GERMAN FOCUS PARTICLES AND INTONATION

Karin Müller
University of Stuttgart

ABSTRACT

Spoken German uses far fewer pitch accents than standard American English. It is commonly assumed that German makes use of focus particles to achieve a comparable gradation of meaning (e.g. depending on context, 'only' can be translated by "allein", "erst", "noch" or "nur").
There are two interacting aspects that are examined in this work. The first aspect is the disambiguation of particles i.e. the decision on the basis of intonation patterns and syntactic information whether the particle is a focus particle or not. The second aspect is the analysis of the intonation patterns that are assigned by focus particles and of the semantic influence on these intonation patterns. The interaction between these different aspects will be discussed.

1. INTRODUCTION

An important challenge in speech synthesis concerns the naturality of synthesized speech. Intonation plays a big role if speech is judged natural or monotonous. There are several ways of assigning pitch accents to synthesized speech: e.g. one is a rule-based assignment another way is an algorithmic assignment of pitch accents. Möhler and Conkie (1998) [10] for example choose a pitch accent out of a set of pitch accents and place them on words. This leads to quite good intonation patterns. However, semantic aspects does not influence this decision.
Intonation is regarded to influence the meaning of a sentence (Mayer 1997). It would be very useful if it would be possible to control semantic information by triggers that point to a specific intonation pattern. Focus particles seem to provide the information that the following lexical head is the focus of the sentence or part of sentence. As intonation is a complex topic and different aspects are influencing each other, one way to examine this complex phenomenon is to look at real data. Although there is a wide variablity in intonation the aim of this study is to extract the main intonation contours from the spoken data.

2. THE DATA

As this study is a data-based approach I examined a spoken database consisting of four hours acted speech, two hours of a feature series and one and a half hours of news stories. Out of this database I chose those sentences that comprised at least one particle. Unfortunately, there are homonymous expressions that looks exactly the same as their counterparts, the focus particles. Thus, pitch accents were found that can be used for disambiguation of homonymous particles.

3. GERMAN PROSODIC ANNOTATIONS

The intonation contour was labelled by the German Tone and Break Indices (GToBI(S)) which was developed at the university of Stuttgart. GToBI(S) is a labelling system for the transcription of German intonation. It is based on the Tone Sequence Model (TSM) that was first introduced for English by Pierrehumbert (1980) [12]. In the beginning of the ninties the TSM was implemented by a research group around Pierrehumbert and Beckman [13] resulting in the ToBI - Tones and Break Indices - labelling system. The TSM for German was developed by Féry [2] in 1993.

3.1 GToBI(S) [9]

3.1.1 Boundary Tones In GToBI(S) only the position but not the tonal specification of terminal intermediate phrase (ip) or international phrase (IP) bounderies is marked. The tonal specification can be derived from the trailing tone of the phrase-final pitch accent. It is sufficient to label

- a "-" for ip boundaries, which is interpreted as H- and
- a "%" for IPs interpreted as H%.

After a falling pitch accent (a L-trailing tone) with the contour staying low then "=" is interpreted as "L-" and "%" as "L%". If the contour rises nevertheless then, according to Féry's analysis, a real "H%" boundary is labelled. There are the following terminal boundary categories left in GToBI(S).

- ip boundaries -
- IP boundaries without terminal tone: %
- IP boundaries with rising terminal tone (only after falling nuclear accent): H%

3.1.2 Pitch Accents The pitch accents of GToBI(S) are identical to the categories that are introduced in Féry (1993) [2]. There are five accents[1]: H*L, L*H, HH*L, L*HL and H*M.

