

# Intonation and Syllable Structure: A Cross-Linguistic Study of German and Italian Conversations\*

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## Abstract

German and Italian have quite different rhythmic and/or melodic characteristics. This paper investigates the correlates of that impression, focussing on intonation and syllable structure. The data are made up of different types of repair activity in German and Italian conversations: problems of expectation, problems of understanding, and contradictions. It turns out that speakers of German and Italian use the same *intonational procedures* to constitute and contextualise activity types in conversations. For the two languages it is therefore possible to devise a uniform model of intonation contour assignment according to function. A comparison of the syllabic structures of the two languages reveals that the main source of the different impressions made by German and Italian prosodic structure is not intonation, but syllable structure. This accords with recent speech perception studies.

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## 1. Introduction

German and Italian are languages that have clearly different rhythmic and melodic characteristics. This observation and the evaluations which are often attributed to the differences by non-linguists are already present in the lectures on art held by the German philosopher August Wilhelm Schlegel in 1801, in which he compares the melodic properties of European languages. Schlegel considers Italian to be superior to German in its melodic quality. In his words (Schlegel 1963:263, 267):

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Italienisch "ist sanft und sonor, ohne im mindesten ins Weichliche zu verfallen [...] [während im Deutschen] der Mangel am Sonoren fast noch ein größerer Fehler als die Härte der allzu vielen, oft übel zusammengesetzten und am Ende der Wörter gehäuften Konsonanten" ist.

This paper tries to capture the reasons for the perceptual differences and focuses on two aspects of prosody which have recently been addressed by a series of studies in the field of speech perception studies (e.g., Ramus 2002; Grabe/Low (to appear); Ramus/Nespor/Mehler 1999; Ramus/Mehler 1999): intonation and syllable structure. In contrast to the cited studies which experiment with reanalysed sentences, my paper is located within the framework of conversation analysis:<sup>1</sup> dialogue sequences from semi-spontaneous conversations are subjected to qualitative and quantitative analysis. Conversation analysis is a qualitative method in which the data must be strictly limited and which thus does not allow statistic analysis in the way the cited studies do. But since the prosody of conversational utterances can differ remarkably from the prosody of read and reanalysed sentences,<sup>2</sup> the results obtained in laboratory studies must be controlled analysing real (semi-)spontaneous speech. Nevertheless, along with the cited speech perception studies, the present paper suggests that syllable structure better accounts for the rhythmic and melodic differences between German and Italian than intonation does.

The paper is structured in five sections. In section 2, the data will be presented. Section 3 is an analysis of intonation and other prosodic features in German and Italian other-initiated repair interactions. In section 4, the syllable structure of the analysed repair-interaction sequences is examined. Finally, in section 5, the results will be discussed.

## 2. Data

The data analysed here were extracted from two corpora of semi-spontaneous dialogues which were not created specially for the purposes of this investigation. The German utterances are taken from Kehrein's (2002) Lego corpus. This corpus was created to study the role of prosody in the expression of emotions in conversations. The participants speak a north-eastern variety of Standard German. The Italian utterances are extracted from recordings of Pisa Italian

1 For the principles of conversation analysis see Taylor/Cameron 1987:99–124 and Levinson 1983:294–332.

2 With regard to prosodic differences between speaking styles cf. Sorianoello 1997; Campbell 1995; Hirschberg 1995; Kohler 1995b.

from the AVIP map task corpus.<sup>3</sup> The AVIP corpus was created to examine intonation in different regional varieties of Italian. In both corpora the speakers have to execute communicative tasks without having a direct visual connection to one another.<sup>4</sup> This separation enables recordings of the speakers on different tape tracks and, therefore, reliable phonetic analyses even in the frequent cases of turn competition and overlapping speech.

For my paper six conversation sequences of more or less equal extent per language were extracted and analysed with respect to their prosody and syllable structure. The German sequences contain 220 syllables with a total length of 50.12 seconds, the Italian ones 229 syllables over a length of 38.81 seconds. The difference in duration is an effect of the unusually high speech rate in the Italian conversation A03 \_\_p.<sup>5</sup> The choice of the extractions was guided by functional criteria (see section 3). The extracts were transliterated according to the conventions of the German “Gesprächsanalytisches Transkriptionssystem” (GAT).<sup>6</sup> For the transcription of intonation, a ToBI annotation system was used (see below). Acoustic analyses of pitch (in *Hz*), intensity (in *dB*) and temporal structure (in *ms*) were performed with Praat.<sup>7</sup> The segmental structure of the acoustically analysed utterances is, in addition, transcribed phonetically in IPA notation.

### 3. Intonation: form and function in a cross-linguistic perspective

According to Ladd (1996:11) the *intonation* of an utterance is made of “categorically distinct entities”, e.g., pitch accents and boundary tones, and the “continuously varying parameters” of their physical correlates (first and foremost  $F_0$ ). The distinction between these two formal aspects of intonation is crucial here. The term *intonation pattern* designates the abstract representation of the speech melody of an utterance (e.g., as sequence of high and low tones). The term *intonation contour* covers more than this: the intonation contour of an utterance is the intonation pattern *plus* its phonetic specification, i.e., the height and extension of  $F_0$  peaks and valleys, range and register, the intensity of the

3 Archivio delle Varietà di Italiano Parlato. URL: <ftp://ftp.cirass.unina.it/avip/> [08.01.2003].

4 For details of the experimental setting cf. Kehrein 2002:149–175, and Savino 2000.

5 The authors of the recording remark in their introduction: “G [Alessia] si comporta come se stesse facendo una sorta di gara e dovesse portare F [Andrea S.] all’arrivo il più velocemente possibile.” URL: [ftp://ftp.cirass.unina.it/avip/mappa\\_a/pisa/A03/A03\\_\\_P.txt](ftp://ftp.cirass.unina.it/avip/mappa_a/pisa/A03/A03__P.txt) [08.01.2003].

6 Cf. Selting et al. 1998. GAT differentiates two types of accents (*PR*imary = primary accent, *sE*condary = secondary accent) and five types of final pitch movements (‘?’ = high rise, ‘,’ = low rise, ‘;’ = low fall, ‘.’ = high fall, ‘-’ = mid level).

7 Praat 4.0.3, see <http://www.praat.org> [08.01.2003].

signal, and the duration of the tone-bearing syllables.<sup>8</sup> For the representation of the intonation pattern a ToBI annotation system is used. In ToBI<sup>9</sup> the pattern is decomposed into high ('H') and low ('L') tones assigned to syllables which bear stress or mark the boundaries of prosodic constituents. Three tone types can be distinguished: *pitch accents* assigned to syllables which bear sentence stress, *phrase accents* aligned to the right edges of intermediate phrases and *boundary tones* which mark the right or left edge of an intonation phrase. It has been argued that there are language-specific sets of tones, and there is not even consensus on whether different regional varieties of the same language share the same basic set of tones.<sup>10</sup> Theoretical aspects of tone inventories in German and Italian within the ToBI framework have been intensively discussed in the last decade (e.g., Grice/Baumann/Benzmüller (to appear); Grice/D'Imperio/ Savino/Avesani (to appear); Grabe 1998; Grice 1995; Avesani 1995; Féry 1993; Uhmann 1991). Generally, whether a phonetic configuration is considered a pitch accent or not usually depends on whether it is a phonological unit or not. While Uhmann (1991:174) proposes an inventory for German made up of the tones which are necessary for the expression of seven different types of declarative and question sentences, Féry's (1993:82–96) inventory additionally contains tones like the triple L\*..H..L with a "meaning like 'of course' (or can also be slightly menacing)". In this paper, I cannot discuss the differences between the various intonation models and ToBI inventories.<sup>11</sup> In my approach the tones are labels for the representation of the intonation pattern,<sup>12</sup> i.e., pitch accents for the accented syllables, and phrase accents and boundary tones for the syllables on phrase edges. The choice of label is determined by perceptual impressions and uses the following inventory:<sup>13</sup>

8 This terminological convention parallels the distinction of the IPO approach between "pitch movements" and "pitch contours" on the one hand, and "intonation patterns" on the other. Cf. t'Hart/Collier/Cohen 1990:38–67.

9 Tone and Break Indices, cf. Beckman/Ayers 1997 for the original (English) ToBI and Pierrehumbert 1980 for the basic concept. My paper is concerned only with the tonal aspects of annotation.

10 But surprisingly there is no other systematic comparative study of German and Italian aside from my monograph (Rabanus 2001a). Cf. Rabanus 2001a:100–103.

11 See Rabanus 2001a:80–84 and 93–97 for a discussion of different inventories.

12 For a similar surface-oriented use of the ToBI labels in conversation analysis cf. Auer et al. 2001:128 f., and Selting 2001:68 f.

13 Thus the intermediate phrase ends in T-, the intonation phrase in T-..T%; T\* is the target tone of the pitch movement on the accented syllable ('T' always stands for 'tone' here). For details of my transcription see Rabanus 2001a:56–59. Note that these labels do not provide exact alignment information.

Pitch accents	Phrase Accents	Boundary Tones
H*	H-	H%
L*	L-	L%
H + L*		
L* + H		

With this inventory, a typical declarative sentence like *das ist eine ROse* 'that's a rose' with a contrastive accent on the first syllable of *ROse* ('a rose, not a tulip') and a clearly falling pitch movement at the end of the sentence is thus represented by H\*..L-..L%.

