

MIND YOUR GRAMMAR!

An fMRI study to the processing of grammatical norm violations

Master's thesis

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1. Introduction

In Dutch the use of the comparative marker *als* 'as' in comparatives of inequality is quite common in daily language. An example is taken from the Spoken Dutch Corpus (CGN) and can be found in (1a). According to prescriptive grammar, however, people have to use the comparative marker *dan* 'than' instead of *als* 'as'. The use of *als* 'as' in a comparative construction of inequality is not allowed. An example of the prescriptively correct counterpart of (1a) is shown in (1b).

(1)

- a. Nou, iemand koopt sneller een slaapzak als een tent.
well, somebody buys faster a sleeping.bag as a tent
"Well, somebody will more easily buy a sleeping bag than a tent."
[CGN
fn000897.240]
- b. Nou, iemand koopt sneller een slaapzak dan een tent.
well, somebody buys faster a sleeping.bag than a tent
"Well, somebody will more easily buy a sleeping bag than a tent."

This kind of variation is not only restricted to the comparative constructions of inequality. Prescriptive grammar also disallows using the pronoun *hun* 'them' as the subject of a sentence. Instead, the pronoun *zij* 'they' or *ze* 'they.REDUCED' should be used. However, the use of *hun* 'them' as the subject of a sentence is quite common. In (2a) an example is presented in which *hun* 'them' is incorrectly used according to prescriptive grammar. Its prescriptively correct counterpart can be found in (2b).

(2)

- a. Wat maken hun een vreselijk lawaai.
what make them a terrible racket
"They are making a terrible racket."
- b. Wat maken ze een vreselijk lawaai.
what make they a terrible racket
"They are making a terrible racket."

Another example of a prescriptively incorrect variant which is quite frequent in daily speech, but which is disapproved of by prescriptive grammar is the construction in which an object pronoun is used in a comparative construction. An example can be found in (3a). According to prescriptive grammar, instead of an object pronoun a subject pronoun has to be used. The prescriptively correct counterpart is presented in (3b).

(3)

- a. Jan is langer dan mij gebleven op het feest.
Jan is longer than me stayed at the party
“Jan stayed up longer than me at the party.”
- b. Jan is langer dan ik gebleven op het feest.
Jan is longer than I stayed at the party
“Jan stayed up longer than me at the party.”

These prescriptively incorrect constructions are frequently used in daily speech, especially by low-educated people. These constructions are also very common in many variants or dialects of Dutch.

Recent research has shown that the prescriptive rule underlying the alternative in (1b) can be seen as an artificial rule that is learned at school (Hubers & de Hoop, 2013). High-educated people use *dan* ‘than’ more often than *als* ‘as’, whereas for low-educated people this is the other way around. Due to the fact that the prescriptively correct counterpart is taught at schools, it might be the case that prescriptive rules are fully absorbed into a high-educated person’s internal grammar (Hubers & de Hoop, 2013). That is, high-educated people do not consciously apply the rule anymore, whereas they may have done so when they first learned the rule at school, or earlier, from their parents.

High-educated people often claim that for them prescriptively incorrect alternatives as in (1a) and (2a) are truly ungrammatical. When getting exposed to these prescriptively incorrect constructions, an emotional reaction (e.g. repugnance) might be elicited. It is mainly because of these feelings that *Genootschap Onze Taal* ‘Association Our Language’ advises not to use *als* ‘as’ as a comparative marker of inequality:

“Maar in de praktijk kan toch het best voor *groter dan* gekozen worden, omdat *groter als* nog altijd veel weerstand oproept — en dat zal nog wel een tijdje zo blijven.”

“In practice it is better to use *groter dan* ‘bigger than’, because *groter als* ‘bigger as’ still generates a lot of resistance — and this will be the case for some time.”

<http://www.onzetaal.nl/taaladvies/advies/groter-als-groter-dan>

This association also advises not to use the construction in which *hun* ‘them’ is used as the subject of a sentence, because of these emotional responses (Onze Taal, 2014).

The people in whom these emotional reactions are elicited usually are highly-educated, have a good knowledge of the prescriptive grammar rules and apply these rules correctly. In this thesis I want to investigate these people’s processing of violations of prescriptive grammar. Is it possible to measure an ‘alarm bell’ that signals violations of a grammatical norm? If this alarm bell is present, what does it look like? Will the processing of grammatical norm

violations elicit an emotional response (repugnance or disgust) in these people, henceforth referred to as *purists*, or will grammatical norm violations be considered as being socially unacceptable, which means that social cognition is involved in this processing, just like in the processing of sentences describing a violations of a social norm?

The fact that people experience strong emotions such as shame or repugnance when they encounter grammatical norm violations, leads me to hypothesize that subjects' brain responses to a violation of a prescriptive language norm will be different from their responses to a true ungrammaticality.

In order to test this hypothesis I conducted an fMRI experiment. In this thesis I will first discuss the reasons for conducting an fMRI experiment, by discussing the pros and cons of different experimental techniques that might be suitable in order to investigate whether norm specific effects are present in the processing of grammatical norm violations by purists and whether these effects are emotional or social in nature (Chapter 2). In Chapter 3 I will go into the details of the experiment. I will discuss how the experiment was set up, and what the materials looked like. In this chapter I will also explain the procedure of recruiting participants. In Chapter 4 I will present the results of the experiment. Chapter 5 consists of a discussion and I will end my thesis with some conclusive remarks on the processing of grammatical norm violations (Chapter 6).

2. Choice of method

2.1. Introduction

In this chapter I will discuss some experimental methods that at first sight seem to be suitable in order to investigate whether norm specific effects can be found in the processing of grammatical norm violations by purists and whether these effects are emotional or social in nature. First, I will discuss literature on behavioral experiments (Section 2.2). Subsequently, I will go into the advantages and disadvantages of neurolinguistic experiments for answering these questions (Section 2.3). In Section 2.4 I will compare the discussed experimental techniques and explain why the technique of functional Magnetic Resonance Imaging has been chosen for the present study.

2.2. Behavioral experiments

2.2.1. *Self-paced reading*

An experimental method that is quite commonly used in psycholinguistics and that is easy to set up and carry out is the self-paced reading paradigm. In this type of experiments participants read sentences word by word. The full sentence appears on the screen in which words are replaced by dashes. By pressing a button, the dashes that represent the first word disappear and the first word becomes visible. By pressing a button the first word gets replaced by dashes again and the second word becomes visible. By means of this paradigm the reading times for each word can be recorded. These reading times are considered to reflect processing. More specifically, longer reading times are thought to reflect processing difficulties (Just et al., 1982; Mitchell, 2004). Processing difficulties might arise because of ungrammaticality, violation of an expectation or a reanalysis process (Just et al., 1982).

When purists encounter grammatical norm violations in a self-paced reading experiment I expect a longer reading time for words that make sentences prescriptively incorrect opposed to the same or similar words in their prescriptively correct counterparts. The high-educated purists say to perceive grammatical norm violations as ungrammatical, so if processing difficulty arise, this might be due to the ungrammaticality of the construction. Longer reading times on the word that makes the sentence prescriptively incorrect can also be explained as a violation of the expectation of the participant or because of an emotional response upon encountering that word.

The self-paced reading paradigm seems not suitable for investigating whether emotions are involved in the processing of grammatical norm violations by purists, since the paradigm cannot tease apart underlying processes. Increased reading times might indicate that the participant is experiencing strong emotions when noticing the prescriptive norm violation, but it can also be explained as a reflection of ungrammaticality or violation of expectation.

2.2.2. Skin conductance response (SCR)

Skin conductance responses are responses to arousal and emotion that are reflected by an increased electrodermal activity (Boucsein, 2012; Dawson et al., 2000). To measure the electrodermal activity electrodes are placed on the hand of the participant which send a small amount of current through the skin by which electrical conductance is measured. The electrical conductance can be influenced by sweat. When being exposed to a stimulus that elicits an emotional response sweat glands will produce sweat which increases the electrical conductance.

In language research, skin conductance responses are often used to study bilinguals. An increased skin conductance is measured in bilinguals when encountering or producing taboo words in their native language in contrast to when they encounter or produce these words in their second language (Harris et al., 2003; Simcox et al., 2011). The processing of taboo words in the native language of bilinguals results in an increased skin conductance response compared to the skin conductance response elicited by neutral words in the same language. In the second language, however, the level of skin conductance is equally low in response to both taboo words and neutral words (Simcox et al., 2011).

Taboo words can be considered to be quite similar to words that make the sentence prescriptively incorrect, since just like taboo words, it is not allowed to use these prescriptively incorrect words. Therefore, the method of skin conductance can be used to measure whether an emotional response is present in purists upon getting exposed to grammatical norm violations.

When purists encounter words that indicate that the sentence is prescriptively incorrect I expect an increased skin conductance opposed to when they encounter prescriptively correct variants at the same position in the sentence. True ungrammaticalities might also elicit an emotional reaction reflected in the skin conductance response, but perhaps not as strong as the emotional reaction elicited by grammatical norm violations.

2.2.3. Heart rate

Experiments in which skin conductance is measured are often accompanied with heart rate measurements, since heart rate is also influenced by emotions (Kreibig, 2010). Disgust, which is elicited by pictures that express contamination or pollution, for example, is associated with an increased heart rate as compared to neutral stimuli (Alaoui-Ismaili et al., 1997; Boiten, 1996; Gruber et al., 2008), whereas disgust related to mutilation results in a decrease in heart rate (Baldaro et al., 2001; Britton et al., 2006; Christie & Friedman, 2004). Anger is found to be related to an increased heart rate (Hamer et al., 2007; Schachter, 1957; Sinha et al., 1992), just like surprise (Boiten, 1996; Ekman et al., 1983; Levenson et al., 1991). Repugnance and contempt, however, have not been investigated yet. An emotion that is quite close to repugnance and contempt is moral disgust, which is elicited when people are exposed to moral offenses (Jones & Fitness, 2008) and thus might be an emotion that is involved in the processing of grammatical norm violations as well. Moral disgust seems to elicit

an accelerated heart rate (Ottaviani et al., 2013), which leads me to hypothesize that when people are exposed to grammatical norm violations, this will lead to an increased heart rate as opposed to when people are exposed to their grammatical counterparts. Since I think that for true ungrammaticalities this emotional response is absent, or at least not that strong, the heart rate of people getting exposed to true ungrammaticalities will not increase as much as when they are exposed to grammatical norm violations. Therefore, in combination with measuring the skin conductance response, heart rate measurements can give additional information on whether emotions are involved in processing grammatical norm violations or not. However, these methods only give information on the presence or absence of emotions and not on which particular emotion is involved in the processing of grammatical norm violations.

2.3. Neurolinguistic experiments

2.3.1. Event related potentials (ERPs)

In contrast to skin conductance and heart rate, event related potentials provide detailed information on the time course of processing, since with this technique responses to specific words in a sentence can be measured. By measuring ERPs it is possible to disentangle brain responses that are due to grammaticality and emotion, while this is not possible in self-paced reading, as a delayed reading time can be explained in several ways.

In processing emotion, two components seem to be involved: the P300 component and the late positive potential (LPP) (Hajcak et al., 2010). The P300 is a positivity that is elicited about 300 to 500 ms after onset of the stimulus (Sutton et al., 1965). This component seems to be present when presenting pleasant or unpleasant stimuli opposed to neutral ones (Johnston et al., 1986; Mini et al., 1996; Palomba et al., 1997). Although this component is present when getting exposed to emotional stimuli, it is suggested that it has to do more with attention than with emotion, since stimuli fail to elicit a P300 when people have to perform a secondary task (Duncan-Johnson & Donchin, 1977; Hillyard et al., 1973). When presenting an emotional stimulus it might not be the emotional content that elicits a P300 compared to neutral stimuli, but rather the attention that is attracted by this emotional stimulus (Bradley et al., 2001; Lang et al., 1997).

The LPP, however, seems to be a more robust reflection of emotion. This ERP component is a superior-posterior positivity which starts at 300 – 400 ms after stimulus onset and often is sustained throughout the entire stimulus duration (Cuthbert et al. 2000). Several previous studies have shown that the amplitude of the LPP is larger for pleasant and unpleasant words and pictures in contrast to neutral ones (e.g. Cuthbert et al., 2000; Dillon et al., 2006; Foti & Hajcak, 2008). An important advantage of the LPP is that it does not habituate over time (Codispoti et al., 2006; Olofsson & Polich, 2007). Individual differences exist in the LPP (Hajcak et al., 2010), as it is found that pictures of spiders, for example, elicit an increased LPP in people with arachnophobia opposed to pictures of birds

and flowers, whereas for people without arachnophobia this increase is absent (Kolassa et al., 2005). An increased LPP is also found in cocaine-addicted people when presented with pictures of cocaine in contrast to neutral pictures, whereas this is not the case for the control group (Franken et al., 2008).

An increased LPP might, therefore, also be present in purists who strongly reject grammatical norm violations upon getting exposed to these constructions in contrast to their grammatical and ungrammatical counterparts. I would also expect an increased P300 component in this situation, since the word that makes the sentence prescriptively incorrect will attract the participant's attention.

Up until now, I only discussed emotions related to grammatical norm violations. However, these norm violations might also be similar to a violation of a social norm, since both types of violations of a normative rule are rejected in society. According to the literature the mediated frontal negativity (MFN), which is a negative deflection around 200 to 350 ms after stimulus onset, is elicited in violations of social expectancy or social norms (Boksem & De Cremer, 2010; Hewig et al., 2011; Polezzi et al., 2008). The amplitude of the MFN, for example, is larger for lower offers than for higher offers in economic exchange games (Boksem & De Cremer, 2010). A social expectancy might be violated as well in the case of grammatical norm violations, which means that an increased MFN might be elicited upon reading or hearing these constructions.

The method of ERPs seems perfectly suitable to investigate whether social cognition or emotions are involved in purists when processing grammatical norm violations. However, although these constructions can be interpreted without any problems, they still might be processed as ungrammatical. Ungrammaticalities are known to elicit a P600, which is a positive deflection around 600 ms after the onset of the stimulus which indicates a non-preferred grammaticality (Hagoort, 2003; Kaan & Swaab, 2003; Kaan, 2007) or even both a P600 and an (Early) Left Anterior Negativity (LAN: Friederici et al., 1996; Kluender & Kutas, 1993; Münte et al., 1993; Osterhout & Holcomb, 1992; Rösler et al., 1993; ELAN: Friederici et al., 1993; Friederici, 2002; Neville et al., 1991). The ELAN is a negative peak around 100 to 300 ms after stimulus onset and the LAN is a negative peak around 300 to 500 ms after stimulus onset. This means that when this component is present in grammatical norm violations it might cancel out the P300 or LPP if present, which would result in no effect at all. Even if the (E)LAN is absent, a positive peak around 500 to 700 ms can be either an effect of grammaticality (P600) or a reflection of an emotional response (LPP).

This means that if something like an alarm bell is present, this might go unnoticed, because components related to grammaticality might cancel out the effect of the P300 or LPP ((E)LAN) or might have the same time course and polarity as the LPP (P600).

2.3.2. Functional Magnetic Resonance Imaging (fMRI)

Above I discussed a couple of disadvantages that have to be taken into account when investigating whether basic emotions or social cognition are involved in the processing of grammatical norm violations by measuring ERPs. Another disadvantage of ERPs is that the type of emotion cannot be determined when an

effect of emotion will be found. Although it is not possible to determine what specific emotion is involved in the processing of grammatical norm violations by means of functional Magnetic Resonance Imaging (fMRI), it is possible to see whether brain regions involved in processing disgust and contempt will be also involved in the processing of grammatical norm violations. The processing of emotions has been quite extensively studied with fMRI (e.g. Garrett & Maddock, 2006; Mercadillo et al., 2007; Ochsner et al., 2002; Phan et al., 2002). Previous research has shown that neural activation to faces expressing contempt and disgust can be distinguished. According to Sambataro et al. (2006) processing contemptuous faces elicits a greater activity in the amygdala opposed to neutral faces, whereas the disgusted faces elicited greater activity in the insula in contrast to neutral faces. However, this is not replicated by Aleman & Swart (2008), which might be due to a different experimental procedure. To investigate whether emotions are involved in the processing of grammatical norm violations, an fMRI experiment can be conducted. Thus, it can be seen whether areas that are involved in processing emotions are also involved in the processing of these grammatical norm violations. Especially the amygdala and the insula are expected to play a role in the processing of these constructions, as these areas are involved in the processing of disgusted and contemptuous faces.

If grammatical norm violations are more comparable to social norm violations, areas that are involved in the processing of sentences describing a social norm violation might be involved in the processing of sentences containing a grammatical norm violation as well. It has been shown that the medial superior frontal gyrus (mSFG) is activated when processing social norm violations (Berthoz et al., 2002; Prehn et al., 2008; Spitzer et al., 2007). If the processing of grammatical norm violations resembles the processing of social norm violations I would expect an increased activity in the mSFG in participants upon getting exposed to violations of the prescriptive norm in contrast to their correct counterpart.

The advantage of fMRI over measuring ERPs is that the processing effects of grammaticality do not interfere with processing effects of emotion or social cognition, since the loci of these effects are different. If reading grammatical norm violations results in an increased demand on grammatical processing, this will lead to an increased activation in the left Inferior Frontal Gyrus (LIFG) opposed to processing grammatical sentences (Friederici et al., 2006; Hagoort, 2005; Snijders et al., 2009). When emotional processing is involved in the processing of grammatical norm violations increased activation is expected to be found in the amygdala or insula. When the processing of grammatical norm violations are more similar to the processing social norm violations, the mSFG might be involved. These processing effects are all reflected in different brain areas.

2.4. Conclusion

Functional Magnetic Resonance Imaging seems to be the most suitable experimental method in order to investigate the processing of grammatical norm violations, and more specifically to investigate whether emotions or social cognition is involved in processing grammatical norm violations. With this technique underlying processes can be disentangled, whereas this is not possible with EEG and the self-paced reading paradigm. Measuring skin conductance in combination with heart rate would be suitable as well, in that emotional responses can be measured. Yet, fMRI provides additional information about the loci of the processes. Therefore, I propose to carry out an fMRI experiment.