- **H*L** 'Peak Accent'. It is a high target (local fundamental frequency maximum) in an accented syllable, followed by a steep pitch descent into the lower third of the pitch range (L-target). If the accented syllable is the last syllable of the phrase, then the L target is also within in the accented syllable, in all other cases the low target is reached after the accented syllable (The exact positon depends on speech velocity as well as syllable and segmental structure).
- **L*H** A L-target (local fundamental frequency minimum) in an accented syllable followed by a steep ascent to the higher third of the pitch range (H-target). If the accented syllable is the last syllable of a phrase, then the H-target lies within the accented syllable, otherwise the high target is reached after the accented syllable.
- **HH*L** 'Early Peak'. There is a H-target in the preaccented syllable followed by a steep or gradual pitch descent. This accent has to be realized over at least two syllables (the preaccented and the accented one). HH*L can only be used when the preaccented syllable is a metrically weak syllable, meaning it can not be stressed.
- **L*HL** 'Rise-Fall'. An early L target in the accented syllable followed by a pitch peak (H target) and a steep pitch descent (L target). If the accented syllable is not phrase-final (this does not occur very often, since there is usually an ip boundary immediately following an L*HL), the three tonal targets can spread over three syllables. However, L*HL frequently spreads over only two syllables or just one long syllable. Thereby the position of the H target depends strongly on the segmental structure of the syllables.

L*HL is an interesting pitch accent. The perceptive impression is that the speaker uses this pitch accent in order to express a contrastive focus or s/he tries to lead the listener's attention to this part of information. The L*HL usually is realized on one syllable and is one third higher than the pitch accents around it. Normally in a paragraph the peaks of the H-suffixes/prefixes can be combined and they form a falling line. The L*HL tops this invisible line. Furthermore it seems that the L*HL can overwrite

---

[1] GToBI(S) does not imploy the symbol "+". A star is followed by the standard notation "*". The positions of all other tones depend on that of the starredtone: they are either *leading tones* (prefixes) or *trailing tones* (suffixes). Therefore H*L is equivalent to H*+L etc.

a H*L. The sentences could be made with a H*L als well but the speaker uses a L*HL because of personal intentions (e.g emotive purposes[2]).

● **H*M** 'Stylization'. H*M can only appear in nuclear position. The pitch contour ends in the middle of the pitch range. Rarely appearing pitch accent. The labels H*, L*L, ..L and ..H are used to represent linking processes. As they do not appear in the presented examples they were just mentioned here. In Mayer 97 [9]

● H*/..L : Partial Linking.
● L*/..H : Partial Linking.
● H* : Complete Linking.
● L* : Complete Linking.

As in ToBI the symbol "!"denotes **downstep**. It only can appear before non-phrase-initial H tones.

GToBI(S) is a phonological transcription system. The main purpose of this system is not the adequate description of the fundamental frequency contour. Various smoothing algorithms can take over this task. GToBI(S) tries to annotate only those events that are categorical and interpretable. While GToBI(S) is a means to annotating spoken language, Mayer [9] dissertation and the present study attempt to interpret these labels.

3.2 The Meaning of Pitch Accents

According to Hobbs (1990) [4] the meaning of tones is entirely compositional. The basic elements are H and L-tones. The pitch accents consists of a starred tone and a suffix or a prefix and a starred tone. Their meaning is:

● 1st Class **Starred Tones, Prefixes**:
H-tone means the information is salient and new.
L-tone means the information is salient and not new.

● 2nd Class **Suffixes, Phrase Accents, Boundary Tones**:
H-tone means the information is incomplete, open-ended
L-tone means underspecification concerning completeness.
(e.g. H*L consists of the starred tone H* and of the suffix L. The meaning of the H* in this example would be that the information is salient and new and the L-suffix means that it is not specified if the information is complete).

4. PARTICLES

The particles can not be treated as one single group. Most focus particles have a different number of homonyms. However, if they are identified as focus particles the same phenomena can be found. Firstly, I would like to present the focus particles and their influence on intonation. In this paper I examined the following six different focus particles: "*selbst*" (even), "*noch*" (finally), "*nahezu*" (almost, nearly), "*beinahe*" (almost, nearly), "*fast*" (almost, nearly), "*nur*" (only). It is to be expected that all other focus particles act like these exemplary examined ones.

4.1 Focus Particles and their phenomena

In this function all six particles are subject to the same phenomena.

4.1.1 Focus on the Semantic (lexical) Head If the information is new a falling pitch accent (H*L) is generally found on the lexical head of the phrase. The following two examples ((1) and (2)) of the Sternzeit news [14] demonstrate this case.

