



# Bachelor Thesis

The influence of ethnic speaker information on the  
perception of alveolar initial fricatives in Dutch

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## Abstract

This study presents a research on the influence of ethnic speaker information on perception. A typical of Moroccan Dutch, an ethnolect variety spoken in the Netherlands, is to pronounce alveolar initial fricative /z/ with more voicing and dentalization compared to standard Dutch. Therefore, it was examined whether the perception of /z/ and /s/ would be influenced if the listener was told that the speaker was of Moroccan Dutch background. The experiment consisted of identification task in which participants had to distinguish between the Dutch words /ze/ 'sea' and /se/ 'c' (the letter), and a survey that measured self-reported contact with Moroccan Dutch speakers. The identification task was presented in two conditions. In one condition the participant was told the speaker they were going to listen to was of Moroccan descent and in the other condition the participant was told that the speaker was Dutch. The expectation was to find that in the Moroccan Dutch condition, the stimuli would more often be perceived as /ze/, as it is typical for Moroccan Dutch speakers to voice the /z/ more. In the Dutch condition the expectation was that the stimuli would more often be perceived as /se/. Moreover, it was expected that the amount of contact would facilitate the effect that was expected, i.e. the more contact a participant reported, the more their perception would differ between the conditions. Unfortunately, this result was not found in the present study. Rather, it was found that participants from a smaller municipality and who reported less contact, perceived /ze/ more often in the Moroccan Dutch condition. On average, the psychometric curve of the Moroccan Dutch condition was shifted compared to the Dutch condition. This result has implications for further research in the field of speech perception and sociolinguistic variables, because it shows that contact might actually decrease the effect of ethnic speaker information on perception.

## 1. Introduction

The sounds of a language are defined and interpreted by the people that speak it, through speech perception. This processing of speech signals by the listener is a complicated process whereby many factors play a role. One of these factors appears to influence speech perception is the social or regional background of the speaker. In this study, the focus lies on whether ethnic background can influence speech perception in a similar way as regional or gender information would influence speech perception. More specifically, in this thesis the perception of one variable of a speech variety spoken in the Netherlands, namely Moroccan Dutch, will be investigated. Moroccan Dutch is a (multi-)ethnolect that emerged relatively recently, and a feature that seems to be characteristic for this ethnolect is the pronunciation of /z/, which in Moroccan Dutch is more voiced and dentalized compared to standard Dutch.

The experiment conducted for this research was an identification task whereby participants had to identify whether they heard the Dutch words /ze/ 'sea' or /se/ 'c' (the letter). The stimuli were randomized items of a continuum between /se/ and /ze/. The task was presented in two conditions, in one condition the participant was told that the speaker they were going to hear was Dutch, in the other condition they were told that the speaker was of Moroccan descent.

Moreover, a survey was conducted to measure the self-reported amount of contact that participants had had with speakers of Moroccan Dutch, to see whether this would play a role in the responses they gave in the identification task. According to the results of this survey, participants were split up according to their longest place of residence in the Netherlands and whether this was a Bigger Municipality ( $>100\ 000$  inhabitants) or a Smaller Municipality ( $<100\ 000$  inhabitants). This was done because it was expected that people from the Bigger Municipalities would have had more contact with Moroccan Dutch speakers, which was confirmed by the responses of the self-report contact survey.

We expected to find a difference in perception between the two conditions in the identification task, whereby the psychometric curve of the categorical perception between /ze/ and /se/ would be more shifted towards a voiced pronunciation /z/ in the Moroccan Dutch condition, and more toward the voiceless pronunciation /s/ in the Dutch condition. This result was not found, but a further analysis of the results will be given in the discussion section at the end of this paper.

## 2. Background

In this section, the background for the present research will be provided. Firstly, relevant studies on speech perception that are relevant to the present study will be discussed. Subsequently, two theories of speech perception will be presented that support these studies. Following these theories, the background of ethnic varieties in the Netherlands will be explained as well as the relevance of this choice of research topic, in relation to speech perception. Finally, the research question and aim of the study will be presented.

### 2.1 Research on the influence of social information on speech perception

A question that is still pending in the research on speech perception is how we account for so many individual differences in the production and perception of speech signals. This is not to say however that research has not been conducted into this field. For instance, research has shown that speech perception is influenced by our individual production of speech. Kendall & Fridland (2010) showed for instance, that subjects who participated more in the Southern Vowel Shift (SVS) in their own production, also had a shifted perception of vowels. In a research project on sound change in Swedish, Janson (1986) found that perception of a dialectal variation differed with age. Janson concluded that this result indicated an ongoing sound change in perception, as the younger cohort perceived the vowels as closer to how the sounds were produced more recently, in contrast to the older cohort, who perceived this phoneme boundary in a different way, namely closer to how the vowels were produced in the past. These studies thus demonstrate a closely linked relationship between the two processes.

On top of production, social information about the speaker seems to influence speech perception as well. For one, perceived gender influences the perception of fricatives (Strand & Johnson, 1996). It is known that the production of /s/ and /ʃ/ is different for men and women because men tend to have longer vocal tracts and thus lower fundamental frequencies when speaking. These production stereotypes about gender are employed by listeners when identifying whether someone produces a /s/ or a /ʃ/ (Strand, 1999). Strand & Johnson (1996) concluded that the boundary between /s/ and /ʃ/ was perceived differently when accompanied by a male or female face on video. A higher percentage of tokens in the middle of the sound continuum that was presented accompanied by a male face was perceived as /s/, whereas a higher percentage of the same tokens was perceived as /ʃ/ when accompanied by a female face.

Thus, it appears that listeners utilise information other than speech sounds to construct and process what they perceive. Other studies have shown that this includes information about regional origin of a speaker, which can influence perception of vowels. Niedzielski (1999) for instance, studied the influence of regional information on perception. She presented participants with speech from a Detroit speaker, and asked them to match the vowel to a token from a continuum of synthesized vowels. The results showed that in the subjects' perception, the speaker from Canada raised his vowels (also referred to as Canadian Raising or CR), whereas the Detroit speaker did not. Participants actually rated the vowels of what they thought was a Detroit speaker as lower than the canonical vowel. Niedzielski thus showed that subjects used their knowledge about Canadian and American speech in categorizing these vowels perceptually. More recently, Hay and Drager (2010) even found that information simply related to specific dialectal regions, in this case Australia and New Zealand, can influence speech perception. In their design, they used stuffed toys to prime the regions, and thus the dialects, of Australia or New Zealand. The results showed that when the participants in the study were presented with a kiwi toy, the vowels presented were perceived as more typical for New Zealand speech, and when presented with a kangaroo or a koala toy, the vowels were perceived as more typical for Australian speech.

