

# PERCEPTUAL EFFECTS OF DEVIANCE IN PITCH ACCENT DISTRIBUTIONS IN L1 AND L2 DUTCH

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## ABSTRACT

This paper describes the effect of deviance in focus marking by means of pitch accent distributions in Dutch on L1 perceptions of accentedness, nativeness and comprehensibility in L1 and L2 speech. On a rating task Dutch natives demonstrate that they have unambiguous intuitions concerning L2 speech by Spanish learners of Dutch by categorically rating it as more accented, more difficult to comprehend and less typical of an L1 speaker than L1 speech, with proficiency factor as a modulating factor. Interestingly, accentedness and nativeness are rated more extremely than comprehensibility, suggesting that non-native, foreign accented speech can still be highly comprehensible. A preference task reveals that Dutch natives prefer prosodically accurate utterances to prosodically inaccurate ones, when making nativeness judgments based on prosodic cues only, for both L1 and proficient L2 speakers.

**Keywords:** prosodic deviance; speech perception; accentedness; comprehensibility; nativeness.

## 1. INTRODUCTION

It is generally assumed that second language (L2) learners aim to (1) come across as native speakers, and (2) communicate successfully in the L2, see [23]. Transfer from the native language (L1) to the L2 might jeopardize these goals and can occur in syntactic, semantic, segmental, and suprasegmental features, see [9], [12], [16], and [26] respectively. In [31], a comparison of pitch accent distributions to mark focus produced by Dutch and Spanish L1 and L2 speakers reveals that Spanish learners of Dutch generally transfer the pitch patterns of their L1 to their L2, especially less experienced learners. This is due to the fact that these two languages are typologically different: In Dutch NPs, new information usually receives a pitch accent (indicated by SMALL CAPITALS), whereas given information does not (e.g., blauwe ezel, RODE ezel, 'blue donkey, RED donkey'). In Spanish, the last word of such NPs generally carries the pitch accent, irrespective of its information status (e.g., globo rojo, burro ROJO, 'balloon red, donkey RED').

When L2 learners transfer pitch accents from their L1 to the L2, this can lead to non-native prosody in the L2, which makes interaction between communication partners more cumbersome, see [19, 23]. However, a review of prior work on L1 perception of prosodic deviance reveals quite a mixed picture. While some conclude that prosodic deviance leads to reduced intelligibility ([6, 13, 14, 27]), or comprehension ([30]), as well as increased accentedness ([1, 18, 20, 28, 29]) or non-nativeness ([10, 13]), others found that prosodic deviance does not outweigh segmental deviance ([4]). Munro and Derwing ([8, 22, 23]) performed a series of experiments in which they related accentedness, comprehensibility and intelligibility (but not nativeness) as factors in a correlation analysis. These studies all show that foreign accent ratings are generally higher than comprehensibility ratings, which are higher than intelligibility measures. This shows that although L1 listeners are relatively quick to mark speech as accented, their reports on perceived difficulty in understanding the speech are less extreme, and results of intelligibility tests demonstrate that even L2 speech that is rated as accented, is actually still intelligible.

In most previous studies speech samples were elicited by an oral reading task or pronounced by instructed speakers (e.g. [1, 2, 4, 6, 11, 13, 14, 18, 20, 23, 27]). However, it is known that spontaneous and read aloud speech have significantly different prosodic characteristics (e.g. [3, 7, 15, 17]). Since L2 learners are assumed to have the intention to use their L2 in communication, all of the speech samples used in the present study are semi-spontaneous and natural. They were elicited in a description task in order to closely approximate the prosodic features used in real-life communication (see [31] for more details). This is especially relevant in the context of focus marking by means of pitch accents, which is the prosodic cue investigated in the current study. De Ruiter [7] shows that spontaneous and read speech differ significantly in this respect: In spontaneous speech, L1 speakers always accent new referents, but they do not always deaccent given referents, while in non-spontaneous speech, new elements are always accented and given elements are more consistently deaccented. Also, different types

of pitch accents are used in the two different speaking modes.