The first example describes the discovery of a supernova. A Canadian astronomer studied some photographs of the Greater Magellanic Cloud. He discovered a very bright star that had not been observed before. The star could be seen with naked eyes even from a distance of 170000 light years (German original is:" *selbst aus einer Entfernung von 170000 Lichtjahren* "). The semantic head "*Lichtjahre*" (light years) recieves a new information H*L-tone. The L*H on the number 170000 as well as on on "*Entfernung*" (distance) points on the incomplete information that is completed by "*Lichtjahren*" (light years). These L*H pitch accents are apperently more variable that means that they can be inserted if the

words/phrases are too long in order to signal incompleteness.

(1) GE: {**Selbst** *aus einer Entfernung von 170   000 **Lichtjahren**}
                  L*H   L*H L*H L*H   !H*L   %
          Even   from a   distance   of 170   000 light years
          <P> *erkannte man die Supernova deutlich mit* <P> *bloßem*
                  L*H   L*H   L*H   !H*L
              make out one the supernova clearly with   naked
          Auge.
          L%
          eye

     EN: Even from a distance of 170000 light-years, one make out the supernova with the naked eye.

The second Sternzeit-example (2) [14] is about the beauty of spiral nebulas. The speaker called them cosmic spinning tops. The forms seem to be 'almost fragile' (German original is:" *beinahe zerbrechlich* ").

The semantic head of the phrase is "*zerbrechlich*" (fragile) which recieves the new information H*L-tone.

(2) GE: [*Sternzeit 27. März. Eine Galaxie in einer Galaxie. Spiralnebel sind wunderschöne Kreisel.*]
          ● *Milliarden von Sternen bilden Formen,* <P> *die* {**beinahe**
                  H*L   L*H H%
              Billions of stars   shape forms   which almost
          zerbrechlich} *erscheinen.*
          H*L   %
          fragile   seem to be.

     EN: [Startime March 27th. A galaxy in a galaxy. Spiral nebulas are magnificent spinning tops.]

          Billions of stars are shaping forms which seem to almost fragile.

The subsequent Sternzeit-example demonstrates the case where a L*HL pitch accents appears instead of a H*L pitch accent (L*HL is described in section 3.1.2 in more details). The different types of molecules in outer space are described. The speaker[3] did not expect that amino acids belong to the set of molecules that exist in outer space. "*Aminosäuren*" (amino acids) gets a L*HL-tone in order to mark that even this element belongs to the set of molecules that exist in outer space.

(3) GE: {**Selbst Aminosäuren**} *zählen dazu.*
                  L*HL   !H*L %
          Even   amino acids   include to this

     EN: Even amino acids are included.

4.1.2 Focus on the Modification If the semantic head of the phrase was mentioned before and only the modification is new information then the falling pitch accent H*L (or the related pitch accents HH*L, !H*L) appears on the modification (the pitch accent "wanders" to the new information). This phenomenon is mentioned by Jacobs [6] and later by Kuhn [8] as deaccenting which expresses the influence of context on intonation.

In the following Sternzeit-example [14] "*meisten anderen Sterne*" (mostly all other stars) were mentioned before thus the semantic head after "*nur*" (only) did not get the falling pitch accent but the preceding modification which provides the new information.

---

[2]May be thats why the L*HL tops the top line in order to contrast it from a H*L

[3]Either the speaker did not expect that amino acids are in outer space or s/he thinks that the listener do not expect it.

(4)   GE: [*Beweise für die drehende Bewegung der Milchstraße. In den 20er Jahren äußerten Astronomen die Vermutung, daß* **die Sonne** *zusammen mit den* **meisten anderen Sternen** *der Galaxis in einer Richtung um deren Zentrum zieht.*]

*Sie   hatten {***nur*** *einige* **wenige**   *Sterne} bemerkt die*
               H*L   H*L   -

They had   some small number of stars   noticed that
sich   dieser Bewegung nicht anschließen.
                 H*L L%
itselves it this movement not follow

   EN: [Proofs for the rotational movement of the milky way. During the 20s the astronoms supposed that **the sun together with mostly all other stars** of the galaxy are drawing around their center in one direction.]

They noticed only a small number of stars that did not follow this movement.

4.2 Focus Particles versus their Homonyms

In this section the special features are presented that were found in the data in order to seperate focus particles from their homonyms. In some cases focus particles can be seperated by intonation from their homonyms. However, syntactical information is also very useful. For more examples see Müller (1998) [11].