What seems to be an important factor in the type of speech perception studies discussed here is the amount of experience with linguistic variation. In Clopper and Pisoni (2004a) for example, the amount of exposure to a dialectal variation was a determining factor for listeners' accurate identification of the region that the speaker was from. In a forced-categorization task, participants had to categorize speech according to region, and subjects who had been exposed to at least three different dialects of American English throughout their life, were better at identifying which speech belonged to which region, than participants who had lived in one place in the US all their life. This shows that exposure to different varieties of a language is an important factor to consider in speech perception research of this kind.

Until now, most studies on speech perception and sociolinguistic variables have looked at differences in perception of speech of different varieties of English. There have not been many studies of this nature in Dutch and its speech varieties. Moreover, most of these perceptual studies have looked at the effect of regional speaker information on perception. It seems this phenomenon in the context of varieties spoken by people of different ethnicities, more often referred to as ethnolects, has not nearly been studied to the same extent. Therefore, in this study we would like to explore the effect of ethnic speaker on speech perception in Dutch. To fully understand this phenomenon however, it is important to relate

the findings of the studies that found this influence (e.g. Niedzielski, 1999; Hay & Drager, 2010) to existing theories of speech perception. Later in this background section, there will be an explanation and exploration of the chosen variable and the context of Moroccan Dutch.

## **2.2 Categorical perception and exemplar theory**

In this section, two theories will be discussed that should be considered when interpreting the aforementioned studies that found that social information influences perception. The first is the theory of categorical perception. This theory states that our perception of speech is organized categorically, meaning that listeners try to relate highly variable speech sounds to the abstract phonological category representations. Unfortunately, categorical perception only is not sufficient to account for the large amount of individual speaker differences in speech signals. Individual speakers have different features to their speech, for example in terms of voice quality and pitch, that categorical perception alone could not account for. Therefore, there is the assumption that speakers adapt a device to account for these differences in speech signals from different speakers, namely speaker normalization (e.g. Johnson, 2008). This involves the mapping from a speaker-specific representation to a relatively speaker-neutral abstraction, which is then stored in linguistic memory. In other words, normalization is a mechanism whereby variation is filtered out so that the meaningful information from the speech signal is recognized and stored in memory. (Pisoni, 1997). This does not explain however, the way in which speakers remember social features (e.g. ethnicity or gender) along with specific linguistic features or markers, and those are stored in memory as typical for that group.

The exemplar model of speech perception (e.g. Johnson, 1997) might be a better fit to explain speech perception that includes the coding of non-linguistic features together with linguistic ones, which speaker normalization would not include. A perceptual category, a phoneme for example, is defined as the set of all experiences of the category, including social information of the speaker. Thus, no abstract category prototypes are stored immediately. New items are compared to remembered instances of each category, and categorization is based on sums of similarity over each category. Given an item to be categorized, its auditory properties are compared with each exemplar's auditory properties, and the similarity between each exemplar and the new item determines the activation level of the exemplar. The better the match, the higher the activation level of the exemplar, and therefore the sum of all the similarities is taken as evidence that the item belongs to that category (Johnson, 1997). The exemplar model works on each of the types of the

categories, therefore the model performs speech and speaker recognition simultaneously, as do people (Remez, Fellows & Rubin, 1997). According to this theory, acoustic-phonetic variability is not lost as a result of phonetic analysis. Instead, listeners store specific attributes of the talker's voice and speaking rate into long term memory. Both linguistic and non-linguistic information is retained (Pisoni, 1993). This is also what we see in the research presented earlier in this paper (section 1.2.1 p. 2), and exemplar theory here managed to give the best explanation for what was found in these studies.

### **2.3 Ethnolinguistic variation in the Netherlands**

Ethnicity is complex and can be an integral part of our identity, and thus our behavior, which includes language use. It is first important to define what specifically is meant when discussing ethnicity, how it relates to language use, and the ethnic language variety that is the topic of this thesis.

Ethnicity as defined by Fishman (1977) entails three essential parts that together define the self-image of an ethnic group. Firstly, there is paternity, which is shared biological origin, which can be apparent in physical aspects for example. Paternity cannot be changed because it is could be seen as the 'nature' aspect of ethnicity, blood and genes that are naturally passed down to different generations. Patrimony is a second factor that constitutes ethnicity, and involves the cultural implications can be subject to change, as they are learned traditions and values such as food, clothing or religion. The last factor influencing ethnicity is phenomenology, by this Fishman (1977) meant the value that we attach to the features of paternity and patrimony, and the evaluation of how they interact. Phenomenology is defined by the group itself but also by others, and can be subject to change as well. These three parts together is what defines ethnic groups and sets them apart from each other (Fishman, 1977).

Language has a symbolic function in the context of ethnic identity. If a group has their own language, this is their most outstanding symbol of ethnicity (Fishman, 1977). A community of second language learners might be reluctant to acquire full command of the standard language. Thus, in a minority or immigrant community, a group-particular variety can emerge. This is more often referred to as an ethnolect. This type of variety emerges when the dominant or 'standard' language of a community is modified through a period of bilingualism (Eckert, 2008). Therefore, the term ethnolect implies a set of linguistic features or variables that sets it apart from the standard variety (Quist, 2008).

The linguistic variable researched in this thesis stems from an ethnolect. This ethnolect emerged in immigrant workers who moved to the Netherlands from the 1960's onwards. These people, a big portion of them from Morocco, had to learn Dutch to integrate into the country. Their children attended Dutch-speaking schools, and their grand-children mostly grew up in the Netherlands. The variety spoken by this first generation of immigrants is considered an ethnolect because it emerged from a contact situation in which there was system convergence during second language acquisition. Hence, Moroccan Dutch ethnolect contains features of languages spoken in Morocco, mainly Moroccan Arabic and Berber. (Dorleijn et al. 2005)

Although the second and third generation of these immigrants spent most of their time in the Netherlands and fully had the resources to learn Dutch on a native level, it seems that among themselves, these youths have developed a certain group-particular accent. Which cannot be given the same classification as the variety that their (grand-)parents speak. It did not emerge as a consequence of lack of ability or reluctance in second language learning. Instead, it is now spoken by youth of different backgrounds, but who have a type of shared 'immigrant' identity, that they express by speaking this variety which has a covert prestige status (Nortier & Dorleijn, 2008). Hence, it fits into the definition of multi-ethnolect by Nortier and Dorleijn (2013:12), who described a multi-ethnolect as "a linguistic style and/or variety that is part of linguistic practices of speakers of more than two different ethnic and (by consequence) linguistic backgrounds, and contains an unusually high number of features from more than one language, but has one clear base language, generally the dominant language of the society where the multi-ethnolect is in use." Although it is important to keep in mind that this variety is used by people from different ethnic backgrounds, it includes a multitude of features that have an origin in the languages spoken in Morocco. Moreover, the specific sound that this thesis discusses seems to have its roots in languages spoken in Morocco (Van Meel et al. 2013). From now on this multi-ethnolect will therefore be referred to as Moroccan Dutch.