I expect to find norm specific effects in the processing of grammatical norm violations. If social cognition is involved in the processing of grammatical norm violations, I expect to find increased activation in the mSFG for these kind of violations in contrast to truly grammatical and ungrammatical sentences. If emotions are elicited upon encountering grammatical norm violations, I expect to find increased activation in the amygdala or insula.

I will also examine the activity in the Inferior Frontal Gyrus (IFG) in order to find out whether processing difficulties are present during the processing of grammatical norm violations. I expect higher activation in the IFG for both grammatical norm violations and truly ungrammatical sentences opposed to truly grammatical sentences, since both types of sentences are unacceptable in a way and thus might cause difficulties in processing. If an increased activation will be found in the IFG for truly ungrammatical sentences this can be ascribed to the fact that they are ungrammatical. If an increased activation is found in the IFG for grammatical norm violations, this does not necessarily mean that these constructions are processed as being ungrammatical. However, it does indicate that these violations need additional linguistic processing.

3. Methods

3.1. Introduction

In order to investigate whether something like an alarm bell is present in (high-educated) purists when they encounter grammatical norm violations, I conducted an fMRI experiment. I have chosen to use the technique of functional Magnetic Resonance Imaging because of the detailed spatial resolution. In addition, by means of this technique it is possible to see whether brain regions involved in emotion processing are also involved in processing grammatical norm violations. Besides that, when areas that are involved in processing sentences that describe a social norm violation are involved in processing grammatical norm violations as well, this can be measured with fMRI.

Apart from the main experiment in which participants had to read sentences, I also conducted a localizer experiment in order to isolate the brain areas that are related to the emotions disgust and contempt.

In this chapter I will firstly discuss how I recruited the participants (Section 3.2). In Section 3.3, I will describe the materials used in the different parts of the experiment. Next, I will provide information on the experimental procedure and I will discuss the fMRI data acquisition and the statistical analyses (Section 3.4). I will end this chapter with a short conclusion (Section 3.5).

3.2. Recruitment of participants

For the fMRI experiment I needed a special type of participants, as they had to be aware of Dutch prescriptive grammar, apply the rules correctly and strongly reject grammatical norm violations. In order to find these people I created a recruitment test. In the next section I will describe what this test looked like. In Section 3.2.2, I will go into the results and Section 3.2.3 will elaborate on the characteristics of the respondents I selected to participate in the fMRI experiment.

3.2.1. Design recruitment test

The test consisted of three parts and was created and conducted via the Internet software NetQ (<http://www.netq-enquete.nl/nl>). In the first part the respondents had to provide general information about themselves. They were asked to provide information on gender, age, educational level, native language, dialects, province of residence and whether they were dyslectic or not.

In the second part, respondents had to indicate whether the sentences that were presented were either correct or incorrect with respect to their grammar and spelling of the words. If they did not know whether a sentence was correct or not, they had the opportunity to tick the option 'I do not know'. In total 40 sentences were displayed. In ten of those sentences a violation of a prescriptive grammar rule was present. Another ten sentences contained spelling errors. The twenty other sentences did not contain any spelling errors or violations of prescriptive grammar rules.

The sentences were presented in a random order and were divided over two web pages. In (4a) an example containing a spelling error (in italics) is presented. Example (4b) contains a grammatical norm violation (in italics).

(4)

- a. Het meisje *krabte* de kat achter zijn oren.
the girl scratched the cat behind his ears
"The girl scratched the cat behind its ears."
- b. In Amerika zijn de mensen dikker *als* in Europa.
in America are the people heftier as in Europe
"People in the USA are heftier than people in Europe."

In the last part of the test the participants had to score three statements on a scale from one to seven, that can be seen in Table 1. The first two statements were about the importance of speaking the language properly and focusing on this in the educational system. The third statement was about whether the respondents feel irritation when encountering language errors. In addition, the respondents had to answer an open question about which language errors specifically annoy them. This question is presented in Table 1 as well.

At the end of the test people had the opportunity to fill in their email address if they were interested in participating in follow up studies.

Table 1. Questions recruitment test participants

Questions	English translation	Question type
Ik vind het belangrijk dat mensen verzorgd Nederlands praten.	"I think it is important that people speak Dutch properly."	Scale from 1 to 7
Ik vind het belangrijk dat er in het onderwijs nadruk wordt gelegd op correct taalgebruik.	"I think it is important that in the educational system correct language use is emphasized."	Scale from 1 to 7
Ik erger me aan taalfouten in mijn omgeving.	"I feel irritation when hearing linguistic errors."	Scale from 1 to 7
Welke taalfouten vindt u vooral hinderlijk?	"Which language errors do you find especially disturbing?"	Open question

I adopted the inclusion criteria presented in Table 2 in order to select participants for the fMRI experiment. The participants had to be either between 18 and 35 years old, or between 30 and 50 years old. Since I did not know how many suitable participants I would find in the two age categories on beforehand, I decided to adopt the age range which consisted of the largest number of respondents that met the remaining inclusion criteria. Participants all had to be of about the same age, since ageing influences the brain's condition (Peters, 2006; Raz & Rodrigue, 2006). Because of the effect of ageing, it is not legitimate to compare the processing of grammatical norm violations in a twenty year old with the processing of these constructions in a fifty or sixty year old person. I selected participants who judged more than 29 sentences correctly (out of 40), or who incorrectly judged no more than two sentences that contained a

grammatical anomaly and did not get below a score of 25 out of 40. In addition, the respondents also had to score the sentence in which *hun* 'them' was used as a subject as incorrect (presented in (5a)), as well as the sentence in which *als* 'as' was used as a comparative marker of inequality (shown in (5b)). It was important to adopt this as an inclusion criterion, as these constructions were presented in the fMRI experiment and I had to make sure that the participants disapproved of these constructions.

(5)

- a. Gisteren fietsten hun naar de supermarkt.
yesterday cycled them to the supermarket
"They cycled to the supermarket yesterday."
- b. In Amerika zijn de mensen dikker als in Europa.
in America are the people heftier as in Europe
"People in the USA are heftier than people in Europe."

As I was looking for purists to participate in my fMRI experiment, the respondents also had to rate the two statements on the importance of Dutch prescriptive grammar and the one on their annoyance of language errors with a mean score of 5.0 or higher in order to get selected. The final criterion described in Table 2 was a practical one. The respondents had to be willing to participate in future research. They could indicate this by entering their email address, so that I was able to contact them about the fMRI study if they met all other criteria as well.

Table 2. Inclusion criteria for recruiting participants

Age	18-35 or 30-50
Correct answers	≥ 30
AlsHun	Judged as incorrect
Mean answer scale questions	≥ 5.0
Would like to participate in future research	Yes

3.2.2. Results of recruitment test

The call for respondents, which included the link to the recruitment test, was published at the LinkedIn webpage of the association *Onze Taal* 'Our Language', which is an association for people who are highly interested in the Dutch language, and in the newsletter of *Onze Taal*.

In total 373 people filled in the test. In Table 3 the general characteristics of all respondents are presented. The respondents were on average about 54 years old and most of them were highly educated (mean: 1.78), as 1 corresponds to *WO* 'higher education' and 2 to *HBO* 'higher professional education'. The mean number of correct answers was 33 (out of 40) and most respondents agreed upon the importance of prescriptive grammar (mean: 6.03).

Table 3. General characteristics of respondents (n = 373)

	Mean	Std. Deviation	Min - Max
Age	54.46	15.047	13 – 87
Education	1.78	0.936	1 – 4
Number correct	33.31	3.714	18 – 40
Average on statements	6.03	0.931	1.00 – 7.00

Only 170 people met all criteria, except for age. The general characteristics of this subset of respondents are displayed in Table 4. These respondents were on average slightly older than the entire group of respondents (mean: 56.54) and had about the same level of education (mean: 1.79).

Table 4. General characteristics of subset of respondents (n = 170). Filters: Correct answer \geq 30 (out of 40); AlsHun = 1; Average on statements \geq 5.0; Willing to participate in future research = Yes

	Mean	Std. Deviation	Min - Max
Age	56.54	13.859	15 – 87
Education	1.79	0.980	1 – 4
Number correct	34.65	2.538	30 – 40
Average on statements	6.29	0.598	5.00 – 7.00

Since ageing affects the brain's condition (Peters, 2006; Raz & Rodrigue, 2006), I had to put a restriction on age. In addition, people older than 50 were not allowed to participate in the fMRI experiment, since this would make the results of the experiment less comparable to results found in previous research, as most previous studies only tested people younger than 50. Therefore, respondents that were either between 18 and 35 years old or between 30 and 50 years old would be asked to participate in the experiment. I used the recruitment test to determine the age range. The age group which consisted of most respondents was adopted as the inclusion criterion on age. The biggest group of respondents was the group older than 50 (Table 5 and 6: n=124). These people, however, were not selected to participate in the fMRI experiment because of the ageing effects. As can be seen in Table 5 and 6, the group of people between 18 and 35 years old was smaller (n=16) than the group of people between 30 and 50 years old (n=34). Therefore, I decided to ask this group of 34 potential participants to take part in the fMRI experiment. In Table 7 the general characteristics of this group are shown. This group consisted of 9 males and 25 females.

Table 5. The number of respondents per age category according to age categorization 1 (n = 170)

Age categorization 1	Number of respondents	Number of respondents in %
< 18 years of age	1	0.6 %
18 – 35 years of age	16	9.4 %
36 – 50 years of age	29	17.1 %
51 – 70 years of age	106	62.4 %
> 71 years of age	18	10.6 %

Table 6. The number of respondents per age category according to age categorization 2 (n = 170)

Age categorization 2	Number of respondents	Number of respondents in %
< 18 years of age	1	0.6 %
18 – 29 years of age	11	6.5 %
30 – 50 years of age	34	20.0 %
51 – 70 years of age	106	62.4 %
> 71 years of age	18	10.6 %

Table 7. General characteristics of subset of respondents of *Onze Taal* (n = 34). Filters: Age: 30-50; Correct answer \geq 30 (out of 40); AlsHun = 1; Average on statements \geq 5.0; Willing to participate in future research = Yes

	Mean	Std. Deviation	Min - Max
Age	42.53	5.722	32 – 50
Education	1.53	0.861	1 – 4
Number correct	34.50	2.390	30 – 39
Average on statements	6.39	0.565	5.00 – 7.00

In order to recruit more potential participants, I also spread the call for participants via the association *Ons Middelbaar Onderwijs 'Our Secondary Education'*, which is an association of teachers from secondary schools in *Noord-Brabant*, and among people that were recommended by colleagues. This resulted in another 15 people who filled in the recruitment test of which 10 people met the criteria. Their characteristics are presented in Table 8.

Table 8. General characteristics of subset of respondents of OMO and recommended people (n = 10). Filters: Age: 30-50; Correct answer \geq 30 (out of 40); AlsHun = 1; Average on statements \geq 5.0; Willing to participate in future research = Yes

	Mean	Std. Deviation	Min - Max
Age	41.30	6.601	31 - 50
Education	1.70	0.675	1 – 4
Number correct	34.70	2.983	30 – 38
Average on statements	6.33	0.444	5.33 – 7.00

3.2.3. Participants fMRI experiment

Twenty-two people who filled in the recruitment test and met the criteria volunteered to participate in the fMRI experiment. All participants were right-handed. Their age varied from 34 to 51 with an average of 42.3. Nine of them were males and all of them were native speakers of Dutch. The group of people on average correctly judged 35 of the 40 sentences in the recruitment test (range: 29 - 39) and the average on statements was 6.47 (range: 5.33 – 7.00). The participants were all paid 15 Euros for their participation and they received a reimbursement of travelling expenses.

The participant that was older than 50, was not excluded from the analysis because at the moment of the experiment she had just turned 51. The participant who correctly scored only 29 out of the 40 sentences, was not excluded from the analysis, since from the sentences that contained a

grammatical anomaly she only incorrectly judged two to be correct. An overview of the characteristics of the people that participated in the experiment is presented in Table 9.

Table 9. Characteristics of the people who participated in the fMRI experiment (n=22)

	Mean	Std. Deviation	Min - Max
Age	42.3	5.35	34 - 51
Education	1.36	0.58	1 – 3
Number correct	35	2.44	29 – 39
Average on statements	6.47	0.53	5.33 – 7.00

3.3. Materials

First I will go into the materials that were used in the main experiment (Section 3.3.1), in which I will discuss the experimental items, which consist of grammatical norm violations and truly grammatical and ungrammatical sentences. I will also provide information on the social/semantic items, which consist of neutral and semantically anomalous sentences and sentences describing a social norm violation. In addition, I will also discuss the pre-tests I used to test the materials. Subsequently, I will describe the materials I used for the localizer experiment (Section 3.3.2).

3.3.1. Materials main experiment

3.3.1.1. Experimental items

The experimental items were divided in three conditions. The condition GN contained grammatical norm violations, the condition GC contained truly grammatical sentences and the condition GO consisted of truly ungrammatical sentences.

Five types of grammatical norm violations were included in the experiment, which are:

- (6)
 - a. *hun* 'them' as the subject of a sentence;
 - b. *als* 'as' as a comparative marker of inequality;
 - c. an object pronoun following a comparative marker;
 - d. *hun* 'them' as the direct object in a sentence;
 - e. the relative pronoun *die* 'that' with a neuter head noun.

The constructions in (6a-c) were already discussed in the first chapter. Examples of the constructions in (6d) and (6e) can be found in (7a) and (7b) respectively.

- (7)
 - a. Waarschijnlijk heeft hij hun nog gezien in the stad.
 probably has he them still seen in the city
 "He probably saw them in the city."

- b. Eindelijk is het huis verkocht die al twee jaar te koop staat.
 finally is the house sold that already two years to buy stands
 "Finally, the house that had been on sale for two years has been sold."

According to prescriptive grammar, instead of *hun* 'them' as a direct object, *hen* 'them' should be used here. In the correct counterpart of the sentence in (7b) the relative pronoun *die* 'that' is replaced by *dat* 'that'.

For each construction in (6), 30 sentences were created. Three different versions were created out of these 30 sentences. The first version of the sentence (condition GN) contained a grammatical norm violation, as for example in (8a). The second version (condition GC) consisted of its prescriptively correct counterpart, as can be seen in (8b) and the third one (condition GO) contained the ungrammatical version of the sentence, like in (8c).

(8)

- a. Vanochtend hebben hun de trein gemist.
 this.morning have them the train missed
 "They missed their train this morning."
 b. Vanochtend hebben zij de trein gemist.
 this.morning have they the train missed
 "They missed their train this morning."
 c. * Vanochtend hebben hem de trein gemist.
 this.morning have him the train missed

In (9) the truly ungrammatical counterparts of the other constructions are presented. In (9a) an ungrammatical version is shown of the construction in (6b). An example of an ungrammatical version of (6c) is shown in (9b). An ungrammatical alternative for (6d) is the example in (9c) and an ungrammatical version of the construction in (6e) is presented in (9d).

(9)

- a. * Zij is veel groter wie¹ haar kleine nichtje.
 she is much larger who her little niece
 b. * Jan is langer dan omdat gebleven op het feest.
 Jan is longer than because stayed at the party
 c. * Waarschijnlijk heeft hij zij nog gezien in the stad.
 probably has he she/they still seen in the city
 d. * Eindelijk is het huis verkocht dit al twee jaar te koop staat.
 finally is the house sold this already two years to buy stands

¹ The truly ungrammatical sentences like in (9a) originally contained the word *dat* 'that' as a comparative marker. However, after extensive pretesting it turned out that these ungrammatical sentences were too often considered to be grammatical, which might have been due to its resemblance with its grammatical counterpart *dan* 'than'. People probably considered it to be a spelling mistake or did not even notice the error and thus approved of the construction. Therefore, *dat* 'that' in the comparative construction was replaced by *wie* 'who'.

When creating the materials, several additional constraints were taken into account. The word that differed between conditions (the critical word) always had to be preceded by at least two words and had to be followed by at least three words. In addition, the sentences had to consist of no more than twelve words and no words were used that consisted of more than twelve letters.

3.3.1.2. Social/semantic items

In order to compare the processing of grammatical norm violations with the processing of sentences describing social norm violations I included 90 sets of social/semantic items. An example of a social/semantic item is presented in (10). For each set of social/semantic items three versions were created. The first version, condition SN, contained the description of a social norm violation, as presented in (10a). The second version (condition SC) contained a slightly adapted version that consisted of the neutral counterpart of the sentence in condition SN, as can be seen in (10b). The sentence in condition SS contained a semantic violation, which minimally differed from their counterparts in condition SN and SC (presented in (10c)).

(10)

- a. De jongeman kruipt voor in de rij bij de kassa.
the young.man crawls ahead in the queue at the cash.register
"The young man jumps the queue at the cash register."
- b. De jongeman sluit achteraan in de rij bij de kassa.
the young.man shuts at.the.back in the queue at the cash.register
"The young man joins the queue at the cash register."
- c. De jongeman kruipt onder in de rij bij de kassa.
the young.man crawls under in the queue at the cash.register
"The young man crawls under the queue at the cash register."

Semantic violations were included in order to keep the social/semantic items as similar as possible to the experimental items. The conditions GN and SN represented sentences that contained a norm violation (grammatical norm and social norm respectively), the conditions GC and SC consisted of neutral sentences and the conditions GO and SS contained sentences with a linguistic violation (grammatical or semantic violations respectively).

