MA Thesis

Implicit Gender Associations in the Approximant /r/ Sound Change in Dutch

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ABSTRACT

Since the second half of the twentieth century rhotic use has rapidly been changing in Dutch. A new variant, approximant /r/ is replacing the traditional alveolar and uvular /r/ in coda. The sound change has been completed in the western part of the country, an area called the Randstad and is now moving west and possibly north. The change resembles Labov’s change from below and is being led by young women. The genderedness of the sound change could influence speakers associations with the approximant /r/. through indexical linking.

To investigate this hypotheses, The speech production and gender association of 13 speakers from Friesland were tested, who traditionally use the alveolar /r/. If the sound change has reached Friesland, we would expect young women to introduce the new variant. The approximant /r/ would in this region then likely be associated with femininity. Additionally, 20 participants from the Randstad were tested as a control group. The approximant /r/ sound change has been completed in this region, and since both men and women use the approximant /r/ here, there should be no gender association. The participants performed a production task to map their speech patterns concerning the coda /r/. An Implicit Associations Test was used to determine the relative strength of their gender associations.

The results of the production task confirm that both male and female speakers from the Randstad use the approximant /r/ frequently in coda. There was a significant association between rhotic use and region, as the speech patterns of the coda /r/ looked very different for Frisian speakers. Surprisingly, some Frisian speakers did use the approximant /r/. A gender comparison revealed that women used the approximant /r/ more than men. It seems that the approximant /r/ is spreading towards the north, where it is introduced into the Frisian speech community by young women. The IAT results showed an overall gender association close to neutral for the participants form the Randstad and stronger towards femininity for the Frisian participants. However, the difference was not significant. These results indicate that there is a possible indexical link between gender and the approximant /r/ in Friesland, but it is not strong enough to produce a significantly feminine association.
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INTRODUCTION

The phoneme /r/ occurs in about 75% of all languages (Ladefoged & Maddieson, 1996). The /r/ is not a singular sound, but can be pronounced in a large variety of ways. These variants are commonly grouped together as rhotics (Van Bezooijen, Kroezen & van den Berg, 2002).

Almost all languages have a realisation of /r/, but only one in five languages has two or more rhotics (Ladefoged & Maddieson, 1996). Dutch is one of these few languages, as three main variants are recognised: the alveolar /r/, the uvular /r/ and the approximant /r/. These variants can again be realised in different manners, making for a diverse landscape of rhotics (Van Bezooijen et al., 2002; Sebregts, 2015). These are all free variants, in a grammatical sense, and do not serve a contrastive function (Van Bezooijen, 2005).

The three Dutch /r/ variants have different origins. The alveolar /r/, which is realised with the tip of the tongue against the alveolar ridge, is generally considered to be the oldest variant. Since the seventeenth century, additionally, the uvular /r/ can be distinguished. This sound is produced with the back of the tongue against the uvula (van Reenen, 1994). Recently, an approximant version of the /r/ has manifested itself and is spreading across the Netherlands (Van Bezooijen et al., 2002). A remarkable feature of the Dutch approximant /r/ sound change is the speed at which it occurs. A study by Van Bezooijen (2005) shows that certain regions are changing from 0% to 100% use of the approximant /r/ within two generations.

The approximant /r/ is restricted to the coda position, so speakers of Dutch always use one of the older variants in addition to the approximant /r/. Although the approximant /r/ has replaced the use of uvular and alveolar /r/ in coda in some speech communities, it has not caused a change in onset realisations of /r/ (Van Bezooijen, 2005).

The approximant /r/ sound change had already been completed in the western part of the Netherlands (Van Bezooijen, 2005). The largest Dutch cities are located in this area which is known in the Netherlands as the Randstad. It is considered the political and economic epicentre of the country and roughly takes the shape of a triangle, between Amsterdam, The Hague and Utrecht (Sebregts, 2015). Previous research (Van Bezooijen, 2005; Sebregts, 2015) has demonstrated a spread of the approximant /r/ from the west of the Netherlands, towards the east. So far, a spread towards the north has not been investigated. Therefore, while the coda alveolar /r/ is giving way to the approximant /r/ in the east, it remains unclear if the same is happening in the north.

Several studies report that the approximant /r/ is used most by women and children (Stroop, 1998; Van Den Toorn, 1992; van de Velde, 1996). The data from both Sebregts (2015) and Van Bezooijen (2005) demonstrate that the spread of the approximant /r/ is indeed being
led by young women. This trend is in accordance with the sociolinguistic principle, formulated by Labov (1990) that young women introduce new linguistic features in unstable language situations, which has been supported by variation studies since (Bilaniuk, 2003; Cavanaugh, 2006; Gal, 1978; Eckert, 1989; Labov, 2002).

Although the sound change of the approximant /r/ is led by young women, it is unclear if, and how, this influences the perception of this variant of the phoneme. If a certain linguistic feature is used by a distinct social group, an association between the sound and that social group often occurs through indexical linking. In this case, an association between the approximant /r/ and women.

This study explores to what extent speakers of Dutch associate the approximant /r/ with femininity or masculinity, looking at the implicit gender associations rather than overt associations. Some linguistic associations and attitudes are easily recognised as they are overt and speakers are aware of them. However, sometimes language attitudes are more subtle and speakers may not even be aware of their preferences and associations (De Houwer, 2006). Though implicit associations are more difficult to test, it is certainly possible, in this case using an Implicit Associations Test (IAT) (De Houwer, 2006; Greenwald, McGhee & Schwartz, 1998). The IAT is a socio-psychological experiment that looks at response times to discern a pattern of automatic associations (Greenwald et al., 1998). Speakers from the Randstad and the northern province of Friesland are compared on their use of and gender associations with the approximant /r/. The approximant /r/ sound change has been completed in the Randstad, but not in Friesland, a province that holds a special position in the Netherlands.

Since 1970, the province of Friesland has had both Dutch and Frisian as its official languages and in 2010 both were included in the constitution as the official languages of the Netherlands as well (Hilton & Gooskens, 2013; Van Bezooijen, 2009). Even though Frisian is the indigenous language of the area, it is also a minority language with around 480,000 speakers (Hilton & Gooskens, 2013). Despite efforts to raise the status of Frisian, due to the historical hierarchical structure, Dutch remains the prestige language in the region. As a result, speakers of Frisian are almost always bilingual. The government has become more involved in maintaining and promoting the language by showing strong support with overt language policies aimed at promoting the use of language, encouraging the transfer of Frisian to younger generations and raising its status beyond the informal domains (Hilton & Gooskens, 2013, Van Bezooijen, 2009). Frisian has regained some of its status in education as more and more primary schools are now offering bilingual (Dutch, Frisian) and trilingual (Dutch, English, Frisian)
education. However, in secondary schools, emphasis is still on proficiency in Dutch, which is required to graduate (Hilton & Gooskens, 2013).

Hilton & Gooskens (2013) looked into the attitudes towards Frisian held by speakers of Dutch and Frisian. They found that both overt and covert attitudes towards Dutch were more positive than towards Frisian. However, speakers of Frisian as their first language rated Frisian significantly higher than speakers of Dutch. Hilton & Gooskens also tested if the effort to expand the use and visibility of Frisian has influenced the attitudes of Dutch speakers. Surprisingly, the results revealed a less positive attitude towards Frisian from Dutch speakers who lived in the province, compared to those who lived elsewhere in the Netherlands. Although this negative attitude is not new, it does indicate that the raised status of Frisian has negatively influenced the attitudes of speakers of the majority language, rather than positively.

The traditional rhotic in Frisian is the alveolar /r/. Among the northern Dutch speakers, the alveolar /r/ is considered to have the strongest foothold in Friesland (Van Bezooijen, 2009). The Frisian language has been influenced considerably by Dutch in both lexicon and morphology, but not phonetically, instead the alveolar /r/ has remained with the uvular /r/ in a stigmatised position (Van Bezooijen, 2009).

Chapter 2 presents the theoretical framework of relevant literature, starting with the realisations of /r/ in Dutch, specifically the approximant /r/. It gives a brief overview of the history, the sociolinguistic features and the specific sounds characteristics of these rhotics. An examination of the mechanism of sound change follows, in particular when led by women as it matches the characteristics of the approximant /r/ change in the Netherlands. Finally, implicit association and their basis in social cognition are discussed. The IAT and its potential for sociolinguistic research are explained in detail, as well as the specifics of the study, in the methodology section in Chapter 3.

Results of the experiment and the production task can be found in chapter 4. Chapter 5 contains a discussion of the results and an evaluation of the experiment. The study is concluded in Chapter 6 with a brief summary of the relevant literature as it pertains to the results and suggestions for further research.
2 LITERATURE

2.1 THE DUTCH /r/
In Dutch, three distinct variants of rhotics can be distinguished: the alveolar /r/, the uvular /r/ and the approximant /r/ (Van Bezooijen et al., 2002).

During the 20th century rhotic use in the Dutch language changed. In the large western cities of the Netherlands, a uvular pronunciation of /r/ became increasingly popular (van Bezooijen, 2005). This variant is pronounced by trilling or tapping in the back of the throat (Van Reenen, 1994). Used by the elite classes in the west of the country, the uvular /r/ had prestige, most likely due to its association with the highly regarded French language. From the elite the use of the uvular /r/ started to spread during the first half of the 20th century towards the lower social classes (Van Bezooijen, 2005).

Another change occurred as pronunciation of /r/ began to vary between onset and coda position. The pronunciation of /r/ was increasingly reduced in coda (Van Bezooijen, 2005). This type of articulatory reduction has been recorded in most Germanic languages and resulted in an increase in linguistic variation (Van de Velde & Van Hout, 1999). In the Dutch language, this reduction manifested in the formation of a new variant; the approximant, or Gooise, /r/, which since has become increasingly popular.

The three main variants can be divided into sub-categories. Over the last decennia each new study on the Dutch /r/ has found new variants, with differences in both manner and place of pronunciation (Sebregts, 2015). Altogether more than 20 different pronunciations of /r/ can be distinguished in the Dutch language today. Figure 1 shows the different variants of /r/ identified in a study by Sebregts (2015).
The use of the three main realisations of /r/ is spread both socially and geographically. Roughly speaking, the country can be divided into three regions, corresponding with the three /r/s. First, the north and east, where historically the alveolar /r/ is used. The uvular /r/ did spread to the north, but remained stigmatised (Van Bezooijen, 2009). Second, the south where the uvular /r/ is used most; and finally, the west, where the approximant /r/ is now firmly established. Linguists have observed, however, that the use of the approximant /r/ is spreading rapidly towards the east (Sebregts, 2015; Van Bezooijen, 2005).