Moroccan Dutch is a variety spoken by a group in the Netherlands that is quite marginalized, as the perception of (Muslim) immigrants became more negative around the beginning of the 21st century (e.g. Buijs, 2009; Bolt & Van Kempen 2010). The linguistic evidence for this societal standpoint is quite conclusive. In an experiment where speech of different Moroccan Dutch speakers was rated by university students on beauty, accent prestige and speaker prestige and found that they rated Moroccan Dutch speakers expressively negative on trait items associated with prestige and beauty. The negative social

meaning of Moroccan Dutch became quite clear through these results. (Grondelaers et al. 2015).

Moroccan Dutch has specific characteristics compared to standard Dutch. Among them a different pronunciation of the /z/ which in standard Dutch is often devoiced, especially word initially (Kissine et al. 2005). Van Meel et al. (2013) investigated the phonetic features of /z/ production among Dutch youth. This research showed that Dutch adolescents, especially from the region of Amsterdam, devoice the /z/, whilst the Moroccan-Dutch participants used a pronunciation of /z/ with more voicing and dentalisation. The aim of this paper is to see if perception of Dutch speech is influenced when knowing that someone is of Moroccan descent, and whether in turn that knowledge would result in a perception of /z/ that is more typical for Moroccan Dutch speakers. Especially because Moroccan Dutch seems to carry a negative social status, which might carry some awareness in society that this difference in pronunciation of /z/ exists, and who uses this specific speech style.

## **2.4 Sociolinguistic classification of /z/**

Before the research question of this paper is presented, it is relevant to define the Moroccan Dutch /z/ in terms of its sociolinguistic properties, to see what kind of linguistic variable this sound is. American sociolinguist William Labov (1972) described three types of linguistic variables that can classify language varieties in terms of their sociolinguistic properties. These are *indicators*, *markers* and *stereotypes*. *Indicators* are described as variables that have little to no social awareness that there is sociolinguistic variability. If an indicator is part of someone's linguistic repertoire, it is used regardless of social context. *Markers* are part of the norms that define a speech community and show some stylistic variation. This means the use of the variable can be restricted to certain domains, which is sometimes referred to as register-based, or it involves shift in usage levels for features associated with certain groups of speakers (Schilling-Estes, 2013). In social psychology, stereotypes are beliefs that certain characteristics can be attributed to particular groups (e.g Myers et al. 2015). *Stereotypes* as Labov (1972) described, are linguistic characteristics or variables prone to stigmatization, i.e. they are perceived as negative characteristics that can be attributed to particular groups of speakers. These linguistic stereotypes may also become the overt topic of social comment. Due to this stigmatization, speakers may be reluctant to use it due to the negative connotations associated with the form, hence when under stigmatization usage of a form may decline and the form may eventually disappear completely from speakers' linguistic repertoire.

If we were to classify the Moroccan Dutch /z/ it appears from the literature (Nortier & Dorleijn, 2008; Dorleijn et al. 2005) that the sound is in fact in people's social awareness, and Moroccan Dutch is developing linguistic norms and norms of stylistic appropriateness. Therefore, the classification as indicator is not in place here, and marker would be a better classification. Van Meel et al (2013) showed that stylistic variation does occur sometimes among speakers of Moroccan Dutch. Especially in terms of dentalization of /z/, which the speakers in the study did more when they were speaking to someone with the same background, whereas for voicing this was less so. Occurrence of stylistic variation could be another reason to classify the Moroccan Dutch /z/ as a marker.

It appears from other studies however, that the form is stigmatized and the typical /z/ seems to be a prominent feature (among others) when an autochthonous Dutch person is asked to imitate an 'immigrant' accent (Dorleijn et al. 2005). Nortier & Dorleijn (2008) showed that the style was recognized, although not always positively evaluated. In one example (see below), the specific /z/ sound was recognized and used in a stereotypical context.

- 1) *Ik had laatst een gesprek met een Turk, en die zei inderdaad om de zin "Ik zzweer het man!"*  
 'The other day I had a talk with a Turk who repeatedly said I swear it man'  
 (adapted from Dorleijn et al. 2008)

Moreover, an 'immigrant' accent can associate certain stereotypical ideas about the group by which it is spoken, to the person who uses it. Ethnic groups in the Netherlands are conscious of differences in status between groups, and adolescents rate autochthonous Dutch speakers as having a higher status than Moroccan Dutch speakers (Jongenburger, 2002). Moreover, Moroccan-accented people are consistently rated negatively in terms of status and prestige. (Grondelaers et al. 2015) One could thus argue for this sound to be classified as a stereotype, because it can be the topic of social comment, and is viewed negatively by the majority in Dutch society. On the other hand, the study on production of the /z/ by Van Meel et al. (2013) showed that Moroccan and Turkish Dutch youth still produce the /z/ with considerably more voicing than Dutch youth, so the form has not completely been divorced from the form in which it is actually still produced by Moroccan- and Turkish-Dutch youth.

Stereotyping, and therefore the disappearance of a form like Labov (1972) described, might be more of a gradual process, and the Moroccan Dutch /z/ could be in that process

right now, although from the studies discussed above there seems to be no straight-forward answer. The Moroccan Dutch /z/ could be classified as both a marker or a stereotype, and more research would be needed to conclude whether it is one or the other. For this study, it is only important that the variable that is researched in terms of social information influencing perception is either a marker or a stereotype. If a variable is a marker or a stereotype, it means that there is social awareness of the difference in the use of the variable across social or ethnic groups. This social awareness aspect might cause listeners' perception to change if they are informed that a speaker belongs to the group that uses this pronunciation of /z/ to mark their social identity.