An intonation contour is a complex phonetic configuration which consists of a ToBI-represented intonation pattern and the supplementary information on its phonetic realization. The intonation contour is the result of the interaction of at least five different factors:

- (a) the anatomical and physiological properties of the speaker's articulatory apparatus;
- (b) the segmental basis of the utterances (sounds, syllables, words);
- (c) the purposes of the utterances (propositions, intentions etc.);
- (d) the linguistic context (preceding, following or overlapping utterances);
- (e) the speaker's emotional state and attitudes.

These factors trigger a high degree of variation even within the same language. It is a fundamental task of cross-linguistic analysis to separate the variation across speakers within one language from the variation across languages. Factors (a) and (b) cannot be kept constant between two languages because the words and sounds necessarily differ, and perfectly bilingual speakers are excluded from the present study since they form a very special class of speaker which must be examined separately. The factors which have to be controlled are thus (c)–(e). These factors encompass the functions of intonation, and a great deal of research has been dedicated to them. For example, the monograph by Kehrein (2002), from which the Lego corpus used here has been taken, is focused on factor (e). Probably the most influential model on the functions of intonation, Pierrehumbert and Hirschberg's (1990) study on English intonation, is concerned with factors (c) and (d). Its principles (Pierrehumbert/Hirschberg 1990:308) should be quoted here:

"Pitch accents convey information about the status of discourse referents, modifiers, predicates, and relationships specified by accented lexical items. Phrase accents convey information about the relatedness of intermediate phrases – in particular, whether (the propositional content of) one intermediate phrase is to form part of a larger

interpretative unit. Boundary tones convey information about the directionality of interpretation for the current intonational phrase – whether it is “forward-looking” or not.”

My comparative paper also concentrates on factors (c) and (d) but not on information structure. Instead of looking at propositional attributes like ‘given’ and ‘new’ or properties like the degree of ‘finality’ or ‘completeness’ of the utterance, I focus on activity types studied and defined in conversation analysis. In Levinson’s (1992:69) definition, the notion *activity type* refers to “a fuzzy category whose focal members are goal-defined, socially constituted, bounded events with *constraints* on participants, setting, and so on, but above all on the kinds of allowable contributions”. As paradigm examples Levinson mentions macrostructures like “job interview” which can be subdivided in the smaller categories usually studied in conversation analysis (e.g., the different types of questions examined in Selting 1996).

It is important to note that in conversation analysis we cannot assign meaning to isolated utterances. Conversation analysis is always sequential analysis, i.e., the meaning of an utterance is fixed only by the reactions to it displayed by the other conversation participants. This implies, on the other hand, that the meaning of an utterance that has already been phonetically realised can still be negotiated by speakers and possibly modified in the subsequent turns. This crucial aspect becomes particularly evident in so-called *repair activities* in which the signalling and the solving of problems in speaking, hearing, understanding, and assessing are addressed. Thus, the organization of repair has always held special interest for conversation analysts (recently, e.g., Egbert 2002, 1997; Uhmann 2001, 1997a, b; Drew 1997; Schegloff 1997a, b). Repair activity is initiated by speakers who notice conversational elements that prevent the conversation from continuing successfully. It is triggered by utterances that are retrospectively marked as trouble sources. In the model of Schegloff, Jefferson, and Sacks (1977:362–365), repair activities are initiated by the speaker of the trouble-source turn (self-initiation) or by the other participants in conversation (other-initiation). The repair initiation is followed by the repair outcome which can, again, be executed by the producer of the trouble-source turn (self-repair) or by another participant (other-repair). Schegloff, Jefferson, and Sacks point out that self-executed-activities (self-initiation, self-repair) and other-executed activities (other-initiation) are not equally valued. Self-execution is always preferred to other-execution because the intervention of other participants can easily damage the image of the speaker of the initial turn. Although some cultural differences in the organization of repair have been reported (e.g., in European vs. Samoan society), the basic principles can be considered language independent (cf. Egbert 2002: chapters 4.4.2, 6.2), at least for the strongly related cultures of Germany and Italy. Thus, repair-activity types are suitable functional categories for cross-linguistic comparison.

In this paper the prosody of three types of non-preferred repair activity in German and Italian is studied: problems of understanding, problems of expectation, and contradictions. The signalling of problems of understanding and problems of expectation are both other-initiated instances of repair. In contradictions, repair initiation and repair outcome coincide so that contradictions are other-initiated other-repairs. Beside the explicit verbalization of the problem, there are special linguistic *contextualization cues* (cf. Gumperz 1982:131 ff.) for other-initiated repairs (e.g., non-lexical speech perturbations, discourse particles<sup>14</sup> such as *hm, bitte, was* in German or *eh, come, cosa* in Italian, partial or complete repetition of the trouble-source turn),<sup>15</sup> but it can also be signalled without using any linguistic cue at all: the raising of an eyebrow or silence in lieu of a conditionally relevant turn<sup>16</sup> may be sufficient to signal a problem of expectation and initiate a repair sequence.

In the following paragraphs I will show how the differentiation of the three types of other-initiation could be achieved prosodically, through the way in which speakers reproduced the contour of the trouble-source turn. The analysis shows that this reproduction primarily affected the pitch accents whereas edge tones could be produced independently of the previous contour so as to provide information on the embedding of the intermediate phrase (phrase accents) or the directionality of the intonation phrase (boundary tones), as suggested by Pierrehumbert and Hirschberg (1990).

### 3.1 Problems of expectation

The signalling of a *problem of expectation* ("lokales Erwartungsproblem", Selting 1987a: 139) is an other-initiated repair in which the speaker reacts to an utterance in a preceding turn and signals that (s)he considers this utterance problematical and did not expect it in the given context. It usually triggers self-repair. It can be defined as follows: a turn B has to be classified as the signalling of a problem of expectation if (i) there is a turn A which can be interpreted as a trouble source, (ii) the proposition of the trouble source is marked in some way as 'not expected' in turn B, and (iii) the speaker of the trouble source tries to repair his utterance in turn C.

14 For details on the functions of discourse particles in conversations cf. Kehrein/Rabanus 2001.

15 Cf. Schegloff/Jefferson/Sacks 1977:367f.; Uhmman 1997a:160; Egbert 2002: chapter 4.2.1.

16 Cf. Uhmman 1997b:81.

German<sup>17</sup>

The nature of problems of expectation in German is illustrated in extract (1). The speakers, both female university students, have to work together to build an object using Lego bricks without being able to see one another. In (1), Regina, who has the construction manual, is describing a particular brick to Ruth, whose task is to put the Lego bricks together.<sup>18</sup>

## (1) Lego corpus, RE/RU 452–453

- 1 Regina: im querschnitt; ein ein ein äh krEuz ergebn.  
*in the transverse section, it's like a cross*
- 2 Ruth: ja das tUn sie ALLe;  
H\* H+L\*L-L%
- they are all that*
- 3 Regina: <<f, h> ALLe?>  
L\*H-H%
- all of them?*
- 4 Ruth: JA,  
yes

Regina is very surprised by Ruth's utterance in line 3. She therefore signals a problem of expectation with regard to the prior utterance, thus rendering the former a trouble-source turn. Having consulted the manual, Regina is convinced

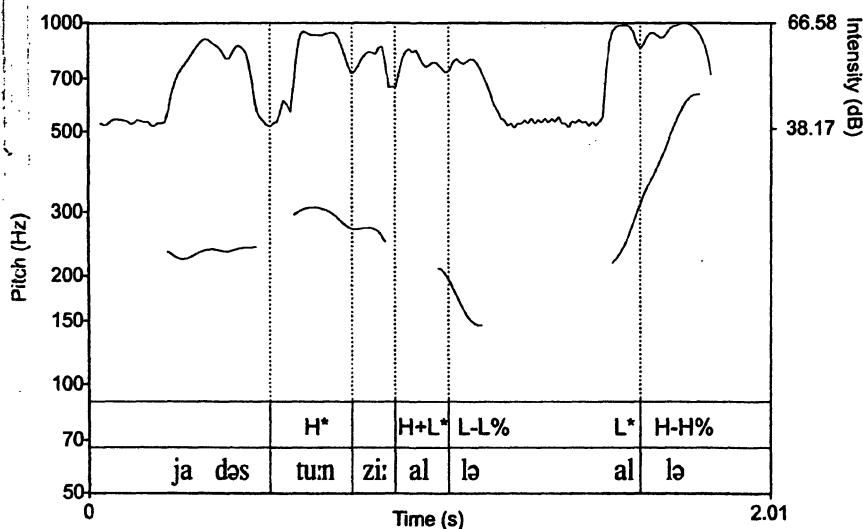


Fig. 1: extract (1), lines 2–3

17 For further analyses of the prosody of problems of expectation in German see Rabanus 2001a:166–169; Selting 1996; 1995:164–177, 293–304; 1987a, b.

18 Cf. Kehrein 2002:234–236 for an analysis of the expression of emotional meaning in this sequence.



that there is only a single brick which matches her description. The utterance in line 4 is the starting point of the repair. In the utterances directly following the quoted sequence, Ruth gives an account of the differences and similarities of the bricks from her point of view.