The present research investigates the effect of deviance in focus marking by means of pitch accent distributions in L1 Dutch and Spanish L2 learners of Dutch on the perceived accentedness, comprehensibility, and nativeness (as defined by Derwing & Munro [8] and Edmunds [10]) by L1 speakers of Dutch, and is set up to address the following issues:

Firstly, based on prior work (e.g. [8, 10, 20, 22, 23, 29]), it is predicted that Dutch L1 listeners are able to distinguish between L1 and L2 speech where accentedness, comprehensibility and nativeness are concerned. Although there are few studies that incorporate proficiency level as a between-subjects factor in their design when investigating one of these concepts, it is expected that accentedness ratings for L1 speech are lower than those for proficient L2 speech, which in turn are expected to be lower than those for less proficient L2 speech. For the comprehensibility and nativeness ratings the opposite tendency is expected. This experiment also functions as a verification of the design, as it will show whether the spontaneous speech samples produced by the different language groups are sufficiently diverse to be suitable for rating.

Secondly, previous work by Edmunds [10] on nativeness suggests that suprasegmental cues can affect nativeness ratings by L1 listeners. As nativeness and accentedness have been considered two extremes of the same dimension (cf. [24]), it is predicted that L1 listeners are able to distinguish between L1 and L2 speech where nativeness is concerned as well. To our knowledge, no studies exist that report on the effect of proficiency level on nativeness ratings, but it is predicted that accentedness and nativeness ratings behave similarly, in the sense that L1 speech is expected to be rated as more native-like than in proficient L2 speech, which is in turn is rated as more native-like than less proficient L2 speech.

## 2. METHOD

### 2.1. Rating task

#### 2.1.1. Participants

44 Dutch natives participated (25 women, age  $M=21.20$ ,  $SD=1.92$ , and 16 men, age  $M=22.38$ ,  $SD=2.06$ ); all of them students of Tilburg University participating for course credit. All of them were raised in a monolingual Dutch environment and none of them spoke L2 Spanish or reported any visual or auditory problems.

#### 2.1.2. Materials

The rating task on L1 and L2 accentedness, comprehensibility, and nativeness was performed in an online questionnaire. Each construct was measured in a separate block of questions, but stimuli were always presented similarly: Participants listened to an utterance, and were asked to assign a rating on a nine-point semantic differential, see (1)-(3), which is the English translation of the original Dutch instructions and scales.

- (1) Indicate to which extent the speaker you heard has a foreign accent.  
No foreign accent – Very strong foreign accent
- (2) Indicate to which extent the speaker you heard is easy/difficult to understand.  
Incomprehensible – Very easy to understand
- (3) Indicate to which extent you think that this speaker sounds like a native speaker of Dutch.  
Does not sound like a native speaker at all – Sounds like a native speaker

All of the utterances were of the type ‘het is + determiner + adjective + noun’ (it is + determiner + adjective + noun), as shown in (4)-(7).

- (4) ‘Het is een blauwe ezel’ (It is a blue donkey)
- (5) ‘Het is een groene bezem’ (It is a green broom)
- (6) ‘Het is een roze ballon’ (It is a pink balloon)
- (7) ‘Het zijn rode wanten’ (They are red mittens)

The utterances were pronounced by three types of speakers: L1 speakers of Dutch (2 males,  $M$  age=23.23 yrs,  $SD=3.56$ , and 2 females,  $M$  age=25.32 yrs,  $SD=7.67$ ), less proficient Spanish learners of Dutch (2 males,  $M$  age=21.38 yrs,  $SD=2.20$ , and 2 females,  $M$  age=26.05 yrs,  $SD=11.94$ ), and proficient Spanish learners of Dutch (2 males,  $M$  age=22.32 yrs,  $SD=1.86$ , and 2 females,  $M$  age=23.60 yrs,  $SD=6.02$ ). Less proficient learners had a proficiency level of  $\leq A2$  and proficient learners had a proficiency level of  $\geq B2$  (see [5]). This resulted in 144 experimental items (3 constructs  $\times$  4 objects  $\times$  12 speakers). The items were presented in a random order, both within each block of questions and across participants.

#### 2.1.3. Procedure

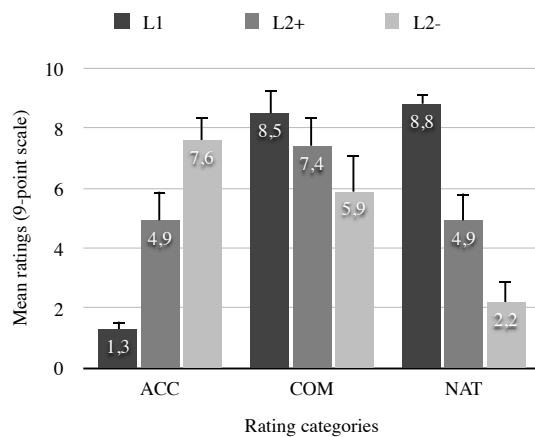
Experimental sessions occurred individually in a sound proof cubicle, taking approximately 15 minutes. Based on the information provided by the participants in a basic questionnaire, three of them were excluded from analysis because they spoke L2 Spanish, and one participant was excluded due to

hearing difficulties. Therefore, statistical analyses were run on the data of the 41 remaining participants.

