiction". These devices may be fairly freely combined. An example, compared with the use of intonation in English, is the following:

DEN Apfel hast du doch wohl meiner Tochter gegeben!

the[acc-focus] apple have[present-singular-2nd] you[nominative-singular] contrary[doch]' obviously [wohl] my-dative-singular daughter given

(You even gave my daughter THAT apple!)

In the unmarked case, phrasal stress is assigned to the final noun, much as in other West Germanic languages (see Ladd 1980), but because of German SOV word order it is not sufficient to specify only "phrase-final lexical word" as it would be for the analogous case in English.

1.2 Outline of the approach adopted in this chapter

The information reviewed in this chapter is keyed more to consensus views than to novel insights. The main assumptions underlying the presentation are, first, that intonation in German is embedded into a prosodic hierarchy, with syllable constituents as the smallest elements and the intonation patterns of dialogue turns as the largest, and second, that the study of intonation should be based on certain specific empirical procedures.

a. The prosodic hierarchy

The idea that intonation in German is hierarchically organised has many sources. It is an old idea, and underlies many traditional and generative descriptions (see Klinghardt and Klemm (1920), von Essen (1956a); Bierwisch (1966) and the overview in Gibbon (1976a)). Intonation units consist of syllables structured into rhythmic sequences with superimposed tonal patterns. Newer developments in theoretical phonology support this idea of a prosodic hierarchy from syllable constituents through the syllable, the metrical foot, to phrase and paragraph (or "paratone") sised discourse units.

More recently, formal hierarchical models of intonation within the framework of automatic speech recognition and synthesis have been proposed (see Grønnum 1992 and Bannert 1983) for German. Feature-based theories also suggest the possibility of hierarchical structure (Gibbon 1995).

However, the hierarchical view has been relativised by the success of models which claim that intonation patterns are linear in the technical sense that they can be modelled by finite state machines ('t Hart and Cohen 1973 for Dutch and Adriaens 1991 for German). Applications of Fujisaki's Japanese model to German (see Möbius 1993) also support this view.

The apparent conflict is discussed by Ladd (1980) and Grønnum (1988). I suggest that the conflict is not an empirical one, but based on different implicit understandings of the concept of hierarchy (which is generally not defined formally in intonation studies). Mathematically, linear patterns are equivalent to exclusively right-branching or exclusively left-branching hierarchies, and other hierarchies with finite depth are also equivalent to linear patterns. But this does not apply to hierarchies with recursive centre-embedding (such as relative clauses

Table 1. *ToBI labels for German.*[2]

Type	ToBI	Interpretation
Pitch accents	*T+T**	*T* = accented part*
	T+T*	
	H*	Normal upward pitch peak
	L+H*	Slightly delayed pitch peak
	L*+H	Right-displaced pitch peak
	L*	Downward pitch "valley"
	H+L*	Left-displaced pitch peak
	H+!H*	Left-displaced weak pitch peak
Boundary tones	*T-T%*	*T- = phrase tone*
		T% = boundary tone
	L-L%	Terminal fall, "final"
	L-H%	Slight rise in terminal syllable
	H-L%	Mid level, "progredient"
	H-H%	Terminal rise, "interrogative"
Break indices	B1	Normal word boundary
	B2	Fragment, hesitation boundary
	B3	Phrase boundary
	B4	Intonation phrase boundary

in non-final noun phrases, or logical expressions) or with more complex structural dependencies than this. The hierarchies described in the literature belong to the class of structures which are equivalent to linear patterns, but whose topology may also be legitimately be described with the term "hierarchy". For example, the German intonation hierarchy shown in figure 1 is of the finite depth type, and can therefore still be modelled as a linear structure by a finite state machine.

At the lowest levels of the hierarchy, the elementary items are syllables, on the one hand, and elementary prosodic units on the other, which are mapped on to each other by rules of association. The traditional **tonetic** school of intonation description assumes a small inventory of prosodic categories based on pitch contour percepts (types of rise, fall, level tone) from which more complex patterns may be constructed. These accents or tones are symbolised by iconic "tonetic stress marks", such as acute and grave accents for rising and falling tones. Different scholars assume different inventories, from two "level switches" (see Isa©enko and Schädlich 1966) through the three standard categories of rise, fall and level (von Essen 1956a) to more elaborate inventories (Pheby 1975).