Figure 1 shows the acoustic analysis of fundamental frequency and intensity of the utterance pair in lines 2–3 in addition to the segmental and tonal structure of the utterances. The syllable [al], which bears the main stress, is associated with a low target tone in both utterances. In line 2, it is a falling tone H + L\*. In line 3, the target is heard as an L\* tone even without a preceding peak.<sup>19</sup> Thus, the pitch accent and the temporal extension (125 ms) of the most prominent syllable in line 2 are reproduced in the most prominent syllable of line 3. But the  $F_0$  target itself is lowered with respect to the mean offset values of the speakers.<sup>20</sup> In line 3, the  $F_0$  of L\* is 215 Hz, which is 5.1 semitones (ST) above Regina's mean offset value. In line 2 it is 226 Hz which corresponds to a relative height of 8.4 ST above Ruth's mean offset value. But the lower  $F_0$  minimum is aligned to a higher intensity peak. In table 1 the acoustic values of the utterance pair are summarized.

Table 1: Values of extract (1), lines 2–3

	H + L* (line 2, Ruth)	L* (line 3, Regina)
$F_0$ target	226	215 Hz
semitones	8.4 ST	5.1 ST
intensity	59 dB	66 dB
duration	125 ms	125 ms

Auditorily, these processes – the lowering of the L\* and the increase in its intensity – trigger the effect of a *reinforcement* of the trouble source in the problem-of-expectation turn. The first participant recognizes the coherence between the two utterances and interprets the prosodic reinforcement as a contextualization cue for the problem of expectation.

Extract (2) shows another problem of expectation in the same Lego corpus context.

19 The auditory impression is confirmed by the acoustic measurement. The pitch of the first syllable is only 215 Hz, far below Regina's mean onset value of 273 Hz if followed by a high offset. Cf. Kehrein 2002:178 (Regina = RE).

20 Since the Hertz values are relative to the corresponding voice it is not possible to compare them directly. The values have to be normalized. This is done here by calculating the distance between the actual value (in Hertz) and the arithmetic mean of all of the speaker's low boundary tones (mean offset value). The distance is expressed in semitones (ST). See Rabanus 2001a:56 for a description of the method. The mean offset value for Regina (RE) is 160 Hz, and for Ruth (RU) 139 Hz, cf. Kehrein 2002:178.

## (2) Lego corpus, RE/RU 430-436

- 1 Regina: hAs du dAs?  
*have you got that?*
- 2 Ruth: ja;  
*yes*
- 3 un da zwAr hab ich die aber in verschIEdenen LÄNgn.  
L\* H- H\* L\*L-L%
- and here I've got them but in different lengths*
- 4 Regina: <<p>ach das hAs du in verschiedenen LÄNgn. >  
H\* H\*L-L%
- aha, you've got that in different lengths*
- 5 Ruth: also ich [hab zwei große,  
*well, I've got two large*
- 6 Regina: [hmhm-
- 7 ja: . pf-  
*yes*
- 8 nImm EInfach ma EIns;  
*just take one*
- 9 nE?  
*okay?*

Here the speakers disagree about the length of the bricks in question. In line 3, Ruth explains that the brick Regina was trying to describe in the preceding turns is available in two different lengths. In line 4, Regina marks Ruth's reactions as 'not expected' (Regina's presupposition that there was only one brick with the described properties becomes evident in the subsequent conversation (not quoted here)). The coherence of the two utterances is marked by their almost identical choice of words. In table 2 the phonetic values of the nuclear pitch accents are compiled.

Table 2: Values of extract (2), lines 3-4

	L* (LÄNgn, line 3, Ruth)	H* (LÄNgn, line 4, Regina)
F <sub>0</sub> target <sup>21</sup>	(135 Hz)	(307 Hz)
semitones <sup>22</sup>	(-0.5 ST)	(11.3 ST)
intensity	61 dB	58 dB
duration	445 ms	475 ms

The problem of expectation (line 4) is prosodically marked mainly by the substitution of an H\* for the L\* of the trouble-source. But the substitution also reinforces the trouble-source contour, an effect which is supported by the longer duration of the accent syllable, whereas the intensity is lower than in the trouble source.

21 The pitch values are in parentheses because, being realizations of different tones, they cannot be compared directly.

22 The semitones always refer to the distance between the actual and the mean offset value for the speaker.

Italian<sup>23</sup>

Sequence (3) is extracted from the AVIP map-task corpus. The global purpose behind the AVIP conversations is similar to that of the German Lego corpus in that the subjects have to execute a communicative task without having direct visual contact. The dialogue between Alessia (a female student) and Andrea S. (a male student) is about finding certain destinations using two street maps of a virtual city. The task is rendered more difficult by the fact that the maps are not identical. The objects Alessia is referring to in extract (3) is *PORTico* 'colonnade':

## (3) AVIP corpus, A03\_\_p, G051–G055

- 1 Alessia: e vai al PORTico,  
H+L\*H-L%
- and then go to the colonnade*
- 2 il pOrtico te lo trovi sulla siNISTra,  
H% H\* L- H+L\*H-L%
- you find the colonnade on the left*
- 3 Andrea S.: mhmh;
- 4 Alessia: [ci SEI,  
*did you get it?*
- 5 Andrea S.: [il PORTico-  
H\* L-
- 6 il PORTico-  
H+L\*H-L%
- the colonnade*
- 7 [sicUra che c'è un PORTi[co-  
H\* H+L\*H- L%
- are you sure that there is a colonnade*
- 8 Alessia: [mh [SI-  
*yes*

Andrea is not able to identify the colonnade on his map and doubts that there is one. Therefore he signals a problem of expectation in lines 5 to 7. In line 8, Alessia starts her repair activity, insisting on the existence of the colonnade. In the conversation following line 8 she supplies further information on its location.

In figure 2, the analyses of lines 1–2 (fig. 2a) and 5–7 (fig. 2b) are pictured. For both H\*..L- and H+L\*..H-..L% carried by [pɔrtiko] in lines 5–7 we find a corresponding pattern in lines 1–2. The patterns are mirrored so that in the representation of the whole sequence the H\* accents are surrounded by H+L\*

23 Cf. Rabanus 2001a:169–174 for additional analyses of problem-of-expectation turns in Italian.

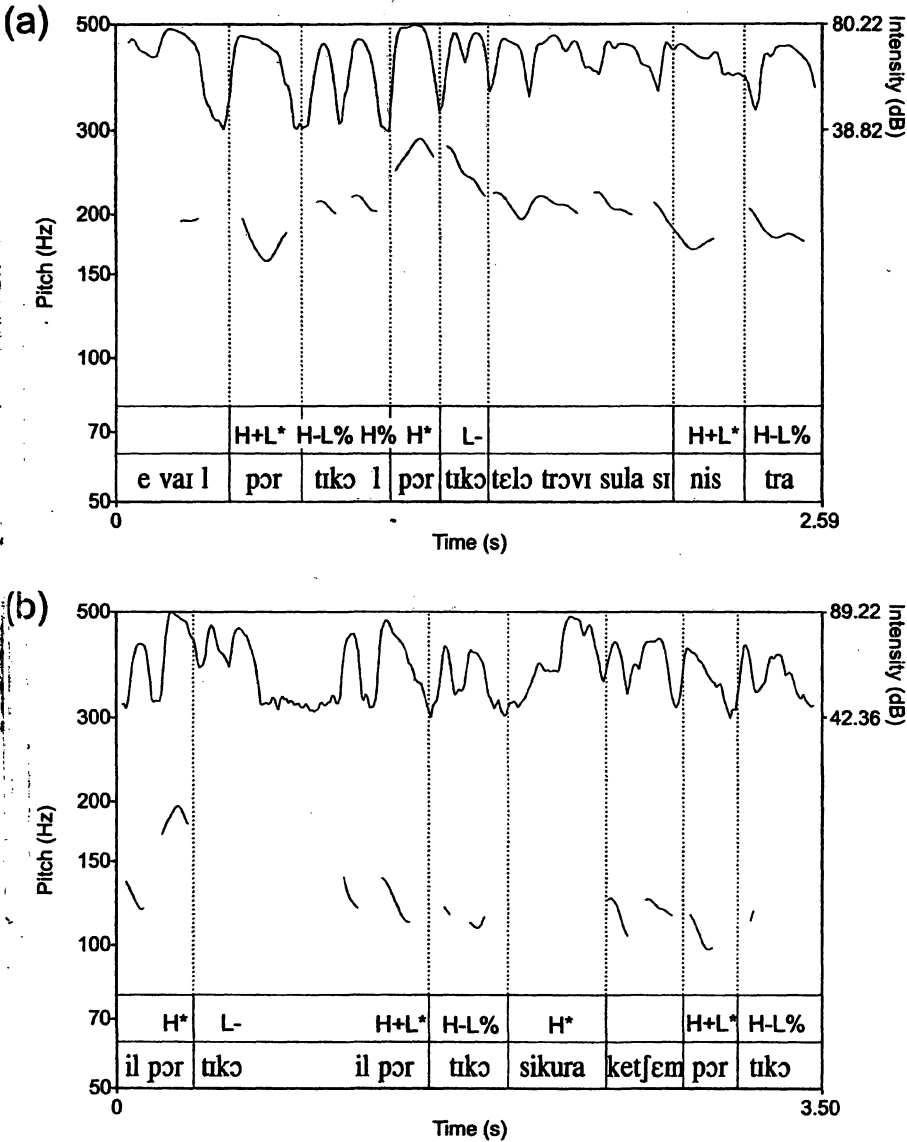


Fig. 2: extract (3), lines 1–2 (a), 5–7 (b)

accents. The coherence of the repetition is additionally strengthened by the length of the accented syllables (see table 3). Since Andrea is male and Alessia female and I have no data with which to normalize the Hertz values of tone targets, the difference in the  $F_0$  peaks is not interpretable (and is hence shown in brackets in table 3). But the difference in intensity is striking.<sup>24</sup> In sum, the

<sup>24</sup> Note that the values in the table refer to the accented syllable as a whole, and not only to the syllable part aligned with the tone target. The intensity maxima of 80 dB and 85 dB in (3), lines 1–6 are aligned to the H in H+L\*, and not the L\*, as attested by fig. 2.

problem-of-expectation contour is much 'louder' than the trouble-source contour.