#### 2.1.4. Results

A repeated measures multivariate analysis of variance (RM-MANOVA) was run with proficiency level (3 levels: L1, proficient L2, and less proficient L2) as within-subjects factor and the ratings for the three constructs as dependent variables. Figure 1 summarizes the results.

**Figure 1:** *M* ratings by L1 Dutch for accentedness (ACC), comprehensibility (COM) and nativeness (NAT) for stimuli produced by L1 Dutch, proficient, and less proficient L2 Dutch.



The analysis (with a Greenhouse-Geisser correction on the degrees of freedom when the sphericity assumption was violated) revealed a significant main effect of proficiency on the accentedness ratings [ $F_{(2,80)}=1184.86$ ,  $p<0.001$ ,  $\eta_p^2=0.97$ ], comprehensibility ratings [ $F_{(1.38,55.37)}=153.98$ ,  $p<0.001$ ,  $\eta_p^2=0.79$ ], and the nativeness ratings [ $F_{(2,80)}=1480.07$ ,  $p<0.001$ ,  $\eta_p^2=0.97$ ]. More detailed analyses by means of pairwise comparisons (always done with the Bonferroni method) reveal that there is a significant difference between the three proficiency groups ( $p<0.001$ ) within each construct. For the accentedness ratings the effect is negative, demonstrating that speech is rated as less accented as the proficiency level of the speaker increases. For the comprehensibility and nativeness ratings the effect is positive: as the proficiency level of the speaker increases, their speech is rated as easier to comprehend and more native-like.

A Spearman's Rho correlation analysis was run to examine the relationship between the constructs. It revealed a significant negative correlation between accentedness, and comprehensibility [ $r=-0.66$ ,  $p<0.001$  (one-tailed)] and nativeness [ $r=-0.96$ ,  $p<0.001$  (one-tailed)], in the sense that as accentedness ratings increase, comprehensibility and

nativeness ratings decrease. Additionally, the analysis revealed a significant positive correlation between the latter two ratings [ $r=-0.71$ ,  $p<0.001$  (one-tailed)]. These results will be discussed further in the general discussion.

## 2.2. Preference task

### 2.2.1. Participants

45 Dutch natives participated in this task (29 women, age  $M=24.14$ ,  $SD=7.72$ , and 12 men, age  $M=33.33$ ,  $SD=16.28$ ). All of them were students of Tilburg University participating for course credit and were raised in a monolingual Dutch environment. None spoke a Romance language as an L2, with the exception of French, which is taught at Dutch high schools. None participated in the rating task.

### 2.2.2. Materials

The experiment consisted of a forced-choice task in which participants were instructed to listen to two utterances, followed by the question 'Which of the two utterances sounds most natural to you?'. The utterances only contained objects and colours with two-syllable names. They were either of the type 'rode ezel, blauwe ezel', (red donkey, blue donkey), in which the adjective of the second NP is focused, or 'blauwe bezem, blauwe ezel (blue broom, blue donkey), in which the noun of the second NP is focused. The two utterances presented to participants were identical except for the fact that in one utterance the focus distribution matched the original context in which it was elicited, and in the other utterance it did not, e.g. the utterance was elicited in a context where focus was on the noun, but was now presented in a context where focus was on the adjective, and vice versa. One would predict that this difference is clearly perceivable for utterances produced by L1 Dutch, who naturally accent the focused word of the NP and deaccent the given word, but less so for utterances by proficient L2 learners, who succeed in placing the main pitch accent on the focused word, but do not deaccent the given word of the NP, and almost indistinguishable for less proficient learners of Dutch, who produce almost identical prosodic patterns in both utterances, in which the main pitch accent is on the last word of the NP, irrespective of its focal status (see 2.1.2. for more details on the speaker groups). This way, prosodic deviance was manipulated and its effect on the perceived naturalness by L1 listeners could be observed. Three different objects were used as targets in this task: 'blauwe ezel' (blue donkey), 'groene bezem' (green broom), and 'rode wanten' (red mit-

tens). Therefore, the design resulted in 72 different items (2 contexts  $\times$  3 objects  $\times$  12 speakers). The order of the two utterances within the experimental item, as well as the order in which the items were presented to the participants, was randomized.