2.1.1 APPROXIMANT /R/

2.1.1.1 HISTORY

During the 20th century this new variant rapidly grew in popularity. Much of its popularity can be contributed to its use by newscasters. A study by Van de Velde in 1996 shows a definite change in the way television presenters spoke, with a later study by Van Bezooijen (2003) finding a high use of the approximant /r/, especially among female anchors. This link between the approximant /r/ and media, earned it its common Dutch nickname Gooise r.

The Gooi region in the West of the country houses most of the national broadcasting companies (Van Bezooijen, 2005). This nickname has falsely led many to believe it as the place of origin for the approximant /r/. When Kloeke (1938) was among the first to mention the existence of the approximant /r/, he claimed it had evolved from urban speech patterns in Leiden and Rotterdam. Its absence in the speech of elders, indicated a new variant. It is likely that some form of the approximant /r/ was being used in urban environments in the West as early as the end of the 19th century (Van Bezooijen, 2005).
2.1.1.2 **Sound Characteristics**

One of the striking characteristics of the approximant /r/ in Dutch is that it is completely restricted to the coda position. The only exception to this rule is in the stigmatized urban dialect of Leiden where it can also occur in onset (Van Bezooijen, 2005). With the approximant /r/ always restricted to coda, speakers that use this /r/ have at least one other realisation of /r/ in their repertoire. The many different realisations of /r/ mean that there are many different combinations possible, depending on whether a speaker is bi-rhotic or even tri-rhotic (Van Bezooijen, Kroezen & Van Den Berg, 2002). The choice of /r/ used relies on stylistic, sociolinguistic and phonological conditions (Sebregts, 2015). Strycharczuk and Sebregts (2014) found that variation in /r/ is typically determined by dialect and has no lexical restriction, but can be predicted through prosodic categories.

The approximant /r/ has an incomplete constriction and does not interfere as much with the airway as other consonantal types of /r/ (Van Bezooijen et al., 2002). There has been much discussion on other phonetic properties of the Dutch approximant /r/. Researchers have debated whether the approximant /r/ is always in retroflex and whether it takes a palatal-velar, pre-velar or palatal position. Van Bezooijen (2005) argues that only the strong variant of the approximant /r/ is in retroflex and the position might be influenced by the use of alveolar or uvular /r/ in onset. This was confirmed by Strycharczuk & Sebregts (2014) who also found that the onset /r/ strongly influences the coda /r/. In his 2015 study Sebregts argues that the approximant realisations of /r/ have likely originated from more constricted types. The palatal approximant shows a vowel-like structure, in which it differs from the more consonantal alveolar and uvular approximants (Sebregts, 2015).

The approximant coda /r/ can be realised either in retroflex (with the tongue tip up and curled back) or bunched (with the tongue tip down) (Strycharczuk & Sebregts, 2014). The retroflex/bunched approximant is closer to uvular than alveolar /r/, and the bunching suggests it is an extremely reduced variant (Sebregts, 2015; Strycharczuk & Sebregts, 2014). Sebregts (2015) found that the retroflex and bunched approximant can be regarded as a single unit, as they share a highly similar acoustic: “both retroflex apical and bunched dorsal are possible articulations. . . . Both the retroflex and the bunched articulation were accompanied by a pharyngeal constriction. . . . They also have the same low third formant (F3) as target” (Sebregts, 2015, pp 202-204).

The retroflex/bunched approximant /r/ is the most common approximant realisation and the quintessential approximant /r/ or ‘Gooise r’ (Sebregts, 2015). It is this retroflex/bunched approximant /r/ that we refer to with the Dutch approximant /r/.
2.1.1.3 Sociolinguistic Features

When the approximant /r/ was first mentioned by Kloeke in 1938, he associated the sound negatively with lower middleclass and urban speakers. The general association with the approximant /r/ has drastically changed as it became more common. The approximant /r/ currently holds a strong position, in its link to media and the rich western part of the country (Van Bezooijen, 2005).

Previous studies have shown that the approximant /r/ spreads remarkably fast (Van Bezooijen, 2005). The rising use is clearest among children and youngsters, who are leading the shift (Sebregts, 2015; Van Bezooijen, 2005; Van den Toorn, 1992; Van de Velde, 1996). Aside from age, gender also plays an important role in this ongoing sound change (Van Bezooijen, 2005; Van den Toorn 1992; Van de Velde 1996). A study in 2005 confirmed that women are using the approximant /r/ more than men (Van Bezooijen, 2005).

Van Bezooijen (2005) looked into the attitudes of Dutch speakers towards the approximant /r/ in different parts of the country, through a matched guise test. In general, participants who encountered frequent use of the approximant /r/ in their speech community had a more favourable attitude. Unsurprisingly, the most positive attitudes were recorded among participants in the Randstad, where the variant is most used. Participants from the province of Gelderland had a moderately positive attitude towards the approximant /r/, while speakers from Limburg showed the most negative opinions (Van Bezooijen, 2005). The results from this study indicate that familiarity with the variant leads to a more positive attitude, but social factors as regional pride may interfere.

Whereas the approximant /r/ was originally associated with lower social classes, the approximant /r/ is now linked to wealth and a high social position. However, general acceptance and the prestige status of the approximant /r/ does not erase any negative connotations completely. The approximant /r/ is linked to “kakkers” (preppy, rich and pompous people) and Dutch fraternity life. Freshmen university students in western cities such as Leiden, often copy the strong approximant /r/ used by their older peers (Van Bezooijen, 2005). However, in his study Van Bezooijen (2005) did not find a relation between the /r/ used and the likeability of the speaker. A possible explanation could be the salience of the /r/, Van Bezooijen suggests it needs to be strong to be noticed and to affect the listeners’ opinion. It is not clear how the high social status of the approximant contributes to its expansion (Van Bezooijen, 2005).

Age and gender are influential factors in the production of the approximant /r/, with the sound change being led by children and young women. No effects, however, were found in Van
Bezooijens study (2005) for age and gender in the positivity of the association and perception of the approximant /r/ (Van Bezooijen, 2005).

For his study on the spread of the approximant /r/ in Dutch, Sebregts (2015) assembled the HEMA corpus. The corpus consist of /r/ tokens from over 400 speakers in 10 cities in the Randstad, Flanders and Nijmegen. The study was done at different branches of the national department store chain “HEMA”. The data show a pattern of alveolar /r/ in Amsterdam and Rotterdam and uvular /r/ in Leiden, The Hague and Utrecht in onset position. In coda position the approximant /r/ is predominantly used, with the highest use recorded in Rotterdam at over 75% of realisations. The most uniform distribution between realisations of /r/ used in onset and coda was found in The Hague. In the whole Randstad area the approximant /r/ was used more frequently by young speakers and women (Sebregts, 2015).

The data collected during the HEMA study in Nijmegen, reveal a spread beyond the Randstad to the east of the Netherlands, with use of the approximant /r/ ranging from low among older men, to moderate among young women. In 2002 and 2003, when the data were collected, the pattern was too small to yield significant differences (Sebregts, 2015). However, considering the speed of the language change it would be reasonable to assume these numbers have since gone up. The same data show that the approximant /r/ was completely absent from the speech of people in Flanders, indicating that if a spread towards the south is happening, it has not reached Belgium.

2.1.2 THE R IN FRISLAND
Pronunciation patterns of /r/ in Dutch have changed since the start of the 20th century, but in 2009 Van Bezooijen found no change in pronunciation of /r/ in Frisian, stating that “the Frisian phonological system has been immune to the influence of Dutch, where uvular [r] and approximant [r] are frequently present” (Van Bezooijen, 2009, p 313). The traditional Frisian /r/ is the alveolar /r/. It differs from the Standard Dutch alveolar /r/ as it is not realised when the /r/ is followed by an alveolar consonant (/s/, /z/, /t/ or /d/) (Van Bezooijen, 2009).

A study by Van Bezooijen in 2009 found that all participants used the alveolar /r/ in onset, both tapped and trilled, when speaking Frisian. This is in line with an observation made by Van de Velde in 1999, who said: “There is a lot of intra-speaker variation in northern standard Dutch. On the combination of variants there only seems to be one restriction: the uvular trill and the retroflex realizations do not co-occur in our corpus” (Van de Velde, 1999, p 186). The alveolar /r/ dominated the coda position as well, except when followed by an
alveolar consonant. In these cases the participants followed the Frisian pattern of /ɾ/ deletion. Van Bezooijen links this pattern of weakened production with lexical factors rather than phonetic, because of the variation among his participants. The production pattern was very different when participants spoke Town Frisian. A part of the participants used a uvular /ɾ/ in both onset and cods, especially when the /ɾ/ came in a word final position (Van Bezooijen, 2009). The pattern of /ɾ/ deletion before an alveolar consonant held for speakers of Town Frisian as well. The difference in use of /ɾ/ is likely due to Dutch influence (Van Bezooijen, 2009).

The uvular /ɾ/ is used in Friesland, but is stigmatized. Use of the uvular /ɾ/ was frowned upon to such an extent that children would be send to speech therapy for it (Van Bezooijen, 2009). The attitudes to using the uvular /ɾ/ when speaking Dutch are now milder, but far from positive (Van Bezooijen, 2005).

An aforementioned study by Van Bezooijen in 2005 looked into language attitudes concerning the Dutch /ɾ/. They found, surprisingly, that Frisian participants had the most positive attitude towards the approximant /ɾ/ and preferred it even over the traditional alveolar /ɾ/. This positive attitude did not seem to lead them to use the approximant /ɾ/ in their own speech. A later study by Van Bezooijen in 2009, found no effect of age or gender in the use of /ɾ/ among speakers of Frisian.
2.2 SOUND CHANGE
In the second half of the 20th century, the use of the approximant coda /r/ became more frequent in the western part of the country, but limited to specific speech communities. Since then, this sound change has been completed in the Randstad (Van Bezooijen, 2005) and spread towards the east, as shown is the data from the HEMA corpus (Sebregts, 2015).