More recently, procedures which decompose the contours into sequences of pitch target levels have been introduced into German intonation research.

b. Corpora and procedures

Prosodic analysis is rarely performed nowadays on a purely auditory basis. A typical procedure for describing the prosody of spoken utterances is to record the utterances on digital tape or directly to a computer storage medium, transcribe them, and then align the transcription symbols with a visual representation of the signal (as an oscillogramme, spectral display, and/or fundamental frequency pattern). The digital technique of prosodic annotation, or prosodic labelling, has been available for about a decade, and has received increasing attention during the past few years because of interest from the area of automatic speech analysis and synthesis.

The symbol inventory which is most commonly used for the prosodic annotation of German is currently an adaptation of the ToBI system (Silverman *et al*. 1992), in which contours are represented as sequences of tone height and boundary marks as shown in table 1 (see also Reyelt *et al*. 1996).

2. Description of intonation patterns

2.1 Description of a basic non-emphatic pattern

There is widespread agreement about basic non-emphatic patterns in formal German speech, and the literature describing these goes back at least to the beginning of the twentieth century. The standard description is by von Essen (1956a). The study of prosody in spontaneous speech in dialogue contexts is, in comparison, still in its infancy.

a. Rhythmic structure

The basic rhythmic skeleton of non-emphatic patterns, typically used in matter-of-fact assertions, and with unmarked SVO and SOV word orders, is similar to that of the other West Germanic languages. The arguments of Jassem (1952) and others about the basic rhythmic structure of English apply, with some modifications, to German. In contemporary analyses, the basic unit is the **foot**, consisting of an accented syllable followed by one or more unaccented syllables, somewhat like (though simpler than) Jassem's **Narrow Rhythm Unit**. In addition to the basic trochaic or dactylic structure of these units, Jassem introduces an additional iambic element, the **Anacrusis**, of unaccented syllables before the accented syllable, creating a **Total Rhythm Unit** (see Jassem and Gibbon 1980). A sequence of feet with a tendency to isochrony, or equal length in time, will be referred to as a **rhythm sequence**, in German "rhythmischer Körper". It appears that there may also be a higher level of

temporal organisation, that is a **paragraph unit**, within which shorter rhythmic sequences are embedded (Gibbon 1981).

The rhythm of German is, like that of English, isochronous only in a weak sense of the term: accented syllables tend to be perceived, like any other kind of audible rhythm, as being evenly spaced in time. Different parts of the overall pattern, especially the unaccented syllables, are not isochronous but may be shortened to support the tendency towards isochrony. It should be added, however, that recent research on details of isochrony in German is lacking. The rhythm sequence provides the fundamental temporal frame within which tonal patterns are associated.

Numerous descriptions of the German rhythm sequences have been based on the von Essen model (1956a), originally designed for teaching formal elocution, in which the constituents of the basic pattern are defined as follows:

1. *Vorlauf (prehead):* a sequence of unstressed syllables.
2. *Rhythmischer Körper (body, rhythm sequence):* a sequence of one or more stressed syllables, the last being the "Schwerpunkt" (nucleus), each optionally followed by a sequence of unstressed syllables,
3. *Schwerpunkt (nucleus):* the last stressed syllable in a rhythmic sequence,
4. *Nachlauf (tail):* an optional sequence of unstressed syllables following the nucleus.

The following examples illustrate the basic von Essen model on two sentences with different rhythmic patterns, *Er kommt mit dem Wagen* (He comes by car), and *Wir wollten doch heute Nachmittag einkaufen gehen* (But we were planning to go shopping this afternoon).

Vorlauf	*Rhythmischer Körper* (*Schwerpunkt* italicised)	*Nachlauf*
er	KOMMT mit dem *WA*-	gen
Wir	WOLLten doch heute NACHmittag *EIN*-	kaufen gehen

An analysis of the rhythm sequence into a foot sequence produces a different grouping. Figure 1 illustrates both the von Essen model and the superimposed foot structure of the Rhythmic Sequence model.[3]

A third, more differentiated model, is that of Jassem. It is not possible on the basis of current evidence to decide which model provides the best description of German rhythm. It seems likely that more than one may be relevant: a rhythm structure for the assignment of accentual patterns, and other global structures for the assignment of melodic patterns.