## **2.5 Research question**

This thesis to test the influence of ethnic information on the perception of the consonant /z/ in Dutch, which is pronounced differently by Moroccan-accented speakers compared to other speakers of Dutch (van Meel et al. 2013). The influence of regional speaker information on speech perception has been shown before (e.g. Niedzielski, 1999), the effect of ethnic information on speech perception however, is important to test whether the perception of /z/ in Dutch students varies depending on given ethnic information about the speaker, especially because the Moroccan Dutch accent is viewed considerably negatively in Dutch society (Grondelaers et al. 2015) In consideration of this aim and the relevance to research the phenomenon of speaker information influencing perception, the research question of the thesis could be formulated as follows:

*What is the influence of ethnic speaker information on the perception of alveolar initial fricatives among Dutch students?*

### 3 Methodology

#### 3.1 Experiment design

To test the perception of the participants, we designed an identification task. They listened to the stimuli in a sound-attenuated booth through a headphone Beyerdynamic DT 250. The participant was asked to identify whether they heard one of two Dutch words, /ze/ ‘sea’ or /se/ ‘c’, and respond accordingly by pressing a button on a button box. Maximum time to respond was set to 900 ms to ensure that the participants’ first reaction was recorded, and they were not able to second-guess. The task was presented in two conditions of 117 trials. In one condition the participant was told that the speaker they would be listening to is Dutch, and from Utrecht. In the other condition the participant was told that the speaker they would hear is of Moroccan origin, i.e. his grandparents moved from Morocco to the Netherlands. In reality, the participants had listened randomized items from a continuum from /ze/ to /se/ spoken by the same male native speaker.

In order to generate the continuum of stimuli, both words were recorded from the same carrier sentence, read out loud by a 22 year-old male native speaker of Dutch, who is not of Moroccan descent and does not speak Moroccan Dutch. The fricatives were extracted from these recordings and from the consonants only, a continuum was generated by using spectral linear interpolation, using the PSOLA (Pitch-Synchronous-Linear-Overlap and-Add) algorithm of Praat (based on the script of Mitterer, 2009). This resulted in eight steps from /s/ to /z/, which were concatenated with copies of the /e/ which in the original recording was preceded by /z/, to form the words /ze/ and /se/. This specific /e/ was chosen from the recordings because the pitch was steadiest, and made the continuum sound most natural and evenly spaced. The final step of the continuum that was used as a stimulus was the original /ze/ as pronounced by our male native speaker. Thus, the final result was nine steps of a continuum from voiced to devoiced to voiceless; /ze/ and /se/.

After this identification task the participants were asked to fill out a short survey that looked at the amount of contact that the participants might have had with speakers of Moroccan Dutch. This was done by giving the participants statements about situations in which they could have spoken to people who might speak Moroccan Dutch, for example in school or in the neighborhood they grew up in. They were asked to rate on a 5 point Likert scale how the statement fit their personal life. An example question was “In my elementary school I had classmates with a migrant background”. The full survey, both English and Dutch versions, can be found in the appendix. Besides information about contact, people were asked about their own linguistic backgrounds, where in the Netherlands they had lived, and

whether they spoke a dialect for example. This was done because, as mentioned earlier, perception is also influenced by individual production (e.g. Kendall & Fridland, 2010). The responses of the survey were used to analyze the collected data further, to see what other factors might play a role in perception of the alveolar initial fricatives researched in this study.

### **3.2 Participants**

A participant database from UiL OTS was used to recruit the participants for this study. The database of UiL OTS consists mainly of students from the University of Utrecht, and are mostly female, which is also the demographic of the 22 participants that decided to sign up for this particular experiment. All participants were between the ages of 18 and 28 years old. From the questionnaire, it appeared that one male participant grew up in Italy. It was decided to exclude this participant from the study because the amount of contact that they would have had with people that speak Moroccan Dutch is very minimal compared to the rest of the sample. Therefore, the results include data from 20 female participants and 1 male participant. All participants were right handed and all participants were students, 17 in the humanities department, 3 in the social sciences, and 1 was a liberal arts student. One question in the questionnaire asked where the participant had lived in the Netherlands and how long. From looking at population records from the Central Bureau of Statistics (2016, 2017), it was decided to split the participants up into two groups. One group ( $n=10$ ) had lived in a municipality with over 100.000 inhabitants, and 15-40% allochthonous (i.e. with migrant background) population, for most of their life and high school years. These included cities such as Alkmaar or Zaanstad. The other group ( $n=11$ ) had lived in a municipality with  $<100.000$  inhabitants for most of their life, unfortunately the number of allochthonous people in those municipalities was not published on the CBS website. Nonetheless, this division might be useful because it shows a difference in living circumstances per participant, as bigger cities might have different societal landscapes compared to smaller towns.

### **3.3 Hypothesis**

The hypothesis for this experiment is as follows. If ethnic information influences speech perception, the psychometric curve in the Moroccan Dutch condition will be shifted more toward a voiced perception, i.e. the stimuli will more often be perceived as /ze/ when the participant was told that the speaker they were going to listen to was of Moroccan descent. In the other condition, when the participant was told they were going to listen to a

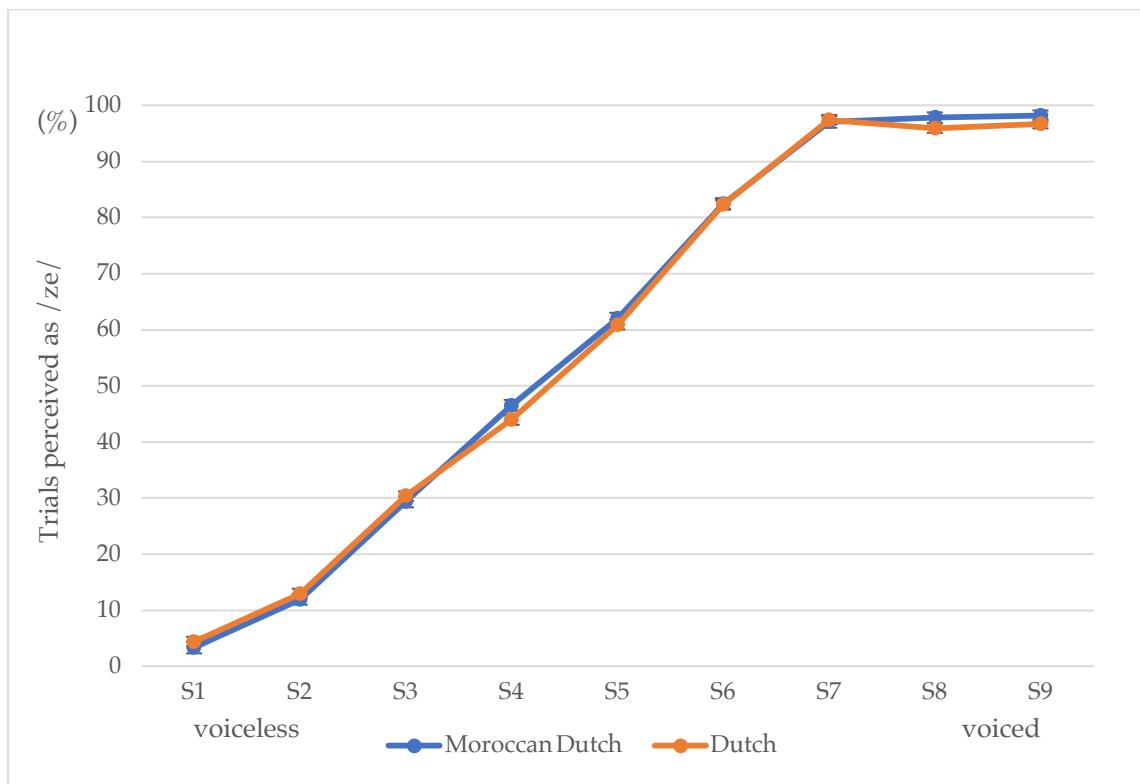
speaker of Dutch descent, the psychometric curve will be shifted the other way, toward a voiceless perception, i.e. the word-initial fricative will be perceived as as /se/.