2.2.1 LANGUAGE CONTACT AND VARIATION IN R
Two main types of sound change can be distinguished: change from above and change from below (Labov, 2002; Van Bezooijen, 2005). In language change from above the change is introduced by the dominant social class. The new variant is often borrowed by adults from a high prestige speech community. The shift happens overtly, with speakers aware of the change, and is deliberately used in their speech (Van Bezooijen, 2005).

In contrast, during a change from below speakers generally only become aware of the change when it is near completion and the new form is introduced by children rather than adults. (Van Bezooijen, 2005). As we have seen before, this is also the case in the shift of the approximant /r/ (Sebregts, 2015; Van Bezooijen, 2005; Van Bezooijen et al., 2002). Although some of these children adopt the approximant /r/ from their parents, most of them acquire it at a later date from their peers. While they start out with an alveolar or uvular in coda, they switch to approximant /r/, thereby introducing the new speech pattern into speech communities, especially outside of the Randstad (Van Bezooijen, 2002; Van Bezooijen, 2005). In a 2002 study on the spread of the approximant /r/ Van Bezooijen et al. described the change as:

“a new and vigorous one. This appears from the large gap between children and adults, pointing to a fast rate of change, as well as from the low level of social awareness, which according to Labov is characteristic of the initial and mid stages” (Van Bezooijen et al., 2002, p 9).

So, what could have caused the rapid spread of the approximant /r/? Linguistic variance is above all a social process: “linguistic variation is correlated with a small number of social variables: age, gender, social class, race/ethnicity, urban/rural status and location in social networks” (Labov, 2002, p 12). Language change is closely related to language variation, and can even be a result of large scale and long-time variation, with sound changing between stable states of variability. Variation is a normal aspect of language both in one person’s speech (inter-speaker variation) and between speakers (intra-speakers variation) (Sebregts, 2015).
Linguistic variation is often depends on social processes of group identity (Foulkes, 2010). Through the use of a specific variant groups can distinguish themselves. Social differentiation seems to be the driving force in most languages shifts since the second halve of the 20th century (Labov, 2002). When people start to copy speech patterns they can spread to other social groups as well as geographically. This is mostly due to the tendency adults have to accommodate and imitate the speech patterns of others as a social tool. The change will start slowly, but accelerate as it reaches a certain level. The real shift occurs when the speech pattern is no longer associated with a certain social group. Then it is no longer seen as marked and will likely be adopted by the whole community as it moves towards completion (Labov, 2002).

Linguistic change in progress is often covert. Speakers are not aware of the changes in their speech patterns, particularly in change from below. Even when the new variant has obvious prestige, speakers adoption of it can still be unconscious as is the case for the approximant /r/ shift (Labov, 2002). The approximant /r/ has prestige as a variant used in the Randstad, the rich, urban, cultural centre of the country. It may be assumed that as the approximant /r/ spreads beyond the Randstad, it will first spread to cities in other parts of the country, before spreading to villages and rural regions (Van Bezooijen, 2005).

2.2.2 Female led sound change

Social, cultural and economic factors can influence people’s choices for certain speech patterns, or codes (Bilaniuk, 2003). Sex, often intersecting with age is one of the most important factors in phonological change (Bilaniuk, 2003; Cavanaugh, 2006; Eckert, 1989).

Some speech patterns are associated with a particular gender, through stereotyping. The relationship between language and gender is formed through the links between characteristics and a specific gender by cultural context (called collocational indexicality). When particular codes have such collocational indexicality it can influence speakers’ language choice, as it allows them to express gender identity through speech (Cavanaugh, 2006). Collocational indexicality and the formation of association is discussed in more detail in chapter 4.3.

Speech differences reflect social distinctions, so we expect to find it wherever a social division occurs, such as a division based on gender, when different roles between men and women are emphasised (Gal, 1978).

The effect of gender is complex, increasingly so as women move into the marketplace and traditional gender roles are questioned. Gender based variation cannot always be explained by looking at it in terms of the binary opposition of men versus women, especially as it intersects with other social factors such as age and class (Eckert, 1989). Gender and its effect
on language can be seen as nothing but a strictly social category (Labov, 2002). There are no biological reasons for women or men use languages differently. Anatomical difference can explain some broad phonetic differences, but speech patterns often follow social differences between men and women and also among women, rather than binary biological ones (Foulkes, 2010) What is evident however is that we associate certain speech patterns with femininity and masculinity. Gender roles are so ingrained in our society that we automatically categorise in two genders, male and female and expect and recognise gender differences in the way men and women speak. As a result gender differences are often interpreted as gender markers. Gender markers have a symbolic and iconic value speaking in a specific way marks you as a woman respectively a man. (Eckert, 1989).

In his studies, William Labov found a tendency for women to use more progressive linguistic forms than men. He formulated principles for sound change led by women to explain this phenomenon:

“Principle I: For stable sociolinguistic variables, men use a higher frequency of nonstandard forms than women” (Labov, 1990, p 210).
This principle can be interpreted both as women using more standard speech as well as men using more stigmatised speech. Women’s speech is generally more conservative in a stable situation and they tend to choose forms with overt prestige, with men doing the opposite (Labov, 1990).

“Principle Ia: In change from above, women favor the incoming prestige form more than men” (Labov, 1990, p 213).
Change from above shares many traits with a stable sociolinguistic situation, that is why it can be seen a subset of principle I. The sexes hold similar roles, with women using the new prestige forms instead of stigmatized forms (Labov, 1990).

“Principle II: In change from below, women are most often the innovators” (Labov, 1990, p 215)
Principle 2 describes an unstable situation, in which it is the men whose speech can be categorised as more conservative. Women introduce new forms through change from below, where gender differences in linguistic behaviour can be seen most clearly. The forms used by the women are nonstandard and if they are overtly recognised, can become stigmatized. In change from below there is often a clear relationship between gender and class, usually women
are the ones ahead in every social class, sometimes by a full generation (Labov, 1990; Labov, 2002)

Although these principles for language change hold true for many changes in progress it cannot be claimed that, universally speaking, women’s speech is more conservative than men’s. In cases of the use of stigmatised forms in stable linguistic situation, women do tend to be more conservative. There is much support for Labov’s claim to linguistic changes led by women (Cavanaugh, 2006; Eckert, 1989; Gal, 1978; Labov, 2002; Maclagan, 1999), but there are also some cases where men lead sound change (Eckert, 1989; Labov, 2002). In all types of change, as the sound change nears it completion, the form becomes more standard and the gender differences tend to disappear (Labov, 2002).

His theory distinguishes on the basis of sex, but Labov did not deem it an appropriate category in linguistic variation studies. Instead he would rather focus on the cultural and social norms of gender as a guiding factor in linguistic behaviour and the interaction between sex and social class into account. This intersectionality explains the curvilinear pattern he found, where new forms are used more by middle classes than high and low social classes. The opposite is found in stable situation, where middle classes have the most conservative speech patterns (Labov, 1990).

There are several factors to the process of female led sound change. From a practical standpoint Labov (2002) describes a life cycle of language change and how women can lead language change through generational transmission. When learning a first language, children receive most of their linguistic input from their caregiver, in most cases a woman. One would expect, hence, that both male and female children copy female speech pattern to a certain extent. Most likely then, the symbolic function of language, would encourage daughters to continue developing this speech pattern further as a way of expressing their female identity, whereas sons would abandon it after acquiring a base level, because they have no need for female identity markers. A study by Strand (1999) showed an adult like production pattern of fricatives by 8 year olds, causing a gender difference in their speech, despite the anatomical similarity between pre-pubescent boys and girls. Such a difference would then likely be driven by social reasons. In fact, gendered speech patterns can be seen in children as early as the age of 3 (Foulkes, 2010).

So, as the next generation of language learners is born, they again copy their mothers’ speech. The cycle continues with female speakers raising the level of differentiation, eventually producing a gender gap, where males of the third generation acquire the same speech pattern as women of the second generation (Labov, 2002). Speech pattern as a way of displaying identity
can be seen in two ways, women’s use of new variables can be considered as accommodation to other women as well as differentiation from men (Eckert, 1989). It is unlikely that the gender difference would be caused by men consciously lowering the frequency of their use of the new pattern it is more likely that their level of use is instead accepted as unmarked, since it is the same for both male and female children, namely the pattern they have copied from their mothers. This removes the gender marker and initial symbolism, which would encourage female speakers to move towards an even higher level as a marker of female identity. As the sound change nears completion, the previously gender marked form becomes more frequent and more standard in the whole speech community. As a result the gender difference diminishes again. This cycle offers an explanation for the generational gap and women’s predominance in change from below.

Generational transmission with women as the main caretaker explains the fast rate with which sound change can occur, but not why women are more likely to use new variants. Bilaniuk explains gender difference through the differential values specific language forms have as symbols of social opportunity (Bilaniuk, 2003). Following this reasoning men are less dependent on the symbolic function of language compared to women given their more powerful position in society and therefore less inclined to use progressive linguistic features: “women’s status and social identity is more dependent on display of community membership and social interaction than is men’s status” (Bilaniuk, 2003, p 49). The orientation towards prestige by women can be seen as an attempt to overcome a powerless position using the symbolic power of language for advancement, in the way of Bourdieu’s linguistic marketplace (Eckert, 1989; Gal, 1978). In the linguistic marketplace, value is assigned to speech patterns based on their desirability, prestige and link to the speech patterns of the dominant group and changing speech can lead to social and economic advancement (Bourdieu & Thompson, 1991)

A study by Eckert (1989) supports the idea of a greater orientation towards prestige as an explanation for women’s leading role in language change. In her study women tended to over-report their use of prestige norms, whereas men underreported theirs. Prestige associated with language forms can operate on three levels, as explained by Eckert (1989): “(a) global prestige, based on norms imposed in the standard language marketplace; (b) covert prestige, based on opposition to those norms; and (c) local prestige, based on membership in the local community” (Eckert, 1989, p 250). A sound change driven by men would, through the same patterns, develop much slower if at all, due to less of an influence on generational transmission and less reliance on linguistic symbolism for prestige (Labov, 2002).
2.3 INDEXICAL LINKING AND IMPLICIT ASSOCIATIONS

2.3.1 COLLOCAATIONAL INDEXICALITY

Research into linguistic associations has shown that social information and linguistic knowledge are linked in a speaker’s memory through collocational indexicality, as mentioned in the previous chapter. What speakers know about language is a combination of pure linguistic information and social context. This knowledge is not static, but can be modified and redefined as new social information is received (Foulkes, 2010). In fact, speakers often re-assigning social meaning to a linguistic feature, transforming its original association to fit a new persona, rather than creating a completely new indexical link (Zhang, 2008). Indexicality can be influenced by both biological and social factors, but the factors are often hard to distinguish and biological features, such as anatomical differences in men and women, seldom fully explain phonological variation (Foulkes, 2010).

