RECONCILING TWO COMPETING VIEWS ON CONTRASTIVENESS

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ABSTRACT

Speakers may use pitch accents as pointers to new information, or as signals of a contrast relation between the accented item and a limited set of alternatives. Some people claim that contrastive accents are more emphatic than newness accents and have a different melodic shape. Others, however, maintain that contrastiveness can only be determined by looking at how accents are distributed in an utterance. In this paper it is argued that these two competing views can be reconciled by showing that they apply on different levels. To this end, accent patterns were obtained in a (semi-)spontaneous way via a dialogue game (Dutch) in which two participants had to describe coloured figures in consecutive turns. By varying the sequential order, target descriptions ("blue square") were collected in four contexts: no contrast (all new), contrast in the adjective, contrast in the noun, all contrast. A distributional analysis revealed that both all new and all contrast situations correspond with double accents, whereas single accents on the adjective or the noun are used when these are contrastive. Single contrastive accents on the adjective are acoustically different from newness accents in the same syntactic position. The former have the shape of a 'nuclear' accent, whereas the newness accents on the adjective are 'prenuclear'. Contrastive accents stand out as perceptually more prominent than newness accents. This difference in salience tends to disappear if the accented word is heard in isolation.

1. INTRODUCTION

Consider the following pair of utterances, with small caps indicating an accent:

(1) Push the RED button.
(2) Pick up the blue CYLINDER.

These sentences differ in that the former can only be used in one type of context whereas the latter is suitable in at least two contexts. What is conveyed by (1) is a request from the speaker to push the red button as opposed to some differently coloured candidate button which the addressee might have in mind. The accent on 'red' has a *narrow focus* because its scope is limited to the word it is associated with. On the other hand, (2) may contrast with a previous statement "*Don't pick up the blue* CUBE*, but …*" (in which case the accent on 'cylinder' has narrow focus), but it may also be an answer to a question like "*what should I do now?*" where the accent on 'cylinder' is said

to have *broad focus*, i.e., takes scope over the entire utterance. Ladd (1980:78-79) claims that often an accent with a narrow focus is assigned a contrastive interpretation, and that to some extent the detection of narrow focus is determined by the *distribution* of accents. If the accent occurs in a non-default position, as in (1), a contrastive interpretation is certified. An accent in default position, of which (2) is an example, is ambiguous without further context between a narrow and a broad focus reading.

While these distribution facts are mostly uncontroversial, the existence of *additional* phonological features which distinguish contrastive accents from more 'neutral' accents only marking new information is hotly debated. One reason to expect that such additional features exist is that they could help disambiguate between broad and narrow focus readings such as in (2). Indeed, some maintain that contrastive accents *are* formally different from other accents, either because the *type of accent* is different for the contrastive cases or because they are more *prominent*. Couper-Kuhlen (1984) and Chafe (1974) mention the existence of a sudden drop in pitch after the contrastive accent, whereas a non-contrastive accent is more likely to be sustained. Pierrehumbert & Hirschberg (1990) suggested that contrastive accents have an L+H* pattern while novelty accents have an H* form. Bartels & Kingston (1994) were unable to find support for Pierrehumbert & Hirschberg's suggestion, but found evidence instead that contrastive accents tend to have higher peak heights than novelty accents. The latter finding is in line with the claim that contrastive accents are more 'emphatic', in the sense that they are extra high or boosted (Brown et al. 1980, Ladd 1983). Others, however, maintain that contrastive accents do *not* exhibit specific intonation features. This is the position taken by intonologists like Halliday and Bolinger. "*As far as we can tell from the behaviour of pitch, nothing is uniquely contrastive*" (Bolinger 1986:342). In this paper, it is argued that these two opposing views can be reconciled by showing that they apply on different levels.

2. METHOD

For a variety of reasons, it is difficult to judge and compare the various observations mentioned in the introduction (differences in the definition of contrastiveness, methodological differences, etc.). The experimental set-up described in this article tries to mimic the natural conversation, in an attempt to create a common test bed for the various hypotheses. Subsequently, Dutch utterances are elicited

in a (semi-)spontaneous manner and studied from both the speaker and the listener perspective by performing distributional and phonetic analyses of the data, the latter consisting of both acoustic and perceptual measurements. The accent patterns were obtained via a simple dialogue game played by four pairs of subjects. The games were played as follows: initially, participant A instructs participant B to select a particularly coloured geometrical figure from an available set by uttering an adjective-noun combination such as "a red square". After B has performed the required action with this object, she takes over and instructs A to perform an analogous action with another figure, e.g., "a blue square". When A and B are out of cards, the game is over. The data thus obtained allow an unambiguous operationalization of the relevant contexts. A property is defined to be *new* (N) to the conversation if it is mentioned for the first time in the current dialogue game, it is *given* (G) if it was mentioned in the previous turn and finally a property is *contrastive* (C) if the object described in the previous turn had a different value for the relevant property. By varying the sequential order, the target descriptions were collected for the eight speakers in four contexts: no contrast (all new, NN), contrast in the adjective (CG), contrast in the noun (GC), all contrast (CC). Table 1 summarizes the situation.