Table 3: Values of extract (3), lines 1-2, 5-6

	H* (line 2, Alessia)	H* (line 5, Andrea S.)	H+L* (line 1, Alessia)	H+L*(line 6, Andrea S.)
F <sub>0</sub> target	(298 Hz)	(200 Hz)	(155 Hz)	(110 Hz)
intensity	75 dB	89 dB	80 dB	85 dB
duration	170 ms	170 ms	260 ms	260 ms

In extract (4), two young male speakers (Gabriele and Andrea G.) are trying to find their way across the map. The point of reference in (4) is a restaurant which has different names in the two maps.

(4) AVIP corpus, C03\_\_p, G097-F104

- 1 Gabriele: e pOI vai su SU,  
*and then go down*
- 2 Andrea G.: sì,  
*yes*
- 3 Gabriele: eeh-
- 4 ce l'hAI ristorante di mAmma MIa;  
*there you've got the restaurant Mamma Mia*
- 5 Andrea G.: Anima mIa;  
H\* L\*L-L%  
*Anima Mia*
- 6 Gabriele: Anima mIa,  
H\* H\*L-H%  
*Anima Mia*
- 7 Andrea G.: E;
- 8 Gabriele: ah Io c'ho MAMma [mIa];  
*um, I've got Mamma Mia*
- 9 Andrea G.: [e Io anima MIa;  
*and I've got Anima Mia*
- 10 va BE';  
*okay*

Becoming aware of the different names, Gabriele signals a problem of expectation in line 6. Andrea's repair in line 10 consists in the invitation to ignore the obvious difference in naming and to go on. Table 4 summarizes the phonetic differences between the lines 5 and 6. Whereas the intensity of the accented syllables is identical, their duration is slightly expanded in the problem-of-expectation turn. The first H\* has a higher pitch value in the problem-of-expectation turn, and the second H\* replaces an L\*. Again, the intonation contour of the problem of expectation results in a reinforced trouble-source contour.

Table 4: Values of extract (4), lines 5–6

	H* ( <i>Anima</i> , line 5, Andrea G.)	H* ( <i>Anima</i> , line 6, Gabriele)	L* ( <i>mIa</i> , line 5, Andrea G.)	H* ( <i>mIa</i> , line 6, Gabriele)
F <sub>0</sub> target	113 Hz	139 Hz	(80 Hz)	(131 Hz)
intensity	68 dB	68 dB	63 dB	63 dB
duration <sup>25</sup>	650 ms	760 ms		

### Comparison

The intonation contours of the problem-of-expectation turns exhibit a high degree of variation with regard to all points of reference: within speakers, within languages, and across speakers and languages. This variation is due to the factors listed above. Nevertheless we find systematicity in both the German and the Italian data. All problem-of-expectation contours are strengthened reproductions of the respective trouble-source contours. The notion of 'reinforcement' describes the auditory impression, which can be based on changes made to any of the prosodic properties of the utterance: to  $F_0$ , intensity or temporal extension of the accented syllable. In the examples presented above we see that it is possible, but not necessary, to increase the value of all prosodic features to gain the reinforcement effect. In the problem-of-expectation turn in extract (4), line 6, the pitch is raised and the syllable duration lengthened, whereas the intensity remains constant with respect to the trouble-source turn. In (3), lines 5–6, the values for the intensity are increased, but the duration is unchanged (pitch cannot be compared because of the gender difference of the speakers). In (2), line 4, the intensity is reduced, the duration expanded, and the low tone target of the trouble-source contour (line 3) is replaced by an H\* in the problem-of-expectation contour (line 4). Extract (1) is a special case because here we have a low tone target in both the trouble source (line 2) and the problem of expectation (line 3). The L\* tone in the problem-signalling turn is perceived as being reinforced. Thus, while an H\* is reinforced by increasing its  $F_0$ , the reinforcement of an L\* accent entails the opposite: decreasing its  $F_0$ . In (1), line 3, this effect is supported by the rise in intensity while the temporal extension remains the same.

Extract (1), line 3 presents the only problem-of-expectation contour which lacks an H\*. In all other extracts, the problem-of-expectation contour contains at least one H\*. In (2) and (4), L\* accents in the trouble-source contour are replaced by H\* accents in the problem-of-expectation contour. In these cases, the trouble-source contours are not only reinforced but also modified in the problem-of-expectation turn.

<sup>25</sup> Because of the extreme shortness of the accented syllables, the duration values are for the entire utterances (lines 5 and 6, respectively).

To sum up: the reinforced reproduction of the preceding contour (of the trouble-source turn) and the addition of an H\* accent is a contextualization cue for the activity type 'problem of expectation'. With regard to the intonational procedures (see section 3.4) the data show no differences between German and Italian.

### 3.2 Problems of understanding

The definition of a *problem of understanding* ("semantisches Zuordnungsproblem", Selting 1987a: 134) is very similar to the problem of expectation: a turn B is the signalling of a problem of understanding if (i) a preceding turn A is interpretable as trouble source and (ii) a following turn C contains some kind of repair activity. But in problems of understanding the trouble source is not contextualized as 'not expected'. A speaker signals a problem of understanding if (s)he cannot assign any meaning to turn A or parts of it but there is no contradiction between the proposition of the trouble source and the speaker's own expectations. The activity types problem of expectation and problem of understanding thus form a minimal pair whose distinctive feature is the value [ $\pm$  not expected] they assign to the trouble-source turn.

#### German<sup>26</sup>

In (5), Regina is explaining the size of the Lego brick needed to continue the construction.

- (5) Lego corpus, RE/RU 193–197
- 1 Regina: DASS.  
*that*
- 2 ähm: -  
*um*
- 3 vIER ma' öh sEchs mal Acht hOch is.  
H\* H\* H- H\* L\* L-L%
- is four by, er six by eight long*
- 4 Ruth: <<p> sEchs mal Acht.  
H\* L\*L-L%
- six by eight*
- 5 mOment, >  
*one moment*
- 6 Regina: prAktisch als grUnd[fläche. wIE: - ((bläst))  
*practically as its area, like*
- 7 Ruth: [eh eh,
- 8 jA=jA.  
*yes yes,*
- 9 verstEh schon.  
*I understand*

26 Cf. Selting 1995:164–167, 292 f. for further analyses.

Ruth's utterance in line 4 is *interpreted* by Regina as signalling a problem of understanding – as is attested by her repair initiation in line 6 – although it was not *intended* as such by Ruth. She therefore impatiently cuts Regina's repair short after the first turn construction unit in line 6. (Nevertheless, the subsequent turns show that proceeding further indeed needs clarification.)

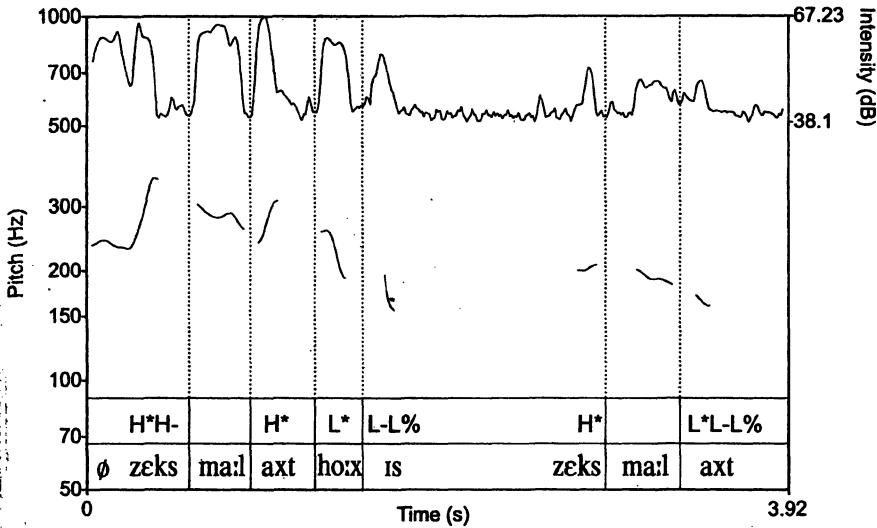


Fig. 3: extract (5), lines 3–4

Table 5: Values of extract (5), lines 3–4

	H* ( <i>sEchs</i> , l. 3, Regina)	H* ( <i>sEchs</i> , l. 4, Ruth)	L*L-L% ( <i>hOch is</i> , l. 3, Regina)	L*L-L% ( <i>Acht</i> , l. 4, Ruth)
$F_0$ target	312 Hz	209 Hz	181–160 Hz	171–161 Hz
semitones	11.6 ST	7.1 ST	2.1–0 ST	3.6–2.5 ST
intensity	67 dB	52 dB	61 dB	48 dB
duration	400 ms	345 ms	290 ms	410 ms

The description of the brick which causes the problem is associated with the tone sequence H\*..L\*..L-..L% in line 4 – the same as in line 3 but with a different alignment. Whereas in line 3 the H\* aligned with [ze:ks] is repeated on [axt], in line 4 the lack of [ho:x is] causes the final pattern L\*..L-..L% to shift to the syllable [axt] and the second H\* to disappear (fig. 3 and table 5 show the phonetics of lines 3–4). The trouble-source turn in line 3 is much more prominent than the problem of understanding in line 4, and its  $F_0$  range is wider, i.e.: the  $F_0$  maxima are higher and the  $F_0$  minima are lower, relative to the voices. The contextualization cue for the problem of understanding is thus the *weakening* of the contour of the trouble-source turn.