The additional criteria for the social/semantic items slightly differed from the additional criteria for the experimental items. Between conditions, the sentences did not always differ with respect to only one word. Sometimes, more words had to be replaced in order to create a semantic violation or a neutral variant of the sentence describing a social norm violation. In order to create a neutral sentence out of the sentence in (10a) two words had to be replaced. The first replaced word always had to be preceded by at least two words and the last one had to be followed by at least three words. The sentences had to consist of no more than twelve words and the maximum word length was twelve letters. As these social/semantic items sometimes differed from each other with respect to more than one word, word frequencies were checked. This was done in order to make

sure that between conditions no frequency effects would occur. The word frequencies were taken from the CELEX database (Baayen et al., 1995). The mean logged lemma frequency of the words in condition SN was 1.98, the mean logged lemma frequency of the words in condition SC was 2.13 and for the words in condition SS this mean frequency was 2.00. The mean logged lemma frequencies of the words per condition did not significantly differ from each other, as was checked with the One-Way ANOVA, $F(2,355) = 0.600$, $p > 0.5$.

3.3.1.3. Pretesting of items

The constructed sentences had to be pretested, in order to see whether they indeed elicited the intended effect. Sentences that were aimed to be ungrammatical had to be truly perceived as ungrammatical, whereas sentences that were intended to be grammatical had to be perceived as grammatical. In addition, sentences that were intended to express a socially unacceptable situation had to be tested as well, just like the sentences that contained a semantic anomaly.

In order to test all sentences I conducted three different online rating studies. These rating studies were designed and conducted via the web-based experimentation platform of Radboud University (Webexp2, 2014).

Grammaticality judgment task

In order to test whether the experimental items elicited the desired effect I developed a rating experiment in which sentences were visually presented. Participants had to indicate on a keyboard whether the presented sentence was grammatical or not by pressing '1', which corresponded to 'no', or '5', which corresponded to 'yes'. Subsequently, they had to identify to what extent they were certain about their answer on a scale from one to five, in which '1' stood for 'not certain at all' and '5' for 'completely certain'.

For each sentence the grammaticality judgement (yes-no) was averaged. The sentences of condition GC, that were intended to be grammatical, were considered to elicit the desired effect if they were judged with an average score higher than 4 with respect to grammaticality, whereas the sentences from condition GO were considered to elicit the desired effect if they were judged with an average score lower than 2. The sentences that did not meet these criteria did not elicit the desired effect, which meant that they had to be adjusted or replaced.

Pre-test 1. For the first pre-test, three master lists were created that each were divided into three separate lists, because otherwise the task would be too long for the participants. Within each master list only one version of each sentence was included and an equal number of sentences from condition GN, GC and GO were present. The master lists consisted of 30 sentences (10 sentences per condition) for each of the five constructions, which means that each master list contained 150 sentences. These master lists were divided into three smaller lists that each contained 50 items. From each construction, 10 sentences were included. The conditions were equally divided over the three sub lists.

Ninety-seven people participated in the online rating study. Each version of the experiment was carried out by at least 10 participants, except for list 1-1. This list was filled in by 8 participants. The people who participated in the test were on average 37 years old and slightly more than 1/3rd of them was male (n = 34). The sentences from condition GC that were intended to be grammatical were on average judged to be grammatical (M = 4.59). However, 12 sentences were judged as less grammatical too often, as their average score was below 4. These sentences had to be replaced. The sentences from condition GO, which were intended to be ungrammatical, were mostly judged to be ungrammatical (M = 1.15). Three of these sentences were judged to be grammatical too often, since their average score was higher than 2 and therefore they had to be replaced. All three sentences contained the construction in which *dat* 'that' was used as a comparative marker of inequality. Participants might have thought that the word *dat* 'that' was a spelling mistake, as the spelling of *dat* 'dat' is very similar to the spelling of its correct counterpart *dan* 'than' or they might not have noticed the error at all. Therefore, I decided to replace *dat* 'that' by *wie* 'who' in all sentences in which this particular construction was used.

Pre-test 2. In the second pre-test, all sentences in which *dat* 'that' was replaced by *wie* 'who' were included in the test, as well as the 12 sentences which were also adjusted as a result of the first pre-test. The counterparts of these adjusted sentences were also included in the second pre-test in order not to present only truly ungrammatical sentences. Three lists were created in which only one version of each sentence was included. Each list contained 39 sentences.

Thirty people participated in the experiment and were on average 32 years of age. Half of them were males. The sentences that were intended to be grammatical were generally judged to be grammatical (M = 4.60). Five sentences still received an average score below 4. These sentences were probably perceived as ungrammatical because of their marked word order. The sentences that were meant to be ungrammatical were indeed most frequently scored to be ungrammatical (M = 1.05). No sentence was scored on average higher than 2.

Pre-test 3. A third pre-test was conducted to test the five adjusted sentences. Only one list was created and the five adjusted sentences were complemented with 15 filler sentences. The third pre-test was not conducted via the Internet, but participants had to fill it in on paper. Nine people participated, who did not have to provide information on their age and gender. The adjusted sentences were judged to be grammatical by almost everyone (M = 4.56). All sentences received an average score above 4 and thus could be used for the fMRI experiment.

Semantic judgment task

The sentences that contained semantic anomalies, had to be perceived as being semantically strange. In order to check this, a semantic judgment task was designed in which people had to indicate on a scale from 1 to 5 how likely it was

for the situation that was expressed by the social/semantic sentences to occur. The number 1 on the scale corresponded to 'highly improbable', and 5 stood for 'highly probable'. People also had the opportunity to choose 2, 3 or 4, depending on how likely they considered the situation expressed by the sentence to occur. For each sentence the probability scores were averaged. The sentences from the social/semantic items that were intended to be neutral (condition SC) had to be perceived as highly probable, whereas the sentences that were intended to be semantically anomalous (condition SS) should be perceived as highly improbable. Therefore, sentences from condition SC at least had to receive an average score of 4, and sentences from condition SS should be judged with a score of 2 or lower. The sentences that contained a social norm violation (condition SN) were not included in this test, as these items were tested in a separate pre-test in which participants had to indicate to what degree the sentence expressed a socially acceptable situation.

Pre-test 1. In this first pre-test all sentences of condition SC and condition SS were included, which totalled to 180 sentences. Two master lists were created in which only one version of each sentence occurred. Because of their length, these master lists were divided into two separate lists of 45 sentences, which led to 4 lists that had to be tested. The conditions were counterbalanced over the lists. Seventy-nine people participated in this task, with an average age of 37.86. Almost 40% of them were males ($n = 31$). The sentences from condition SC, that were intended to be neutral, and therefore highly probable, indeed were considered to be highly probable ($M = 4.63$). Four sentences received an average score below 4 and therefore had to be adjusted. The sentences from condition SS, that were intended to be semantically anomalous, were indeed perceived to be highly improbable, as they received an average score of 1.38. Only two sentences had to be adjusted, since these sentences were judged on average with a score of 2.63 and 2.55.

Pre-test 2. The second pre-test was developed to test the six sentences that had to be adjusted. The four semantically anomalous counterparts of the sentences of condition SC were also included, as well as the two neutral counterparts of the sentences from condition SS that were adjusted. In addition, four sentences, both in condition SC and SS, were tested again, because these sentences received a score just below (in case of condition SS) or above (in case of condition SC) the cut-off points. The materials were divided into two lists of each sixteen sentences. Again, each list only contained one version of each sentence and an equal number of sentences from condition SC and condition SS were included in each list.

The pre-test was filled in by 20 participants (10 per list), who had a mean age of 28.05. Nine of them were males. The sentences from condition SC that were intended to be neutral, were considered to be highly probable, as their mean score was 4.62. Only one sentence received a mean score below 4 and had to be adjusted. The sentences from condition SS, which supposed to be highly improbable, due to their semantic anomalies, received a mean score of 1.54.

Two sentences were scored on average higher than 2, which meant that they had to be adjusted.

Pre-test 3. In the third pre-test, only three adjusted sentences had to be tested again. For each sentence, two adjusted versions were created, so that it was possible to select the version that received the best score. In total six sentences were tested, along with 30 filler sentences. All versions were presented in one list. The third pre-test was not conducted via the Internet, but participants had to fill it in on paper. Nine people participated, of which age and gender were unknown. The adjusted sentences from condition SS were all judged to be highly improbable and therefore could be used in the fMRI experiment. The adjusted sentences from condition SC also elicited the intended effect, which meant that these sentences could be included in the fMRI experiment.

Social acceptability task

The sentences that were intended to express a socially unacceptable situation had to be tested in order to verify whether they indeed expressed a socially unacceptable situation. Therefore, I designed a rating experiment in which participants were presented with sentences of which they had to indicate to what degree the situation that was expressed by the sentence was socially acceptable. This had to be indicated on a five point scale in which 1 corresponded to 'socially unacceptable' and 5 to 'socially acceptable'.

For each sentence, the scores were averaged. The sentences from the social/semantic items that were intended to be neutral (condition SC) had to be perceived as socially acceptable, whereas the sentences that were aimed to express a socially unacceptable situation (condition SN), should be perceived as socially unacceptable. Therefore, sentences from condition SC at least had to receive an average score of 4, whereas the sentences from condition SN should be judged with a score of 2 or lower.

Pre-test 1. The first pre-test contained all sentences from condition SN and SC. In total 180 sentences were tested. These sentences were divided over two master lists. The conditions were counterbalanced over the two master lists. Because of the length of the two master lists, they were divided into two separate lists of 45 sentences each, which resulted in four experimental lists. In total, 86 people participated in this rating experiment. The four lists were tested by at least 20 participants. Participants were on average 37 years old and about 40% of the participants were males ($n = 35$). The sentences from condition SN that were intended to express a socially unacceptable situation received an average score of 1.8, which indicated that most of the sentences indeed elicited the desired effect. However, 11 sentences received an average score above 2, which meant that they had to be revised. The sentences from condition SC, which were intended to express a socially acceptable situation, indeed seem to express a socially acceptable situation ($M = 4.54$). However, four sentences received a score below the cut-off point of 4 and had to be adjusted.

Pre-test 2. This pre-test was designed to test fifteen sentences, which were adjusted as a result of the first pre-test. Their counterparts were also included in

order to construct lists with as many sentences from condition SN as from condition SC. Because of the low number of sentences, only two lists were created. These lists both contained fifteen sentences.

List 1 was tested by 14 participants, whereas the second list was tested by 13 participants. The participants had a mean age of 29 and 15 of them were males. The sentences that were intended to express a socially unacceptable situation almost all indeed elicited the desired effect ($M = 1.93$). Four of them had to be adjusted, as they received a score higher than 2. The sentences that were intended to be neutral, received an average score of 4.58. Two sentences had to be revised, since participants judged the sentences with a score below 4.

Pre-test 3. This pre-test was conducted in order to test six adjusted sentences. In addition, fillers were used, so that the sentences did not had to be divided over separate lists. The third pre-test was not conducted via the Internet, but participants had to fill it in on paper. Nine people participated, of which age and gender were unknown. The adjusted sentences all evoked the desired effect and therefore could be included in the fMRI experiment (Condition SN: $M = 1.97$; Condition SC: $M = 4.2$).

3.3.2. Materials localizer experiment

The materials of the localizer experiment consisted of faces and arrows. The faces that were included were either neutral faces, or faces expressing disgust or contempt. These faces were taken from the Radboud Faces Database (Langner et al., 2010) and were already pretested in order to make sure the faces expressed the intended emotion. From the database sixteen Caucasian males and sixteen Caucasian females were extracted.



Figure 1. Examples from Caucasian faces extracted from the Radboud Faces Database that were included in the localizer experiment. Emotional expressions from left to right: neutral, contempt, disgust.

Each person expressed three emotions (neutral: Condition EN, contempt: Condition EC and disgust: Condition ED), which were expressed with a frontal gaze direction. In total, 96 faces were included in the experiment. An example of faces used in the experiment are shown in Figure 1. The arrows that were included, were used as a baseline measurement. One type of arrow was used during the entire experiment. This arrow was presented 28 times pointing to the right and 28 times pointing to the left.

3.4. Experimental procedure and analyses

I will first give an overview of the general experimental procedure (Section 3.4.1). Next, I will provide information on the procedure of the main experiment (Section 3.4.2) and subsequently the procedure of the localizer experiment will be discussed (Section 3.4.3). In Section 3.4.4. I will discuss how the fMRI data were acquired and in Section 3.4.5 I will elaborate on the statistical analyses that were conducted.

3.4.1. General experimental procedure

Prior to participation, participants had to sign a consent form and had to fill in a screening form. I provided an oral instruction on what they could expect of the MRI scanner and what the experiment would look like. Subsequently, the participants read a written instruction and were put in the MRI scanner. First, some preparatory scans were made in order to determine the position of the head. During these preparatory scans, the participants performed a practice session of the main experiment. After that, participants had the opportunity to ask questions whenever things were unclear with respect to the experimental task. Next, the main experiment was conducted, which lasted for about 45 minutes (see Section 3.4.1). After that, anatomical scans were made, which took about 5 minutes and subsequently the localizer experiment was conducted (see Section 3.4.3). The duration of this part of the experiment was 15 minutes. When the participants finished the localizer experiment they were taken out of the MRI scanner and finished the experiment by filling in a questionnaire and a paper and pencil test. At the very end the participants were told what the experiment was about.

In the questionnaire I asked for general information on gender, date of birth, place of residence, but also for the language background of the participant. In addition, questions were posed that were specifically related to the experiment. I asked for example whether or not they were able to stay focused during the experiment and whether they noticed anything remarkable during the experiment or not. The paper and pencil test consisted of sentences, of which some were displayed during the experiment. In part one of this test, participants had to rate to what degree the situation that was expressed by the sentences were socially acceptable on a scale from 1 to 5, in which 1 corresponded with 'socially unacceptable' and 5 with 'socially acceptable'. In the second part of the test, participants had to indicate whether the presented sentences were grammatical or not (yes-no) and how certain they were about their answer on a

scale from 1 to 5, in which 1 corresponded with 'not certain at all' and 5 with 'completely certain'.

3.4.2. Procedure main experiment

Each trial started with a fixation cross that was presented at the center of the screen for about two to six seconds (randomly determined). Subsequently, a sentence was visually presented word by word on the centre of the screen. Each word was depicted on the screen for 300 ms, after which a blank screen was presented for 200 ms. The trial ended after the presentation of the last word of the sentence and its blank screen. As a secondary task, after every ten to fifteen sentences participants had to answer a question about the directly preceding sentence. This question required a 'yes'- or 'no'-response with the button box. These questions were included in order to force the participants to truly read the sentences and to refrain them from falling asleep. Two breaks were included and the experiment started with a practice session in order to make the participant familiar to the task and the speed with which the words were presented on the screen. After the practice session, the participant had the opportunity to ask questions whenever things were still unclear and to inform the experimenter about potential difficulties in reading.

Three lists were created, which consisted of 240 trials and 26 questions each. The three versions of each sentence, corresponding to the three conditions, were counterbalanced over the three lists. Several constraints were adopted when creating the lists. No more than three sentences of the experimental items were presented in a row and maximally two sentences in the same condition from the same item type (experimental or social/semantic) were presented in a row. In addition, within the experimental items, sentences from the same construction were separated by at least two other sentences. Social/semantic items from the same set, that were very much alike, had to be minimally 20 sentences apart. No more than 2 sentences with the same length occurred in a row and sentences of which the critical word was at the same position in the sentence were presented maximally 3 times in a row. The lists were automatically created by the program Mix, which is especially developed for pseudo-randomizations (van Casteren & Davis, 2006). After creating the lists, three practice trials were added at the beginning of the list, so that people got used to the way of presentation and the noise of the scanner before they had to read the experimental and social/semantic items.

3.4.3. Procedure localizer experiment

For the localizer experiment a block design was used. The faces and arrows were presented in blocks. The procedure was taken from Sambataro et al. (2006) and slightly adapted. Each block of stimuli was preceded by a textual announcement (PIJLEN 'arrows' or GEZICHTEN 'faces') of what type of block would be presented. This announcement was presented for about 3 seconds. Subsequently, a fixation cross was presented for about 500 ms after which a picture was presented for 1500 ms at the centre of the screen. Next, a fixation cross was presented again which was followed by a picture. After the last

stimulus of the block a fixation cross was presented after which a textual announcement for the next block appeared. As a secondary task, participants had to indicate the gender of the faces and the direction of the arrows. They received two button boxes, one for each hand, of which the upper button had to be used to perform the task. When faces were presented, labels were presented below the picture indicating gender choices. The left label corresponded to *vrouw* 'woman' and the right label to *man* 'man'. When arrows were presented, labels were presented below as well. The left label corresponded to *links* 'left' and the right label corresponded to *rechts* 'right'. Answers were recorded as long as the picture was presented. When participants pressed the button after the picture disappeared from the screen, the answer was recorded as 'missing'. No practice session preceded this experiment, although two practice blocks of each four pictures were included at the beginning of the experiment, so that the participant had the opportunity to get familiar to the task. The first practice block consisted of four neutral faces (two males, two females), whereas the second practice block consisted of four arrows (two left arrows, two right arrows).

Three lists were created. In addition to the two practice blocks of each four pictures, each list consisted of 280 items. Out of these items, 144 items were pictures of faces and 136 items were pictures of arrows. The faces were clustered in 18 blocks containing 8 pictures each. Each block of faces consisted of four feminine and four masculine faces that all expressed the same emotion. Each of the three emotions were represented in six blocks. Half of the faces were presented twice in each emotion, since otherwise only twelve facial blocks would be included in the experiment, which would have been too few for the statistical analysis. The arrows were clustered in 17 blocks, which also contained 8 pictures of arrows. Each block of arrows contained four arrows directed to the left and four arrows directed to the right. Within each block the order of arrows was randomized in such a way that no more than three arrows pointing in the same direction were presented in a row. This was also the case for faces with respect to their gender. The order of the blocks was counterbalanced across the three lists.

3.4.4. fMRI data acquisition

During the presentation of the sentences (main experiment) and pictures and arrows (localizer experiment) the fMRI data were acquired with a SIEMENS MAGNETOM Skyra 3T MR scanner using an ascending slice acquisition sequence. A multi-echo EPI sequence was used in order to obtain 36 slices per volume (voxel size = 3.3 x 3.3 x 3.0 mm; repetition time (TR) = 2250 ms; TE1 = 9.0 ms, TE2 = 19.5 ms, TE3 = 30.0 ms, TE4 = 40.0 ms; flip angle = 90 degrees; field of view = 212 mm). In between the main and localizer experiment a high-resolution anatomical scan was acquired (T1-weighted MPRAGE, voxel size = 1 x 1 x 1 mm, TR = 2300 ms, TE = 3.03 ms, 192 slices with thickness of 1 mm, field of view = 256 mm) accelerated with GRAPPA parallel imaging (Griswold et al., 2002).