Table 1: Examples of the four contexts

NN		(beginning of game)
	B:	"blue square"
CC	A:	"red circle"
	B:	"blue square"
CG	A:	"yellow square"
	B:	"blue square"
GC	A:	"blue triangle"
	B:	"blue square"

The data were subjected to three kinds of analysis: (*i*) All utterances of two target descriptions ("blue square" and "red square") were used for a distributional analysis. (*ii*) For a more detailed, phonetic analysis, four realizations of "blue square" (in the contexts NN, CC, CG, GC) of two prototypical speakers were used. This set of utterances was explored acoustically. (*iii*) In a listening experiment eight prosodically naive subjects (distinct from the eight speakers) were presented twice with 48 pairs of phrases in a random order. The pairs were presented in two conditions: *complete* (entire utterances) and *isolated* (words). In the former, subjects were asked to focus on either the noun or the adjective and to determine by forced choice which of the pairs contained the most prominent one. In the latter, they had to select (again by forced choice) the most prominent word.

3. RESULTS

3.1. Distribution

The results of the distributional analysis are give in Table 2, and reveal a clear trend: in the NN (no contrast/all new case) both adjective and noun are always accented, and in most cases the same holds for the CC (double contrast) cases. When one item is given, while

Table 2: Accent distribution on all target utterances "blauw vierkant" and "rood vierkant" (blue and red square) in four contexts: NN (no contrast), CC (all contrast), CG (contrast only in adjective), GC (contrast only in noun).

	Accent on					
Context	Adj Only		Noun Only		Adj and Noun	
NN	0	(0%)	0	(0%)	16	(100%)
CC	3	(19%)	2	(13%)	11	(69%)
CG	15	(100%)	0	(0%)	0	(0%)
GC	1	(6%)	11	(69%)	4	(25%)

the other is contrasted (i.e., the CG and GC cases), the contrasted item generally is the only accented word. Interestingly, the NN case always requires a double accent. This entails that there is no ambiguity in the data between broad and narrow focus, contrary to what one might expect on the basis of the literature discussed in the introduction. Even though both CG & GC, and NN & CC are strikingly similar, there are two exceptions. First, there is a complete lack of postnuclear accents in the CG case, while occasionally prenuclear accents on the adjective occur in the GC case. Second, CC differs from NN in that there are a number of utterances in the CC context with an accent only on the adjective or the noun. Looking at these exceptional cases revealed that in all cases the speaker made a contrast with his or her *own* last utterance, thereby ignoring their partners last contribution. Interestingly, all these "egocentric" speakers happen to end their utterances on a high boundary tone, whereas the other speakers uniformly employed low boundary tones. This appears to be in accordance with the general observation that low boundary tones are generally interpreted as signals of the speaker's intention to give the turn to the other participant. Apparently, in the current experiment, speakers using high boundary tones signal that they want to continue their own train of thought, which leads to what is generally referred to as list intonation.

3.2. Phonetic Analysis

For the phonetic analysis two representative speakers were selected, one uniformly employing low boundary tones (JR) and one systematically using high boundary tones (WY).