- (6) Lego corpus, RE/RU 350-355
- 1 Regina: <<len> genAU. >  
*exactly*
- 2 und dann stEht äh: -  
*and then there's um*
- 3 EIn son pUnkt Über  
 L\*+H H\* H\*L-  
*a kind of dot above*
- 4 glAUb ich. (.)  
 L\* L-L%  
*I think*
- 5 kAnn das sEIn?  
*is that right?*
- 6 Ruth: hm: : ((breathes out))
- 7 EIN pUnkt Über?  
 L+H H\* H\*L-H%  
*one dot above?*
- 8 Regina: könnte das sEIn=hInkommen?=  
*could that be right, work out?*
- 9 =das sIEht man hier nich so gUt;  
*you can't see that so clearly here*
- 10 so ge[nAU. sch'  
*so exactly*
- 11 Ruth: [also also von mir-  
*well, well as far as I'm*
- 12 also das is ja nu son langes TEIL nE,  
*well that's yeah now a long piece okay?*

In extract (6), it is the description of the outcome of an intermediate step in the construction of the Lego object which causes the problem of understanding. The utterance *EIn son pUnkt Über* in line 3 has a rich intonation pattern which is repeated exactly in line 7, but with a much less prominent contour. Table 6 shows that the main correlate of the impression of a reproduced but weakened contour in line 7 is intensity. The pitch and duration values are almost the same in both the trouble-source and problem-of-expectation turns, the last H\* tone has an even higher pitch and the associated syllable a longer duration in the problem-of-expectation turn.

Table 6: Values of extract (6), lines 3, 7

	L*+H (EIn, l. 3, Reg.)	L*+H (EIN, l. 7, Ruth)	H* (pUnkt, l. 3, Reg.)	H* (pUnkt, l. 7, Ruth)	H* (Über, l. 3, Reg.)	H* (Über, l. 7, Ruth)
$F_0$ target	240-355 Hz	220-350 Hz	345 Hz	305 Hz	296 Hz	308 Hz
semitones	7-13.8 ST	8-16 ST	13.3 ST	13.6	10.7 ST	13.8 ST
intensity	66 dB	63 dB	62 dB	59 dB	64 dB	58 dB
duration	335 ms	315 ms	200 ms	200 ms	280 ms	350 ms





### Comparison

While the problem-of-expectation activity type causes reinforcement of the reproduced contour, the problem-of-understanding type triggers *weakening* of it. As for the acoustic cues, intensity is reduced in all problem-of-understanding turns. In the Italian utterances in (7), line 2, and (8), line 4, the pitch accent bearing syllable is, additionally, always shortened (pitch cannot be compared because of the gender difference). The picture is less consistent in the German material: in the problem-signalling turns (5), line 4, and (6), line 7, the acoustic values of pitch and temporal extension are sometimes decreased, sometimes not. It seems that the main acoustic correlate of weakening is the reduction of intensity. In order to answer the question of whether or not the acoustic features are more consistent in creating the auditory effect of weakening in Italian than in German, we would need a larger corpus. But since the weakening is observed without exception, it can be considered a contextualization cue for the activity type 'problem of understanding' in both German and Italian, even on the basis of a limited corpus.

### 3.3 Contradiction

From the perspective of conversation analysis, a *contradiction* belongs to the category of other-initiated other-corrections (cf. Schegloff/Jefferson/Sacks 1977:378–381). In contradictions the repair initiation and the repair outcome are realized simultaneously. The occurrence of other-corrections is very restricted because it can easily damage the image of the addressee. Speakers tend to avoid other-corrections: they prefer signalling a problem of understanding or expectation in order to make the addressee execute a self-repair (as illustrated in the examples above).<sup>28</sup> Speakers usually execute other-corrections only if their problem signalling does not have the effect of triggering a self-repair. A contradiction is defined as follows: a turn B has to be interpreted as contradiction if (i) it is preceded by a turn A interpretable as trouble source and (ii) if there is a propositional difference between the turns A and B. In most cases the difference consists in the negation of (parts of) the proposition of turn A.

#### German<sup>29</sup>

In (9), the speakers Ruth and Regina treat the placement of a tube with respect to a brick identified before:

28 Cf. Schegloff/Sacks/Jefferson 1977, Selting 1987b.

29 Cf. Rabanus 2001a:198–209 for further analyses.

## (9) Lego corpus, RE/RU 1063–1069

- 1 Ruth: ich dAchte da soll das grade RAUF;  
H\*L-L%
- I thought that it had to go on  
2 auf die[sen STEIN.  
on that brick
- 3 Regina: [<<f> da sOll s REIN; >  
H\* H\*L-L%
- it should go in there,  
4 [in dEn stEIn den wir schon lAngst dRAUFgesetzt HATtn;  
in the brick that we should have already put
- 5 Ruth: [<<h> REIN?>  
in?
- 6 Regina: auf die konstruktION; =  
on the construction  
7 =in schritt DREI schon berEits.  
back in step three
- 8 Ruth: das soll da-  
that should go  
9 ach SO: .  
aha!
- 10 das soll da REIN;  
that should go in there

The contradiction is in line 3: Regina negates Ruth's supposition that the tube has to be put *on top* (RAUF) of the brick. Her correction is that it has to be placed *inside* of it (REIN). In signalling a problem of expectation (not analysed here) in form of an astonished question (line 5), Ruth tries to defend her image as a partner who is following the conversation. She accepts Regina's correction only after further explanations in lines 6–7.

Table 9: Values of extract (9), lines 1, 3

	H* (RAUF, line 1, Ruth)	H* (REIN, line 3, Regina)
F <sub>0</sub> target	349 Hz	428 Hz
semitones	15.9 ST	17 ST
intensity	66 dB	77 dB
duration	340 ms	480 ms

The acoustic analysis shows two extremely high peaks associated with the specification of place. But the second H\* pitch accent is even stronger than the first with respect to all phonetic features. The intonation contour of the contradiction turn is, consequently, perceived as reinforced with regard to the logically linked trouble-source turn.

(10) is extracted from the same context and treats exactly the same problem: the position of the tube in question.

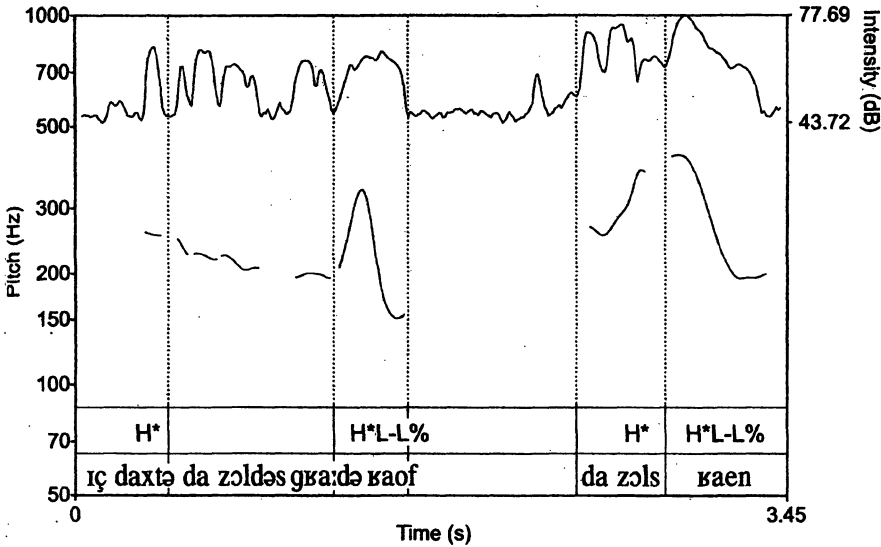


Fig. 5: extract (9), lines 1, 3

- 1) Lego corpus, RE/RU 1037-1040
- 1 Regina: und dA stEckst du-  
*and there you put*
- 2 Ruth: un da soll ich das RAUF[steckn.  
 H+L\*L-L%  
*and I put it on there*
- 3 Regina: [ <<f> dAs REIN. >  
 H\* L\*L-L%  
*in there*
- 4 durch das LOch.  
*through the hole*
- 5 inner MITte.  
*in the middle*

Table 10 shows the phonetic properties of the expressions *RAUFsteckn* (line 2) and *dAs REIN* (line 3). All of the values for the pitch decline on the nuclear accent are increased in the contradiction turn, except the height of the initial peak (14 ST in line 2 vs. 11.8 ST in line 3). But note that the initial  $F_0$  maximum is realized as a high pitch accent (H\*) only in the contradiction turn. In line 2, it is only a local maximum preceding the low pitch accent. We see that the prosody of Regina's contradiction is, once more, a reinforced reproduction of Ruth's initial intonation contour.

Table 10: Values of extract (10), lines 2–3

	H + L* (line 2, Ruth)	H* L* (line 3, Regina)
$F_0$ target	312–166 Hz	316–290 Hz
semitones	14–3.1 ST	11.8–10.3 ST
intensity	65 dB	80 dB
duration	190 ms	550 ms

Italian<sup>30</sup>

Extract (11) is taken from Gabriele and Andrea G.'s interaction. On their way through the virtual city Gabriele asks Andrea in line 1 to confirm the *leOne* 'lion' as a point of reference. In line 3, Andrea gives the requested confirmation and proposes a way to deal with the object. In saying *lo SPACco in due* Andrea is joking because he believes the lion to be of minor importance for the continuation of the walk. In line 6, Gabriele contradicts that assumption and says, in line 8, that Andrea has to pass nearby the lion.