Indexical differences are not restrained to any specific type of linguistic features, but are often most clear when a feature is used frequently by a specific social group, as is the case with the approximant /r/ in Dutch (Foulkes, 2010). Repeated use of a variant by a specific group leads to the association between the two, because social meaning is assigned to linguistic forms as speakers perceive correlations between a variant and social information (Moore & Podesva, 2009). Since indexical links are based on social information tied with linguistic information, some are formed earlier depending on the amount of exposure and the transparency of clues, according to exemplar theory (Foulkes, 2010). Exemplar theory proposes that when we encounter stimuli (for instance linguistic features) they are stored in our memory as exemplars. An exemplar becomes the prototypical reflection of that feature in memory. New information is compared to exemplars that are already stored. Similar exemplars are grouped together and labelled into categories. In the case of language, it seems that as more exemplars are added, speakers become more adept at the categorisation of new information (Foulkes, 2010).

Three different levels can be distinguished in indexical links. ‘First-order’ indexicality is any correlation between a form and a social group or identity that be observed by outsiders. Any first order indexicality had the potential to become second order, but it does not necessarily happened (Johnstone & Kiesling, 2008). The stages of indexicality are closely linked to sound change. During the start of a sound change, first order indexicality is not yet recognisable, often due to a lack of exposure, and the correlation between the form and the group goes unnoticed. To achieve second order indexicality, speakers must actively use the form to project the associated social information. Third order indexicality is reached when the indexical meaning becomes mainstream and synonymous with a particular identity (Johnstone & Kiesling, 2008).
Linguistic interaction requires speakers to interpret and embed meaning through social clues (Holtgraves & Kashima, 2007). Collocational indexicality can be used differently by speakers and listeners. It functions a tool for speakers to signal specific social information, as explained by Foulkes (2010):

“Any speech act involves the simultaneous signalling of indexical information in parallel with propositional linguistic information, and it seems likely that the range of factors indexed will always include social ones (minimally reflexes of the individual speaker, and almost certainly of their sex and/or age”). (Foulkes, 2010, p)

Collocational indexicality also allows listeners to use phonetic information to find social information about speakers (Foulkes, 2010). Not only the function, but also the exact indexical meaning may vary between speaker and listener (Johnstone & Kiesling, 2008). A study by Johnstone and Kiesling (2008) found that speakers who linked a form to a strong local identity, where in fact less likely to use the form than speakers who did not hold a strong local association.

2.3.2 Implicit Associations

People are capable of reasoning about social structures that influence language perception and production. Reasoning of this kind can happen on either an associative and automatic domain, or on a controlled, purposeful and available level (Campbell-Kibler, 2012). The level of consciousness determines whether these are attitudes and associations that we are aware of (explicit) or that some lie below the surface of consciousness (implicit) (De Houwer, 2006). The term implicit has, to some confusion, been used to describe both the measurement procedure, as well as the construct under assessment (Gawronski et al., 2011). In this study the term implicit is used only “to describe constructs that influence task performance in an automatic fashion” (Gawronski et al., 2011, p79). To avoid confusion we will apply De Houwer’s (2006) distinction between direct and indirect to describe the two different methods of measurement and we will use the terms implicit and explicit to describe the psychological processes to be tested by those measures.

Direct measures are often self-reporting measures, such as surveys or interviews and are used to assess, among other things, attitudes and stereotypes (Gawronski et al., 2011). The usefulness of direct measures relying on self-report is limited. They are susceptible to
manipulation and bias through self-representation by the participants and inadequately assess those processes that take place unconsciously and are inaccessible through introspection (Gawronski et al., 2011).

Indirect measures aim to test implicit associations and have been described as measures that participants are not aware of, do not have conscious access to and in which they can exercise no control over the measurement outcomes (De Houwer, 2006; Gawronski et al., 2001). Several indirect measures have proven useful in predicting overt behaviour to a level never achieved through self-assessment measures and they have given insight into the formation and adaptation of associations (Gawronski et al., 2011). Indirect measures hence offer a very good chance to discover implicit association.

It is important to note that using indirect measures is no guarantee to indeed test implicit associations. Whether an association is implicit does not depend on the mechanics of the measurement procedure, but is rather an empirical question that needs to be determined by careful study (Gawronski et al., 2011).

2.3.3 RESEARCH QUESTIONS
The sound change of the approximant /r/ is led by young women and previously mentioned studies have shown they are the ones introducing the new variant in their speech communities. It is possible that the genderedness of the change influences speakers association. A frequent use of the new variant by young women, can lead to an indexical link between the approximant /r/ and this social group. It is particularly likely that in speech communities where the approximant /r/ change has not been completed, speakers associate the form with femininity rather than masculinity. Whereas in areas where the sound change has been completed, such a link does not exist. This study investigates how gendered sound change influences the implicit gender association linked to the new linguistic form?

A possible relationship between the characteristics of sound change and the attitude towards that change can be answered by looking at the following three research questions:

1) Is there a production difference in coda /r/ between Randstad and Frisian Dutch?
2) Is there a gender difference in these regions?
3) Is there a gender association difference along with production differences?

To answer these question a three part experiment was performed. The methodology and details of the experiment are explained in the next chapter.
3 METHODOLOGY

3.1 THE IMPLICIT ASSOCIATIONS TEST

The strength of implicit associations in speech communities where the sound change has been completed, versus where the sound change is newly introduced can be tested using an Implicit Associations Test.

The Implicit Associations Test (or IAT) is one of the most popular indirect measures, first developed by Greenwald, McGhee and Schwartz in 1998 (Gawronski et al., 2011). The test is a measurement tool used in socio-psychological research to test automatic preference and response and has since its publication in 1998 proven to be a reliable tool (Greenwald, McGhee & Schwartz, 1998; Teige-Mocigemba et al., 2010).

The ability of the IAT to measure implicit associations is based on the assumption that automatic associations in the participant’s mind can either facilitate or inhibit response. Response time is quicker when the task lines up with the participant’s unconscious preferences and fewer errors are made (Campbell-Kibler, 2012; Gawronski et al., 2011; Greenwald et al., 1998; Lane, 2007; Teige-Mocigemba, 2010). Many methods, such as the Stroop task and semantic priming, operate on the same principle of timing, using the time it takes to process a task as an estimate of its relative difficulty and assess cognitive functions like attention and memory (Lane et al., 2007).

The IAT has not been used much in linguistic research, but has promise for sociolinguistic studies into language attitudes (Campbell-Kibler, 2012). A study by Campbell-Kibler (2012) showed that sociolinguistic variables can carry implicit associations, for instance in the form of markers: “variables which speakers alter with formality shifts but cannot identify” (Campbell-Kibler, 2012, p 761)...

3.1.1 ADVANTAGES

There are many advantages to using the IAT to test implicit association. The first advantage is its resistance to manipulation, compared to explicit measures and self-assessment (Campbell-Kibler, 2012). Participants do not always answer truthfully about their associations or are simply not aware of them (Gawronski et al., 2011; Lane et al., 2007). Implicit associations are often beyond the participants’ awareness, making the results of the IAT a more reliable source.
of information than self-reporting measures (Greenwald et al., 1998). So far, evaluative research of the IAT has shown that it does indeed test implicit associations and predicts behaviour better than explicit measures (Greenwald et al., 1998; Teige-Mocigemba et al., 2010). In their original study of the IAT, Greenwald et al. (1998) found it to be twice as sensitive as priming measures to evaluative differences. The IAT reflects a priori and universal judgement as long as the groups that are measured can be assumed to differ sufficiently on a priori grounds and captures in group and individual variance (Teige-Mocigemba et al., 2010). The internal consistency has shown to be satisfactory (Lane et al., 2007; Teige-Mocigemba et al., 2010).

3.1.2 Criticism

The IAT is not a perfect system and especially the reliability and validity of the IAT have been called into question, due to both general and structure specific issues (Lane et al., 2007). The retest reliability of the IAT is not very high, which is surprising considering its good internal consistency (Teige-Mocigemba et al., 2010). Although the IAT is less sensitive to conscious manipulating by participants, it is not completely resistant. It is possible to “fool” an IAT if participants are told how to fake their results, are highly motivated and good at self-monitoring and have prior experience in performing an IAT (Teige-Mocigemba et al., 2010).

The high cognitive demand of performing an IAT test, leads to a correlation between test length and response speed. A longer test lowers the response times, which means that the IAT effect is at least partly influenced by the participants’ cognitive skills (Teige-Mocigemba et al., 2010). The response times measured by the IAT are extremely small. Any lapse in focus on behalf of the participant, even something as small as blinking, if simultaneous to the presentation of a stimulus can skew the data, lowering the reliability of the measure (Lane, 2007). Error feedback can be used to ensure the focus of the participant, as it requires a correct answer before continuing to the next trial. This way, the participant is forced to not only respond quickly, but also correctly (Lane et al., 2007; Teige-Mocigemba et al., 2010).

If the categories used in the IAT are not clearly divided, it is at risk of participants re-defining the category labels to match category and stimuli according to their own expectations, as already reported above (Campbell-Kibler, 2012; Teige-Mocigemba et al., 2010). The IAT also suffers from order effect, as the IAT effect tends to larger be when the congruent block precedes the incongruent block (Teige-Mocigemba et al., 2010). The researcher, however, will not know which block is congruent until after reviewing the data. It is hard to completely eliminate the order effect, but it is essential for researchers to be aware of the possibility and try to counterbalance the order of presentation (Lane, 2007; Teige-Mocigemba et al., 2010).
A final criticism regards the usefulness of the IAT as a tool. The IAT effect is relative in nature. It does not give any absolute answers, but only reveals the relative strength of one association pairing over the other (Tiege-Mocigemba et al., 2010). The biggest problem that the IAT faces does not stem from the test itself. Much of the process underlying the IAT is still unclear, which casts some doubt on its reliability. It has not yet been definitively proven that the IAT does test the associations it is meant to test (Teige-Mocigemba et al., 2010). However, the advantages of the IAT far outweigh the critique and so far it has proven reliable as an indirect measure.