Acoustic Measurements A phonological analysis was carried out to find justification for the alleged existence of a specific contrastive accent. If one makes the common assumption that a single accent on the noun is ambiguous between a broad focus and a narrow focus reading, then one might expect that a contrastive accent manifests itself most clearly in the noun position. However, comparing a single contrastive accent on the noun (GC) with a newness accent on the noun reveals no differences with respect to the type of accent. This appears to be in accordance with the observation, made in section 3.1., that the data do not exhibit any broad vs. narrow focus ambiguities. Interestingly, at first sight the single contrastive accent on the adjective (CG) *is* of a different type than the newness accent on that same syntactic position. However, the single contrastive accent on the adjective is of the *same* type as the accent on the noun. Thus: the
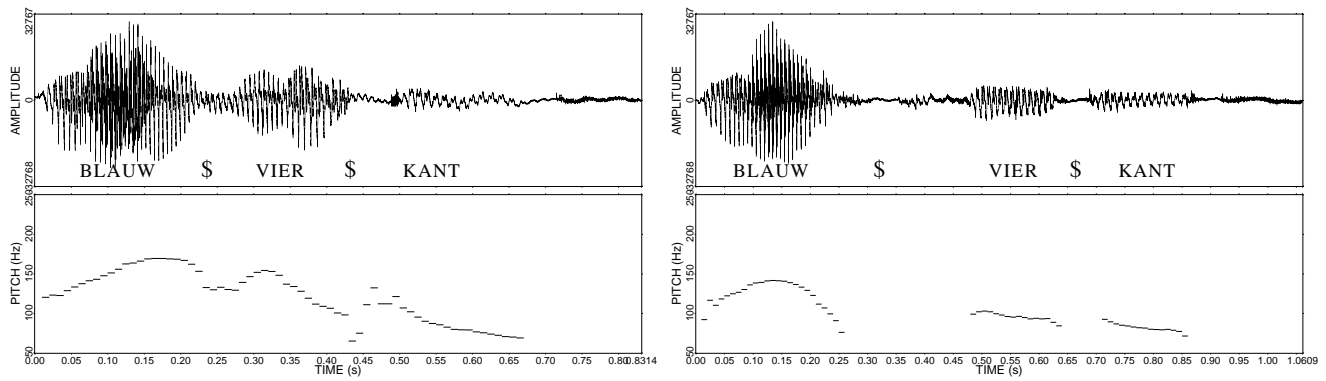
Figure 1: Waveform and F_0 measurement of two realizations of "blauw vierkant" (*blue square*) by speaker JR. Left: NN context. Right: CG context. $ represent syllable boundaries.
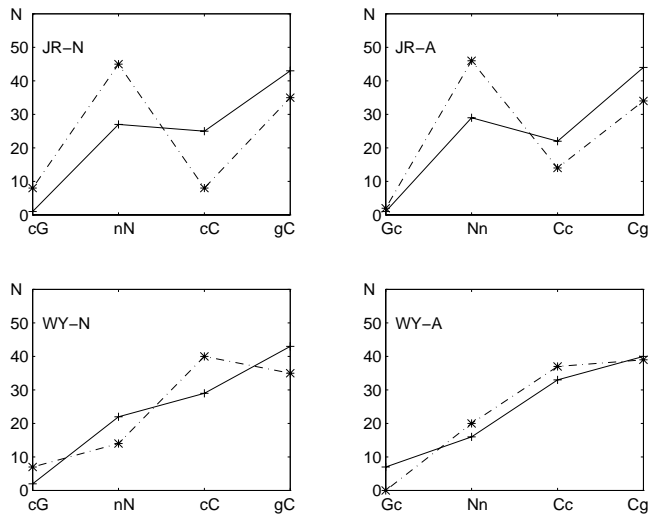

Figure 2: Results of the perceptual measurements of prominence ratings on A (adjective) and N (noun) for speaker JR and WY. Solid line with + represents results for the complete condition, dashed line with ∗ gives results for isolated condition. The four contexts CG, NN, CC and GC are defined in the text, for readability the word of interest is capitalized. The maximum value of the Y-axis is 48.

difference in type of accent is only apparent, since in the CG context the adjective is associated with a nuclear accent in a non-default position. Figure 1 visualizes this phenomenon. Focussing on the F_0 pattern on the word "blauw" (blue) shows a difference in pitch contour, in particular with respect to the timing of the fall. In the NN context (left), the pitch level is sustained throughout the adjective and only drops slightly at the syllable boundary. In the CG context (right), one can indeed observe 'a sudden drop of pitch' *before* the syllable boundary is reached. The latter pattern is phonologically the same as the pitch movement that occurs on the syllable "vier" in the NN context. For reasons of completeness it should be noted that for the other, high ending speaker (WY), essentially the same is observed: the accent on the noun in the NN context and on the ad-

jective in the CG context both show a pronounced increase in pitch which is sustained to the end of the utterance.

Perceptual Measurements Prominence ratings were obtained by the perceptual study described in section 2. Figure 2 shows the results. In the complete condition subjects were presented with pairs of entire utterances and were asked to judge in which of the two the noun or the adjective was most prominent. In the following, capitalized letters indicate the words on which the subject scored (thus: 'Gc' indicated that the subject had to rate the prominence of the adjective in GC condition). The results thus obtained are basically the same in all cases, that is: a single contrastive accent (gC or Cg) is always judged to be the most prominent while givenness (Gc or cG) uniformly scores lowest (near 0) on prominence. The double contrast (cC/Cc) and no contrast/all new (nN/Nn) cases are in between these two extremes, with for WY double contrast being judged somewhat more prominent than the no contrast case, whereas the two are nearly identical for JR. It is interesting to see that both adjective and noun lead to similar prominence patterns, and it is even more striking to observe that the different speakers lead to a similar prominence pattern, even though they provided their utterances with different intonation contours (low vs high ending).