## 4 Results

For the identification task, the percentage of times the word was perceived as voiced /ze/ was calculated. These results are visible in table 2 and figure 1.

*Table 1* Mean percentages for perceived voiced /ze/ per continuum token and condition (n=21)

Condition Tokens	“Speaker is Moroccan Dutch” (% perceived /ze/)	“Speaker is Dutch” (% perceived /ze/)
S1 - /s/	3,3	4,4
S2	11,9	13,0
S3	29,3	30,3
S4	46,5	43,9
S5	62,0	60,9
S6	82,5	82,3
S7	97,0	97,4
S8	97,8	95,9
S9 - /z/	98,1	96,7



*Figure 1* Percentage of tokens perceived as voiced, per token where stimulus 1 (S1) is most voiceless and stimulus 9 (S9) is most voiced, split up by condition (n=21)

Figure 1 shows a typical categorical perception curve, where perception gradually shifts along the continuum, and around the middle tokens, the perception of a voiced or voiceless sound is hard to distinguish, and participants guess, which is why those

percentages are expected to be around 50%. Whereas at the beginning and end of the continuum, the participants are more certain and perceive a voiceless fricative for almost all trials of stimulus 1 (S1) and a voiced fricative at almost all trials of stimulus 9 (S9). These results did unfortunately show that the independent variable (i.e. information given beforehand) did not have an effect on the perception of this phoneme boundary, since the psychometric curves are almost in the same place.

T-tests between the conditions were performed separately for each token. As the data above shows, and what the t-tests showed as well is that the data is not significant ( $p>0.05$ ) to conclude that there was any effect of the information given in the two conditions. These results are not as expected, especially the middle tokens of the continuum were expected to have significantly different mean values for perceived voicing, which would show that the phoneme boundary was perceived differently between the conditions.

When looking at the differences between the groups of participants, the ones from bigger municipalities and the ones from smaller municipalities, we see that there is a difference in the results of both these groups.

Table 2 *Mean percentage of perceived /ze/ for the Bigger Municipality group.*

Stimulus 1 (S1) most voiceless and Stimulus 9 (S9) is most voiced. (n=10)

Condition Tokens	“Speaker is Dutch” (% perceived /ze/)	“Speaker is Moroccan Dutch” (% perceived /ze/)
S1	6,2	6,2
S2	16,5	14,4
S3	39,2	30,8
S4	51,5	48,8
S5	65,6	59,1
S6	88,9	81,9
S7	96,1	94,6
S8	95,4	95,4
S9	94,6	97,6

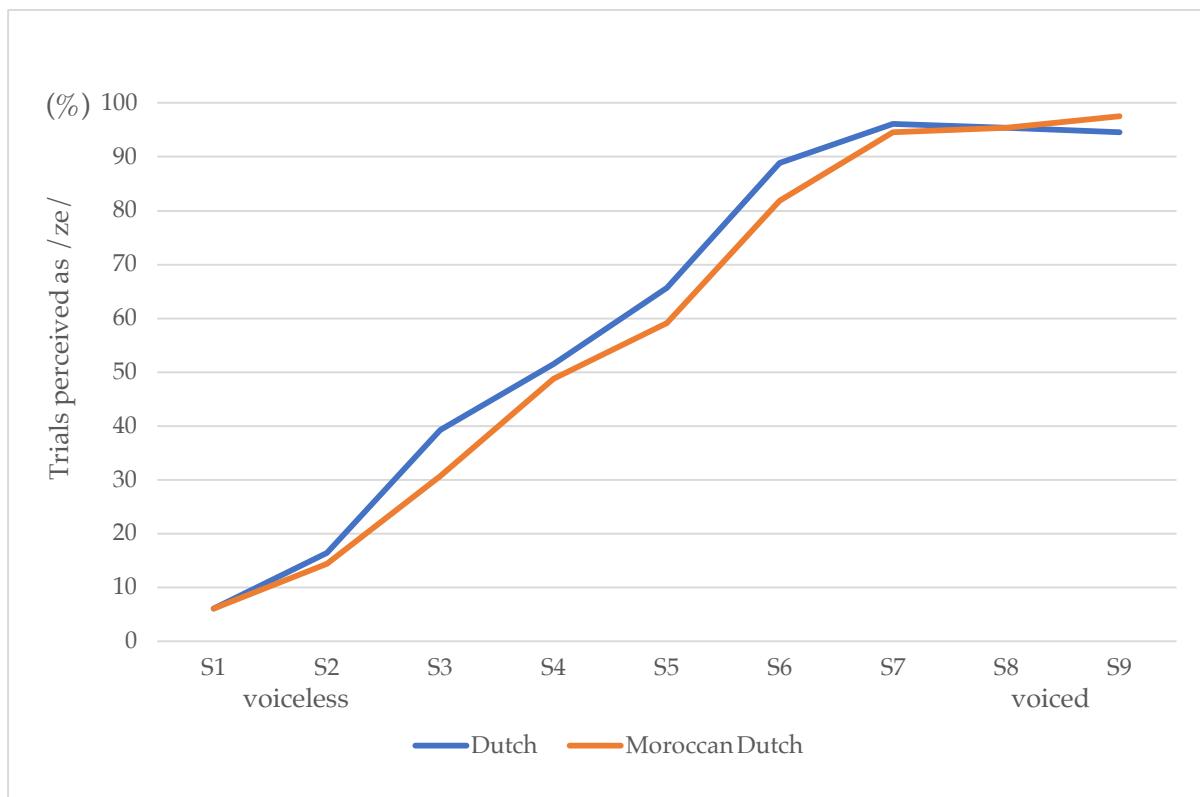


Figure 2 Perceived voicing from the Bigger Municipality participant group (municipality population >100.000) per condition. (n=10)

From Table 2 and Figure 2 it becomes clear that in the Dutch condition, the tokens were slightly more often perceived as voiced, compared to the Moroccan Dutch condition, and although the difference is insignificant, goes in the opposite direction of our expectation of the results. None of the differences between the conditions were significant however.