3.4.5. Statistical analyses

In order to perform statistical analyses, the fMRI data had to be combined and preprocessed first. Combining the multi-echo DICOMs into the NIFTI format was done via a tool of Rasim Boyacioglu, for which the weighting of the echoes was calculated based on the first 30 volumes obtained before the start of the actual experiment.

The preprocessing was done using SPM 8 (www.fil.ion.ucl.ac.uk/spm). First, the combined data were realigned and the subject-mean images were co-registered with respect to the corresponding structural scans. Subsequently, slice timing was applied, in which the middle slice (slice 18) was taken as the reference slice. The data were normalised in Montreal Neurological Institute (MNI) space as defined by the EPI template of SPM. Finally, smoothing was applied (FWHM = 8.0 mm).

Main experiment. The fMRI data were statistically analysed by using multiple regression at the subject level of analysis and flexible factorial regression at the second level or group level, as not all main effects had to be tested. In addition, this method automatically checked for sphericity of the data. Mini-block regressors were included in the regression analyses to model the sentence presentation from the onset of the critical word to the offset of the last word of the sentence. The presentation of the words preceding the critical word were modelled as regressors of no interest (OW, other words) and the presentation of the fixation cross (FIX) as an explicit baseline. Realignment parameters for movement were included to account for effects of no interest as well. Single-subject contrast images were created by subtracting the regression parameter of the fixation cross from the regression parameters that were condition specific. In this way, contrast images were defined for GN (Grammatical norm violation), GC (Grammatical), GO (Ungrammatical), SN (Social norm violation), SC (Neutral), SS (Semantic violation) and OW (Other words). At the second level, flexible factorial whole-brain analyses were conducted on the contrasts created at the first level, including the factors condition (6) and subjects (21). As I wanted to investigate whether norm specific effects were present in the processing of grammatical norm violations I examined the contrast *grammatical norm > grammatical* exclusively masked with *ungrammatical > grammatical* (uncorrected mask: $p=0.05$). I also examined the contrasts *grammatical norm > grammatical* inclusively masked with *ungrammatical > grammatical* (uncorrected mask: $p=0.05$) and *grammatical norm > ungrammatical* inclusively masked with *grammatical > ungrammatical* (uncorrected mask: $p=0.05$) in order to study the overlap between grammatical norm violations and grammatical and ungrammatical sentences. In order to investigate whether norm specific effects were present in the processing of social norm violations, I examined the contrast *social norm > neutral* exclusively masked with *semantic violations > neutral* (uncorrected mask: $p=0.05$). The overlap of social norm violations and neutral and semantically anomalous sentences were studied by examining the contrasts *social norm > semantic violations* inclusively masked with *neutral > semantic violation* (uncorrected mask: $p=0.05$) and *social norm > neutral*

inclusively masked with *semantic violations* > *neutral* (uncorrected mask: $p=0.05$). For these comparisons I examined the cluster-size statistics. Statistical inferences were made at the cluster level (cluster extent $P > 0.05$, corrected for multiple comparisons (Forman et al., 1995)).

Localizer experiment. For the localizer experiment, at the first level, the fMRI data were analysed using multiple regression. The presentations of the facial blocks, including the fixation crosses, were modelled as regressors. The presentations of the arrow blocks were treated as explicit baseline. Realignment parameters for movement were included to account for effects of no interest. Single-subject contrast images were created for the conditions EN (neutral emotion), EC (contempt), ED (disgust) relative to the baseline condition (arrows). At the second level, no analyses were conducted so far, as for the main experiment no activation was found in the areas that are typically involved in processing emotion, even at very low thresholds ($p < 0.1$ uncorrected).

3.5. Conclusion

In this chapter I discussed the recruitment procedure of participants for the fMRI experiment, and the fMRI experiment and its materials. The recruitment test resulted in 44 respondents that met the criteria, of which 22 eventually participated.

The participants started with the main experiment in which they had to read sentences that were either neutral or grammatical or that contained grammatical and social norm violations, semantic violations and grammatical violations. A question was posed after every ten to fifteen sentences, which had to be answered with 'yes' or 'no'. This part took about 45 minutes. Subsequently, anatomical scans were made and the last task consisted of a localizer task in which faces and arrows were presented. If faces were presented, participants had to determine the gender of these faces and if arrows were presented, their direction had to be identified (left or right). Subsequently, the participants had to fill in a paper and pencil test and a questionnaire and in the end I told them what the experiment was about.

4. Results

4.1. Introduction

Twenty-two people participated in this study. One of them had to be excluded from the statistical analyses, since his main experiment consisted of two scan sessions, because of inconsistencies in the programming script. The remaining participants were all included in the analysis, as none of them made more than 5 errors with respect to the questions in the main experiment (mean number of errors: 2.29). The results of the statistical analyses conducted on the basis of these 21 participants are described in this chapter. First, I will go into the question whether something like an alarm bell is present in purists upon encountering grammatical norm violations (Section 4.2). Subsequently, I will report whether the processing of grammatical norm violations overlaps with the processing of grammatical and truly ungrammatical sentences or not (Section 4.3). After that, I will present the results on the processing of social norm violations. Section 4.4 elaborates upon norm specific effects in the processing of sentences describing a social norm violation and Section 4.5 goes into the similarities and differences between the processing of these sentences and the processing of neutral and semantically anomalous sentences. I will end this chapter with a discussion in which I summarize the most important results and compare the processing of grammatical norm violations with the processing of social norm violations (Section 4.6).

4.2. Grammatical norm violations: Norm specific effects

In order to examine whether norm specific effects were present in the processing of grammatical norm violations, I had to examine the processing of grammatical norm violations compared to neutral sentences and the processing of truly ungrammatical sentences compared to grammatical sentences first. The results are shown in Table 10 and Table 11 respectively.

Table 10. Grammatical norm violations versus truly grammatical sentences

Region	BA	Cluster size	Voxel T ¹⁰⁰ value	x	y	z
Grammatical norm > grammatical						
<i>L Inferior Frontal Gyrus / Superior Temporal Pole</i>		918				
L Superior Temporal Pole	38		6.61	-52	14	-4
L Inferior Frontal Gyrus	47		4.85	-46	24	-2
L Inferior Frontal Gyrus (orbitalis)	45		3.69	-54	32	-2
<i>Bilateral Supplementary Motor areas</i>		129				
R Supplementary Motor Area	8		4.58	10	22	66
R Supplementary Motor Area	6		3.92	10	14	68
L Supplementary Motor Area	6		3.26	-2	14	62

<i>R Inferior Frontal Gyrus / Insula</i>		122				
R Inferior Frontal Gyrus (triangularis)	47		3.88	44	26	0
R Inferior Frontal Gyrus (orbitalis)	47		3.86	50	18	-8
R Insula	48		3.70	40	16	-4

Note: Significant activation peaks > 8.0 mm apart (P < 0.001 uncorrected, cluster-level p<.05 FWE corrected). Multiple peaks within a single activation cluster are shown intended.

Table 11. Truly ungrammatical sentences versus truly grammatical sentences

Region	BA	Cluster size	Voxel T ¹⁰⁰ value	x	y	z
Ungrammatical > grammatical						
<i>L Inferior Frontal Gyrus</i>		3639				
L Inferior Frontal Gyurs (operculum)	48		7.36	-56	14	2
L Inferior Frontal Gyrus (orbitalis)	47		6.44	-50	24	-4
L Inferior Frontal Gyurs (operculum)	44		6.39	-52	10	12
<i>L Angular Gyrus / Middle Occipital Gyrus</i>		1123				
L Middle Occipital Gyrus	7		6.59	-30	-56	38
L Superior parietal lobule (SPL)	7		6.26	-28	-62	44
L Angular Gyrus	40		4.72	-44	-44	44
<i>Bilateral Supplementary Motor areas</i>		948				
L Supplementary Motor area	6		5.08	-2	10	58
R Supplementary Motor area	8		4.91	8	22	54
L Supplementary Motor area	6		4.63	-12	12	50
<i>R Inferior Frontal Gyrus</i>		887				
R Inferior Frontal Gyrus (operculum)	44		4.75	54	16	14
R Inferior Frontal Gyrus (triangularis)	45		4.24	42	34	2
R Inferior Frontal Gyrus (triangularis)	45		4.24	52	42	0
<i>L Middle Temporal Gyrus</i>	21	591	5.81	-56	-32	0
<i>R Angular Gyrus/Superior Parietal Gyrus</i>	7	334	4.92	32	-60	40
<i>R Middle/Superior Temporal Gyrus</i>	21	192	4.63	50	-32	-2

Note: Significant activation peaks > 8.0 mm apart (P < 0.001 uncorrected, cluster-level p<.05 FWE corrected). Multiple peaks within a single activation cluster are shown intended.

Table 12. Norm specific effects for grammatical norm violations

Region	BA	Cluster size	Voxel T ¹⁰⁰ value	x	y	Z
Grammatical norm > grammatical (excl. ungrammatical > grammatical)						
n.s.						

These results show an increased activation in the bilateral Inferior Frontal Gyrus (IFG), as well as in bilateral supplementary motor areas, for both grammatical norm violations and truly ungrammatical sentences versus grammatical

sentences. However, the results from Table 10 do not tell us anything about the presence of norm specific effects, since the effects that are present might be due to an overlap in processing between grammatical norm violations and truly ungrammatical sentences. In order to see whether norm specific effects were present, I examined the activations as a result of the contrast *grammatical norm > grammatical* in which the activations involved in *ungrammatical > grammatical* are masked out (masking threshold: $p > 0.05$). This, however, did not reveal any significant results, as can be seen in Table 12, which suggests the absence of norm specific effects for the processing of grammatical norm violations.

4.3. Grammatical norm violations: Overlap with grammatical and ungrammatical sentences

As high-educated people often claim that for them grammatical norm violations are ungrammatical, I examined whether the processing of grammatical norm violations overlapped with the processing of truly ungrammatical sentences. The results are presented in Table 13.

Table 13. *Overlap in processing of grammatical norm violations and ungrammatical sentences as compared to grammatical sentences*

Region	BA	Cluster size	Voxel T ¹⁰⁰ value	x	y	z
Grammatical norm > grammatical (incl. ungrammatical > grammatical)						
<i>L Inferior Frontal Gyrus</i>		918				
L Superior Temporal Pole	38		6.61	-52	14	-4
L Inferior Frontal Gyrus (orbitalis)	47		4.85	-46	24	-2
L Inferior Frontal Gyrus (orbitalis)	45		3.69	-54	32	-2
<i>R Inferior Frontal Gyrus / Insula</i>		122				
R Inferior Frontal Gyrus (triangularis)	47		3.88	44	26	0
R Inferior Frontal Gyrus (orbitalis)	38		3.86	50	18	-8
R Insula	48		3.70	40	16	-4

Note: Significant activation peaks > 8.0 mm apart ($P < 0.001$ uncorrected, cluster-level $p < .05$ FWE corrected). Multiple peaks within a single activation cluster are shown intended.

These results indeed show an overlap between the processing of grammatical norm violations and the processing of truly ungrammatical sentences. The bilateral Inferior Frontal Gyrus is increasingly activated for both grammatical norm violations and true ungrammaticalities in contrast to grammatical sentences. This pattern of activation is depicted in Figure 2.

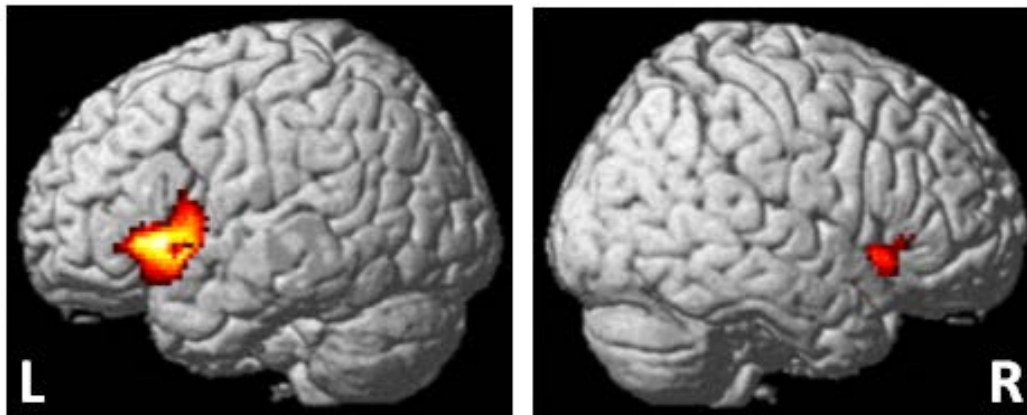


Figure 2. Overlap in processing grammatical norm violations and truly ungrammatical sentences: Enhanced activity in the bilateral Inferior Frontal Gyri for grammatical norm violations and true grammatical violations as compared to grammatical sentences (significant activations are displayed on a rendered template of a brain, activations shown at voxel-level $P_{\text{uncorr}} < 0.001$, cluster-level $p < .05$ FWE corrected).

I also examined whether overlap was present between the processing of grammatical norm violations and truly grammatical sentences as compared to truly ungrammatical sentences. The results of this comparison are presented in Table 14.

Table 14. *Overlap in processing of grammatical norm violations and truly grammatical in contrast to truly ungrammatical sentences*

Region	BA	Cluster size	Voxel T^{100} value	X	y	z
Grammatical norm > ungrammatical (incl. grammatical > ungrammatical)						
<i>Bilateral medial Superior Frontal Gyrus</i>		698				
L medial Superior Frontal Gyrus	10		4.48	-6	62	26
R Anterior Cingulate	32		4.11	6	42	26
R medial Superior Frontal Gyrus	10		4.06	4	64	16
<i>L Posterior Cingulate</i>		325				
L isthmus of Cingulate Gyrus (gyrus fornicatus)			4.25	2	-52	14
L Posterior Cingulate	23		4.00	0	-50	24
<i>L Angular Gyrus / Middle Temporal Gyrus</i>		324				
L Angular Gyrus	39		4.39	-46	-66	30
L Parietooccipital transition zone			3.80	-44	-80	34
L Middle Temporal Gyrus	39		3.47	-52	-66	22
<i>L (medial) Superior Frontal Gyrus</i>		210				
L medial Superior Frontal Gyrus	9		4.24	-4	48	52
L Superior Frontal Gyrus	9		3.57	-22	34	50
L Superior Frontal Gyrus	8		3.39	-14	38	56

Note: Significant activation peaks > 8.0 mm apart ($P < 0.001$ uncorrected, cluster-level $p < .05$ FWE corrected). Multiple peaks within a single activation cluster are shown intended.

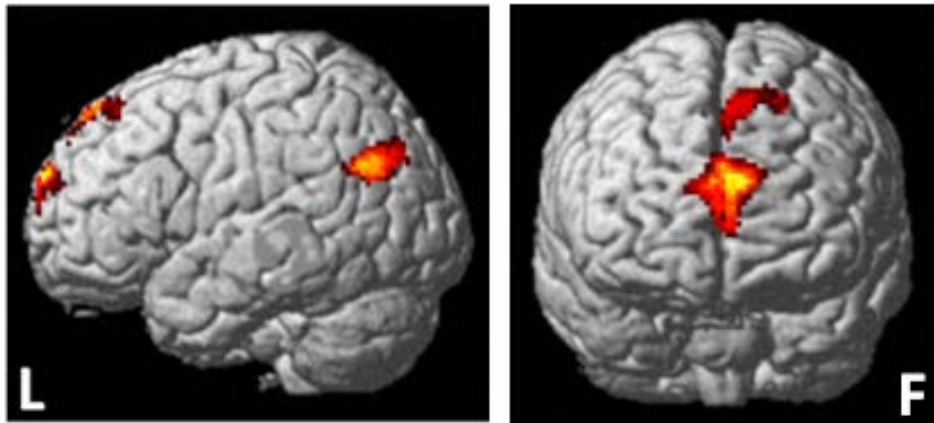


Figure 3. Overlap in processing grammatical norm violations and truly grammatical sentences: Enhanced activity in the (medial) Superior Frontal Gyrus and the left Angular Gyrus for grammatical norm violations and true grammatical violations as compared to grammatical sentences (significant activations are displayed on a rendered template of a brain, activations shown at voxel-level $P_{\text{uncorr}} < 0.001$, cluster-level $p < .05$ FWE corrected).

The results in Table 14 show an overlap between the processing of grammatical norm violations and the processing of truly grammatical sentences. Significant activations were found in the (medial) Superior Frontal Gyrus, the left Cingulate Gyrus and the left Angular Gyrus (see Figure 3).

4.4. Social norm violations: Norm specific effects

In order to see whether social cognition might be involved in the processing of grammatical norm violations, I studied the processing of sentences containing a social norm violation. I examined whether norm specific effects were present when processing these sentences. Table 15 shows which areas were involved in the processing of social norm violations compared to neutral sentences and in Table 16 the results are shown for semantically anomalous sentences versus neutral sentences.

Table 15. *Social norm violations versus neutral sentences*

Region	BA	Cluster size	Voxel T^{100} value	X	Y	z
Social norm > neutral						
<i>L (medial) Superior Frontal Gyrus</i>		321				
L medial Superior Frontal Gyrus	9		4.83	-10	48	40
L medial Superior Frontal Gyrus	32		4.20	-8	48	26
L Superior Frontal Gyrus	9		3.67	-12	40	44
<i>L Middle Temporal Gyrus</i>		137				
L Middle Temporal Gyrus	21		4.30	-54	-24	-8
L Middle Temporal Gyrus	48		3.83	-48	-18	-10
L Middle Temporal Gyrus	21		3.72	-58	-14	-10

Note: Significant activation peaks > 8.0 mm apart ($P < 0.001$ uncorrected, cluster-level $p < .05$ FWE corrected). Multiple peaks within a single activation cluster are shown intended.