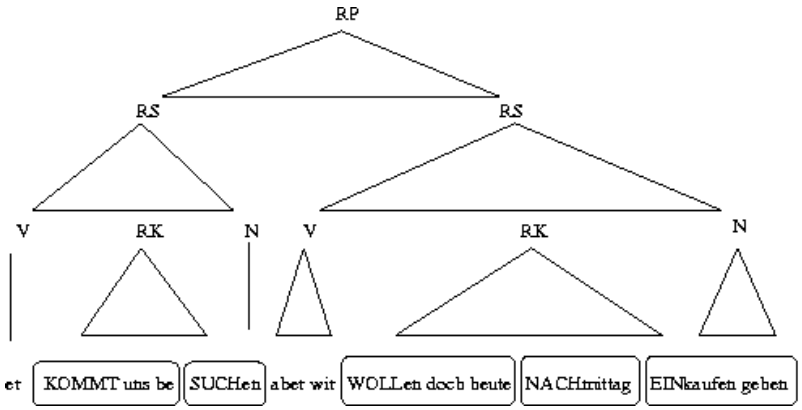


Figure 1. Foot and accent oriented prosodic structures.

b. Stress and accent

Stress is an abstract positional property of linguistic units which denotes the position at which a non-contrastive accent can occur. The stress position is determined by the structure of words and phrases. Pitch accent, on the other hand, is an approximately syllable-sised pitch modulation of the speech signal which lends perceptual prominence. The modulation may be a frequency change away from the basic carrier frequency line and back to it, resulting in the perceptual impression of a pitch peak (a pitch accent); the duration of the relevant syllable may be extended, and the overall energy of the signal may also increase round this syllable. It is generally accepted that pitch and duration changes are more significant than amplitude changes.

In figure 2, an orthographically labelled pitch tracing of a spontaneous utterance in a corpus of scheduling dialogues is reproduced: *ich FINde es zwar AUCH ganz SCHÖN was mir da ge-* (I find it basically quite good what we (did) there). The pitch modulations on *FINde*, *AUCH* and *SCHÖN* are prominent in the F_0 curve, and correspond to auditory impressions of the rhythmic accent positions. The emphatic focal accent on *AUCH* (also) has the strongest pitch modulation.

c. Tonal structure: statements and questions

In the traditional linguistic and elocutionary literature, statements and questions are associated with falling and rising intonations, respectively, with W-questions (*wer*, *wie*, *was*, *wo*, *wann*, analogous to English WH-questions with *who*, *how*,

what/which, *where*, *when*), associated with falling tones in the unmarked cases. With increasing awareness of the variety of the uses of prosody in different situations, however, these claims are now widely regarded as too simplistic.

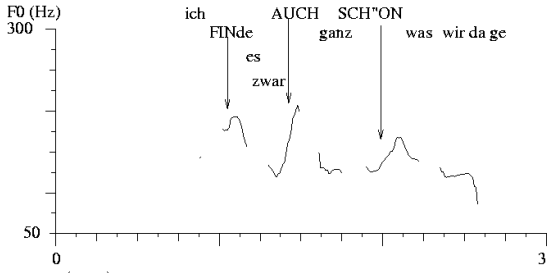


Figure 2. Pitch accent sequence in spontaneous speech.

The first detailed linguistic analysis of sentence mood and intonation in German was Pheby's (1975) study in the framework of systemic linguistics. Pheby distinguishes fifty systems of contrast, some of which are hierarchically related to others, starting with five main sentence classes:

1. statement, answer, question, request, exclamation;
2. familiarity, unfamiliarity;
3. emphatic, unemphatic;
4. contrastive, non-contrastive;
5. expressiveness, unexpressiveness.

In Pheby's analysis, these systems and their subsystems are realised by the tones (simplified characterisations of Pheby's systemic functions are given in parentheses):

1. falling (statements, exclamations);
2. rising (non-final, questions);
3. level (progredience, incompleteness);
4. falling-rising (uncertainty);
5. rising-falling (certainty, obviousness).