3.1.1. Structure

The IAT used in this study was created by researchers of the University of Groningen and University of Leuven as part of the Multilingual Melodies project, using the Affect 4.0 program (Spruyt, Clarysse, Vansteenwegen, Baeyens, & Hermans, 2010). The original IAT by Greenwald et al (1998) had a 5 block structure, but this IAT has an updated 7 block structure (Gawronski et al., 2001; Greenwald et al., 1998; Lane et al., 2007). In each block the participant is presented with a number of trials where they are asked to place the stimuli in the appropriate category. Previous studies suggest that a combination of 20 trials for block 3 and 6 and 40 trials in block 4 and 7 is optimal (Lane et al., 2007). The time between trials is typically more than 150 ms and less than 750 ms, increasing the length beyond that does not seem to affect the outcomes of the IAT (Greenwald et al., 1998; Teige-Mocigemba et al., 2010). Depending on the focus of the study, an IAT can employ a randomised or fixed random trial order. Randomised order is used to look at group differences and a fixed random trial for correlation studies (Teige-Mocigemba et al, 2010).

The first two blocks are 20 trials each, where the participants are presented with the two target concepts. In the second block the same is done with only the attributes. Block 3 and 4 are actual test blocks in which the participants have to categorise both the target concepts and the attributes, both blocks are identical and made up of 40 trials each. The fifth block is a reversed version of the first. The participants are again presented with 40 trials of solely the target concepts with switched sides. Block 6 and 7 are again actual test blocks, similar to block 3 and 4, except that the combination of categories has been switched. Both block 3 and 4 and block 6 and 7 are preceded by 4 practice trials of which the participants are not aware. This allows the participant to acquaintance themselves with the task at hand.

Because the IAT is a cognitively challenging task, a balance needs to be found in the length of the test, to result in a sufficiently large dataset without over straining the participants as this may influence the results (Teige-Mocigemba et al., 2010). In this IAT it was chosen to
have test blocks of 40 trials each, resulting in a total of 160 trials of data. As a result the IAT took around 10 minutes to complete.

The design of the IAT ensures that during the categorisation task, a combination is either association-congruent or association-incongruent. As such, it picks up the differences in response time, showing which combination of concepts is in sync with the participant’s implicit associations (Gawronksi et al., 2011). In the case of a strong automatic association, the participant will have a shorter overall response time in one of the combined task blocks (i.e. block 3 or 5) (Greenwald et al., 1998).

The order in which compatible and non-compatible combinations are presented can influence the IAT’s sensitivity (as shown by Greenwald et al., 1998). So in order to reduce an order effect two versions of the IAT were designed. These versions differed only in the order of blocks 3 and 4 and block 6 and 7. In version A in block 3 and 4 the categories alveolar /r/ and male are presented on the left and approximant /r/ and female on the right side. In version B these are approximant /r/ and male on the left and alveolar /r/ and female on the right side. The structure of the two versions is presented in table 1 and 2. Both versions were distributed randomly among the respondents, as it cannot be predicted, which combination of categories is compatible for a participant.

<table>
<thead>
<tr>
<th>A</th>
<th>Key assignment</th>
<th>N Trials</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Left key ('~')</strong></td>
<td><strong>Right key ('backsapce')</strong></td>
</tr>
<tr>
<td>1</td>
<td>alveolar</td>
<td>approximant</td>
</tr>
<tr>
<td>2</td>
<td>male</td>
<td>female</td>
</tr>
<tr>
<td>3 practice</td>
<td>alveolar</td>
<td>approximant</td>
</tr>
<tr>
<td>3</td>
<td>male</td>
<td>female</td>
</tr>
<tr>
<td>4</td>
<td>alveolar</td>
<td>approximant</td>
</tr>
<tr>
<td>5</td>
<td>approximant</td>
<td>alveolar</td>
</tr>
<tr>
<td>6 practice</td>
<td>approximant</td>
<td>alveolar</td>
</tr>
<tr>
<td>6</td>
<td>male</td>
<td>female</td>
</tr>
<tr>
<td>7</td>
<td>approximant</td>
<td>alveolar</td>
</tr>
<tr>
<td>7</td>
<td>approximant</td>
<td>alveolar</td>
</tr>
</tbody>
</table>
3.1.4 Task
Each target and concept category is assigned a side. They are presented on either the left or right side of the screen and correspond to a left and right hand key. Participants are asked to rapidly categorise the stimuli by pressing the key corresponding with the category (Greenwald et al., 1998; Lane et al., 2007). Participants are required to respond as quickly and accurately as possible. Speed is important as it is their response time that is being measured, but for the sake of the salience of the test, it is also important that the participants aim to answer correctly instead of simply pressing a button as fast as they can (Gawronski et al., 2011).

3.1.5 Stimuli
The stimuli used during the IAT depend on the variable being tested. An IAT directed at assessing racial bias might present the participants with pictures, names, words or even sounds that would be strongly associated with either of the races. When selecting suitable stimuli the distinction has to be absolutely clear. The IAT measures response time, so any ground for deliberation must be avoided. It must be clear to the participant that the stimuli irrevocably belong to only one of the categories. (Lane et al., 2007). If the categories used in the IAT are not clearly divided, there is a risk of participants re-defining the category labels to match category and stimuli according to their own expectations (Teige-Mocigemba et al., 2010).

Table 2 IAT structure of version B

<table>
<thead>
<tr>
<th>B</th>
<th>Key assignment</th>
<th>N trials</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Left key ('~')</td>
<td>Right key ('backspace')</td>
</tr>
<tr>
<td>1</td>
<td>approximant</td>
<td>alveolar</td>
</tr>
<tr>
<td>2</td>
<td>male</td>
<td>female</td>
</tr>
<tr>
<td>3 practice</td>
<td>approximant male</td>
<td>alveolar female</td>
</tr>
<tr>
<td>3</td>
<td>approximant male</td>
<td>alveolar female</td>
</tr>
<tr>
<td>4</td>
<td>approximant male</td>
<td>alveolar female</td>
</tr>
<tr>
<td>5</td>
<td>alveolar</td>
<td>approximant</td>
</tr>
<tr>
<td>6 practice</td>
<td>alveolar male</td>
<td>approximant female</td>
</tr>
<tr>
<td>6</td>
<td>alveolar male</td>
<td>approximant female</td>
</tr>
<tr>
<td>7</td>
<td>alveolar male</td>
<td>approximant female</td>
</tr>
</tbody>
</table>
The stimuli can be divided into target and attribute stimuli. The target stimuli take the form of the concept under investigation. For example, in a study on race, the target stimuli could be pictures of faces with different skin tones. The attribute stimuli are aimed at the association, for instance in the form of positive or negative adjectives (Lane, 2007). The IAT requires at least two stimuli per category, but five to six is conventional (Teige-Mocigemba et al., 2010). For this study the target concepts were recordings of the following words:

- Haar (Hair)
- Jaar (Year)
- Keer (Turn)
- Maar (But)
- Meer (More)
- Veer (Feather)

These words all have only one syllable with /r/ in the coda position. They are common words that sound quite similar. The words were recorded once with the alveolar /r/ and once with the approximant /r/ by an adult woman who uses both variants. The same six words were repeated randomly throughout the IAT.

Since the study aimed at discovering any automatic gender association, it was essential to avoid any gendered element in the experiment itself, as not to influence the participants. To make the voice less distinctly gendered, the pitch of the recordings was manipulated to resemble a child’s voice.

The second category was that of male or female gender and was tested using attribute concepts. The attributes needed to be clearly distinguishable into the two gender categories. They also needed to be free from any inherent positive or negative connotations, as not to bias the participants. For these reasons kinship terms were chosen as they were believed to be clearly male or female, while remaining sufficiently neutral to avoid associative bias. The attributes used were:

- Opa (Grandfather)
- Oma (Grandmother)
- Oom (Uncle)
- Tante (Aunt)
- Neef (Nephew)
- Nicht (Niece)
These six attributes were repeated randomly throughout the IAT.

In this IAT, error feedback was provided, but only for the target concepts. When a participant incorrectly categorised a target concept (i.e. approximant or alveolar/r/), a red X appeared on the screen and they were asked to correct their response. Error feedback such as this is meant to motivate the participants and keep them focused without sacrificing accuracy for speed (Lane et al., 2007). This IAT did not provide error feedback for attributes, as target concepts were deemed more important.

3.1.7 SCORING AND INTERPRETATION
The structure of the test leads to a description of the IAT effect as the difference in performance between the initial combined blocks and the reversed combined blocks. Several ways of calculating this effect have been suggested, since the test was first used, but all are used to compare the difference in performance between those two blocks (Teige-Mocigemba et al., 2010).

The original calculation proposed by Greenwald et al. (1998) looked at log-transformed response latencies. Any latency smaller than 300 ms would be coded as 300 ms and anything larger than 3000 ms would be coded as 3000 ms. The IAT effect is calculated as the difference in mean of these log-transformed response latencies between the two second combined trials (block 4 and 7) (Greenwald et al., 1998; Lane et al., 2007; Teige-Mocigemba et al., 2010). In this traditional calculation, IAT scores based on the raw data, rather than the log-transformed response latencies were often reported in descriptive statistics (Teige-Mocigemba et al., 2010).

In 2003 Greenwald, Nosek & Banaji suggested a new scoring method, improving their original algorithm. This new method, called D measures or D-scores, used the IAT’s psychometric criteria to optimise analyses. Several alterations were made to the old scoring system. D measures have a modified upper and lower tail treatment of latencies and include an error response. An additional error penalty is given to every incorrect response latency, increasing its value. Individual standardisation was also added (Greenwald et al., 2003; Teige-Mocigemba et al., 2010). D is computed by dividing the difference in average response latency by a standard deviation of the subject’s response latencies (Lane et al., 2007). The goals of the new scoring system were to:

“minimize (1) the correlation between IAT effects and individual subjects’ average response latencies, (2) the effect of the order of the IAT blocks, and (3) the effect of previously completing one or more IATs on IAT scores, while (4)
retaining strong internal consistency and (5) maximizing the correlation between implicit and explicit measures” (Lane et al., 2007, p 91)

The D measure scoring system is now widely accepted, but does face some criticism on its adequacy as a measure of the IAT effect (Teige-Mocigemba et al., 2010). Both systems have a shortcoming in the way they reduce the IAT effect to a single outcome, it could for instance obscure details of test results and which trials are responsible for the differences:

“[…]when reduced to a single index, it is impossible to examine whether different IAT scores in different experimental conditions (for example) reflect differences in responses to target trials, attribute trials, or both. Similarly, it is impossible to tell whether the effects are driven by responses on compatible trials, incompatible trials, or both” (Teige-Mocigemba et al., 2010, p 8).