(11) AVIP corpus, C03\_\_p, G091–F094

- 1 Gabriele: ce l'hAI un [leOne?  
*have you got a lion there?*
- 2 Andrea G.: [Sì;  
*yes*
- 3 [l lo lo lo: lo SPACco in due.  
H\* H- L%  
*I cut it in half*
- 4 Gabriele: [EH- prAti-  
*so then*
- 5 NO;  
H\*L-L%  
*no*
- 6 nOn lo [SPACca' in [due.  
H\* L\* L- L%  
*don't cut it in half*
- 7 Andrea G.: [NO. [AH;  
*no er*
- 8 Gabriele: ci pAssi: inTORno.=  
*go round it*
- 9 Andrea G.: =Sì.  
*yes*

In figure 6 we see that Gabriele's contradiction imitates the intonation pattern of line 3, but the alignment of the pitch accents is different: the H\* associated with *SPACco* in line 3, is shifted forward to [nOn] in line 6, while [spakka] gets a L\* pitch accent instead of H\*. The pitch of H\* is much higher in line 6 than in line 3

30 Cf. Rabanus 2001a:210–218 for further analyses.

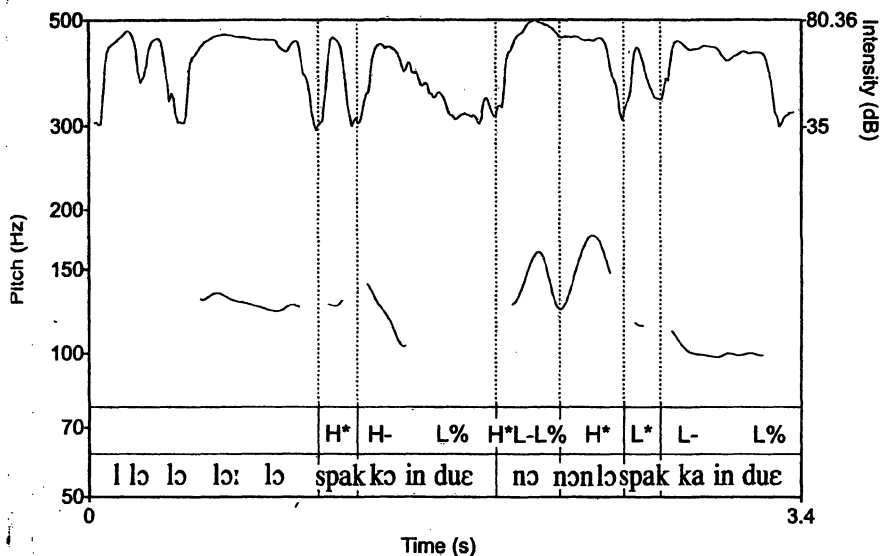


Fig. 6: Analysis of extract (11), lines 3, 6

which creates the effect of a reinforced contour in the contradiction turn, regardless of the identical intensity and reduced duration of the accented syllable.

Table 11: Values of extract (11), lines 3, 6

	H* (SPACco, line 3, Andrea G.)	H* (nOn, line 6, Gabriele)
F <sub>0</sub> target	128 Hz	177 Hz
Intensity	73 dB	73 dB
Duration	320 ms	200 ms

In extract (12), once again, Alessia and Andrea S. are interacting. Andrea verbalizes his last moves. While he is saying, in line 2, that he made a circle which brought him back to the hotel, Alessia interrupts him (line 3) and produces a contradiction in line 4.

## 12) AVIP corpus, A03\_\_p, F196-G199

- 1 Andrea S.: *ciò ho fatto un giro LARGO;*  
*so, I've done a big curve*  
 →2 *però sto tornando sull'alBER[go Io.*  
H\* L- H\*L-L%  
*but now I'm heading back to the hotel*
- 3 Alessia:  
[eh NO;  
ah no
- 4 *devi invece salire;*  
 5 H\*L-L%  
*you have to go up*



- 6            *devi risaLIR,*  
               *you have to go up again*  
 7            *non te l'ho DETto;*  
               *didn't I tell you that*  
 8            [*scUsa;*  
               *sorry*  
 9 Andrea S.: [*aha,*

Although the words of trouble source and contradiction are different, the intonation of the nucleus accent on *saLIRE* in line 4 exhibits the same high peak as that characterizing *alBERgo* in line 2. Table 12 shows that the pitch of H\* in line 4 is much higher than in line 2. This is also perceived as higher, even if the gender difference between Alessia and Andrea is taken into consideration.

Table 12: Values of extract (12), lines 2, 4

	H* ( <i>alBERgo</i> , l. 2, Andrea S.)	H* ( <i>saLIRE</i> , l. 4, Alessia)
$F_0$ target	138 Hz	324 Hz
intensity	78 dB	72 dB
duration <sup>31</sup>	(249 ms)	(280 ms)

### Comparison

We can observe a high degree of variation in the intonation contours in the contradiction turns. But all contradiction contours, in both the German and Italian extracts, can be considered as reinforced reproductions of the respective trouble-source contours. In (9), line 3, the value of all acoustic parameters are increased. The contradiction turn in (10), line 3 shows higher intensity and longer duration, and the pitch moves in a higher register (even though it starts from a relatively lower level, and the overall range of movement is reduced). In (11), line 6, and (12), line 4, pitch is higher while intensity and duration are either identical or reduced with respect to the trouble source. It seems that the main prosodic feature of reinforcement in contradictions is the presence of an increased H\* in both German and Italian. In German, intensity and duration are more likely to support the effect of reinforcement than in Italian.

### 3.4 Intonational procedures in repair initiations

The sections 3.1–3.3 have shown that intonation is systematically used by speakers to mark the coherence between trouble-source and problem-signalling turn. This coherence is expressed by speakers reproducing the intonation

31 The duration cannot be compared because the accented syllables have a different syllabic structure.

pattern of the linked utterances and modifying their phonetic values (i.e., the intonation contour) according to the type of other-initiation. Thus, a repair initiation is a problem of understanding if the contour of the trouble-source turn is weakened and a problem of expectation or a contradiction if it is reinforced. Contradictions and problems of expectation are not necessarily differentiated by prosodic means. I refer to the way in which speakers treat the intonation contour of a related utterance to achieve the auditory effects of reinforcement, weakening, or modification as *intonational procedure* (cf. also Rabanus 2001b, 2000). With respect to these intonational procedures, I propose the model for German and Italian intonation depicted in figures 7–9. In this model, the production of the intonation contour is conceived as the result of selections from each of three components governed by the activity type of the target utterance.

In the first component a source contour is selected from the conversational context. This *source contour* is that of the preceding utterance to which the speaker refers. For the other-initiations under investigation here this is always another speaker's utterance: the trouble-source turn. The intonation contour of the trouble-source turn is the input for the model.

The second component serves to assign the tones which are obligatory for the respective repair initiation. As shown in the preceding sections there are no obligatory tones in the signalling of problems of understanding: almost all tone types occur. Hence the tone component is inactive in figure 7. But there is always an H\* pitch accent in contradictions (in German and Italian), regardless of whether it was present in the source contour or not. In figure 9, this process is symbolized via an obligatory H\* tone inserted into the pattern adopted from the source contour. In problems of expectation, an H\* tone occurs in three of the

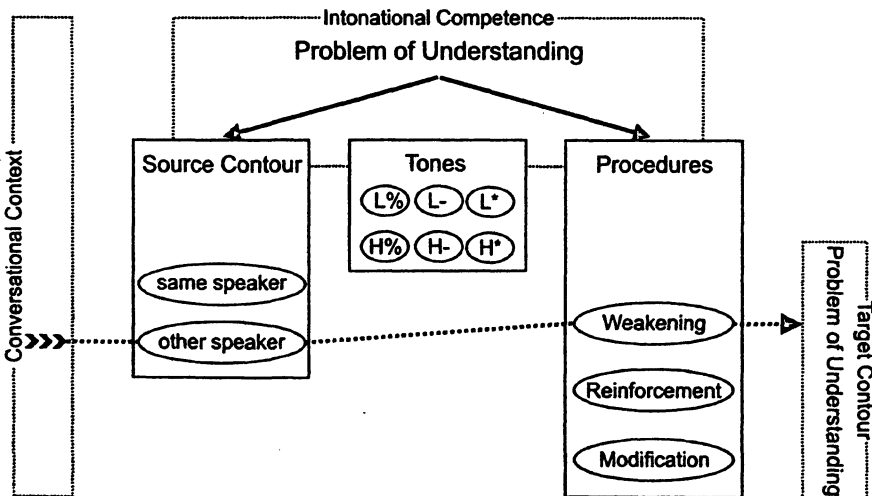


Fig. 7: Intonation of problems of understanding

four examples studied here (not in extract (1), line 3). Thus, the possible but not necessary insertion of an H\* pitch accent is indicated by the dotted line in figure 8.