As can be seen in Table 15 the left (medial) Superior Frontal Gyrus and the left medial Temporal Gyrus were involved in the processing of social norm violations as compared to neutral sentences. For the semantic violations, almost the same activation pattern was found as for true ungrammaticalities (see Table 16). For both type of sentences the bilateral Inferior Frontal Gyrus was increasingly activated, as well as the bilateral Supplementary Motor areas. For semantically anomalous sentences increased activation was also found in the left Middle Temporal Gyrus.

Table 16. *Semantically anomalous sentences versus neutral sentences*

Region	BA	Cluster size	Voxel T ¹⁰⁰ value	x	Y	z
Semantic violation > neutral						
<i>L Inferior Frontal Gyrus / Superior Temporal Pole</i>		1377				
L Superior Temporal Pole	38		4.75	-42	22	-18
L Inferior Frontal Gyrus (operculum)	48		4.73	-48	18	20
L Inferior Frontal Gyrus (orbitalis)	47		4.71	-44	26	-10
<i>R Inferior Frontal Gyrus (triangularis)</i>		534				
R Inferior Frontal Gyrus (triangularis)	45		4.71	50	28	16
R Inferior Frontal Gyrus (triangularis)	48		4.44	50	26	28
R Inferior Frontal Gyrus (triangularis)	45		4.33	50	30	8
<i>R Inferior Frontal Gyrus (orbitalis)</i>		345				
R Inferior Frontal Gyrus (orbitalis)	47		5.27	44	34	-12
R Inferior Frontal Gyrus (orbitalis)	47		3.57	32	30	-8
<i>L Middle Temporal Gyrus</i>	22	274	4.95	-58	-46	12
<i>Bilateral Supplementary Motor areas</i>	6	136	3.85	-4	16	60

Note: Significant activation peaks > 8.0 mm apart (P < 0.001 uncorrected, cluster-level p < .05 FWE corrected). Multiple peaks within a single activation cluster are shown intended.

Table 17 shows the brain areas that were increasingly activated for sentences that contain a social norm violation opposed to neutral sentences, but not for semantic violations opposed to neutral sentences. The left (medial) Superior Frontal Gyrus and the left Middle Temporal Gyrus were involved in the processing of sentences describing a social norm violation. These norm specific effects are depicted on a rendered template of a brain in Figure 4.

Table 17. *Social norm violations versus neutral sentences, which does not include activations present in semantic violations versus neutral sentences*

Region	BA	Cluster size	Voxel T ¹⁰⁰ value	x	Y	z
Social norm > neutral (excl. semantic violations > neutral)						
<i>L (medial) Superior Frontal Gyrus</i>		312				

L medial Superior Frontal Gyrus	9	4.83	-10	48	40
L medial Superior Frontal Gyrus	32	4.20	-8	48	26
L Superior Frontal Gyrus	9	3.67	-12	40	44
<i>L Middle Temporal Gyrus</i>		126			
L Middle Temporal Gyrus	21	4.30	-54	-24	-8
L Middle Temporal Gyrus	48	3.83	-48	-18	-10
L Middle Temporal Gyrus	21	3.72	-58	-14	-10

Note: Significant activation peaks > 8.0 mm apart ($P < 0.001$ uncorrected, cluster-level $p < .05$ FWE corrected). Multiple peaks within a single activation cluster are shown intended.

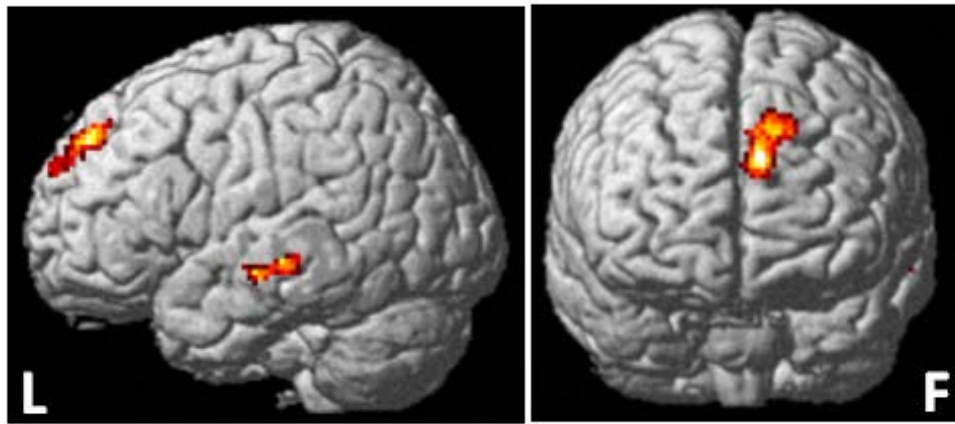


Figure 4. Norm specific effects for social norm violations: Enhanced activity in the left (medial) Superior Frontal Gyrus and in the left medial Temporal Gyrus for social norm violations, but not for semantic violations, as compared to neutral sentences (significant activations are displayed on a rendered template of a brain, activations shown at voxel-level $P_{\text{uncorr}} < 0.001$, cluster-level $p < .05$ FWE corrected).

4.5. Social norm violations: Overlap with neutral and semantically anomalous sentences

Apart from looking for norm specific effects in the processing of sentences that express a social norm violation, I also examined whether overlap was present between sentences containing a social norm violation and neutral sentences and between sentences that describe a social norm violation and semantic violations. As can be seen from Table 18 overlap was found between sentences expressing a social norm violation and neutral sentences. The frontal regions and the bilateral Cingulate were increasingly activated for both social norm violations and neutral sentences. In addition, activation was found in the left Angular Gyrus, the left Superior Frontal Gyrus, and the Temporal gyrus (bilateral). These activations are depicted in Figure 5 (note the similarity with Figure 3).

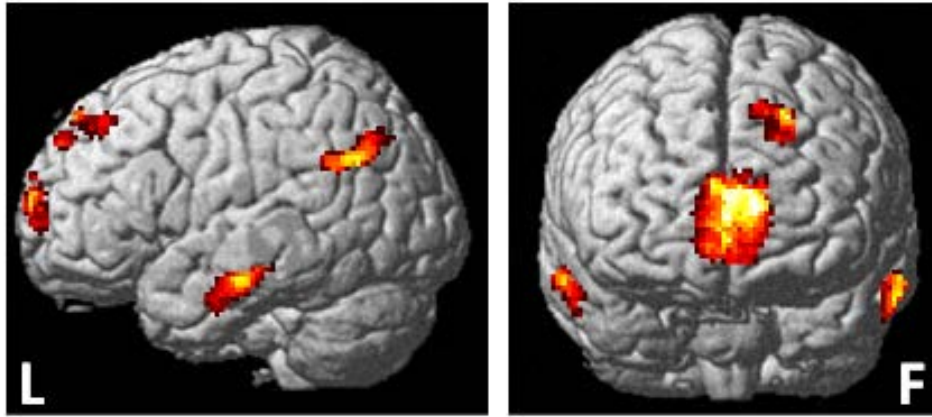


Figure 5. Overlap in the processing of social norm violations and neutral sentences: Enhanced activity in the left and right (medial) Superior Frontal Gyrus, in the bilateral Temporal Gyrus and in the left Angular Gyrus for social norm violations and neutral sentences, but not for semantically anomalous sentences (significant activations are displayed on a rendered template of a brain, activations shown at voxel-level $P_{\text{uncorr}} < 0.001$, cluster-level $p < .05$ FWE corrected).

Table 18. *Overlap between processing of social norm violations and neutral sentences as compared to semantic violations.*

Region	BA	Cluster size	Voxel T^{100} value	x	y	z
Social norm > semantic violations (incl. neutral > semantic violations)						
<i>Bilateral Frontal regions</i>		1940				
L Anterior Cingulate	32		5.08	-8	46	14
R medial Frontal Gyrus	10		4.86	10	50	0
L medial Superior Frontal Gyrus	10		4.77	-10	64	8
<i>Bilateral Cingulate</i>		1255				
R Middle Cingulate	23		5.56	6	-20	44
L Posterior Cingulate	23		4.32	-4	-52	26
L Middle Cingulate	23		4.27	-4	-28	44
<i>L Angular Gyrus / Superior Temporal Gyrus</i>		252				
L Angular Gyrus	23		5.06	-52	-56	28
L Angular Gyrus	39		4.32	-54	-68	36
L Superior Temporal Gyrus	39		4.27	-58	-64	28
<i>L Middle/Inferior Temporal Gyrus</i>		217				
L Middle Temporal Gyrus	21		4.99	-60	-18	-18
L Inferior Temporal Gyrus	21		4.24	-62	-6	-26
L Middle Temporal Gyrus	20		3.92	-62	-26	-14
<i>L Superior Frontal Gyrus</i>	9	165	4.50	-14	46	46
<i>R Middle Temporal Gyrus</i>	21	131	5.07	62	-6	-16

Note: Significant activation peaks > 8.0 mm apart ($P < 0.001$ uncorrected, cluster-level $p < .05$ FWE corrected). Multiple peaks within a single activation cluster are shown intended.

Table 19. *Overlap between processing of social norm violations and semantic violations opposed to neutral sentences*

Region	BA	Cluster size	Voxel T ¹⁰⁰ value	x	y	z
Social norm > neutral						
(incl. semantic violations > neutral)						
n.s.						

As can be seen in Table 19, no overlap was found between the processing of social norm violations and semantic violations, as no brain areas were increasingly activated for both social norm violations and semantic violations versus neutral sentences.

4.6. Discussion

The results presented in this chapter showed no norm specific effects to be present in the processing of grammatical norm violations. No activation was found in the medial Superior Frontal Gyrus, which is often involved in social cognition (Berthoz et al., 2002; Prehn et al., 2008). In addition, no increased activation was found in the insula or amygdala, which are typically involved in the processing of emotions (Aleman & Swart, 2008; Sambataro et al., 2006). Moreover, the results showed that the processing of grammatical norm violations was partly similar to the processing of both grammatical and truly ungrammatical sentences. On the one hand, grammatical norm violations were processed in the same way as truly grammatical sentences, but on the other hand, their processing was partly similar to the processing of truly ungrammatical sentences. For sentences containing a social norm violation norm specific effects were present, as increased activation was found in the medial Superior Frontal Gyrus. In addition, the processing of social norm violations overlapped with the processing of neutral sentences, whereas there was no overlap with the processing of semantically anomalous sentences.

Since the processing of social norm violations did not resemble the processing of semantic violations, which is a linguistic violation, and norm specific effects were present for social norm violations, the processing of violations of a social norm, which is reflected by the norm specific effects, is considered to be social rather than linguistic in nature. However, the processing of grammatical norm violations seemed to be linguistic rather than social in nature, because of its resemblance with the processing of truly grammatical violations and the lack of norm specific effects.

This suggests that grammatical norm violations are processed differently than social norm violations. In addition, no activation in brain regions related to social cognition or basic emotions was identified for the processing of grammatical norm violations.

5. Discussion

As presented in the previous chapter, the processing of grammatical norm violations showed resemblance with the processing of grammatical sentences on the one hand and with the processing of truly ungrammatical sentences on the other hand. Besides that, no norm specific effects were elicited in purists upon reading grammatical norm violations. Social norm violations, however, did elicit norm specific effects, as was expected on the basis of the literature (Berthoz et al., 2002; Prehn et al., 2008; Spitzer et al., 2007). In addition, the processing of social norm violations overlapped with the processing of neutral sentences, but not with the processing of semantically anomalous sentences. The overlap between social norm violations and neutral sentences was quite similar to the overlap between grammatical norm violations and grammatical sentences. Yet, grammatical norm violations seem to be different from social norm violations, in that for grammatical norm violations no norm specific effects were found and overlap was also present between grammatical norm violations and truly ungrammatical sentences, whereas no overlap was present between social norm violations and semantic violations.

No additional brain activation was found in the medial Superior Frontal Gyrus or in the insula or amygdala in response to grammatical norm violations, meaning I found no evidence for the involvement of brain regions implicated in social cognition, or basic emotions like disgust or contempt, in the processing of these constructions. The lack of norm specific effects, however, also might be due to the method of sentence presentation. People who experience emotions when getting exposed to grammatical norm violations, probably experience these emotions especially when they hear their interlocutor use these constructions while engaged in a conversation. The situation in the MRI scanner is quite unnatural, however, in that the grammatical norm violations were not presented auditory, but visually, and the participant was not engaged in a conversation. This unnatural situation might have prevented these emotions to emerge in response to the grammatical norm violations.

Although no norm specific effects were found in the processing of grammatical norm violations, these constructions can still be considered to be unique, since grammatical norm violations seem to be partly similar to truly grammatical and partly to truly ungrammatical sentences. Increased activation in the left Inferior Frontal Gyrus (LIFG) was found for the overlap between truly ungrammatical sentences and grammatical norm violations opposed to truly grammatical sentences. This brain area is usually associated with the processing of sentences that are difficult to process. Truly ungrammatical sentences usually lead to an increased activation in the LIFG, which is due to the ungrammaticality of the sentence (Friederici et al., 2006; Hagoort, 2005). However, the LIFG is also involved in the reinterpretation of semantic ambiguities (Bekinschtein et al., 2011; Rodd et al., 2005; Snijders et al., 2009; Vitello et al., 2014; Zempleni et al., 2007) and in the processing of semantic violations (Hagoort, 2003, 2005). Thus, the increased activation in the LIFG for grammatical norm violations cannot be directly ascribed to the ungrammaticality of these constructions, but

does indicate that the participants had difficulties in processing these constructions.

Although purists claim that for them grammatical norm violations are truly ungrammatical, their processing of these constructions also overlapped with the processing of truly grammatical sentences. An increased activation was found in the bilateral (medial) Superior Frontal Gyrus (mSFG) and the anterior Cingulate (frontal regions), and in the left Angular Gyrus and the posterior Cingulate. All brain areas involved in both the processing of grammatical norm violations and the processing of truly grammatical sentences opposed to truly ungrammatical ones typically play a role in semantic processing (Binder et al., 2009). More specifically, the Angular Gyrus (BA 39) and the left Middle Temporal Gyrus are found to be involved in semantic integration (Binder et al., 2009; Hagoort et al., 2009; Seghier, 2013). Increased activation in these areas is usually found when the interpretation can be integrated in conceptual memory (LMTG: Hagoort et al., 2009; Hein et al., 2007; LAG: Binder et al., 2009; Seghier, 2013). The interpretations of grammatical norm violations and truly grammatical sentences seem to be perfectly in line with conceptual memory, and therefore can be semantically integrated perfectly well. However, truly ungrammatical sentences do not match conceptual memory, since it is hard to extract their semantics. This might be the reason for the increased activity in the LAG and the LMTG for grammatical norm violations and truly grammatical sentences, but not for truly ungrammatical sentences.

The increased activation in the medial frontal regions for grammatical norm violations and truly grammatical sentences as compared to truly ungrammatical sentences might be a reflection of perspective taking (Amodio & Frith, 2006; Buckner et al., 2008; Mason & Just, 2006), since all sentences in this experiment described a situation in which only third persons were involved (examples presented in (11)). For the grammatical norm violation in (11a) and its truly grammatical counterpart presented in (11b) people are able to take perspective, because of the clear interpretation. The truly ungrammatical sentence presented in (11c), however, cannot be interpreted very well, which might prevent participants from taking perspective. This might be the reason for the increased activity in the frontal regions for grammatical norm violations and truly grammatical sentences opposed to truly ungrammatical sentences.

(11)

- a. Vanochtend hebben hun de trein gemist.
this.morning have them the train missed
"They missed their train this morning."
- b. Vanochtend hebben zij de trein gemist.
this.morning have they the train missed
"They missed their train this morning."
- c. * Vanochtend hebben hem de trein gemist.
this.morning have him the train missed

The processing of sentences describing a social norm violation overlapped with the processing of neutral sentences, but not with the processing of semantic violations. Almost all brain areas that were increasingly activated for both social norm violations and neutral sentences as compared to semantically anomalous sentences were also activated for grammatical norm violations and grammatical sentences opposed to truly ungrammatical sentences. For the overlap between social norm violations and neutral sentences increased activation was found in the frontal regions (left and right mSFG and the anterior Cingulate), and also in the left Angular Gyrus, the Posterior Cingulate and in the bilateral Middle/Inferior Temporal Gyrus (MTG/ITG). The involvement of these brain areas can be explained in the same way as the brain areas involved in the overlap between truly grammatical sentences and grammatical norm violations. The Angular Gyrus and the temporal regions might reflect semantic integration (Binder et al., 2009; Hagoort et al., 2009; Hein et al., 2007; Seghier, 2013) and the frontal regions might be the result of perspective taking (Amodio & Frith, 2006; Buckner et al., 2008; Mason & Just, 2006).

In addition to the overlap between the processing of social norm violations and neutral sentences, norm specific effects were found for sentences describing a social norm violation. The medial Superior Frontal Gyrus is increasingly activated in response to social norm violations as opposed to neutral sentences. This is in line with previous literature in which violations of social norms are compared with normal behaviour (Berthoz et al., 2002) and in which socio-normative judgements are compared with grammatical judgements (Prehn et al., 2008). However, in addition to activation in the mSFG, the social norm violations also evoked increased activation in the left Middle Temporal Gyrus (LMTG). This activation is also previously reported to be the result of violations of a social norm and social cognition. More specifically, the temporal regions are found to be involved in representing mental states of others (Theory of Mind) (Berthoz et al., 2002, Prehn et al. 2008). According to Berthoz et al. (2002), Theory of Mind is involved in the processing of social norm violations in order to reconstruct whether the individual is intentionally engaged in the situation or not, so that can be determined whether the situation has to be socially disapproved of. The activation in the LMTG might also reflect language processing (Acheson & Hagoort, 2013; Snijders et al., 2009) because the stimuli containing social norm violations in the experiment in some cases differed from their neutral counterparts with respect to more than one word, although this was not often the case.