While the measures give an absolute number, the IAT effect in itself is not absolute. It shows a relative association of one combination of target and attribute over another and is open to interpretation (Lane et al., 2007; Teige-Mocigemba et al., 2010).

The results of this IAT were coded using D-scores. For this study the individual response latency data were transformed into D-scores by Dr. Laura Rosseel at the University of Leuven. The D-score indicates the relative association of the participant. A D-score of 0 would be a completely neutral association, anything above 0 indicated a stronger association with femininity and below 0 a stronger association with masculinity.

3.2 THE QUESTIONNAIRE

After completing the IAT the participants were asked to fill in a questionnaire, which contained questions about their personal characteristics and language use. In the final question the participants were asked to guess the age and gender of the voice they heard during the IAT in order to check if the test was indeed sufficiently genderless. If a disproportionate number of participants judged the voice to be female or male, the test had been too clearly gendered, which might have influenced their results. For the participants of group 1 additional questions were added to assess their Frisian proficiency. A full text of the questionnaire, in Dutch, can be found in Appendix I
3.3 PRODUCTION TASK
The last part of the experiment consisted of a small production task. The participants had to read a short text out loud, which was then recorded. The text contained the /r/ in both coda and onset position to elicit different kinds of /r/ realisations from the participants. The text is identical to one used by Koppers and Van Bezooijen in their study on approximant /r/ perception in Friesland (2008). The recording task for the Frisian participants was expanded with a Frisian translation of the text. A copy of the text in both Frisian and Dutch can be found in Appendix II.

The recordings from the production task were analysed to map the different realisations of /r/ by the participants. This allows us to see whether the sound change has reached the north of the Netherlands and to reaffirm its full realisation in the Randstad. The data adds to existing corpora of rhotic use in Dutch, allowing for further analyses and research into the sound change of /r/ and speech patterns in the Netherlands.

The data from the production task were all coded by hand. Each rhotic in the text was counted as one token. The Dutch text contained 37 tokens, 11 onset and 26 coda, the Frisian translation of the text contained 35 tokens, 11 onset and 24 coda. The researcher listened to the recording and coded each token according to how the rhotic was realised, distinguishing between approximant /r/, alveolar /r/, uvular /r/, another variation and deletion:
0: uvular
1: approximant
2: alveolar
3: fricated or unclear
4: weakened or deleted

3.4 PARTICIPANTS
The experiment was performed by 33 participants in total, divided in two separate groups. In Friesland, the approximant /r/ change has not been completed, so if the new variant is used here at all, it would be by young women. A second group from the Randstad area was included in the study as control group. Since the approximant /r/ is already fully realised in the Randstad and it is used by both men and women, there should be no distinct gender associations concerning the approximant /r/ for speakers of that region.
3.4.1 Group 1
Group 1 included 13 participants resident in the province of Friesland, among which 8 men and 5 women. They all spoke Frisian (to varying degrees) either as a first or second language. All participants were between the ages of 17 and 25. All participants were students at the University of Applied Sciences in Leeuwarden.

3.4.2 Group 2
Group 2 was the control group. It included 20 participants who were born and raised in the Gooi area or the city of Utrecht and surrounding municipalities (from now on to be referred to as “Randstad”). All participants spoke Dutch as a first language and used the approximant /r/, according to the data from the production task (see: chapter 4.1).
All participants were between the ages of 17 and 25. The group was made up of 10 male and 10 female participants. The participants all were (or had been) students at a University or University of Applied Sciences.

3.5 Materials
The IAT’s for both groups were done on an Acer laptop type Aspire V3 with a QWERTY keyboard. The laptop ran on Microsoft Windows10 software. Sounds was played through a Logitech H390 USB headset. Participants were able to control the volume with a button on the headset cord.

The IAT’s were performed in a separate room where the participants were by themselves, with the investigator sitting on the opposite end of the table, not facing the participant. The participants were seated at a table, straight in front of the laptop, at a distance of 20-25 cm from the screen. Hands resting comfortably on the sides of the laptop keyboard. The “~” functioned as the left control, marked by a blue sticker and the “backspace“ key functioned as right control, marked by a pink sticker, as can be seen in Figure 2. The questionnaire was printed on paper and filled in with a ballpoint pen.

The Logitech H390 USB headset was also used to record the participant’s speech during the production task. The sound was recorded using the Audacity Free recording tool to ensure sufficient sound quality for speech analyses.
3.6 PROCEDURE
Each test experiment started by greeting the participants and seating them behind the laptop. The participants knew that they would be participating in a short language test, however, the goal, details or type of test were not disclosed to them.

After being seated, the procedure of the test was explained to the participants, with the programme already activated on the laptop. They were told that the test would consist of three parts; a computer test, a questionnaire and a recording task. The task was briefly explained, by telling participants that they were going to see or hear a word, spoken by a child that they needed to sort into the correct category as quickly as possible, using the left and right key. The researchers emphasised that since response time was measured, speed was important, but not at the expense of accuracy. The participant then could read the instructions on the screen and adjust the volume of the headset according to the sound sample. If everything was clear after reading the instructions, they were allowed to start the test.

At this point the researchers took their place on the opposite side of the table. This was meant to eliminate any distraction to the participants, while still being close enough to answer respondent’s questions during the test.

After completing the IAT, the participant filled out the questionnaire and signed a consent form allowing us to use their data and recordings. During this time the researcher would close the IAT programme on the laptop and open the production task and voice recorder app. The participants were then asked to read the text on the laptop screen out loud, while their voice was recorded.
After completing this final part of the experiment, the participant were kindly thanked for their participation and asked to comment on the tasks they had just performed. Any comments were written down. At this point the participants were also informed about the aim of the study and how their data were going to be used.
4 RESULTS

4.1 PRODUCTION TASK

4.1.1 DUTCH RECORDING

All participants were recorded while reading a short Dutch text out loud. For each word with a rhotic, the participant’s realisation of that /r/ was coded. Distinction was made between alveolar, uvular and approximant /r/. Realisation that were fricated, or deleted were coded separately.

4.1.1.1 REGION

The production task produced data on the participants rhotic use for both the coda and onset position. Figure 3 shows the frequency with which the two groups of participants realised rhotics in coda.

A chi-square analyses revealed that the association between region and rhotic use was significant $\chi^2 (4) = 290.06; p < 0.00$. Cramer’s V is 0.694, showing a moderate to strong association. The Lambda value revealed a directionality of 0.585 if the dependent is the region and 0.355 is the rhotic use is the dependent variable.

<table>
<thead>
<tr>
<th></th>
<th>Friesland</th>
<th>Randstad</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alveolar</td>
<td>143</td>
<td>6</td>
</tr>
<tr>
<td>Approximant</td>
<td>30</td>
<td>236</td>
</tr>
<tr>
<td>Uvular</td>
<td>61</td>
<td>37</td>
</tr>
<tr>
<td>Fricated</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Deleted</td>
<td>39</td>
<td>45</td>
</tr>
</tbody>
</table>

Table 3 Contingency table of /r/ in coda

Figure 3 Frequency graph of rhotic frequency in coda based on region
The frequency distribution from the participants from the Randstad is in line with the results from the HEMA corpus (Sebregts, 2015). In codas, they used the approximant /r/ predominantly and much more often than participants from Friesland. Alveolar /r/ is used only sparsely and uvular /r/ to a small extent as well. The Frisian participants used the alveolar /r/ most, combined with some use of the uvular and even approximant /r/. This is striking as it shows that the approximant /r/ is being used by speakers in Friesland, indicating that the sound change has indeed reached the north of the Netherlands.

When looking at the use of rhotics in onset, the pronunciation patterns differ clearly. The only possible realizations in onset are either alveolar or uvular /r/. Figure 4 shows the frequency of rhotic in onset.

![Bar chart of rhotic frequency in onset](image)

**Figure 4** Bar chart of rhotic frequency in onset

A chi-square analysis revealed that the association between region and rhotic use is significant $\chi^2 (1) = 124.48; p < 0.00$. This association has no strong directionality as the Lambda value is 0.625 when region is the dependent variable and 0.636 when rhotic use is the dependent. Cramer’s V shows a moderate to strong negative association at -0.661.

<table>
<thead>
<tr>
<th></th>
<th>Randstad</th>
<th>Friesland</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alveolar</td>
<td>106</td>
<td>22</td>
</tr>
<tr>
<td>Uvular</td>
<td>26</td>
<td>131</td>
</tr>
</tbody>
</table>

**Table 4** Contingency table of /r/ in onset

Participants from the Randstad predominantly use the uvular /r/ in onset and the participants from Friesland the alveolar /r/. This is in accordance with previous studies by Sebregts (2015) and Van Bezooijen (2009).
4.1.1.2 Gender

The genderedness of the sound change makes it important to look at the gender of the participants as a variable as well. A comparison of the frequency of rhotic use in coda by gender, revealed a significant association ($\chi^2 (4) = 29.25; p < 0.00$.) The strength of the association was low, with a Cramer’s V value of 0.214. Lambda showed a gender dependent directionality of 0.157 and 0.00 for rhotic dependent.

![Figure 5](image)

**Figure 5** Bar chart of rhotic frequency in coda by gender

Figure 5 shows the speech patterns of male and female participants and reveals a more even distribution of rhotic use, than when compared by region. Men seem to use the uvular /r/ more than women and women use the approximant /r/ more in coda. Comparing by gender as well as region can illuminate where this difference comes from.

When comparing the speech patterns of men and women from the Randstad, as demonstrated in figure 6, a relatively equal distribution of rhotic use be seen. Men from the Randstad delete more rhotics and women use more alveolar /r/. However, their use of uvular /r/ and approximant /r/ is very similar. This confirms that the approximant /r/ sound change has been completed in the Randstad and is used equally by both men and women.
A chi-square analysis revealed a significant association between gender and rhotic use for participants from the Randstad ($\chi^2 (4) = 30.7; p < 0.00$). The association strength is low at 0.290 for Cramer’s $V$ and the directionality is 0.60 when gender is the dependent variable and 0.00 for rhotic as the dependent.