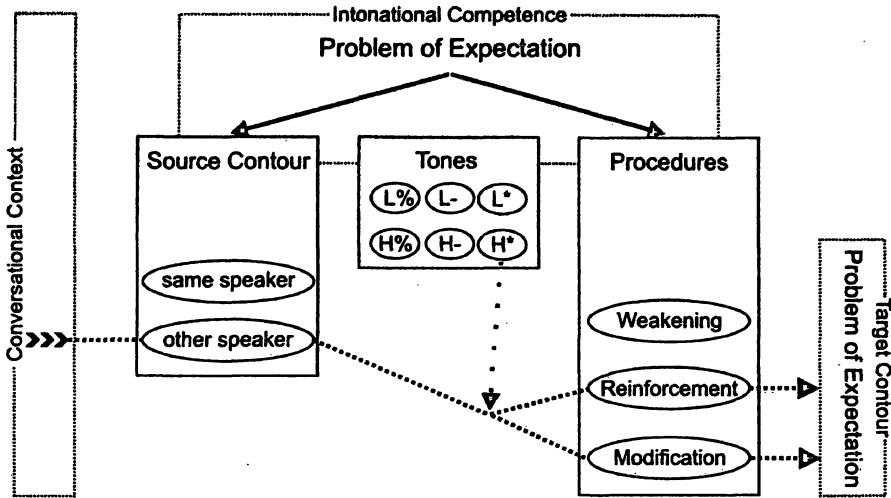


Fig. 8: Intonation of problems of expectation

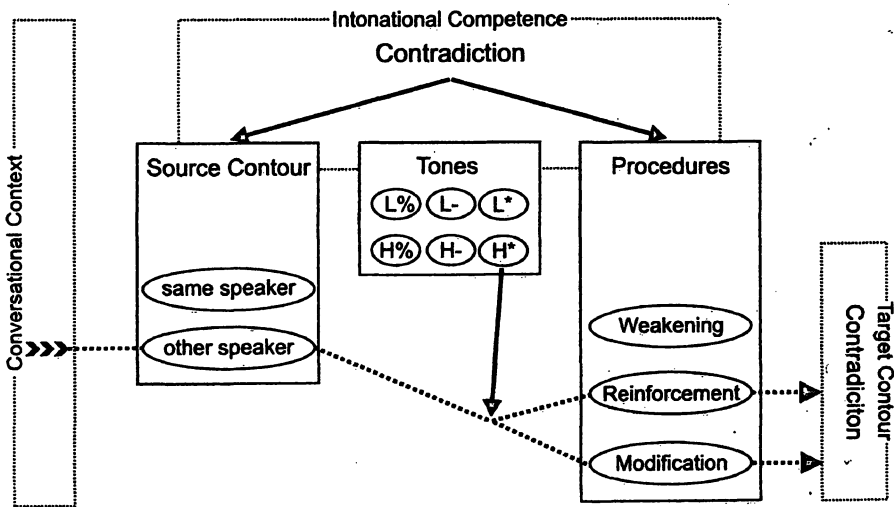


Fig. 9: Intonation of contradictions

The core of the model is the third component. In this component the source contour (maybe already modified by the insertion of H\*) is subject to various intonational procedures. The contours of problems of expectation are the result of reinforcements of the source contour and, in most cases, the insertion of an H\* tone. Thus we have two intonational procedures involved here: all source contours are reinforced, and can additionally be modified. Almost the same holds true for contradiction contours. But for the latter an H\* accent is obligatory: contradiction patterns without H\* do not occur at all. When we consider the obligatory occurrence of H\* tones in contradictions and compare the acoustic values of contradiction and problem-of-expectation contours, it seems that pitch (as opposed to intensity or temporal extension) is a more important feature for contradictions than it is for problems of expectation (in the acoustic analyses of which we observe the least degree of consistency among the features). But it has to be pointed out that this is only a preliminary result, which needs to be confirmed by the acoustic analysis of more data.

In the case of problems of understanding, the source contours are weakened. There are no modifications in the intonation patterns analysed above. In (5), line 4; (6), line 7, and (8), line 4, L\* in the source remains L\* in the target, and in (5), line 4, (6), line 7, and (7), line 2, the same holds true for H\*. As for the acoustic correlates, we have observed the particular importance of the reduction of intensity.

The comparison shows that the intonational procedures are used as contextualization cues for repair-initiation types in an almost identical manner in German and Italian. There are minor differences in tone assignment (the presence vs. absence of an H\* tone in problems of expectation) and in the phonetic realization of the procedures (e.g., the degree to which intensity and duration contribute to the perception of reinforced contradiction contours). It is not completely clear whether these empirical differences reflect a structural contrast or are simply due to the small corpus. Additionally, there may be differences in the alignment of pitch and intensity curves to the segmental tier (of the types studied by Peters 1999 and Gilles 2001 in different regional varieties of German and by D'Imperio 2002 in Neapolitan Italian). However, it seems that the intonational differences are not strong enough to account for the perceived systematic differences between German and Italian.

#### 4. Syllable structure

The syllable structure of German and of Italian are compared here from two different points of view. First, the structural possibilities afforded by the two languages, and then the frequencies in the realization of the different syllable types are contrasted. To demonstrate the categorical differences I use the hierarchical model of the syllable depicted in figure 10, whose immediate

constituents are onset and rhyme, nucleus and coda (cf. Wiese 1996:43–47; Nespor 1993:155 f.). In the frequency analysis, the syllables contained in extracts (1)–(12) quoted above were classified in terms of CV phonology (cf. Clements/Keyser 1983).

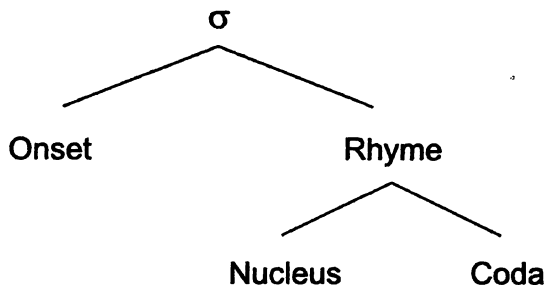


Fig. 10: Hierarchical model of the syllable

The nucleus is the only obligatory syllabic constituent in both German and Italian: all other positions can be empty. In Standard Italian the nucleus always has to be occupied by a full vowel or a diphthong, in German secondary syllables can additionally consist of [ə], [ɐ], or a syllabic sonorant [l̩, ŋ̩, m̩, ŋ̩].

The distribution of the consonants in onset and coda is, in general, in accordance with the sonority hierarchy (cf. Wiese 1996:258–261). The distributional constraints on the Italian syllable in native words can be summarized in four rules (cf. Nespor 1993:152 f.):

- (i) A monosegmental onset can be constituted by all consonants except /ŋ/, which occurs only in preconsonantal position (in codas followed by /k, g/ onsets).
- (ii) In a bisegmental onset the second consonant has to be a liquid (/pri.ma/, /blu/).
- (iii) The coda is constituted by a sonorant (/pɛr/, /kɔn/, /baŋ.ka/). Other consonants only occur if followed by an identical consonant in the onset of the next syllable (/fat.to/, /lɛg.go/).
- (iv) Rules (i) to (iii) do not cover the distribution of /s/, which enables trisegmental onsets (/stra.da/), and can be followed by consonants other than liquids in bisegmental onsets (/skar.pa/).<sup>32</sup>

32 Note that Nespor does not consider the /s/ a generic part of polysegmental onsets but rather an extrasyllabic element. Evidence for this point of view comes from the observation that the so-called “s impura” always contradicts the sonority principle and that in nouns it requires an article which provides an empty coda position. In the syllabification of the determiner phrase the /s/ then joins this preceding syllable, e.g., the syllabification of the DP *lo storico* ‘the historian’ is /los.to.ri.co/.

The constraints on the distribution of consonants to the syllable margins in German native words are more complicated, thus the picture sketched here is not complete.<sup>33</sup>

(i) Monosegmental onsets consist of all consonants except /ŋ/. The consonants /h/ and [ʔ] occur only in monosegmental onsets (cf. Wiese 1996:60).

(ii) The constraints for the second position in a bisegmental onset are not as strong as in Italian. In addition to the liquids the nasals /m, n/, the plosives /p, t, k/, and the fricatives /f, v, s, ʃ/ are possible (/ʃma:l/, /ʃpi:l/, /kva:l/, /pfa:l/). Although bisegmental onsets with the approximant /j/ in the second position do not occur in the native German lexicon, they are a structural possibility of German which is attested by the integration of Germanic words such as /bjœrn/ (cf. Kohler 1995a:179).

(iii) Clusters of three onset consonants contain affricates like /pf/ and /ts/ or fricative-plosive combinations such as /ʃp/ and /ʃt/ (/ʃtro:m/, /tsvek/) (cf. Wiese 1996:40–43).

(iv) The coda can contain up to five consonants. If there are two or more consonants the nucleus is usually a short vowel. There are lexical stems with trisegmental or quadrisegmental codas (/zanft/, /ɛrnst/, /hɛrpst/) but in most cases the complex codas appear in inflected forms. In these cases the coda contains a morpheme boundary (indicated by '+': /trɪŋk + t/, /mɛlk + t/). From the fourth position onwards, only /s/ or /st/ are possible, with the former symbolizing genitive case (/o:ɪpst + s/, /pʊŋkt + s/, /markt + s/, /ʔɛrnst + s/, /hɛrpst + s/), and the latter symbolizing second person singular (/ʃœpf + st/, /grapʃ + st/, /ʔɪmpf + st/, /pantʃ + st/).