When comparing grammatical norm violations to social norm violations it can be concluded that grammatical norm violations are more linguistic than social in nature, since no norm specific effects were found for grammatical norm violations, whereas these effects were present for social norm violations, and because the processing of grammatical norm violations partly overlapped with the processing of truly ungrammatical sentences, whereas this was not the case for social norm violations and semantically anomalous sentences. Yet, grammatical norm violations cannot be considered entirely equal to truly

ungrammatical sentences, as the processing of grammatical norm violations overlapped with the processing of truly grammatical sentences as well. On the one hand, grammatical norm violations resemble truly ungrammatical sentences, in that both types of sentences are considered to be unacceptable. On the other hand, however, grammatical norm violations resemble truly grammatical sentences, in that both types of sentences can be interpreted and integrated with conceptual memory perfectly well.

6. Conclusion

By means of this fMRI study, I sought to find out whether emotions, experienced by language purists upon encountering grammatical norm violations, can be measured in the brain. I investigated whether brain regions associated with social cognition or more basic emotions like contempt or disgust were involved in the processing of grammatical norm violations. In addition, I examined whether the processing of these constructions differed from the processing of truly ungrammatical sentences or not, since purists often claim that for them these grammatical norm violations are truly ungrammatical. I compared the processing of grammatical norm violations with the processing of truly ungrammatical and truly grammatical sentences and in order to see whether this processing was similar to the processing of social norm violations, I also compared the processing of social norm violations with neutral and semantically anomalous sentences. In order to see whether social cognition or basic emotions were involved in the processing of grammatical norm violations I examined whether increased activation was found in the mSFG (social cognition) and the amygdala and/or the insula (emotion).

No norm specific effects were found in the processing of grammatical norm violations, which might indicate that social cognition and basic emotions are not involved in the processing of these constructions, although this might be due to the task as well.

Yet, grammatical norm violations seem to be unique, as the processing of these constructions on the one hand overlaps with the processing of truly ungrammatical sentences but on the other hand overlaps with the processing of grammatical sentences. The overlap of the processing of grammatical norm violations and truly grammatical sentences can be explained by the fact that both types of sentences can be integrated in conceptual memory perfectly well, whereas this is not the case for truly ungrammatical sentences. The processing of grammatical norm violations and truly ungrammatical sentences overlaps because both types of sentences elicit difficulties in processing. This, in combination with the lack of norm specific effects, suggests that violations of a grammatical norm can be considered to be linguistic in nature, rather than social or emotional.

References

- Acheson, D. J., & Hagoort, P. (2013). Stimulating the Brain's Language Network : Syntactic Ambiguity Resolution after TMS to the Inferior Frontal Gyrus and Middle Temporal Gyrus. *Journal of Cognitive Neuroscience*, 25(10), 1664–1677. doi:10.1162/jocn
- Alaoui-Ismaïli, O., Robin, O., Rada, H., Dittmar, A., & Vernet-Maury, E. (1997). Basic emotions evoked by odorants: comparison between autonomic responses and self-evaluation. *Physiology & Behavior*, 62(4), 713–20.
- Aleman, A., & Swart, M. (2008). Sex differences in neural activation to facial expressions denoting contempt and disgust. *PLoS ONE*, 3(11), e3622. doi: 10.1371/journal.pone.0003622
- Amodio, D. M., & Frith, C. D. (2006). Meeting of minds: the medial frontal cortex and social cognition. *Nature Reviews Neuroscience*, 7(4), 268–77.
- Baayen, R. H., Piepenbrock, R., & Gulikers, L. (1995). The CELEX lexical database (CD-ROM). Philadelphia PA: Linguistic Data Consortium, University of Pennsylvania.
- Baldaro, B., Mazzetti, M., Codispoti, M., Tuozi, G., Bolzani, R., & Trombini, G. (2001). Autonomic reactivity during viewing of an unpleasant film. *Perceptual and Motor Skills*, 93(3), 797–805.
- Bekinschtein, T. A., Davis, M. H., Rodd, J. M., & Owen, A. M. (2011). Why clowns taste funny: the relationship between humor and semantic ambiguity. *The Journal of Neuroscience*, 31(26), 9665–71. doi: 10.1523/JNEUROSCI.5058-10.2011
- Berthoz, S., Armony, J. L., Blair, R. J. R., & Dolan, R. J. (2002). An fMRI study of intentional and unintentional (embarrassing) violations of social norms. *Brain : A Journal of Neurology*, 125(Pt 8), 1696–708.
- Binder, J. R., Desai, R. H., Graves, W. W., & Conant, L. L. (2009). Where is the semantic system? A critical review and meta-analysis of 120 functional neuroimaging studies. *Cerebral Cortex (New York, N.Y. : 1991)*, 19(12), 2767–96. doi:10.1093/cercor/bhp055
- Boiten, F. (1996). Autonomic response patterns during voluntary facial action. *Psychophysiology*, 33(2), 123–31.
- Boksem, M. a S., & De Cremer, D. (2010). Fairness concerns predict medial frontal negativity amplitude in ultimatum bargaining. *Social Neuroscience*, 5(1), 118–128. doi:10.1080/17470910903202666
- Boucsein, W. (2012). *Electrodermal Activity*. Boston, MA: Springer US. doi: 10.1007/978-1-4614-1126-0

- Bradley, M. M., Codispoti, M., Cuthbert, B. N., & Lang, P. J. (2001). Emotion and motivation I: Defensive and appetitive reactions in picture processing. *Emotion, 1*(3), 276–298. doi:10.1037//1528-3542.1.3.276
- Britton, J. C., Taylor, S. F., Berridge, K. C., Mikels, J. A., & Liberzon, I. (2006). Differential subjective and psychophysiological responses to socially and nonsocially generated emotional stimuli. *Emotion (Washington, D.C.), 6*(1), 150–5. doi:10.1037/1528-3542.6.1.150
- Buckner, R. L., Andrews-Hanna, J. R., & Schacter, D. L. (2008). The brain's default network: anatomy, function, and relevance to disease. *Annals of the New York Academy of Sciences, 1124*, 1–38. doi:10.1196/annals.1440.011
- Christie, I. C., & Friedman, B. H. (2004). Autonomic specificity of discrete emotion and dimensions of affective space: a multivariate approach. *International Journal of Psychophysiology: Official Journal of the International Organization of Psychophysiology, 51*(2), 143–53.
- Codispoti, M., Ferrari, V., & Bradley, M. M. (2006). Repetitive picture processing: autonomic and cortical correlates. *Brain Research, 1068*(1), 213–20. doi:10.1016/j.brainres.2005.11.009
- Cuthbert, B. N., Schupp, H. T., Bradley, M. M., Birbaumer, N., & Lang, P. J. (2000). Brain potentials in affective picture processing: covariation with autonomic arousal and affective report. *Biological Psychology, 52*(2), 95–111.
- Dawson, M. E., Schell, A. M., & Fillion, D. L. (2000). The Electrodermal System. In J. T. Cacioppo, L. G. Tassinary, & G. Berntson (Eds.), *Handbook of Psychophysiology* (2nd ed.). Cambridge: Cambridge University Press. doi:10.1017/CBO9780511546396
- Dillon, D. G., Cooper, J. J., Grent-'t-Jong, T., Woldorff, M. G., & LaBar, K. S. (2006). Dissociation of event-related potentials indexing arousal and semantic cohesion during emotional word encoding. *Brain and Cognition, 62*(1), 43–57. doi:10.1016/j.bandc.2006.03.008
- Duncan-Johnson, C. C., & Donchin, E. (1977). On Quantifying Surprise: The Variation of Event-Related Potentials With Subjective Probability. *Psychophysiology, 14*(5), 456–467. doi:10.1111/j.1469-8986.1977.tb01312.x
- Ekman, P., Levenson, R. W., & Friesen, W. V. (1983). Autonomic nervous system activity distinguishes among emotions. *Science (New York, N.Y.), 221*(4616), 1208–10.
- Experimentation Platform (Webexp2). (2014). Nijmegen: Radboud University. <http://ru.nl/letteren/webexperimenten>
- Forman, S. D., Cohen, J. D., Fitzgerald, M., Eddy, W. F., Mintun, M. A., & Noll, D. C. (1995). Improved assessment of significant activation in functional

- magnetic resonance imaging (fMRI): use of a cluster-size threshold. *Magnetic Resonance in Medicine : Official Journal of the Society of Magnetic Resonance in Medicine / Society of Magnetic Resonance in Medicine*, 33(5), 636–47.
- Foti, D., & Hajcak, G. (2008). Deconstructing reappraisal: descriptions preceding arousing pictures modulate the subsequent neural response. *Journal of Cognitive Neuroscience*, 20(6), 977–88. doi:10.1162/jocn.2008.20066
- Franken, I. H. A., Dietvorst, R. C., Hesselmann, M., Franzek, E. J., van de Wetering, B. J. M., & Van Strien, J. W. (2008). Cocaine craving is associated with electrophysiological brain responses to cocaine-related stimuli. *Addiction Biology*, 13(3-4), 386–92. doi:10.1111/j.1369-1600.2008.00100.x
- Friederici, A. D. (2002). Towards a neural basis of auditory sentence processing. *Trends in Cognitive Sciences*, 6(2), 78–84.
- Friederici, A. D., Fiebach, C. J., Schlesewsky, M., Bornkessel, I. D., & von Cramon, D. Y. (2006). Processing linguistic complexity and grammaticality in the left frontal cortex. *Cerebral Cortex*, 16(12), 1709–17. doi:10.1093/cercor/bhj106
- Friederici, A. D., Hahne, A., & Mecklinger, A. (1996). Temporal structure of syntactic parsing: early and late event-related brain potential effects. *Journal of Experimental Psychology. Learning, Memory, and Cognition*, 22(5), 1219–48.
- Friederici, A. D., Pfeifer, E., & Hahne, A. (1993). Event-related brain potentials during natural speech processing: effects of semantic, morphological and syntactic violations. *Brain Research. Cognitive Brain Research*, 1(3), 183–92.
- Garrett, A. S., & Maddock, R. J. (2006). Separating subjective emotion from the perception of emotion-inducing stimuli: an fMRI study. *NeuroImage*, 33(1), 263–74. doi:10.1016/j.neuroimage.2006.05.024
- Griswold, M. a, Jakob, P. M., Heidemann, R. M., Nittka, M., Jellus, V., Wang, J., ... Haase, A. (2002). Generalized autocalibrating partially parallel acquisitions (GRAPPA). *Magnetic Resonance in Medicine*, 47, 1202–10. doi:10.1002/mrm.10171
- Gruber, J., Johnson, S. L., Oveis, C., & Keltner, D. (2008). Risk for mania and positive emotional responding: too much of a good thing? *Emotion (Washington, D.C.)*, 8(1), 23–33. doi:10.1037/1528-3542.8.1.23
- Hagoort, P. (2003). How the brain solves the binding problem for language : a neurocomputational model of syntactic processing, 20, 18–29. doi:10.1016/j.neuroimage.2003.1796
- Hagoort, P. (2005). On Broca, brain, and binding: a new framework. *Trends in Cognitive Sciences*, 9(9), 416–23. doi:10.1016/j.tics.2005.07.004

- Hagoort, P., Baggio, G., & Willems, R. M. (2009). Semantic Unification. In M. S. Gazzaniga (Ed.), *The cognitive neurosciences* (4th editio., pp. 819 – 836). Cambridge, MA: MIT Press.
- Hajcak, G., MacNamara, A., & Olvet, D. M. (2010). Event-related potentials, emotion, and emotion regulation: an integrative review. *Developmental Neuropsychology, 35*(2), 129–55. doi: 10.1080/87565640903526504
- Hamer, M., Tanaka, G., Okamura, H., Tsuda, A., & Steptoe, A. (2007). The effects of depressive symptoms on cardiovascular and catecholamine responses to the induction of depressive mood. *Biological Psychology, 74*(1), 20–5. doi: 10.1016/j.biopsycho.2006.06.003
- Harris, C. L., Ayçiçeği, A., & Gleason, J. B. (2003). Taboo words and reprimands elicit greater autonomic reactivity in a first language than in a second language. *Applied Psycholinguistics, 24*(04), 561–579. doi: 10.1017/S0142716403000286
- Hein, G., Doehrmann, O., Müller, N. G., Kaiser, J., Muckli, L., & Naumer, M. J. (2007). Object familiarity and semantic congruency modulate responses in cortical audiovisual integration areas. *The Journal of Neuroscience, 27*(30), 7881–7. doi: 10.1523/JNEUROSCI.1740-07.2007
- Hewig, J., Kretschmer, N., Trippe, R. H., Hecht, H., Coles, M. G. H., Holroyd, C. B., & Miltner, W. H. R. (2011). Why humans deviate from rational choice. *Psychophysiology, 48*(4), 507–14. doi: 10.1111/j.1469-8986.2010.01081.x
- Hillyard, S. A., Hink, R. F., Schwent, V. L., & Picton, T. W. (1973). Electrical signs of selective attention in the human brain. *Science (New York, N.Y.), 182*(4108), 177–80.
- Hubers, F., & de Hoop, H. (2013). The effect of prescriptivism on comparative markers in spoken Dutch. *Linguistics in the Netherlands, 30*, 89–101. doi: 10.1075/avt.30.07hub
- Johnston, V. S., Miller, D. R., & Burleson, M. H. (1986). Multiple P3s to emotional stimuli and their theoretical significance. *Psychophysiology, 23*(6), 684–94.
- Jones, A., & Fitness, J. (2008). Moral hypervigilance: the influence of disgust sensitivity in the moral domain. *Emotion (Washington, D.C.), 8*(5), 613–627. doi: 10.1037/a0013435
- Just, M. A., Carpenter, P. A., & Woolley, J. D. (1982). Paradigms and processes in reading comprehension. *Journal of Experimental Psychology. General, 111*(2), 228–38.
- Kaan, E. (2007). Event-Related Potentials and Language Processing: A Brief Overview. *Language and Linguistics Compass, 1*(6), 571–591. doi: 10.1111/j.1749-818X.2007.00037.x

- Kaan, E., & Swaab, T. Y. (2003). Repair, revision, and complexity in syntactic analysis: an electrophysiological differentiation. *Journal of Cognitive Neuroscience*, *15*(1), 98–110. doi:10.1162/089892903321107855
- Kluender, R., & Kutas, M. (1993). Subjacency as a processing phenomenon. *Language and Cognitive Processes*, *8*(4), 573–633. doi:10.1080/01690969308407588
- Kolassa, I.-T., Musial, F., Mohr, A., Trippe, R. H., & Miltner, W. H. R. (2005). Electrophysiological correlates of threat processing in spider phobics. *Psychophysiology*, *42*(5), 520–30. doi:10.1111/j.1469-8986.2005.00315.x
- Kreibig, S. D. (2010). Autonomic nervous system activity in emotion: a review. *Biological Psychology*, *84*(3), 394–421. doi:10.1016/j.biopsycho.2010.03.010
- Lang, P. J., Bradley, M. M., & Cuthbert, B. N. (1997). Motivated attention: Affect, activation, and action. In P. J. Lang, R. F. Simons, & M. Balaban (Eds.), *Attention and orienting: Sensory and motivational processes* (pp. 97 – 135). Psychology Press.
- Langner, O., Dotsch, R., Bijlstra, G., Wigboldus, D. H. J., Hawk, S. T., & van Knippenberg, A. (2010). Presentation and validation of the Radboud Faces Database. *Cognition & Emotion*, *24*(8), 1377–1388. doi:10.1080/02699930903485076
- Levenson, R. W., Carstensen, L. L., Friesen, W. V., & Ekman, P. (1991). Emotion, physiology, and expression in old age. *Psychology and Aging*, *6*(1), 28–35.
- Mason, R. A., & Just, M. A. (2006). Neuroimaging contributions to the understanding of discourse processes. In M. Traxler & M. A. Gernsbacher (Eds.), *Handbook of Psycholinguistics* (pp. 765 – 799). Amsterdam: Elsevier.
- Mercadillo, R. E., Luis Diaz, J., & Barrios, F. A. (2007). Neurobiology of moral emotions. *SALUD MENTAL*, *30*(3), 1–11.
- Mini, A., Palomba, D., Angrilli, A., & Bravi, S. (1996). EMOTIONAL INFORMATION PROCESSING AND VISUAL EVOKED BRAIN POTENTIALS. *Perceptual and Motor Skills*, *83*(1), 143–152. doi:10.2466/pms.1996.83.1.143
- Mitchell, D. C. (2004). On-line methods in language processing: Introduction and historical review. In M. Carreiras & C. J. Clifton (Eds.), *The On-line Study of Sentence Comprehension: Eyetracking, ERPs and Beyond* (pp. 15–32). New York, NY: Psychology Press.
- Müntz, T. F., Heinze, H. J., & Mangun, G. R. (1993). Dissociation of brain activity related to syntactic and semantic aspects of language. *Journal of Cognitive Neuroscience*, *5*(3), 335–44. doi:10.1162/jocn.1993.5.3.335
- Neville, H., Nicol, J. L., Barss, A., Forster, K. I., & Garrett, M. F. (1991). Syntactically based sentence processing classes: evidence from event-