An even more detailed analysis, founded in detailed interpretative analyses of an impressively large quantity of spontaneous informal speech and a sophisticated functional account of dialogue processes, with a detailed intonation transcription system, is given by Selting (1991). However, these analyses do not cover the full range of tones which can be observed in colloquial German (cf. §2.4, for example).

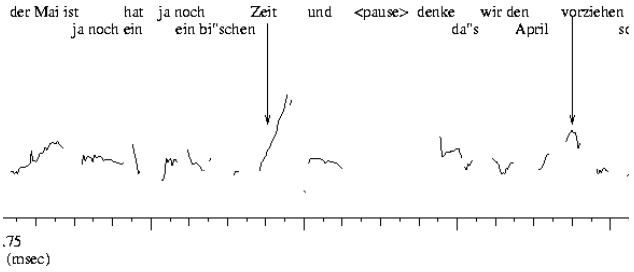


Figure 3. Rising pitch medially, falling terminally in spontaneous speech.

2.2 Mode and expressivity

More attention has been paid in studies of German intonation to the correlation between sentence mood and intonation than to the correlation between intonation and semantic and pragmatic categories such as modality and illocutionary force or speech act type (see Altmann 1988).

a. Sentence type and speech acts

In formal speech, a distinction is, as noted above, generally made between three kinds of terminal or nuclear tone which characterise different speech acts: the falling terminal, typically associated with assertions; the rising terminal, typically associated with yes/no questions; and the mid-level terminal, typically called progredient or *weiterweisend*, *i.e.* continuative. In spontaneous speech the mid-level progredient appears to be rare, except in stylised contexts (see §2.4), and rising nuclei are used for a range of functions, from progredience to questions, but they may also have connotations of deference, politeness, or uncertainty, as shown in figure 3 on the utterance *der Mai ist ja noch ein hat ja noch ein bißchen Zeit und <pause> denke daß wir den April vorziehen sollten* (May is of course still there's still a little time and <pause> [I] think that we should prefer April). A range of interrelations between syntactic mood and speech act type is shown in table 2.

Selting (1995) has demonstrated that in spontaneous German dialogue numerous different question types occur, each of which has a complex relation to intonation and syntax. This means that the traditional categorisation, which applies to less colloquial speech styles such as reading aloud, may not be applicable to everyday speech.

Table 2. *Relations between sentence mood and function.*

Mood	Tone	Function
Declarative	Fall	Assertion
	Rise	Echo question
		Uncertain statement
Imperative	Fall	Command
	Rise	Request, plea
Interrogative (auxiliary inversion)	Fall	Peremptory question
	Rise	Neutral question
W-question	Fall	Neutral question
wer, wie, ...	Rise	Interested or echo question

b. Monotony and excitement

The indexical function of pitch height to indicate degree of excitement is widespread, and certainly it occurs in German. However, the range of pitch modulation in German is in general much less than in English and many other languages in otherwise comparable situations, which may lead to misjudgements of intention or attitude. British female voices, in general relatively high-pitched, tend to sound aggressive and over-excited to the German hearer, and, conversely, German males may sound "bored" or "unfriendly" to the British hearer. Misjudgements of this kind indicate elements of cultural convention in an area of intonation which is often taken to be universal.

2.3 Focalisation and contextual effects

German has three main ways of signalling focalisation and related aspects of functional sentence perspective: with **focus particles**, with word order, and with accentuation. The three signalling devices do not have to coincide, and can therefore be assumed to relate to slightly different aspects of focalisation. This will be illustrated with reference to variants of the example given above.

a. Focal accents

In a simpler version of the example already given, *DEN Apfel hast du meiner Tochter gegeben*, accent, word order and focus particle combine to select the definite article *den*. But starting with a basic, unmarked formulation, six types of combination of marked utterance turn out to be possible:

1. *Unmarked word order, normal accent, no focus particle:*
   Du hast meiner Tochter den APFel gegeben.
   you[singular-familiar] have[present-singular-second] my[dative] daughter the[accusative] apple given
   (You have given my daughter the apple.)
2. *Unmarked word order, marked accent, no focus particle:*
   Du hast meiner TOCHter den Apfel gegeben.
3. *Unmarked word order, unmarked accent, focus particle:*
   Du hast sogar meiner Tochter den APFel gegeben.
4. *Marked word order, normal accent, focus particle:*
   Meiner Tochter hast Du sogar den APFel gegeben.
   Den Apfel hast Du sogar meiner TOCHter gegeben.
5. *Marked word order, marked accent, no focus particle:*
   Meiner Tochter hast DU den Apfel gegeben.
   Den Apfel HAST Du meiner Tochter gegeben.
6. *Marked word order, marked accent, focus particle:*
   Meiner Tochter hast DU sogar den Apfel gegeben.
   Den Apfel hast DU sogar meiner Tochter gegeben.

More variations in word order and in the positioning of accent and focus particles are possible for this example sentence than can be illustrated here: effectively, any syllable or combination of syllables can be accented for contrastive or emphatic purposes, any Noun Phrase or Adverbial can be fronted, and a focus particle can occur before or after the focused constituent.

Focalisation is one of the most challenging areas in the study of German intonation, and the largest number of recent studies on German intonation have treated related aspects such as topic and comment, focus and background, given and new information, signalling of the scope of semantic operators; an overview is given by Féry (1993). In German linguistics the field is often referred to as "functional sentence perspective", *funktionale Satzperspektive*, a term introduced in the Prague School of linguistics (see Sgall and Hajičova 1983).

b. Anaphoric, contrastive, and emphatic accent

In broader contexts, most of the marked accent assignments described above have contrastive function. One of the contrastive functions of accent, optionally accompanied by tone group boundary marking such as a pause or a different nuclear tone, is to localise the scope of a semantic operator such as negation, as in English:[4] *Er KAM nicht, weil er viel zu TUN hatte* (He didn't COME, because he had a lot to DO) as opposed to *Er kam nicht, weil er viel zu TUN hatte …sondern weil er LUST dazu hatte*. (He didn't come because he had a lot to DO…but because he WANTED to). In the first case he came, in the second he did not come.

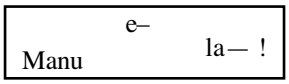
The standard preference for assigning a nuclear accent to the final noun in a group is overridden by the discourse condition of anaphoric or co-referential nominal groups: *Kennen Sie Herrn Buschkamp? – Ja, ich KENNE Herrn Buschkamp*. (Do you know Mr Buschkamp? – Yes, I KNOW Mr Buschkamp.) The noun Buschkamp is anaphoric; the verb KENNE is neither focused nor contrastively accented; in fact, it is also anaphoric (see Gibbon 1987). There is apparently no striking acoustic difference between this form of accentuation in anaphoric contexts and contrastive accent, though experimental evidence on this is lacking. Accent assignment in these anaphoric contexts is sometimes misleadingly referred to as **de-accenting** and **default accent**, but there is no reason to suppose that in such cases the anaphoric expression is in some sense first accented and then de-accented

Emphatic or emotive accents are not necessarily different in kind from other accents, but basically just have "more of everything". For example they have broader frequency modulation and more extreme syllable lengthening than non-emphatic accents, as in /SØ::n/ *Schön!* (lovely!), where the *ö* may be extremely long.

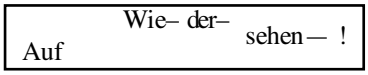
2.4 Stylised patterns

The "chanted", flat or stylised pitch contour is used in German to signal the opening, sustaining and closing of a channel of communication (Jakobson's **phatic** function of language). These are the contours which are often called "call contours". In German, they are indeed used specifically in calls, but they have a range of other phatic functions, such as greeting, leave-taking, thanking, and, unlike other languages, in signalling cases of discourse repairs caused by mishearing (see Gibbon 1976a, 1976b, 1984).