The data from Friesland in figure 7 shows a very different distribution. Male participants used the uvular /r/ more than women and women used the alveolar /r/ slightly more than men. In contrast to the Randstad, women use the approximant more frequently than men in Friesland. This lines up with the theory of female led sound change (Labov, 1991; Labov, 2002). These data show that the approximant /r/ is being introduced into the Frisian speech community and it is young women who are using the form most frequently.
The association is significant ($\chi^2 (4) = 41.6; p < 0.00$) as shown through Chi-square analysis. The strength of the association is stronger for Friesland than for the Randstad, with a Cramer V value of 0.389. The directionality cannot be clearly established as Lambda gave no significant value.

4.1.2 FRISIAN RECORDING
The Frisian participants also recorded a Frisian translation of the same text. The translated text had only 24 /r/ tokens in coda, where the Dutch text had 26. The number of onset tokens was 11 for both texts. The double recording allows for a comparison of the speech patterns of the participants when they speak Dutch and when they speak Frisian. The results are demonstrated below in figure 8.

![Figure 8 Bar chart of rhotic frequency in coda by language of recording](image)

Figure 8 Bar chart of rhotic frequency in coda by language of recording

Surprising is the difference in frequency of alveolar and uvular /r/. Alveolar /r/ is the traditional /r/ in Frisian, with uvular /r/ in a stigmatized position (Van Bezooijen, 2009). However, these data show a higher frequency of alveolar /r/ in the Dutch recording and a higher frequency of uvular /r/ in the Frisian recording. The Frisian recording also contains more deleted and fricated realisations. Another surprising feature is the appearance of approximant /r/ in the Frisian recording, albeit a small number.

A significant association is revealed through chi-square analyses ($\chi^2(4) = 47.5; p < 0.00$), although it is not a strong one ($V = 0.297$). The Lambda value of 0.261 shows a significant directionality only with language as the dependent variable.

The frequency of rhotics also differs in onset realisation between the Dutch and the Frisian recording, as can be seen in figure 9.
Again, the frequency of alveolar /r/ is much higher in the Dutch recording than the Frisian recording. In the Frisian recording the distribution between alveolar /r/ and uvular /r/ is almost equal. A chi-square analysis revealed a significant association ($\chi^2(1) = 26,4; p< 0,00$). The association strength is higher here than in the coda realisations, with a Cramer’s Phi value of 0,323. Lambda gave a significant value of 0,289 with language as the dependent variable.

4.1.3 REVIEW
A few problems occurred with the production task. In some cases the coding proved very difficult as the participant used a non-distinct variation of /r/ that could not be categorised as clear alveolar, uvular or approximant. Some speakers had the habit of deleting the /r/ altogether or using a variant so reduced it was close to deletion, especially when followed by a /t/ or /s/ sound. This pattern is common in Frisian (Van Bezooijen, 2009). However, no significant difference in deletion was found between Randstad and Frisian participants, and no effect of first language among Frisian participants.

Due to a technical problem at the start of the project, the recording data from the first 7 participants was rendered useless as the sound quality was too low. The participants were not contacted to repeat the recording as their familiarity with the both the text and the study could have influenced their results. Instead their data was simply omitted from the set. Additionally two of the recordings of the Dutch text by Frisian participants were lost, leaving a rather small sample.

As for the Frisian recordings, the Frisian proficiency of the participants varied. Although all recordings were useable, it is possible that proficiency could influence pronunciation patterns. Some of the participants also commented on the translation of the text, saying it was...
different from the Frisian dialect they spoke. Most Frisians are not used to reading the language, which could have also made the task more difficult (Hilton & Gooskens, 2013; Gorter, 2001).

4.2 IAT
After calculating the D-scores for all the participants, the mean IAT scores were compared by performing an independent samples t-test. The results of the statistical analyses of the IAT scores are presented in this chapter.

Table 5 Compared means of IAT score per region

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>N</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friesland</td>
<td>.069</td>
<td>13</td>
<td>.290</td>
</tr>
<tr>
<td>Randstad</td>
<td>-.003</td>
<td>20</td>
<td>.336</td>
</tr>
</tbody>
</table>

Table 5 shows the IAT scores compared by region. On average the participants from Friesland associated had a stronger association of the approximant /r/ with femininity than with masculinity. The participants from the Randstad, however, associated the approximant /r/ slightly more with masculinity than femininity. Neither group showed a very strong gender association and the difference between the groups was non-significant (t = -0.633; Df = 31, p = 0.532). Especially the gender association from the Randstad participants is very close to neutral. This becomes very clear when looking at the boxplot in figure 10. The red line represents a D-score of zero, which indicates a completely neutral association. Anything above the line is a relative association with femininity and below the line a relative association with masculinity.

![Figure 10 Boxplot of the average IAT score per region](image)
A comparison of IAT scores by gender was computed as well. The results of the independent samples t-test are presented in table 6, with gender comparison within groups presented in table 3.

**Table 6** Compared means of IAT score by gender

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>N</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>.115</td>
<td>15</td>
<td>.356</td>
</tr>
<tr>
<td>Male</td>
<td>-.050</td>
<td>18</td>
<td>.267</td>
</tr>
</tbody>
</table>

On average female participants associated the approximant /r/ more with femininity than masculinity, whereas male participants associated the approximant /r/ more with masculinity. The difference was nonsignificant (t = -1.530; Df = 31; p = 0.136).

**Table 7** Compared means of IAT score per region by gender

<table>
<thead>
<tr>
<th>Region</th>
<th>Female</th>
<th>Male</th>
<th>M</th>
<th>N</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friesland</td>
<td>.091</td>
<td>.054</td>
<td>.091</td>
<td>5</td>
<td>.166</td>
</tr>
<tr>
<td>Randstad</td>
<td>.127</td>
<td>-.134</td>
<td>.127</td>
<td>10</td>
<td>.116</td>
</tr>
</tbody>
</table>

No significant effect was found for gender within groups. In both regions women associated the approximant /r/ more with femininity and men more with masculinity, but the differences were again non-significant.

The results of the Frisian speakers were also analysed to check for an effect of first language. A few participants had Dutch as their first language, however, no significant effect for first language on the IAT score was found among Frisian participants (t = -0.478; Df = 11; p = 0.642).

**Table 8** Compared means of IAT score of Frisian participants by first language

<table>
<thead>
<tr>
<th>Language</th>
<th>M</th>
<th>N</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frisian</td>
<td>.047</td>
<td>10</td>
<td>.085</td>
</tr>
<tr>
<td>Dutch</td>
<td>.141</td>
<td>3</td>
<td>.239</td>
</tr>
</tbody>
</table>

4.2.1 **Review**

There was a technical problem with the IAT. While reviewing the results, we found an unusually large amount of lost milliseconds indicated by Affect 4.0. Affect 4.0 calculates response time by checking in with the computer’s internal hardware clock as often as possible. The lost milliseconds indicate that the operating system constrained the Affect 4.0’s ability to check in for a certain amount of time. Affect 4.0 shows both the total amount of milliseconds
lost during a trial and the largest gap. The scores reveal that milliseconds were lost, but not if this affected the response time data. The response time data is only affected if the response fell within that window of lost time. Unfortunately there is no way of knowing if and when that was the case ([A short explanation about the 'lost msec' column] (n.d)). The chance that the response time was incorrectly recorded can be calculated by dividing the largest lost milliseconds gap by the trial time. In this case the largest gap most often corresponded with the total amount of milliseconds lost. The largest gaps ranged between 1 and 51, which is not a lot taking into account response times between 102 and 9275. The calculations indicate a very low (0.1%) chance of data being lost during those lost milliseconds. It is still possible that some of the response time data was lost or altered by these lost milliseconds. This could theoretically alter a participants D-score, but it seems very unlikely that the data was significantly altered by the lost milliseconds in this case. There are several possible explanations for Affect 4.0 recording so many lost milliseconds. After reviewing the possible interfering factors, it seems most likely that Affect 4.0 is not compatible with Windows10. In previous experiments only computers operated by Windows8 were used with no case of lost milliseconds.

Because of the sensitivity of the test to gender, the test itself needed to be as gender-neutral as possible, as not to influence the participants associations. The test was voiced by woman, but as an attempt to insure gender neutrality, the pitch was manipulated to sound like a child. To check if the voice was indeed gender-neutral, participants were asked to rate the age and gender of the speaker.

![Bar graph of the gender of the speaker as assigned by the participants.](image-url)
As the bar graph in Figure 11 clearly indicates, the desired gender neutrality was not achieved. Over 80% of the participants thought the speaker had been a girl. On average the participants estimated that the speaker was 11 years old. So while the voice was convincing as a child’s voice, it was still clearly female. The genderedness of the voice has not seemed to have influenced the IAT scores. An independent sampled t-test revealed no significant difference in IAT score between participants who had estimated the voice to be a girl (M = -0.002, SD = 0.313) or a boy (M = 0.144, SD = 0.333).
5. DISCUSSION

The aim of this study was to see if the genderedness of the approximant /r/ sound change influenced the gender association of speakers.

First a production task gave insight into possible production differences of the coda /r/ between speakers from the Randstad and Friesland. The approximant /r/ sound change has already been completed in the Randstad, so it was not surprising to find a high frequency of coda realisation of the approximant /r/ among those speakers. Participants from the Randstad used the approximant /r/ in almost 75% of cases, with the remaining realisation either uvular /r/, deleted, fricated or alveolar /r/. A low, but significant association was found between gender and rhotic use among the participants from the Randstad. Men deleted more of their /r/’s and the alveolar /r/ was more frequent in women’s speech. They did not differ much in their use of the approximant /r/, confirming that both men and women use this variant equally in the Randstad and making a strong gender association unlikely. A comparison of this speech pattern with that of the Frisian participants revealed a significant association, between rhotic use and region.