4.2.1 Selbst The German word "*selbst*" can appear in different kinds of contexts. It can be used as a focus particle, a reflexive pronoun (referring to an NP, PP), a noun 'the self', a fixed expression 'by itself' or to mark a conditional construction 'even if'.

- **Selbst (Even) as a Focus Particle**
  In this function "*selbst*" is used in the same sense as "*sogar*" (even). The focus particle is followed by either a noun phrase (NP), a prepositional phrase (PP) or an adjective phrase (AP).
  Description: "*Selbst*" emphasizes one alternative out of a set of alternative events and highlights it. The event can be unexpected or already known.
  In the case of an unexpected event, the speaker can assign a L*HL tone to the head of the following phrase. L*HL overlays the tone of a focus particle which is usually H*L or !H*L.
  A L*H-tone on "*selbst*" can only appear at the beginning of the syntactic phrase.

- **"*Selbst*" (Even if/Even when) in a Conjunctional Construction** In this function "*selbst*" can appear in a sentence after punctuation marks, sentence initial or, rarely, in combination with other particles . Examples are "*Selbst wenn [...]*" (even if [...]) , "*Selbst whpronomen [...]*" (even whpronoun [...]) , "*Selbst als [...]*" (even when [...]);

- **"*Selbst*" (Itself,Himself,Herself) as a Reflexive Pronoun**
  Description: In this function "*selbst*" emphasizes that the event itself is the agent, the location|source|goal or the theme. "*selbst*" can only refer to an NP, AP or PP that precedes it. "*Selbst*" as reflexive pronoun is a quite flexible particle and can appear in many different positions. If the particle bears a H*L, !H*L or H* tone it must be a reflexive pronoun[4].

- **Noun 'Selbst (*Identity*)'**
  No occurence of "*selbst*" as a noun was found in the spoken corpus. The only help in identifying the word "*Selbst*" lies in the fact that it **never appears at the beginning of a sentence** and **starts with a capital letter**. "*Selbst*" as a focus particle, reflexive pronoun or in conjunctional constructions never appears with a capital letter, unless it is in the beginning of a sentence. The example (5) is taken from a written newspaper corpus [15].

---

[4]Provided that it does not start with a capital letter, or is preceded by 'von'

(5)   GE: *Lindenberg bleibt bei sich, verausgabt sich nicht mehr als Sprachrohr für die Gebeutelten um ihn herum, hält sich nur noch auf mit dem zermürbten, versoffenen* **Selbst**.

   EN: Lindenberg remains with himself, he does not commit himself to the weak around him, he only is preoccupied with his own resigned and drunken self.

- **Fixed Expression 'Selbst (*By Oneself*)'**
  The fixed expression "*von selbst*" means 'of one's own accord' or 'by oneself'. If the construction "*von*" plus "*selbst*" appears, it is always a fixed expression.

4.2.2 Noch The German particle "*noch*" has several different meanings. In the literature the following readings are listed: additive reading (referring to an additional event), comparative reading (establishing a scale), perfective reading (describing an event with beginning or end) and imperfective reading (duration without a concrete beginning and end). It also functions as the negation of 'already' (describing as an event that has not yet happened) and as part of a coordinating conjunction (negative enumeration). An interesting result of this work is that with respect to prosodic characteristics the additive, the comparative and the perfective uses of "*noch*" can be subsumed under one intonational group. Thus their division into different groups may be artificial.

- **Additive "*Noch*"**
  Description: The recipient understands an event as additional to another one mentioned in the preceding context.
  The scope of the particle is the following constituent. König (1991)[7] suggests to replace the additive particle by "*auch noch*" (too, also) for reasons of clarity. Generally, there is a falling pitch accent on the semantic head. The deaccenting phenomenon is also observable. Moreover, there is something new: if there is a H*-pitch (H*L as well) accent on the particle itself then the meaning of is 'another'. This pitch accent implies that there was a quantity expression/fact mentioned before in the context.