Table 3 Mean percentage of perceived /ze/ for the Smaller Municipality group. (n=11)

Condition \ Tokens	“Speaker is Dutch” (% perceived /ze/)	Speaker is “Moroccan Dutch” (% perceived /ze/)
S1	2,9	0,7
S2	10,0	11,9
S3	23,0	29,6
S4	36,2	45,0
S5	56,0	62,4
S6	76,3	82,4
S7	98,6	96,5
S8	96,4	97,2
S9	98,6	97,9

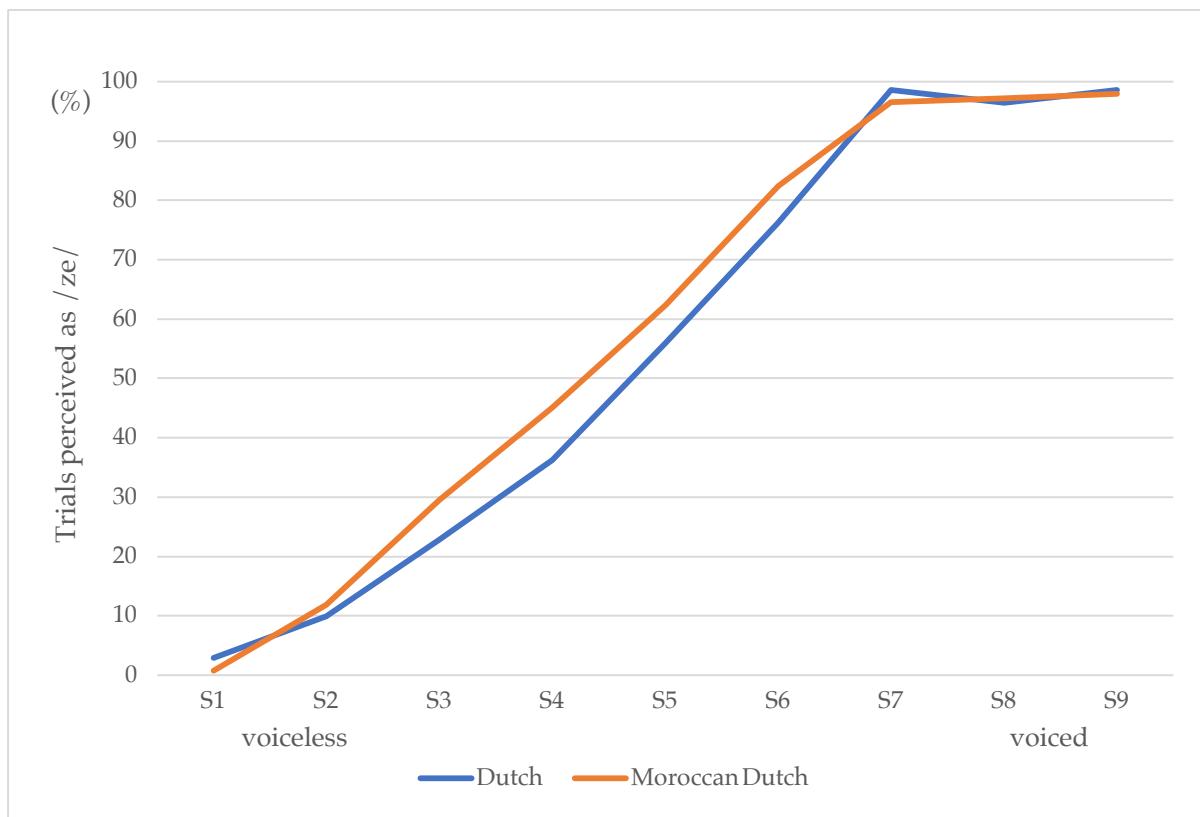


Figure 3 Perceived voicing from smaller municipality participant group (municipality population <100 000) per condition

For the last table and figure, it is worth mentioning that the difference between the percentage of tokens perceived as voiced in the Dutch ( $M=76.3$ ,  $SD=25.7$ ) and Moroccan Dutch condition ( $M=82.4$ ,  $SD=21.5$ ) was significant;  $t(10)=-2.5$ ,  $p<0.05$  for Stimulus 6 (S6). This could be an indication that for the Smaller Municipality group we do see a difference in perception of /z/. As is visible in the graph in Figure 3, in the Moroccan Dutch condition, the tokens were more often perceived as /ze/, and the phoneme boundary is perceived earlier along the continuum, compared to the phoneme boundary in the Dutch condition.

The results from the survey confirm why we slightly different result in the identification task between the Bigger Municipality and the Smaller Municipality group. From the survey it appeared that the average Likert scale ratings (0-5) from the Bigger Municipality group ( $M=2.4$ ,  $SD=0.82$ ) was significantly higher than the ratings from the Smaller Municipality group ( $M=1.9$ ,  $SD=0.53$ );  $t(15)=1.5$ ,  $p<0.05$ . We did expect the Bigger Municipality group to have more contact on average than the Smaller Municipality group. What was not expected however, was the fact that the Smaller Municipality group would show the effect that we expected overall, namely the effect of ethnic information on speech perception, and the Bigger Municipality group did not show this.

## 5 Discussion and conclusion

This study presents the results of an experiment that examines the influence of ethnic information on speech perception. More specifically, the aim was to explore the influence of ethnic information on the perception of alveolar initial fricatives /z/ and /s/ in Dutch, which is pronounced with more voicing and dentalization by Moroccan Dutch speakers compared to standard Dutch (Van Meel et al. 2013). The influence of social information on speech sounds has been researched before (e.g. Niedzielski, 1999), but these studies were limited to testing the effect of regional speaker information on perception. We investigated the influence of ethnic information on speech perception, because this might indicate the importance of social cues, such as ethnic ones, in speech perception.

The experiment conducted was an identification task, whereby listeners had to indicate which of the Dutch minimal pair /ze/ or /se/ they heard, from a continuum of 9 steps from /ze/ to /se/. The expectation was that participants more often perceived the stimuli as /ze/ when they were told that the speaker they were listening to was of Moroccan descent, compared to when told that the speaker they heard was Dutch, because the voiced /z/ is characteristic of Moroccan Dutch. Unfortunately, we did not find this result.

Considering that there are multiple factors that might play a role the effect of ethnic information on speech perception, the participants were split up according to whether their longest place of residence was a municipality of >100 000 inhabitants, or <100 000 inhabitants. This was done because we expected that people from bigger cities might live in a more ethnically diverse environment, therefore have more contact with Moroccan Dutch speakers as well. The self-report survey confirmed this expectation because the Smaller Municipality group turned out to have significantly lower rating scores for contact compared to the Bigger Municipality group.