The articulation of clusters composed of more than two consonants is difficult.<sup>34</sup> Therefore in spontaneous speech consonants are often omitted (e.g., /dampf/ > /damf/) or [ə] is inserted, which constitutes the creation of a new syllable: /a:rtsts/ > /a:rts.təs/. However, we note that the distribution of consonants is far more constrained in Italian than in German. This holds true especially for codas in which, at most, a single consonant in Italian is opposed to sometimes very complex clusters in German. Figure 11 illustrates the differences in

33 For an exhaustive phonetic description see Kohler 1995a:175–186. Cf. also Zifonun et al. 1997:176–189. For a more phonological point of view see Wiese 1996:33–56, 261–269.

34 Note the surprising similarity to Wiese's CCVCC model in which the two segments that exceed the CC structure of the coda in syllables like /hɛrpst/ 'autumn' are considered extrasyllabic (thus the syllabification would be /hɛrp.st/). Words which are still more complex – \**Obsts*, \**Herbsts* – are not considered well formed. Cf. Wiese 1996:47–49.

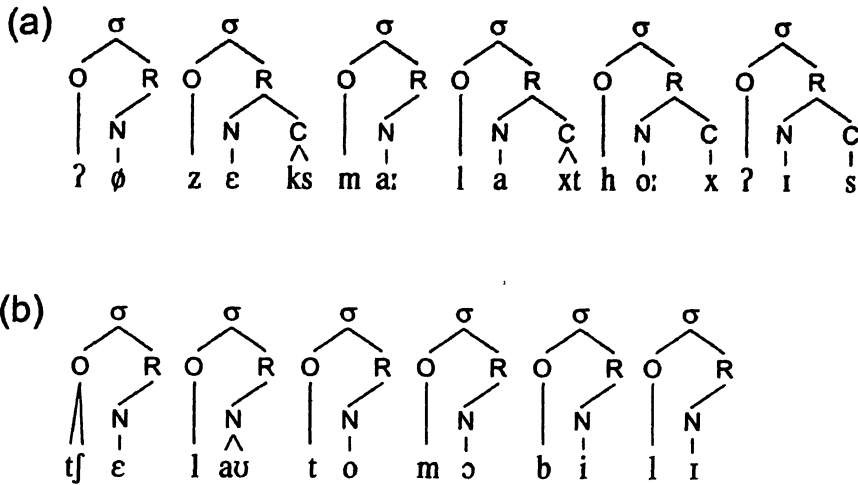


Fig. 11: Syllable structures of (5), line 3, and (7), line 1

contrasting the syllable structures of a typical German and Italian utterance: (a) *öh sEchs mal Acht hOch is* (extract 5, line 3) vs. (b) *c'è l'autoMObili* (extract 7, line 1). The Italian utterance almost exclusively features syllables without codas and with a single consonant in the onset (CV structure). German displays a higher degree of variance but the syllables are usually closed, two of them have complex codas. The frequency-based comparison confirms the crucial difference with respect to the coda (see table 13). In my sample, 85 % of the Italian but only 41 % of the German syllables were found to be open, i.e., without codas. 58 % of the Italian syllables are not only open, but exhibit CV structure, i.e., a single consonant followed by a short vowel. In German, CV structure is exhibited by only 31 % of the syllables. Of these, 32 % (N = 68) are syllables with [ə] and [ɐ] nuclei, usually in word-final position, such as [gro:sə], *große* in extract (2), line 5, and [y:r.bɐ], *über* in (6), line 3/7.

Table 13: Comparison of syllabic features

	German	Italian
open syllables <sup>35</sup>	41 % (N = 220)	85 % (N = 229)
CV	31 % (N = 220)	58 % (N = 229)
consonant clusters	16 % (N = 220)	11 % (N = 229)
vocalic share	38 % (N = 561)	47 % (N = 478)

35 In Italian words with geminates like [fat.tə], *fatto* in (12), line 1, and German words with ambisyllabic consonants like [mitə], *Mitte* in (10), line 5, the first syllable is considered a closed syllable of the CVC type.

With respect to consonant cluster, the frequency differences in my sample are not as marked as would be expected on the basis of clear categorical differences. This may be due to the articulatory simplifications in spontaneous speech mentioned above.<sup>36</sup> But there is another important difference. If all the sounds of the sample are counted and grouped into the classes of 'vowels' and 'consonants' a larger proportion of vocalic intervals within the Italian syllable becomes evident (see table 13).

Diachronically, the differences in syllable structure are the consequence of the principle of root syllable accentuation in the Germanic languages, which fixed the accent to the root and led to a strong reduction of vowel quality in the nonroot syllables and even to their deletion (cf. Braune/Eggers 1987:58–77). In Old High German the proportion of vocalic intervals was much larger than in modern Standard German. Synchronically, there are analogous processes of syllable reduction and deletion in coarticulation, and the faster the speech rate the more a hypothetical underlying input string is reduced in the output.<sup>37</sup> Italian exhibits fewer coarticulative processes. In my sample, the speech rate is much faster in Italian (5.9 syllables per second) than in German (4.3 syllables per second). Nevertheless, the proportion of vocalic elements remains larger in Italian than in German. In order to label that difference, Vékás and Bertinetto (1991:155) introduce the terms "compensazione" vs. "controllo locale". "Compensazione" is a characteristic of languages like German and English which tend to reduce the characteristics of the unaccented syllables in order to emphasize the accented ones. "Controllo locale" is adopted in languages like Italian or Spanish that tend to keep the acoustic properties of segments and syllables unchanged even in fast speech. These terms characterize the crucial distinction between the two language classes more adequately than the opposition between *stress-timed* and *syllable-timed*, which refers to differences in the phonetic outcome that could not be proved experimentally (cf. Auer/Uhmann 1988).

## 5. Conclusion

This paper has attempted to explain the intuitive rhythmic-melodic differences between German and Italian by analyzing semi-spontaneous conversational speech.

<sup>36</sup> A comparison of monosyllabic words in their normative pronunciation leads to a different picture: here only 8.8% of the Italian compared to 94.6% of the German monosyllabic words contain consonant clusters. Cf. Bortolini 1976:13 for the Italian and Kohler 1995a:226 for the German data.

<sup>37</sup> Kohler 1995a:201–229 gives a good overview of the most frequent and typical coarticulative processes in German connected speech.



With regard to intonation, functionally equivalent utterances were compared. The analysis shows a great deal of variation among their intonation contours which is a consequence of the many different factors affecting intonation. There is, however, a high degree of intonational coherence between logically related utterances. Couper-Kuhlen (1996) has pointed out the importance of the speaker's repetition of the words and prosody of another speaker for the purposes of quoting and mimicry in English. Szczepek (2001) investigates, also for English, how speakers use "prosodic matching" and "non-matching" with respect to various parameters in order to "create a bridge between two turns which could not be achieved by verbal means alone".<sup>38</sup> In this paper I have tried to go one step further and to specify how – aside from the fact that the reproduction of a prosodic configuration always intensifies the relatedness of two utterances – the type of reproduction of the previous turn's contour contextualises the current turn as a problem of understanding, problem of expectation, or contradiction. Speakers do this in a very systematic way, using the intonational procedures described in section 3.4. It turns out that the assignment of intonational procedures to repair-activity types is almost the same for German and Italian.

With regard to syllable structure, German and Italian are clearly distinct. My analysis has shown that the quantity of open and CV syllables in Italian is greater than in German and that the proportion of vocalic elements in Italian is also larger. With respect to Italian, the latter result matches the measurements made by Ramus, Nespors, and Mehler (1999:272), who specify a proportion of vocalic intervals (within the sentence) of 45.2 % (my data: 47 % within the syllable). These authors do not discuss German (38 % in my data), but they obtain a vocalic proportion of 40.1 % for English which, like German, is a stress-timed language, tending to "compensazione". In a series of perception experiments Ramus and colleagues have shown that the proportion of vocalic intervals (and the variability of consonantic intervals, not examined in this study) is the best acoustic correlate for the distribution of languages to rhythm classes. Subjects (both adults and infants) are able to discriminate reanalyses of English and Italian sentences in which all segmental and prosodic information except syllabic rhythm (i.e., the proportion of vocalic and consonantic intervals) was cancelled (cf. Ramus/Nespors/Mehler 1999:279–280). Thus, they were able to discriminate on the basis of "pure rhythm". But they were unable to do so with reanalysed "pure intonation" sentences. Even for English and Japanese, two typologically very distant languages which can be easily distinguished on the basis of their syllabic rhythm,<sup>39</sup> global intonation (reanalysed pitch) alone was

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<sup>38</sup> Szczepek 2001:41.

<sup>39</sup> In Ramus/Nespors/Mehler 1999:279 the subjects did this with a discrimination score of 92.5 %.

not sufficient to allow subjects to recognize that the sentences belong to different languages (cf. Ramus/Mehler 1999:515 f.).

To sum up: the differences in intonation alone, as studied with respect to the contextualization of repair-activity types, do not provide a sufficient explanation for the intuitively clear rhythmic-melodic differences between Italian and German, whereas the differences in syllable structure do. We can, even if we are careful, conclude from the data that syllable structure is a better phonetic correlate of the rhythmic-melodic differences between German and Italian than is intonation. This view is supported by the cited speech perception studies which suggest, additionally, that this could also be true for many other languages.<sup>40</sup> The role of metrical structure (the distribution of lexical and postlexical accents) is omitted from consideration here as it would require a study of its own.

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<sup>40</sup> The investigations of Grabe/Low (to appear) and Ramus and colleagues consider typologically very different languages, like Germanic, Slavic and Romance languages on the one hand, and Japanese, Thai or Mandarin on the other.

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