However, the overall picture changes dramatically when words are presented in isolation. Within speakers essentially the same pattern for the adjective and the noun can be observed, but this pattern is rather different from the complete pattern. In particular, for JR the newness accent (Nn/nN) is suddenly judged to be the most prominent, while the double contrast accent (Cc/cC) scores almost as low as the given case (Gc/cG). For WY, the single contrast (Cg/gC) gets comparatively lower prominence ratings.

Since context plays no role in the isolated condition, it seems likely that hearers solely base prominence judgement on acoustic properties of the target word. It is commonly assumed that F_0 maxima are reliable acoustic correlates of prominence. Table 3 contains the relevant F_0 values for the 16 target words in Figure 2. This table indeed reveals a close correspondence between F_0 maxima and perceived prominence for speaker JR in that the ranking of words presented in isolation strongly covaries with the F_0 values. For speaker WY

Table 3: F_0 maxima (Hz) on A (adjective) and N (noun) for speaker JR and WY in the four contexts CG, NN, CC and GC. For readability the word of interest is capitalized.

	Accent on Noun				Accent on Adj			
	cG	nN	cC	gC	Gc	Nn	Cc	Cg
JR	103	155	128	140	112	170	141	142
WY	171	169	168	166	123	131	133	141

F_0 is only partly explanatory for the perceived prominence values: in particular for the N the correspondence breaks down. However, this is due to the fact that WY systematically employs high boundary tones thus always yielding high F_0 values for the utterance final word: the N. Apparently, a further acoustic factor plays a role here.

4. DISCUSSION

In the introduction two competing views on contrastive accent were mentioned: the view that contrastiveness is solely determined by accent distribution and the claim that, besides distribution, the accent on the contrasted item is phonologically different from other accents. The data presented here in fact give justification for both positions.

On an acoustic level, it appears that single contrastive accents on the adjective are indeed prosodically different from newness accents in the same syntactic position. However, the former have the shape of a 'nuclear' accent, whereas the newness accents on the adjective are 'prenuclear'. In fact, the shape of the newness and the contrastive accents on the noun, both in default, nuclear position, are essentially identical. Thus, apparently, the contrastive interpretation is not associated with a specific prosodic shape but rather with the non-default position of the nuclear accent.

On a perceptual level, it appears that contrastive accents are perceived as more prominent than newness accents on the same syntactic position. However, this only holds true if subjects can listen to the *complete* utterance. The difference in perceived prominence tends to disappear if the noun or adjective is presented in isolation. This effect might be called *prosodic masking*: an isolated pitch peak is perceived as more prominent than the same peak presented in the context of an intonationally comparable pitch peak. (The Mt. Everest would be perceived as higher when encountered in the low lands than in the Himalaya.) It thus seems that the prosodic context (whether or not the relevant accent is preceded or followed by another accent) is the major factor contributing to the perception of a contrastive intonation.

Even though no acoustic evidence for a separate contrastive accent was found, the data show that contrastiveness can be determined on the basis of intonation. Given this, a natural follow up question is what the function of contrastiveness *is*. Probably, speakers signal a contrast relation to enhance the hearer's processing of their utterance: by marking the information which is contrastive, e.g., "BLUE square," they seem to say: pick the 'gestalt' of the previous square which we discussed and modify the colour value by setting it to blue (compare Levelt 1989:131-132, Pechmann 1984). This would also explain why neither the distributional nor the phonetic analysis revealed any essential differences between the NN and the CC contexts: a double contrast would have very little informative content for the hearer as it would urge her to create a "gestalt" on the basis of the previous object of attention by modifying *both* colour and shape, which is tantamount to creating an entirely new object.

Finally, note that this study was based on the analysis of Dutch, a *Plastic* language (Vallduví 1991) with a relatively fixed word order and in which deaccenting is common. In a sequel to this paper, results of comparable research on a non-plastic language, Italian, will be described, using basically the same experimental paradigm. According to the literature (Ladd 1996), languages like Italian strongly resist deaccentuation but have a freer word order. It will be interesting to see if and how non-plastic languages differ from plastic ones in their prosodic cues to contrastiveness.

5. ACKNOWLEDGMENTS

6. REFERENCES

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