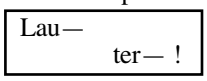
1. Call:



2. Leave-taking:



3. Request for louder repetition:



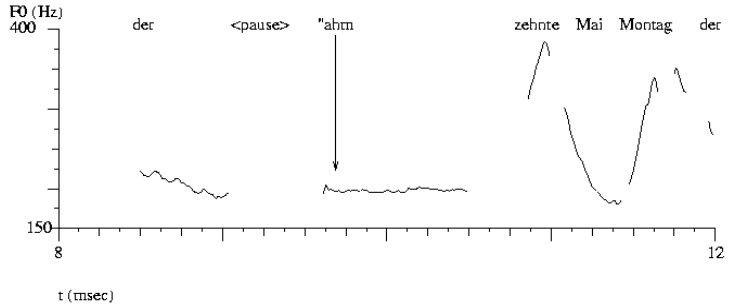


Figure 4. Flat stylised contour on a hesitation particle.

4. Repetition after mishearing:

Ich habe	"Jo—	hann"	— ge	— sagt	— !

It has often been pointed out that the pitch drop in this contour may approximate to a musical interval, such as a minor third, though this has not been experimentally established. Unlike English, German does not have a rising stylised contour.

A different form of stylised contour occurs with hesitation particles such as *ehm* or *ähm*, and can also be classified as having a variety of phatic functions. The hesitation contour is flat, and is accompanied by conspicuous lengthening of the associated vowel. Figure 4 illustrates this contour, with the utterance fragment *der <pause> ähm zehnte Mai Montag der* (the <pause> erm tenth of May Monday the), The stylised hesitation vocalisation is followed by a pitch accent on the immediately following lexical selection *zehnte* (tenth) and a rising nucleus on *Mai* (May). It is not known whether the hesitation contour, or indeed the other stylised contours with phatic functions, are universal.

3. Comparisons with other intonation systems

3.1 Comparisons with other dialects

a. Recurrent patterns

It was noted at the outset that the main regional standards are associated with the cities of Berlin, Hamburg, Hanover, Cologne, Frankfurt, Stuttgart, Munich and Leipzig, as well as Vienna for Austrian German, and Zurich for Swiss German, and that fundamentally these varieties share the same prosodic properties. However they have characteristic differences in detail.

A characteristic shared by all these German dialects is the regular foot-based rhythm, with syllable reduction on weak syllables. In many dialects, however, the inflectional affixes are much weaker than in the standard language superstrate, or have disappeared. Most inflectional affixes being word-final weak syllables such as /ˇn, ´l, ´m, ´s, ´, å/, this has led to small differences in rhythmic pattern between dialects and the standard language. The reductions are particularly characteristic of Southern varieties, but are also to be found in many other dialects.

Rhythm is based on the regular recurrence of prominent syllables, either with or without enhancement by pitch modulation. Dialects (as well as styles of speaking) vary in the details of this modulation. In general, Southern dialects are associated with a **right-displaced prominence peak**, that is, the syllable perceived as being accented has low pitch, and a pitch rise, often followed by a peak, occurs on one of the following syllables (ToBI *L*+H*, similar to Bolinger's Accent C in English, (Bolinger 1958)). In the standard pronunciation, the peak tends to occur on the accented syllable itself, though in some speech styles, such as telling stories to children, the right-displaced peak rhythm occurs.

The North German coastal dialects in general display features which are quite close to those of dialects of north-eastern England. There have been no comparative studies of the intonation patterns of these areas, however.

b. Nuclear patterns

Conspicuous prosodic differences between German dialects are found in the pitch contours of falling nuclei associated with plain statements. Three main varieties are to be found: fall from the nuclear syllable, a high fall from the nuclear syllable followed by a low rise, and a delayed rise to high following the nuclear syllable, with a fall to mid or low.

The fall from the nuclear syllable is characteristic of Standard Pronunciation in formal situations, and of many dialects. The other two varieties are distinctly regional, however. The high fall from the nuclear syllable followed by a low rise (ToBI *H*+L L-H%*) is characteristic of the intonation of Hamburg and of neighbouring coastal dialects. The delayed rise to high following the nuclear syllable, with fall to mid or low (ToBI *L*+H H-H%*), is common to a chain of dialects along the Rhine valley, from Switzerland ("Schwyzer Dütsch") to Cologne ("Kölsch"). Phonetically, the delayed rise is similar to displaced pitch accents and tones in other languages. Kohler has demonstrated that nuclear accent displacement of this kind is an option associated with different attitudinal meanings in Standard German pronunciation (see Kohler 1995).