Looking at the separate groups, it was found that the psychometric curve was different between conditions in the Smaller Municipality group, and this was in the direction that was hypothesized, i.e. in the Moroccan Dutch condition the stimuli would more often be perceived as /ze/. It must be noted however that the number of participants of this group was quite small ( $n=11$ ), and there was only one token of the continuum that was perceived significantly differently in both conditions, namely S6. Therefore, we can only conclude that in the Smaller Municipality group there was a slight effect of ethnic speaker information on speech perception, although in the direction that was expected. It is surprising however that we did not find this effect for the Bigger Municipality group and although not significant, the opposite was found compared to the Smaller Municipality group. For the Bigger Municipality

group, the stimuli were more often perceived as /ze/ in the Dutch condition, which goes against our expectations.

It could be speculated why we see a slight difference between the bigger municipality group and the smaller municipality group. It was shown in research that people from migrant backgrounds, are marginalized groups in the Netherlands (e.g. Bolt & van Kempen). Linguistic research on the attitudes toward the Moroccan Dutch accent shows this negative perception of Moroccan people as well (Grondelaers, 2015). The Likert scale ratings of the Smaller Municipality group showed that they had had significantly less contact with Moroccan Dutch speakers. It might also be the case that they live in a relatively homogeneous society compared to the Bigger Municipality group. Therefore, when under the assumption that they are listening to speech of a Moroccan Dutch person, people who have had less contact with Moroccan Dutch speakers have to rely on stereotypes instead of real life experience. This stereotype might have resulted in the difference in perception that we saw in the Smaller Municipality group. The people from bigger municipalities might live in a more ethnically diverse environment, therefore will not adapt this stereotype in their perception, which could be why we did not see a significant difference between conditions in this group.

It still remains that this research did not yield the expected results, but it seems that there is some difference in perception when the groups are divided according to their longest place of residence. Perhaps if the group-sizes are bigger, and the participants were controlled for where they have lived in the Netherlands, this could yield the results that are in accordance with what we expected to find in this study.

Moreover, the only feature that was manipulated in the stimuli used in this study was voicing. Yet, Van Meel et al. (2013) also showed that dentalization of /z/ is a feature that Moroccan Dutch speakers use to distinguish themselves from Dutch speakers. The difference between dentalized or alveolarized /z/ is not a phonemic distinction in Dutch therefore the paradigm of asking participants to distinguish between phonemes like was done in this study, would not have been possible. It would be interesting however to further investigate how dentalization of /z/ is perceived by Dutch speakers in the Netherlands, precisely because it is not a phonemic distinction in Dutch, therefore might be a more subtle characteristic to the Moroccan Dutch pronunciation of /z/, in contrast to voicing.

Again, speech perception seems a complicated process that is influenced by a multitude of factors. Although we did not find an effect of ethnic speaker information on speech perception in this study, the results of other studies show quite clearly that social given social information such as region or gender can affect speech perception (e.g. Strand,

1999; Hay & Drager, 2010). The speaker information in this study however might have had a different effect because it is ethnic speaker information, and information that implies a speaker of a marginalized group in the Netherlands, namely Moroccan Dutch. Moreover, Moroccan Dutch speech is rated consistently negative by Dutch speakers (Grondelaers et al. 2015). The fact that Moroccan Dutch speakers are marginalized implies that features that are characteristic for Moroccan Dutch speech might trigger more negative connotations compared features related to region or gender. Therefore, ethnic speaker information in the context of this study might affect perception differently in contrast to speaker information about regional origin or gender of the speaker. These many factors that could be of influence made that the group size for this study was too small and too heterogeneous to find the results that were hypothesized.

All in all, it would be relevant to add the new dimension of ethnic speaker information to the existing research of speech perception, because this gives insight into the way in which social cues are used to interpret speech as a listener. For future research on ethnic information and speech perception it is important that the societal factors, and the societal factors related to speech variety are well researched before any sound conclusions can be made about the link between ethnic speaker information and speech perception.

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## Appendix

A. Demographic, language background, and language contact survey in Dutch as given to the participants (all native speakers of Dutch). For a translation see appendix B.

### Onderzoek spraakperceptie

Enquete bij bacheloronderzoek naar spraakperceptie.

Alle gegevens worden vertrouwelijk behandeld en anoniem verwerkt. De gegevens worden alleen gebruikt in het kader van dit onderzoek.

Bedankt voor je deelname!

Veerle Schoon

\* Required

**1. Deelnemer (laat Veerle dit invullen) \***

---

**2. Datum \***

Example: December 15, 2012

**3. Geslacht \***

Mark only one oval.

- Man
- Vrouw

**4. Geboortejaar \***

---

**5. Mijn huidige beroep/studie is: \***

---

**6. Ik ben: \***

Mark only one oval.

- Rechtshandig
- Linkshandig

**7. Ik heb gehoorproblemen (zo ja vul in bij "other") \***

Mark only one oval.

- Nee
- Other: \_\_\_\_\_

**8. Ik ben dyslectisch \***

Mark only one oval.

- Nee
- Licht
- Matig
- Sterk

## Taalachtergrond

Dit gedeelte gaat over je taalachtergrond.  
Als iets niet duidelijk is, aarzel niet om het te vragen.

**9. Geboorteplaats \***

**10. Woonplaats \***

**11. Mijn moedertaal is/zijn \***

*Check all that apply.*

- Nederlands
- Frans
- Engels
- Duits
- Arabisch
- Berber
- Other: \_\_\_\_\_

**12. Als mensen in Nederland vragen waar ik  
vandaan kom dan antwoord ik: \***

**13. Plaatsen waar je tot nu toe hebt gewoond hebt gewoond en hoe lang (bijv. Haarlem van 2001 tot 2008) \***

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**14. Ik spreek een dialect \***

*Mark only one oval.*

- Ja
- Nee

**15. Als je bij de vorige vraag ja hebt geantwoord  
geef aan welk dialect je (soms) spreekt**

**16. Als je een dialect spreekt, geef aan in welke  
situaties/met wie.**

## Informatie over sociale groepen

**In het volgende deel komen een paar vragen over de omgeving waar je bent opgegroeid en welke sociale omgeving je je in bevond. Het gaat er in deze studie om of je in contact bent geweest met mensen met een migratieachtergrond.**

---

**LET OP Hiermee bedoelen we jongeren waarvan de ouders of grootouders naar Nederland zijn gekomen, dus tweede of derde generatie immigranten.**