- related brain potentials. *Journal of Cognitive Neuroscience*, 3(2), 151–65. doi: 10.1162/jocn.1991.3.2.151
- Ochsner, K. N., Bunge, S. A., Gross, J. J., & Gabrieli, J. D. E. (2002). Rethinking feelings: an fMRI study of the cognitive regulation of emotion. *Journal of Cognitive Neuroscience*, 14(8), 1215–29. doi: 10.1162/089892902760807212
- Olofsson, J. K., & Polich, J. (2007). Affective visual event-related potentials: arousal, repetition, and time-on-task. *Biological Psychology*, 75(1), 101–8. doi: 10.1016/j.biopsycho.2006.12.006
- Onze Taal. (2014). Hun hebben. <http://www.onzetaal.nl/advies/hunhebben.php>
- Osterhout, L., & Holcomb, P. J. (1992). Event-related brain potentials elicited by syntactic anomaly. *Journal of Memory and Language*, 31(6), 785–806. doi: 10.1016/0749-596X(92)90039-Z
- Ottaviani, C., Mancini, F., Petrocchi, N., Medea, B., & Couyoumdjian, A. (2013). Autonomic correlates of physical and moral disgust. *International Journal of Psychophysiology: Official Journal of the International Organization of Psychophysiology*, 89(1), 57–62. doi: 10.1016/j.ijpsycho.2013.05.003
- Palomba, D., Angrilli, a, & Mini, a. (1997). Visual evoked potentials, heart rate responses and memory to emotional pictorial stimuli. *International Journal of Psychophysiology: Official Journal of the International Organization of Psychophysiology*, 27(1), 55–67.
- Peters, R. (2006). Ageing and the brain. *Postgraduate Medical Journal*, 82(964), 84–8. doi: 10.1136/pgmj.2005.036665
- Phan, K. L., Wager, T., Taylor, S. F., & Liberzon, I. (2002). Functional neuroanatomy of emotion: a meta-analysis of emotion activation studies in PET and fMRI. *NeuroImage*, 16(2), 331–48. doi: 10.1006/nimg.2002.1087
- Polezzi, D., Daum, I., Rubaltelli, E., Lotto, L., Civai, C., Sartori, G., & Rumiati, R. (2008). Mentalizing in economic decision-making. *Behavioural Brain Research*, 190(2), 218–223. doi: 10.1016/j.bbr.2008.03.003
- Prehn, K., Wartenburger, I., Mériaux, K., Scheibe, C., Goodenough, O. R., Villringer, A., ... Heekeren, H. R. (2008). Individual differences in moral judgment competence influence neural correlates of socio-normative judgments. *Social Cognitive and Affective Neuroscience*, 3(1), 33–46. doi: 10.1093/scan/nsm037
- Raz, N., & Rodrigue, K. M. (2006). Differential aging of the brain: patterns, cognitive correlates and modifiers. *Neuroscience and Biobehavioral Reviews*, 30(6), 730–48. doi: 10.1016/j.neubiorev.2006.07.001

- Rodd, J. M., Davis, M. H., & Johnsrude, I. S. (2005). The neural mechanisms of speech comprehension: fMRI studies of semantic ambiguity. *Cerebral Cortex*, *15*(8), 1261–9. doi:10.1093/cercor/bhi009
- Rösler, F., Pütz, P., Friederici, A. D., & Hahne, A. (1993). Event-related brain potentials while encountering semantic and syntactic constraint violations. *Journal of Cognitive Neuroscience*, *5*(3), 345–62. doi:10.1162/jocn.1993.5.3.345
- Sambataro, F., Dimalta, S., Di Giorgio, A., Taurisano, P., Blasi, G., Scarabino, T., ... Bertolino, A. (2006). Preferential responses in amygdala and insula during presentation of facial contempt and disgust. *European Journal of Neuroscience*, *24*(8), 2355–2362. doi:10.1111/j.1460-9568.2006.05120.x
- Schachter, H. (1957). Pain, fear, and anger in hypertensives and normotensives; a psychophysiological study. *Psychosomatic Medicine*, *19*(1), 17–29.
- Seghier, M. L. (2013). The angular gyrus: multiple functions and multiple subdivisions. *The Neuroscientist: A Review Journal Bringing Neurobiology, Neurology and Psychiatry*, *19*(1), 43–61. doi:10.1177/1073858412440596
- Simcox, T., Pilotti, M., Mahamane, S., & Romero, E. (2011). Does the language in which aversive stimuli are presented affect their processing? *International Journal of Bilingualism*, *16*(4), 419–427. doi:10.1177/1367006911425821
- Sinha, R., Lovallo, W. R., & Parsons, O. A. (1992). Cardiovascular differentiation of emotions. *Psychosomatic Medicine*, *54*(4), 422–35.
- Snijders, T. M., Vosse, T., Kempen, G., Van Berkum, J. J. a, Petersson, K. M., & Hagoort, P. (2009). Retrieval and unification of syntactic structure in sentence comprehension: an fMRI study using word-category ambiguity. *Cerebral Cortex (New York, N.Y. : 1991)*, *19*(7), 1493–503. doi:10.1093/cercor/bhn187
- Spitzer, M., Fischbacher, U., Herrnberger, B., Grön, G., & Fehr, E. (2007). The neural signature of social norm compliance. *Neuron*, *56*(1), 185–96. doi:10.1016/j.neuron.2007.09.011
- Sutton, S., Braren, M., Zubin, J., & John, E. R. (1965). Evoked-potential correlates of stimulus uncertainty. *Science (New York, N.Y.)*, *150*(3700), 1187–8.
- Van Casteren, M., & Davis, M. H. (2006). Mix, a program for pseudorandomization. *Behavior Research Methods*, *38*(4), 584–589. doi:10.3758/BF03193889
- Vitello, S., Warren, J. E., Devlin, J. T., & Rodd, J. M. (2014). Roles of frontal and temporal regions in reinterpreting semantically ambiguous sentences. *Frontiers in Human Neuroscience*, *8*, 1–14. doi:10.3389/fnhum.2014.00530

Zempleni, M.-Z., Renken, R., Hoeks, J. C. J., Hoogduin, J. M., & Stowe, L. a. (2007). Semantic ambiguity processing in sentence context: Evidence from event-related fMRI. *NeuroImage*, 34, 1270–9. doi: 10.1016/j.neuroimage.2006.09.048

Appendix I : Materials recruitment test

Sentence	Options	Correct
Vorige week bleef het meisje dat ziek geworden was, thuis van school.	correct/incorrect/weet niet	1
Het meisje krabte de kat achter zijn oren.	correct/incorrect/weet niet	0
Ik heb sowieso niet genoeg geld voor een vakantie in het buitenland.	correct/incorrect/weet niet	1
Ik heb eindelijk mijn gemiddelde berekent.	correct/incorrect/weet niet	0
Vanavond ga ik bij mijn vader op bezoek.	correct/incorrect/weet niet	1
In Amerika zijn de mensen dikker als in Europa.	correct/incorrect/weet niet	0
Naar aanleiding van het overleg krijgt het personeel opslag.	correct/incorrect/weet niet	1
Hij irriteert zich aan de jongen die de bal steeds in zijn tuin schopt.	correct/incorrect/weet niet	0
Jij wordt bewonderd door heel veel mensen.	correct/incorrect/weet niet	1
Vanavond eten we pannenkoeken.	correct/incorrect/weet niet	1
Hij floste zijn tanden voor hij naar bed ging.	correct/incorrect/weet niet	1
Hij maakt ten allen tijde zijn huiswerk.	correct/incorrect/weet niet	0
Hen die binnenkort afstuderen, nodig ik uit.	correct/incorrect/weet niet	1
Als boer zijnde moet je hard werken.	correct/incorrect/weet niet	0
Denk ook af en toe eens aan jezelf.	correct/incorrect/weet niet	1
Zij irriteert me met haar bazige gedrag.	correct/incorrect/weet niet	1
De buurvrouw kan geen Engels.	correct/incorrect/weet niet	0
De genodigde gaf het cadeau aan hun.	correct/incorrect/weet niet	0
Het jongetje die dat fout doet, krijgt bijles.	correct/incorrect/weet niet	0
Die koffer weegt te veel om mee te nemen in het vliegtuig.	correct/incorrect/weet niet	1
De media hebben dat goed opgepakt.	correct/incorrect/weet niet	1
De college zaal zit vol met studenten.	correct/incorrect/weet niet	0
De mannen zijn beiden kaal.	correct/incorrect/weet niet	1
Die auto is twee keer zo groot als de auto van zijn vriendin.	correct/incorrect/weet niet	1
Een aantal scholieren moesten nablijven aan het einde van de dag.	correct/incorrect/weet niet	0
Volgende week wordt je ondervraagd door de politie.	correct/incorrect/weet niet	0
Na regen komt zonnenschijn.	correct/incorrect/weet niet	0
Toen hebben ze dat op die manier gedaan.	correct/incorrect/weet niet	1
De problemen zijn beiden op te lossen.	correct/incorrect/weet niet	0
Weet je wat dat voor mij heeft betekend?	correct/incorrect/weet niet	1
Gisteren fietsten hun naar de supermarkt.	correct/incorrect/weet niet	0
Ik heb teveel gegeten.	correct/incorrect/weet niet	0
Janneke besepte dat ze verkeerd gefietst was.	correct/incorrect/weet niet	1
Ik kom morgen werken mits ik ziek ben.	correct/incorrect/weet niet	0
Dit gouden horloge is veel geld waard.	correct/incorrect/weet niet	1
Hij gaf hun het boek.	correct/incorrect/weet niet	1
Ik bied jouw mijn excuses aan.	correct/incorrect/weet niet	0
Bij deze wordt het ongedaan gemaakt.	correct/incorrect/weet niet	0
Ik heb me ouders al lang niet meer gezien.	correct/incorrect/weet niet	0
De sportcommissie heeft een leuke sportdag georganiseerd.	correct/incorrect/weet niet	1

Statements

Ik vind het belangrijk dat mensen verzorgd Nederlands spreken.	1-2-3-4-5-6-7
Ik vind het belangrijk dat er in het onderwijs nadruk wordt gelegd op correct taalgebruik.	1-2-3-4-5-6-7
Ik erger me aan taalfouten in mijn omgeving.	1-2-3-4-5-6-7
Welke taalfouten vindt u vooral hinderlijk?	open vraag

Appendix II: Materials of fMRI experiment

Grammatical items

ID	Sentence
1-1-A	Vanochtend hebben hun de trein gemist.
1-1-B	Vanochtend hebben ze de trein gemist.
1-1-C	Vanochtend hebben hem de trein gemist.
1-2-A	Wat maken hun een vreselijk lawaai!
1-2-B	Wat maken ze een vreselijk lawaai!
1-2-C	Wat maken hem een vreselijk lawaai!
1-3-A	Samen hebben hun heel veel plezier.
1-3-B	Samen hebben ze heel veel plezier.
1-3-C	Samen hebben hem heel veel plezier.
1-4-A	Vroeger deden hun alles graag samen.
1-4-B	Vroeger deden ze alles graag samen.
1-4-C	Vroeger deden hem alles graag samen.
1-5-A	Op zondag renden hun door het park.
1-5-B	Op zondag renden ze door het park.
1-5-C	Op zondag renden hem door het park.
1-6-A	Volgens mij zijn hun vanochtend vroeg vertrokken.
1-6-B	Volgens mij zijn ze vanochtend vroeg vertrokken.
1-6-C	Volgens mij zijn hem vanochtend vroeg vertrokken.
1-7-A	Gisteren gingen hun naar de camping.
1-7-B	Gisteren gingen ze naar de camping.
1-7-C	Gisteren gingen hem naar de camping.
1-8-A	Morgen zullen hun verder gaan met afwassen.
1-8-B	Morgen zullen ze verder gaan met afwassen.
1-8-C	Morgen zullen hem verder gaan met afwassen.
1-9-A	Daar liepen hun aan de overkant.
1-9-B	Daar liepen ze aan de overkant.
1-9-C	Daar liepen hem aan de overkant.
1-10-A	Laatst belden hun met de directeur.
1-10-B	Laatst belden ze met de directeur.
1-10-C	Laatst belden hem met de directeur.
1-11-A	In de zomer zijn hun wel op vakantie geweest.
1-11-B	In de zomer zijn ze wel op vakantie geweest.
1-11-C	In de zomer zijn hem wel op vakantie geweest.
1-12-A	Vorige week liepen hun naar de speeltuin.
1-12-B	Vorige week liepen ze naar de speeltuin.
1-12-C	Vorige week liepen hem naar de speeltuin.
1-13-A	Waarom wisten hun dat nog niet?
1-13-B	Waarom wisten ze dat nog niet?
1-13-C	Waarom wisten hem dat nog niet?
1-14-A	Morgen gaan hun op ziekenbezoek.
1-14-B	Morgen gaan ze op ziekenbezoek.

- 1-14-C Morgen gaan hem op ziekenbezoek.
- 1-15-A Dinsdag zijn hun ziek thuis gebleven.
- 1-15-B Dinsdag zijn ze ziek thuis gebleven.
- 1-15-C Dinsdag zijn hem ziek thuis gebleven.
- 1-16-A In de lente hebben hun altijd last van hooikoorts.
- 1-16-B In de lente hebben ze altijd last van hooikoorts.
- 1-16-C In de lente hebben hem altijd last van hooikoorts.
- 1-17-A Waarom slapen hun niet in de tent?
- 1-17-B Waarom slapen ze niet in de tent?
- 1-17-C Waarom slapen hem niet in de tent?
- 1-18-A Misschien willen hun even alleen zijn.
- 1-18-B Misschien willen ze even alleen zijn.
- 1-18-C Misschien willen hem even alleen zijn.
- 1-19-A Hoe doen hun dat zo snel?
- 1-19-B Hoe doen ze dat zo snel?
- 1-19-C Hoe doen hem dat zo snel?
- 1-20-A Liever komen hun niet op bezoek.
- 1-20-B Liever komen ze niet op bezoek.
- 1-20-C Liever komen hem niet op bezoek.
- 1-21-A Afgelopen vrijdag gingen hun eerder weg van school.
- 1-21-B Afgelopen vrijdag gingen ze eerder weg van school.
- 1-21-C Afgelopen vrijdag gingen hem eerder weg van school.
- 1-22-A Tijdens de vakantie genieten hun van het mooie weer.
- 1-22-B Tijdens de vakantie genieten ze van het mooie weer.
- 1-22-C Tijdens de vakantie genieten hem van het mooie weer.
- 1-23-A Hopelijk gaan hun niet meer verhuizen.
- 1-23-B Hopelijk gaan ze niet meer verhuizen.
- 1-23-C Hopelijk gaan hem niet meer verhuizen.
- 1-24-A Welke kleding dragen hun op de bruiloft?
- 1-24-B Welke kleding dragen ze op de bruiloft?
- 1-24-C Welke kleding dragen hem op de bruiloft?
- 1-25-A Waarom gaan hun nu al naar huis?
- 1-25-B Waarom gaan ze nu al naar huis?
- 1-25-C Waarom gaan hem nu al naar huis?
- 1-26-A Vanmorgen reden hun al vroeg naar het werk.
- 1-26-B Vanmorgen reden ze al vroeg naar het werk.
- 1-26-C Vanmorgen reden hem al vroeg naar het werk.
- 1-27-A Volgende week zullen hun wel klaar zijn.
- 1-27-B Volgende week zullen ze wel klaar zijn.
- 1-27-C Volgende week zullen hem wel klaar zijn.
- 1-28-A Natuurlijk waren hun er gisteren ook.
- 1-28-B Natuurlijk waren ze er gisteren ook.
- 1-28-C Natuurlijk waren hem er gisteren ook.
- 1-29-A Eigenlijk hebben hun vandaag een feestje.
- 1-29-B Eigenlijk hebben ze vandaag een feestje.
- 1-29-C Eigenlijk hebben hem vandaag een feestje.

- 1-30-A Straks vertrekken hun naar de stad.
- 1-30-B Straks vertrekken ze naar de stad.
- 1-30-C Straks vertrekken hem naar de stad.
- 2-1-A Ze heeft hun twee weken geleden al uitgenodigd.
- 2-1-B Ze heeft hen twee weken geleden al uitgenodigd.
- 2-1-C Ze heeft zij twee weken geleden al uitgenodigd.
- 2-2-A Wij liepen hun tegen het lijf.
- 2-2-B Wij liepen hen tegen het lijf.
- 2-2-C Wij liepen zij tegen het lijf.
- 2-3-A Hij zwaaide hun bij vertrek vrolijk uit.
- 2-3-B Hij zwaaide hen bij vertrek vrolijk uit.
- 2-3-C Hij zwaaide zij bij vertrek vrolijk uit.
- 2-4-A We zagen hun in de winkel.
- 2-4-B We zagen hen in de winkel.
- 2-4-C We zagen zij in de winkel.
- 2-5-A Wij stuurden hun gisteren naar huis.
- 2-5-B Wij stuurden hen gisteren naar huis.
- 2-5-C Wij stuurden zij gisteren naar huis.
- 2-6-A Hij heeft hun met de opdracht geholpen.
- 2-6-B Hij heeft hen met de opdracht geholpen.
- 2-6-C Hij heeft zij met de opdracht geholpen.
- 2-7-A We zullen hun wel laten winnen.
- 2-7-B We zullen hen wel laten winnen.
- 2-7-C We zullen zij wel laten winnen.
- 2-8-A We ontmoeten hun in de bioscoop.
- 2-8-B We ontmoeten hen in de bioscoop.
- 2-8-C We ontmoeten zij in de bioscoop.
- 2-9-A Daarom begrijpt ze hun niet zo goed.
- 2-9-B Daarom begrijpt ze hen niet zo goed.
- 2-9-C Daarom begrijpt ze zij niet zo goed.
- 2-10-A Morgen begeleidt Janneke hun naar het gemeentehuis.
- 2-10-B Morgen begeleidt Janneke hen naar het gemeentehuis.
- 2-10-C Morgen begeleidt Janneke zij naar het gemeentehuis.
- 2-11-A Misschien kan Paul hun niet goed verstaan.
- 2-11-B Misschien kan Paul hen niet goed verstaan.
- 2-11-C Misschien kan Paul zij niet goed verstaan.
- 2-12-A Ze hoorde hun net nog praten.
- 2-12-B Ze hoorde hen net nog praten.
- 2-12-C Ze hoorde zij net nog praten.
- 2-13-A In de winkel verstond de man hun niet zo goed.
- 2-13-B In de winkel verstond de man hen niet zo goed.
- 2-13-C In de winkel verstond de man zij niet zo goed.
- 2-14-A Hopelijk heeft Jan hun wel goed begrepen.
- 2-14-B Hopelijk heeft Jan hen wel goed begrepen.
- 2-14-C Hopelijk heeft Jan zij wel goed begrepen.
- 2-15-A Jij moet hun morgen helpen met aankleden.