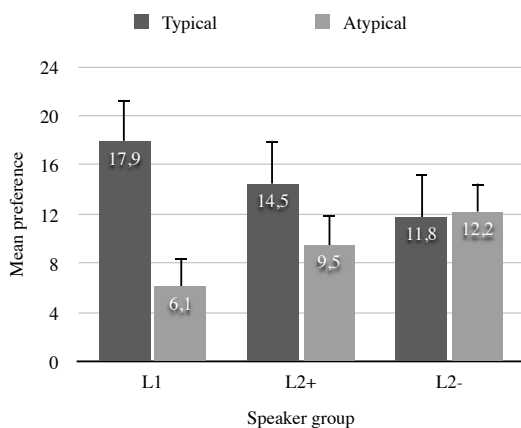
### 2.2.3. Procedure

Experimental sessions occurred individually in a sound proof cubicle, and took 20 minutes. Based on the information provided by the participants in a basic questionnaire, the data of four participants were excluded from analysis, as they spoke Italian or Portuguese as an L2. Thus, analyses were performed on the data of the 41 remaining participants.

### 2.2.4. Results

A RM-ANOVA was performed with the speaker's proficiency level (3 levels: L1, proficient L2, and less proficient L2) as within-subjects factor and the preference scores as dependent variable. Figure 2 summarizes the results.

**Figure 2:** *M* number of preferences by L1 Dutch for utterances with typical or atypical pitch accent distributions, for stimuli produced by L1 Dutch, proficient, and less proficient L2 Dutch.



The analysis revealed a significant main effect of proficiency [ $F_{(2,80)}=54.04$ ,  $p<0.001$ ,  $\eta_p^2=0.58$ ], which indicates that as the speakers' proficiency level increases, the utterance in which the focus distribution matches the original elicitation context is preferred more than the utterance in which the focus distribution does not match the context in which it was originally elicited. Pairwise comparisons reveal that there is a significant difference between all of the speaker groups ( $p<0.001$ ). Moreover, while utterances in which the focus distribution matches the elicitation context is chosen significantly more often when the items are produced by L1 speakers and proficient L2 learners ( $p<0.001$  for both), participants have no significant preference for either of the

two utterances when presented with speech by less proficient L2 learners ( $p=0.70$ ). An almost perfect balance between a preference for utterances in which the original elicitation context matches the focus distribution and utterances in which it does not shows that listeners choose an utterance at random.

## 3. GENERAL DISCUSSION

This study showed that deviance in focus marking by means of pitch accent distributions in L1 and L2 Dutch affects accentedness, nativeness, and comprehensibility as perceived by Dutch natives. Moreover, the speakers' proficiency level modulated these perceptions for all three constructs. The rating task showed that natives have clear intuitions on the accentedness, comprehensibility and nativeness of L1 and L2 speech. They perceive L2 speech as more accented, more difficult to understand and less native-like than L1 speech. This is mirrored within L2 speech, where the same tendency exists between less proficient and proficient L2 speech. In this sense, the intuitions of our participants are in line with what is expected and reported in prior work (e.g. [8, 10, 20, 22, 23, 29]). Remarkably, the difference between the language groups for accentedness and nativeness ratings appears to be substantially larger than the difference between the language groups for comprehensibility ratings, suggesting that participants are more strict in their judgment of a foreign accent and non-nativeness, than regarding the difficulty with which this speech is understood, cf. [22]. To investigate the effect of prosodic deviance on the perception of L1 and L2 Dutch by Dutch natives when segmental deviance is controlled for, the preference task was performed. Its results suggest that Dutch natives prefer utterances in which the focus distribution matches the original elicitation context, but only when produced by L1 speakers or proficient L2 speakers. This demonstrates that they can distinguish between the two utterances, and prefer one to the other, based solely on their prosodic cues. Thus, while it is known that listeners can do this for manipulated or read speech, we show that this also holds for spontaneous speech. Furthermore, participants only have a clear preference when the difference between the two utterances is distinguishable; suggesting that Dutch natives can perceive prosodic deviance, both in L1 and L2 Dutch, and feel this affects its nativeness. The question whether deviance in pitch accent distributions also affects the speed with which natives process L1 and L2 speech is addressed in a follow-up study using similar stimuli and reaction times as a measurement of intelligibility [32].

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