---

17. Het is belangrijk dat je de bovenstaande instructies goed hebt gelezen. Als je nog vragen hebt stel ze dan voordat je doorgaat met de enquête. \*

*Check all that apply.*

Ik heb de instructies gelezen en wil doorgaan

### **Informatie over sociale groepen**

1. (Bijna) geen
2. Een beetje/een paar
3. Niet veel/niet weinig/normaal
4. Veel
5. Heel veel

18. In de buurt waar ik ben opgegroeid woonden mensen met een migratieachtergrond \*

*Mark only one oval.*

1      2      3      4      5

(bijna) geen      heel veel

19. Op mijn basisschool had ik contact met kinderen met een migratieachtergrond \*

*Mark only one oval.*

1      2      3      4      5

(bijna) geen      heel veel

20. Ik heb vrienden met een migratieachtergrond \*

*Mark only one oval.*

1      2      3      4      5

(bijna) geen      heel veel

21. Op de middelbare school had ik klasgenoten met een migratieachtergrond \*

*Mark only one oval.*

1      2      3      4      5

(bijna) geen      heel veel

**22. In de buurt waar ik nu woon wonen mensen met een migratieachtergrond \****Mark only one oval.*

1      2      3      4      5

(bijna) geen      heel veel**23. Ik heb vrienden met voornamelijk dezelfde achtergrond als ik \****Mark only one oval.*

1      2      3      4      5

(bijna) geen      heel veel**24. Op mijn werk praat ik met mensen met een migratieachtergrond \****Mark only one oval.*

1      2      3      4      5

(bijna) niet      heel veel**25. Op mijn studie praat ik met mensen met een migratieachtergrond \****Mark only one oval.*

1      2      3      4      5

(bijna) niet      heel veel**26. Ik kom uit een omgeving met een gemiddelde tot hoge sociaal-economische status \****Mark only one oval.*

1      2      3      4      5

helemaal oneens      helemaal eens**Bedankt voor je deelname!**

Dit onderzoek ging over de perceptie van spraak onder invloed van gegeven sociale informatie. De woorden waar je naar hebt geluisterd waren gesproken door dezelfde spreker, namelijk door Niels.

Het onderzoek probeert op geen enkele wijze te insinueren dat sommige etnische of sociale groepen beter zijn dan anderen, het gaat puur om de (onbewuste) status van deze groepen in de maatschappij, en wat dat voor invloed heeft op onze perceptie van spraak.

We hebben geprobeerd de informatie en de vragen in het experiment zo politiek correct mogelijk proberen weer te geven. Je reacties zullen anoniem blijven.

**27. Het kan zijn dat de analyse nog extra vragen bij ons oproept. Indien we contact met je mogen opnemen voor extra informatie of vervolgonderzoek, geef hieronder je email adres:**

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B. Demographic, language background, and language contact survey in English

## Research speech perception

Speech perception research

Survey as part of bachelor research thesis in speech perception.

All data will be handled with care and analyzed anonymously. The data will only be used in the context of this research.

Thanks for your participation

\* Required

**1. Participant number \***

---

**2. Date \***

Example: December 15, 2012

**3. Sex \***

Mark only one oval.

- Man
- Vrouw

**4. Year of birth \***

---

**5. My current occupation is \***

---

**6. I am... \***

Mark only one oval.

- Right handed
- Left handed

**7. I have hearing problems (if yes specify at "other") \***

Mark only one oval.

- No
- Other: \_\_\_\_\_

**8. I am dyslexic \***

Mark only one oval.

- No
- Slightly
- Moderately
- Strongly

## Language background

This part is about your own language background.  
If something is not clear do not hesitate to ask

**9. Place of birth \***

---

**10. Place of residence \***

---

**11. My native language(s) is/are \***

*Check all that apply.*

- Dutch
- French
- English
- German
- Arabic
- Berber
- Other: \_\_\_\_\_

**12. If people in The Netherlands ask me where I  
am from I answer... \***

---

---

---

---

---

**13. Places where you have lived up until now and how long (e.g. Haarlem from 2008 until 2012**

\*

---

---

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---

---

**14. I speak a dialect \***

*Mark only one oval.*

- Ja
- Nee

**15. If you answered yes to the previous question  
please specify which dialect you speak.**

---

---

---

**16. If you speak a dialect please specify in what  
situations and with whom you speak it.**

## Information about social groups

In the next part there will be a few questions about the (social) surroundings that you grew up in. In this study it is about the amount of contact that you have had with people from a migration background.

---

**NB by migration background we mean youth of which the grandparents migrated to the Netherlands, meaning second or third generation immigrants.**

---

17. It is important that you have read the information above, if you have any further questions please ask them before continuing. \*

*Check all that apply.*

I have read the instructions and would like to continue

## Information about social groups

1. (Almost) none
2. A couple/a few
3. Not a lot/not few/normal amount
4. Many
5. Very many

18. In the neighbourhood I grew up in lived a lot of people with a migration background \*

*Mark only one oval.*

1	2	3	4	5
(almost) none <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> very many				

19. In my primary school were children with a migration background \*

*Mark only one oval.*

1	2	3	4	5
(almost) none <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> very many				

20. I have friends with a migration background \*

*Mark only one oval.*

1	2	3	4	5
(almost) none <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> very many				

21. In my high school I had classmates with a migration background \*

*Mark only one oval.*

1	2	3	4	5
(almost) none <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> very many				

**22. There are people with a migration background living in the neighbourhood where I live now \***

*Mark only one oval.*

1	2	3	4	5		
(almost) none	<input type="radio"/>	very many				

**23. I mostly have friends with similar background as me \***

*Mark only one oval.*

1	2	3	4	5		
(almost) none	<input type="radio"/>	very many				

**24. In my job I talk to people with a migration background \***

*Mark only one oval.*

1	2	3	4	5		
(almost) never	<input type="radio"/>	Very much				

**25. At my university I talk with people with a migration background \***

*Mark only one oval.*

1	2	3	4	5		
(almost) never	<input type="radio"/>	Very much				

**26. I come from an environment with an average to high socio-economic status \***

*Mark only one oval.*

1	2	3	4	5		
Completely disagree	<input type="radio"/>	Completely agree				

## Thanks for your participation

This research was about the influence of social information on speech perception. The words you listened to were spoken by the same speaker, Niels.

This research does not intend to insinuate in any way that some ethnic groups are better than others, it is purely about the (unconscious) status of these groups in society, and how that influences our speech perception.

We have tried to portray all information and questions as politically correct as possible.

Your responses will remain anonymous.

**27. It could be that analysis of your results might give rise to further questions, if this is the case, and we may contact you, please give us your email address below:**

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