- **Comparative "*Noch*"**
  Description: On the scale between positive and superlative value the addressee interpretes "*noch*" with a comparative adjective as 'stronger' (i.e. closer to the superlative value) than a mere comparative adjective.
  There can be a falling pitch accent observed on the adjective after comparative "*noch*". If this pitch accents wanders to the particle itself then a further degree is added on the scale.

- **"*Noch*" as Focus Particle (Perfective)**
  Description: The addressee understands the event as an event with a starting or an end point.
  In order to test if "*noch*" is used perfectively, Hoepelman & Rohrer(1981) [5] suggest replacing "*noch*" by "*doch noch*" (finally). Characteristic are temporal specifications that point to the perfective use of "*noch*". Intonational contours are like mentioned in chapter 4.1.1.

- **Imperfective "*Noch*"**
  Description: The recipient understands the information as a state without a specific ending or beginning point. The verb must imply a durational state. It is assumed (Dogil (1998) [1]) that the constituent which expresses a duration gets a L*H.
  According to Hoepelman J & Rohrer C (1981) [5] imperfective "*noch*" is "connected with periods - and not with moment - of time". They suggested a test to distinguish imperfective from perfective "*noch*": replacing "*noch*" by "*immer noch*". "*Immer noch*" is an aggraviated expression of imperfective "*noch*". Unfortunately there was no special intonation contour found that can be regarded as imperfective contour. In some cases a L*H was found on the word before the "*noch*" but the percepitve impression was that structures of pauses or even rhythmic structures point to the imperfective interpretation. May be some descriptions must be added to ToBI to describe this phenomenon.

- **"*Noch nicht*" (not yet) - Negation of "*schon*" (already)**
  Description: The addressee understands the event has not happened yet. If there is a H*L pitch accent on "*noch*" itself, then it signals an expectation that the event will happen soon (contrast accent).
  The phenomena are not different from focus particles as described before (this is the case also for "*immer noch*" (still) as well as "*immer noch nicht*" still not.

- **Conjunction "*Weder [...] Noch*" (Neither Nor)**
  Description: The addressee understands the states/event as an negated enumeration of at least two events. Both states/events are not going to happen.
  All examples agree in the **L*H**-tone on the semantic head after "*weder*" (neither) and in 5 of 8 cases there was a falling tone on the semantic head that was following "*noch*" (nor).

4.2.3 Nahezu, Beinahe, Fast "*Nahezu, beinahe, fast*" can be grouped together. The phenomena in the function as focus particles has already been described in chapter 4.1.1. Moreover can be used synonymously in the the construction "*fast/beinahe/nahezu so [...] wie*" (almost as [...] as).

- **"*Nahezu, Beinahe, Fast*" (Almost, Nearly) as Focus Particle**
  Description: The addressee understands "*nahezu NP*" as an NP1, whereas NP1 is a subset of NP (but NP1 is not the same as NP) and NP minus NP1 is small [5]

- **Comparison "*Fast so [...] wie*" (almost as [...] as))**
  As there are only two examples in the corpus, it is not possible to give a conclusive analysis of the comparison use of "*fast*". Nevertheless there seems that there is a particular intonation pattern. There was a high pitch accent on "*fast*" as well as a rising tone on the adjective. This points out that the compared element gives the main information, for example 'so alt wie x *(as old as x)*'.

- **'Fast' as Adverbial**
  "*Fast*" as an adverbial occurs at the end of a sentence. It is similar to an idiomatic expression.

  (6)   GE: *Wir haben es fast. Wir habens fast.*
          EN: We're almost there. We've almost finished

4.2.4 Nur The particle "*nur*" can be used as a focus particle, as a modal particle, as a restrictive conjunction or as a multipartite conjunction.

- **"*Nur*" (Only) as Focus Particle**
  Description: The adressee understands the focus of "*nur*" as a singular choice out of a sets of alternative choices.

- **"*Nur*" (Just)**
  Description Modal particles are used to modify a statement and are mainly used in colloquial language. The speaker (or writer) expresses his/her amazement, doubt, resignation or annoyance.
  Unfortunately, the small number of examples does not allow a detailed analysis of "*nur*" in the function as modal particle. However, some hints that there was found rising tones on on "*nur*" itself and on the semantic head after the particle.