The Frisian participants used the alveolar /r/ predominantly. This matches previous research (Van Bezooijen, 2009) into the use of rhotics in Frisian and Dutch spoken in Friesland. However, surprisingly a small number of approximant /r/ realisation were found as well (around 10%). This suggests that the approximant /r/ indeed spreads towards the north and has already been introduced into the speech pattern of young Frisians. Considering the characteristic of the spread, this new variant would likely be introduced in Friesland by young women. The production data from this study support this notion. Frequency analyses showed a significant association between gender and rhotic use among Frisian participants. Both men and women use the alveolar /r/ in around half of the tokens. However, a difference can be seen in the frequency of uvular and approximant /r/. Where men use the uvular /r/ more than women, almost all realisations of the approximant /r/ are produced by women. On the basis of these data it would seem that young women are introducing the approximant /r/ into the speech community. A remarkable feature of the speech pattern of the Frisian participants is their frequent use of the uvular /r/. The uvular /r/ is historically stigmatized in Friesland (Van Bezooijen, 2009), however, the frequent use recorded here could indicate a lessening of this stigma. A comparison between the production data from the Dutch recording and the Frisian recording also produced a significant association between language and rhotic use. Of particular interest is the appearance of the approximant /r/ in the participant’s Frisian speech. The approximant /r/ might be changing coda production not only in Dutch, but Frisian as well.
The production data confirm that there is a difference in the realisation of the coda /r/ between the Randstad and Friesland, and that in Friesland, it is young women who use the new variant, whereas in the Randstad there is no gender difference. This gender difference could lead to a difference in association, between speech communities where both men and women use the approximant /r/ and speech communities where women introduce the new variant.

An Implicit Associations Test allowed us to test the relative strength of the gender associations speakers have with the approximant /r/. The IAT results showed that participants from the Randstad had a fairly neutral gender association with the approximant /r/. The average IAT score was close to zero, at -0.003. Since the approximant /r/ sound change has been completed in the Randstad area and both previous studies and our own production task show that men and women use it to equal extent, this result is not surprising. It seems that in a speech community where the sound change has been completed there is no indexical link between femininity and the approximant /r/.

In Friesland such a link would be expected, since the sound change has only just spread to that region. The production data show that young Frisian women use the approximant /r/ much more than men. If this has indeed resulted in collocational indexicality between femininity and the approximant /r/, the Frisian participants would have an average positive D-score. The higher the D-score the stronger the association with femininity over masculinity is. The IAT data indeed revealed a stronger average association with femininity among the Frisian participants. However, statistically the differences between the Frisian participants and those from the Randstad were not significant. The results indicate that Frisian speakers do not differ significantly with Randstad participants in the extent to which they associate the approximant /r/ with femininity.

A few notes must be made on the results of this study. The questionnaire results show that we did not succeed in creating a completely gender-neutral IAT. However, this does not seem to have influenced the results. If it had, much stronger association with femininity should have been found among both groups. The structure of the IAT seemed otherwise successful. IAT’s are always cognitively challenging and require concentration and alertness; most of the participants rated the test as indeed challenging, but also fun. Unfortunately we encountered some trouble with the IAT’s lost seconds, which was probably due to an incompatibility of Affect 4.0 with Windows10 operating system. The chances of these lost milliseconds significantly affecting the overall results are slim, but should be taken into account. The problem does give a new insight into the program and can be used in the further development of Affect 4.0.
The biggest issue with this study is the sample size. It is possible that the differences in gender associations found in this study reach a statistically significant level with a larger sample. The rhotic use of the participants may have been influenced by accommodation. In this case, the participants could have used the approximant and uvular /r/ more frequently to resemble the speech pattern of the researcher. The approximant /r/ is a reduced variant, which makes it “easier” to pronounce than the alveolar and uvular /r/. This could contribute to the speed of the sound change, as it could motivate speakers to adopt it.
6. CONCLUSION
The history of Dutch rhotics shows two major changes during the 20th century. First of all a change from alveolar /r/ to uvular /r/ in the west and south of the Netherlands. Secondly the reduction of the /r/ in coda lead to a new variant: the approximant /r/ (Van Bezooijen, 2005, Van Bezooijen et al., 2002). Use of this new variant has been spreading rapidly, replacing the alveolar and uvular /r/ in coda. So far this sound change has been completed in the western part of the country, and research reveals a spread towards the east and possibly the north of the Netherlands (Sebregts, 2015; Van Bezooijen, 2005). Although the approximant /r/ has overt prestige, its sound change resembles a change from below (Labov, 1990; Sebregts, 2015; Van Bezooijen, 2005). Young women are leading this language change, spreading the approximant /r/ first to large cities and from there to smaller towns. According to Labov's (1999) principles of sound change, women tend to use new variant more in unstable linguistic environments and change from below. Through collocational indexicality, speakers can signify social information and identity by the way they speak. This has often been the case for women who rely on the symbolic function of language for prestige more than men. Indexical linking is the process in which linguistic information and social information are stored together in the brain. Repeated use of a specific linguistic feature by a social group can lead to an association, when speakers notice a correlation between the form and the social context. Such an indexical link could form between femininity and the approximant /r/ when young women are using the new variant significantly more frequent than other social groups.

On the basis of this study we can see that the production of the approximant /r/ is gendered in speech communities where the sound change has not been completed. However, it seems that the genderedness of the sound change does not significantly influence the gender association of the new variant. The fact that the spread of the approximant /r/ is led by women, does not necessarily increase the femininity associated with the variable to such an extent that a significant difference can be seen between completed and in completed speech communities.

It could be interesting to redo the study with a more strictly selected participant group, for instance to compare within Friesland among participants from Leeuwarden and the rural area. The spread of the approximant /r/ is generally to urban areas before rural areas and citizens of Leeuwarden tend to have more contact with Dutch speakers. A more extensive study in Friesland could also lead to a better insight into the relevance of Frisian as first or second language and investigate the possible spread of the approximant /r/ into Frisian indicated by the results of this study. If the approximant /r/ is indeed spreading to Frisian, it might also be
influencing the patterns of coda /r/ production in other regional languages in the Netherlands, such as Low Saxon or Limburgisch.

The frequency of the uvular /r/ in the speech patterns of Frisian participants suggests that the uvular /r/ is becoming less stigmatised in Friesland. It would be interesting to study the overt and covert associations with the uvular /r/ in Friesland to see if this is in fact the case.

The approximant /r/ sound change has now been studied to a certain extent and it seems that speakers are becoming more and more aware of it. Both in communities where the change has been completed and regions where it has not. This increasing overtness and the prestige already linked to the approximant /r/, could result in shift in characteristics of the sound change. Where it has started out as a change from below, it is possible that in fact, it is morphing into a change from above in the remaining unaffected regions. Such a shift would mean that the way in which the approximant /r/ could change, and no longer be led by young women. The sound change would then likely be adopted more consciously by adults, both men and women, leading to different associations as well.
REFERENCES


Dutch and Town Frisian. *Variation in Indigenous Minority Languages*. Amsterdam, Netherlands: Benjamins. 299-318


APPENDIX I

Questionnaire Randstad

Persoonsgegevens

Leeftijd:
Geslacht: Man Vrouw

Studierichting:

Geboren (plaats, land):

Opgegroeid (plaats, land):

Moedertaal (of dialect):

Spreekt u thuis andere talen dan uw moedertaal?
Nee
Ja, namelijk:

Welke talen heeft u (bijvoorbeeld op school) geleerd?

……………………………………………………………………………………………

Je hebt net een classificatietaak gedaan; de geluidsfragmenten die je gehoord hebt, zijn ingesproken door een kind. Zou je hieronder aan willen geven wat jij denkt dat de leeftijd en het geslacht van dit kind is?

Leeftijd:

Geslacht: Jongen Meisje
Questionnaire Friesland

Persoonsgegevens

Leeftijd:
Geslacht:  Man  Vrouw

Studierichting:

Geboren (plaats, land):

Opgegroeid (plaats, land):

Moedertaal (of dialect):

Spreekt u thuis andere talen dan uw moedertaal?  Nee  Ja, namelijk:

Spreekt u Fries?  Nee  Ja

Zo ja: hoe goed vind je dat je het Fries kunt verstaan?

0 1  2  3  4  5  6  7  8  9  10
Helemaal niet  helemaal

Hoe goed vind je dat je het Fries kunt spreken?

0 1  2  3  4  5  6  7  8  9  10
Helemaal niet  helemaal

Hoe goed vind je dat je het Fries kunt lezen?

0 1  2  3  4  5  6  7  8  9  10
Helemaal niet  helemaal

Hoe goed vind je dat je het Fries kunt schrijven?

0 1  2  3  4  5  6  7  8  9  10
Helemaal niet  helemaal

Welke talen heeft u (bijvoorbeeld op school) geleerd?

........................................................................................................................................................................

Je hebt net een classificatietaak gedaan; de geluidsfragmenten die je gehoord hebt, zijn ingesproken door een kind. Zou je hieronder aan willen geven wat jij denkt dat de leeftijd en het geslacht van dit kind is?

Leeftijd:  Geslacht:  Jongen  Meisje
APPENDIX II

Production Task

Dutch

Hallo, ik ben Robin van Veer. Ik ben veertien jaar. Ik heb bruine ogen en donkerblond haar. Ik heb een broer, die heet Jasper en een zusje die Floor heet. Samen met hen en mijn ouders woon ik in de Prins Willem Alexanderstraat. Ik ga naar de Zuiderpoortschool. Als ik geen huiswerk heb, luister ik veel naar muziek en ik sport ook graag. Verder vind ik het erg leuk om met mijn kater te spelen. Zijn naam is Krabbetje omdat hij graag overal aan krabt, vooral aan de deur. Ik borstel mijn kater ook iedere dag, omdat hij zo verhaart.

(From: Koppers & Van Bezooijen, 2008)

Frisian

Hoi, ik bin Robin van Veer. Ik bin fjirtjin jier. Ik ha brune eagen en donkerblond hier. Ik ha in broer, dy hjit fan Jasper en in suske dy't Floor hjit. Tegearre mei har en myn âlden wenje ik yn de Prins Willem Alexanderstraat. Ik gean nei de Suderpoortskoalle. As ik gjin huswurk ha, harkje ik in protte nei muzyk en ik sport ek graach. Fierders fyn ik it hiel leuk om mei myn boarre te boartsjen. Syn namme is 'Krabbetje', omdat er graach oeral aan klaut, foaral aan de doar. Ik boarstelje myn boarre ek alle dagen omdat er sa ôfhierret.