3.2 Comparison with other languages

German is a foot-timed language, with a small amount of lexical and morphological stress contrast and no lexical tone or lexical pitch accent. Consequently, German prosody differs greatly both from that of pitch accent languages such as Japanese or Swedish, and that of tone languages such as those of Africa and South East Asia.

Dutch and English are both typologically and historically very close to German, and have fundamentally quite similar prosodic systems. The stress systems of both Dutch and German are less complex than that of English, and have more pronounced tendencies towards initial stress assignment. Sentence stress in both German and Dutch is influenced by the predominant SOV word order, which reduces the tendency to sentence-final stress, in contrast to English. Several factors result in different rhythmic patterns. German is a relatively highly inflecting language, and syllabic inflexional suffixes contribute to a pronounced trochaic rhythm. The distribution and degree of vowel reduction differ in German from those in English; in loan words, vowel quantity and quality tends to be preserved, thus German /fo.n·e:.tÈk/ *Phonetik* (phonetics) as opposed to English /f´.n·E.tÈks/ *phonetics*. The distribution of /´/-elision before sonorants (nasals, laterals) in German differs subtly from that in English. There are also differences in the prosodic inventory; English has a rising "call contour", which is absent in German, but the falling German call contour has a broader range of functions than its English counterpart (see Gibbon 1976a, 1976b) Schubiger (1980) claims that in German, modal particles such as *doch*, *wohl*, *ja* play similar roles to certain intonation tunes in English, which does not have such a wide range of particles and particle combinations, while German does not have such a wide range of intonation patterns as English. This claim has a *prima facie* plausibility, but has not been extensively or systematically investigated.

The main central European German-speaking area (Austria, Germany, the Swiss German area) has border contacts with a variety of major languages (Czech, Danish, Dutch, French, Hungarian, Polish, Italian, Slovak and Slovenian), and there are German-speaking minorities in each of these other areas. The Slavic languages Polish, Czech, Slovak and Slovene are also stress timed, and their prosodic systems are similar in many general respects. But the detailed phonetic realisation of prosodic patterns differs markedly, with pronounced differences in rhythm and the bandwidth of pitch modulation.

4. Implications and conclusions

The intonation of German has received considerable attention from linguists and phoneticians, and currently there is an upsurge of interest stemming from speech technology. The goals of providing natural speech synthesis, and, in automatic

speech recognition, of disambiguating alternative analyses and of identifying speaker intentions, have received prominence in the context of large research and development projects.

It seems likely that this activity will continue, and be extended to cover increasingly sophisticated problems such as phonostylistic (e.g. fast speech) and dialectal differences, coupled with adaptive techniques for coping with them. A major heuristic contribution of these efforts has been the creation of large speech corpora which have been prosodically analysed, and the development of tractable computer-aided techniques of prosodic corpus analysis (see the overview in Gibbon 1994).

On the side of semantics and pragmatics, and independently of these technological developments, two main centres of linguistic interest can be currently identified: the application of interpretative methods from discourse analysis to the description of intonation, and investigation of the role of focus in formal semantics (see Quasthoff 1994). In these areas, increasingly detailed analyses of the functions of prosody are emerging, which cast doubt on the validity of simple functional labels such as "question intonation", "impatient intonation" and the like in view of insights into the complexity of such notions as "question" and "emotion".

Notes

1 Notation: /./ syllable boundary, /'/ primary stress, /"/ secondary stress (placed before syllable nucleus), /+/ morpheme boundary, /#/ word boundary in compounds; syllable boundaries are placed after morphological boundaries.

2 The symbols in the table have the following meanings: L = low, H = high, ! = downstepped tone (^ is also used for upstepping), - = phrase tone marker, % = boundary tone marker, * = accent position, + = concatenation of tone constituents in a pitch accent.

3 The abbreviations in figure 1 have the following meanings: PU is a Paragraph Unit, RS is a Rhythmic Sequence, V is a *Vorlauf*, RK is a body, *rhythmischer Körper*, N is a tail, *rhythmischer Nachlauf*.

4 Note that comma punctuation in German is determined by grammar, and does not correlate as closely with intonation as in English.