- **"*Nur*" (But) as Restrictive Conjunction**
  Description: The addressee understands the whole event (the sentence) as a restriction of another event that was mentioned before in the context.
  If "*nur*" (just) occurs at the beginning of a phrase followed by a finite verb, then "*nur*" is used as a conjunction. If "*nur*" is followed by an infinite verb and a comma, then it is about a topicalized focus particle.

---

[5] In set theory:
"*nahezu NP*" $\equiv$ NP1 , whereas NP $\not\subseteq$ NP1 and NP-NP1 is small

- **"*Nicht Nur*" (Not Only) as Multipartite Conjunction**
  In the construction "*nicht nur [...] sondern*" (not only [...] but) there is a particular intonation pattern. "*Sondern*" (but) recieves a high tone (a **H*** or a **H*L**) to contrast to the facts mentioned before. There was found only one example in the data.

5. DISCUSSION

This study is a starting point in the examination of focus particles and their influence on intonation. I was interested in finding triggers for typical German intonation contours. Focus particles were assumed to deliver this kind of information. Thus, I examined the surrounding of focus particles on spoken data. I observed two main phenomena regarding focus particles: generally a falling pitch accent on the lexical head of the subsequent phrase or if the information was mentioned before a falling pitch accent on the modification. There is no falling pitch accent on the focus particle itself.

Furthermore, some particles can be seperated from focus particles because of pitch accent. For instance, if "*selbst*" bears a falling pitch accent it used as a reflexive pronoun.

There is much more to say about focus particles, but to make statements about the data that was available, it seems that all focus particles suffer from the same phenomena.

Particle accumulation should be subject to further studies. Some remarks on this topic can be found in Müller (1998) [11]. Focus particles can be modified by other focus particles and it is far too much to say something about them in this study.

REFERENCES

[1]   Dogil G (1998 in print): Intonation of aspectual meaning: Remarks on NOCH in German. In:

[2]   Féry C. 1993. German Intonational Patterns. Niemeyer, Tübingen.

[3]   Grice, M., Reyelt M., Benzmüller R., Mayer J., Batliner A., 1996. Consistency in transcription and labelling of German intonation with GToBI. *Proceedings, 4th International Conference on Spoken Language Processing.* Philadelphia, 1716-1719

[4]   Hobbs J.R. 1990. The Pierrehumbert-Hirschberg theory of intonational meaning made simple: comments on Pierrehumbert and Hirschberg. In: Cohen P., Morgan J., Pollack M. (eds) *Intentions in Communications.* Cambridge, MIT Press, 313-323

[5]   Hoepelman J, Rohrer C (1981): *Remarks on Noch und Schon in German.* In: Tedeschi PJ, Zaenen A, Syntax and Semantics, Volume 14, Tense and Aspect

[6]   Jacobs, J. (1988). Fokus-Hintergrund-Gliederung und Grammatik. In Altmann, H. (ed) *Intonationsforschungen.* Niemeyer, Tübingen

[7]   König E (1991): *The Meaning of Focus Particles. A Comparative Perspective*, Routledge, London

[8]   Kuhn J (1996a): *On intonation and interpretation in context - is there a unitary explanation for focus and deaccenting?*, Master's thesis, Universität Stuttgart

[9]   Mayer J. 1997. Intonation und Bedeutung. AIMS Arbeitspapiere des Instituts für Maschinelle Sprachverarbeitung. Vol.3, No. 4, 68-87.

[10] Möhler G., Conkie A. 1998. Parametric modeling of intonation using vector quantization. *Proceedings of 3rd ESCA Workshop on Speech Synthesis.* Jenolan Caves, Australia.

[11] Müller K. 1998. German Focus Particles and their Influence on Intonation. Master Thesis. University of Stuttgart.

[12] Pierrehumbert J. 1980. The Phonology and Phonetics of English Intonation. PhD Thesis, MIT.

[13] Pierrehumbert J., Hirschberg J. 1990. The meaning of intonational contours in the interpretation of discourse. In Cohen P., Morgan J., Pollack M. (eds), *Intentions in Communications,* Cambridge, MIT Press, 271-311.

[14] Sternzeit des Deutschlandfunks, 24.07.96 - 06.10.97

[15] Stuttgarter Zeitung