- 2-15-B Jij moet hen morgen helpen met aankleden.
- 2-15-C Jij moet zij morgen helpen met aankleden.
- 2-16-A Wij gaan hun verrassen met een etentje.
- 2-16-B Wij gaan hen verrassen met een etentje.
- 2-16-C Wij gaan zij verrassen met een etentje.
- 2-17-A Op donderdag neemt de jarige hun mee naar de dierentuin.
- 2-17-B Op donderdag neemt de jarige hen mee naar de dierentuin.
- 2-17-C Op donderdag neemt de jarige zij mee naar de dierentuin.
- 2-18-A Wanneer zullen jouw ouders hun voor de eerste keer ontmoeten?
- 2-18-B Wanneer zullen jouw ouders hen voor de eerste keer ontmoeten?
- 2-18-C Wanneer zullen jouw ouders zij voor de eerste keer ontmoeten?
- 2-19-A Waarom vond Frans hun zo vervelend tijdens de vliegreis?
- 2-19-B Waarom vond Frans hen zo vervelend tijdens de vliegreis?
- 2-19-C Waarom vond Frans zij zo vervelend tijdens de vliegreis?
- 2-20-A Hij moet hun op tijd wakker maken.
- 2-20-B Hij moet hen op tijd wakker maken.
- 2-20-C Hij moet zij op tijd wakker maken.
- 2-21-A Vanavond zal de burgemeester hun feliciteren met de overwinning.
- 2-21-B Vanavond zal de burgemeester hen feliciteren met de overwinning.
- 2-21-C Vanavond zal de burgemeester zij feliciteren met de overwinning.
- 2-22-A Kan de leerling hun beter telefonisch bereiken?
- 2-22-B Kan de leerling hen beter telefonisch bereiken?
- 2-22-C Kan de leerling zij beter telefonisch bereiken?
- 2-23-A Misschien moeten jullie hun maar eens bellen.
- 2-23-B Misschien moeten jullie hen maar eens bellen.
- 2-23-C Misschien moeten jullie zij maar eens bellen.
- 2-24-A Wij kenden hun nog van vroeger.
- 2-24-B Wij kenden hen nog van vroeger.
- 2-24-C Wij kenden zij nog van vroeger.
- 2-25-A Heeft u hun deze week nog gesproken?
- 2-25-B Heeft u hen deze week nog gesproken?
- 2-25-C Heeft u zij deze week nog gesproken?
- 2-26-A Heeft Anne hun nog uitvoerig gesproken?
- 2-26-B Heeft Anne hen nog uitvoerig gesproken?
- 2-26-C Heeft Anne zij nog uitvoerig gesproken?
- 2-27-A Hij smeekte hun om niet te gaan.
- 2-27-B Hij smeekte hen om niet te gaan.
- 2-27-C Hij smeekte zij om niet te gaan.
- 2-28-A We vinden hun helemaal niet zo aardig.
- 2-28-B We vinden hen helemaal niet zo aardig.
- 2-28-C We vinden zij helemaal niet zo aardig.
- 2-29-A Heeft Helen hun gisteren nog gezien?
- 2-29-B Heeft Helen hen gisteren nog gezien?
- 2-29-C Heeft Helen zij gisteren nog gezien?
- 2-30-A Heeft de jongen hun vanochtend zien weggrijden?
- 2-30-B Heeft de jongen hen vanochtend zien weggrijden?

- 2-30-C Heeft de jongen zij vanochtend zien wegrijden?
- 3-1-A Petra is liever als mijn vorige buurmeisje.
- 3-1-B Petra is liever dan mijn vorige buurmeisje.
- 3-1-C Petra is liever wie mijn vorige buurmeisje.
- 3-2-A Hij rent harder als zijn oude docent.
- 3-2-B Hij rent harder dan zijn oude docent.
- 3-2-C Hij rent harder wie zijn oude docent.
- 3-3-A Sandra eet gulziger als haar jongere zusje.
- 3-3-B Sandra eet gulziger dan haar jongere zusje.
- 3-3-C Sandra eet gulziger wie haar jongere zusje.
- 3-4-A De hamsters eten minder als de grote konijnen.
- 3-4-B De hamsters eten minder dan de grote konijnen.
- 3-4-C De hamsters eten minder wie de grote konijnen.
- 3-5-A Een dokter verdient meer als een ervaren timmerman.
- 3-5-B Een dokter verdient meer dan een ervaren timmerman.
- 3-5-C Een dokter verdient meer wie een ervaren timmerman.
- 3-6-A Wij zijn sterker als die kleine kinderen.
- 3-6-B Wij zijn sterker dan die kleine kinderen.
- 3-6-C Wij zijn sterker wie die kleine kinderen.
- 3-7-A Niets is mooier als een zonsondergang op het strand.
- 3-7-B Niets is mooier dan een zonsondergang op het strand.
- 3-7-C Niets is mooier wie een zonsondergang op het strand.
- 3-8-A Zij wil beter als die jongen zijn.
- 3-8-B Zij wil beter dan die jongen zijn.
- 3-8-C Zij wil beter wie die jongen zijn.
- 3-9-A Ik werk veel meer als die vrouw zonder kinderen.
- 3-9-B Ik werk veel meer dan die vrouw zonder kinderen.
- 3-9-C Ik werk veel meer wie die vrouw zonder kinderen.
- 3-10-A Jullie zijn gezelliger als die andere groep.
- 3-10-B Jullie zijn gezelliger dan die andere groep.
- 3-10-C Jullie zijn gezelliger wie die andere groep.
- 3-11-A Geen enkel dier is sneller als een hongerige cheeta.
- 3-11-B Geen enkel dier is sneller dan een hongerige cheeta.
- 3-11-C Geen enkel dier is sneller wie een hongerige cheeta.
- 3-12-A De gekookte eieren zijn zachter als ik had verwacht.
- 3-12-B De gekookte eieren zijn zachter dan ik had verwacht.
- 3-12-C De gekookte eieren zijn zachter wie ik had verwacht.
- 3-13-A Misschien is het sneller klaar als wij in eerste instantie dachten.
- 3-13-B Misschien is het sneller klaar dan wij in eerste instantie dachten.
- 3-13-C Misschien is het sneller klaar wie wij in eerste instantie dachten.
- 3-14-A Vandaag is het veel warmer als het tot nu toe is geweest.
- 3-14-B Vandaag is het veel warmer dan het tot nu toe is geweest.
- 3-14-C Vandaag is het veel warmer wie het tot nu toe is geweest.
- 3-15-A Leeuwen in het wild zijn veel magerder als in de dierentuin.
- 3-15-B Leeuwen in het wild zijn veel magerder dan in de dierentuin.
- 3-15-C Leeuwen in het wild zijn veel magerder wie in de dierentuin.

- 3-16-A Wij zijn sterker als de fanatieke sporter.
- 3-16-B Wij zijn sterker dan de fanatieke sporter.
- 3-16-C Wij zijn sterker wie de fanatieke sporter.
- 3-17-A Studenten drinken meer als andere mensen.
- 3-17-B Studenten drinken meer dan andere mensen.
- 3-17-C Studenten drinken meer wie andere mensen.
- 3-18-A Vertrekt de bus eerder als de trein naar Zwolle?
- 3-18-B Vertrekt de bus eerder dan de trein naar Zwolle?
- 3-18-C Vertrekt de bus eerder wie de trein naar Zwolle?
- 3-19-A Mijn kat is dikker als de kat van Bram.
- 3-19-B Mijn kat is dikker dan de kat van Bram.
- 3-19-C Mijn kat is dikker wie de kat van Bram.
- 3-20-A Daan liep eerder als zijn oudere zusje.
- 3-20-B Daan liep eerder dan zijn oudere zusje.
- 3-20-C Daan liep eerder wie zijn oudere zusje.
- 3-21-A Waarom werken zij sneller als de andere ploeg?
- 3-21-B Waarom werken zij sneller dan de andere ploeg?
- 3-21-C Waarom werken zij sneller wie de andere ploeg?
- 3-22-A Is jouw hond mooier als de hond van de burens?
- 3-22-B Is jouw hond mooier dan de hond van de burens?
- 3-22-C Is jouw hond mooier wie de hond van de burens?
- 3-23-A Die jongen vergeet meer als zijn dementerende opa.
- 3-23-B Die jongen vergeet meer dan zijn dementerende opa.
- 3-23-C Die jongen vergeet meer wie zijn dementerende opa.
- 3-24-A Het meisje lacht minder als haar broer vroeger.
- 3-24-B Het meisje lacht minder dan haar broer vroeger.
- 3-24-C Het meisje lacht minder wie haar broer vroeger.
- 3-25-A Piet gedraagt zich beter als de rest van zijn vrienden.
- 3-25-B Piet gedraagt zich beter dan de rest van zijn vrienden.
- 3-25-C Piet gedraagt zich beter wie de rest van zijn vrienden.
- 3-26-A De koekjes zijn nog lekkerder als de taart van gisteren.
- 3-26-B De koekjes zijn nog lekkerder dan de taart van gisteren.
- 3-26-C De koekjes zijn nog lekkerder wie de taart van gisteren.
- 3-27-A Gijs is slimmer als de andere leraren.
- 3-27-B Gijs is slimmer dan de andere leraren.
- 3-27-C Gijs is slimmer wie de andere leraren.
- 3-28-A Ze is veel groter als haar kleine nichtje.
- 3-28-B Ze is veel groter dan haar kleine nichtje.
- 3-28-C Ze is veel groter wie haar kleine nichtje.
- 3-29-A Hij eet veel meer als zijn grote neef.
- 3-29-B Hij eet veel meer dan zijn grote neef.
- 3-29-C Hij eet veel meer wie zijn grote neef.
- 3-30-A Ik ben sneller als al mijn klasgenootjes.
- 3-30-B Ik ben sneller dan al mijn klasgenootjes.
- 3-30-C Ik ben sneller wie al mijn klasgenootjes.
- 4-1-A Stan heeft meer gedaan dan mij wanneer hij straks klaar is.

- 4-1-B Stan heeft meer gedaan dan ik wanneer hij straks klaar is.
- 4-1-C Stan heeft meer gedaan dan omdat wanneer hij straks klaar is.
- 4-2-A Hij heeft beter dan mij zijn best gedaan.
- 4-2-B Hij heeft beter dan ik zijn best gedaan.
- 4-2-C Hij heeft beter dan omdat zijn best gedaan.
- 4-3-A De buurman maait vaker dan mij het gras in de zomer.
- 4-3-B De buurman maait vaker dan ik het gras in de zomer.
- 4-3-C De buurman maait vaker dan omdat het gras in de zomer.
- 4-4-A Sanne ruimt vaker dan mij haar kamer op.
- 4-4-B Sanne ruimt vaker dan ik haar kamer op.
- 4-4-C Sanne ruimt vaker dan omdat haar kamer op.
- 4-5-A Steven heeft sneller dan mij zijn rijbewijs gehaald.
- 4-5-B Steven heeft sneller dan ik zijn rijbewijs gehaald.
- 4-5-C Steven heeft sneller dan omdat zijn rijbewijs gehaald.
- 4-6-A Henk heeft meer dan mij gedaan in huis.
- 4-6-B Henk heeft meer dan ik gedaan in huis.
- 4-6-C Henk heeft meer dan omdat gedaan in huis.
- 4-7-A Jullie liepen harder dan mij tijdens de marathon.
- 4-7-B Jullie liepen harder dan ik tijdens de marathon.
- 4-7-C Jullie liepen harder dan omdat tijdens de marathon.
- 4-8-A Mijn collega gaat langer dan mij weg in de vakantie.
- 4-8-B Mijn collega gaat langer dan ik weg in de vakantie.
- 4-8-C Mijn collega gaat langer dan omdat weg in de vakantie.
- 4-9-A Jij bent beter dan mij in het verdedigen van het doel.
- 4-9-B Jij bent beter dan ik in het verdedigen van het doel.
- 4-9-C Jij bent beter dan omdat in het verdedigen van het doel.
- 4-10-A De jongen is groter dan mij sinds zijn groeispurt.
- 4-10-B De jongen is groter dan ik sinds zijn groeispurt.
- 4-10-C De jongen is groter dan omdat sinds zijn groeispurt.
- 4-11-A Zij is veel sneller dan mij met het inpakken van haar koffers.
- 4-11-B Zij is veel sneller dan ik met het inpakken van haar koffers.
- 4-11-C Zij is veel sneller dan omdat met het inpakken van haar koffers.
- 4-12-A Jij bent veel beter dan mij in het bedenken van oplossingen.
- 4-12-B Jij bent veel beter dan ik in het bedenken van oplossingen.
- 4-12-C Jij bent veel beter dan omdat in het bedenken van oplossingen.
- 4-13-A Niemand is eerder dan mij naar bed gegaan gisteren.
- 4-13-B Niemand is eerder dan ik naar bed gegaan gisteren.
- 4-13-C Niemand is eerder dan omdat naar bed gegaan gisteren.
- 4-14-A Zij koopt vaker dan mij een taart met slagroom.
- 4-14-B Zij koopt vaker dan ik een taart met slagroom.
- 4-14-C Zij koopt vaker dan omdat een taart met slagroom.
- 4-15-A Hij is gevoeliger dan mij voor dat soort dingen.
- 4-15-B Hij is gevoeliger dan ik voor dat soort dingen.
- 4-15-C Hij is gevoeliger dan omdat voor dat soort dingen.
- 4-16-A Een soldaat rent sneller dan mij wanneer hij getraind heeft.
- 4-16-B Een soldaat rent sneller dan ik wanneer hij getraind heeft.

- 4-16-C Een soldaat rent sneller dan omdat wanneer hij getraind heeft.
- 4-17-A Mijn paard onthoudt beter dan mij de route van het parcours.
- 4-17-B Mijn paard onthoudt beter dan ik de route van het parcours.
- 4-17-C Mijn paard onthoudt beter dan omdat de route van het parcours.
- 4-18-A Jij kunt hoger dan mij klimmen in deze boom.
- 4-18-B Jij kunt hoger dan ik klimmen in deze boom.
- 4-18-C Jij kunt hoger dan omdat klimmen in deze boom.
- 4-19-A Zij is zeker niet beter dan mij in schaken tegen de computer.
- 4-19-B Zij is zeker niet beter dan ik in schaken tegen de computer.
- 4-19-C Zij is zeker niet beter dan omdat in schaken tegen de computer.
- 4-20-A Kan hij duidelijker dan mij die opdracht uitleggen?
- 4-20-B Kan hij duidelijker dan ik die opdracht uitleggen?
- 4-20-C Kan hij duidelijker dan omdat die opdracht uitleggen?
- 4-21-A Jan werkt even hard als mij aan de opdracht.
- 4-21-B Jan werkt even hard als ik aan de opdracht.
- 4-21-C Jan werkt even hard als omdat aan de opdracht.
- 4-22-A Gert verdient net zo veel als mij met zijn krantenwijk.
- 4-22-B Gert verdient net zo veel als ik met zijn krantenwijk.
- 4-22-C Gert verdient net zo veel als omdat met zijn krantenwijk.
- 4-23-A Zij is niet zo lief als mij voor die jongen.
- 4-23-B Zij is niet zo lief als ik voor die jongen.
- 4-23-C Zij is niet zo lief als omdat voor die jongen.
- 4-24-A Heb jij net zo veel zin als mij in het eten?
- 4-24-B Heb jij net zo veel zin als ik in het eten?
- 4-24-C Heb jij net zo veel zin als omdat in het eten?
- 4-25-A Hebben jullie net zo genoten als mij van de voorstelling?
- 4-25-B Hebben jullie net zo genoten als ik van de voorstelling?
- 4-25-C Hebben jullie net zo genoten als omdat van de voorstelling?
- 4-26-A Mijn vriend is net zo fanatiek als mij op het sportveld.
- 4-26-B Mijn vriend is net zo fanatiek als ik op het sportveld.
- 4-26-C Mijn vriend is net zo fanatiek als omdat op het sportveld.
- 4-27-A Niemand is zo bang als mij in die achtbaan.
- 4-27-B Niemand is zo bang als ik in die achtbaan.
- 4-27-C Niemand is zo bang als omdat in die achtbaan.
- 4-28-A Dirk is even geschikt als mij voor die functie.
- 4-28-B Dirk is even geschikt als ik voor die functie.
- 4-28-C Dirk is even geschikt als omdat voor die functie.
- 4-29-A Lotte is niet zo handig als mij in dat soort dingen.
- 4-29-B Lotte is niet zo handig als ik in dat soort dingen.
- 4-29-C Lotte is niet zo handig als omdat in dat soort dingen.
- 4-30-A Zij is net zo groot als mij op die hoge hakken.
- 4-30-B Zij is net zo groot als ik op die hoge hakken.
- 4-30-C Zij is net zo groot als omdat op die hoge hakken.
- 5-1-A Kun jij het raam die daar op een kiertje staat dichtdoen?
- 5-1-B Kun jij het raam dat daar op een kiertje staat dichtdoen?
- 5-1-C Kun jij het raam dit daar op een kiertje staat dichtdoen?

- 5-2-A Ik zoek het gebouw die vroeger als school werd gebruikt.
- 5-2-B Ik zoek het gebouw dat vroeger als school werd gebruikt.
- 5-2-C Ik zoek het gebouw dit vroeger als school werd gebruikt.
- 5-3-A Ik vind het ijs die naar kaneel smaakt niet lekker.
- 5-3-B Ik vind het ijs dat naar kaneel smaakt niet lekker.
- 5-3-C Ik vind het ijs dit naar kaneel smaakt niet lekker.
- 5-4-A Bestaat er ook gras die je nooit hoeft te maaien?
- 5-4-B Bestaat er ook gras dat je nooit hoeft te maaien?
- 5-4-C Bestaat er ook gras dit je nooit hoeft te maaien?
- 5-5-A Ga jij naar het festival die morgen in het dorp plaatsvindt?
- 5-5-B Ga jij naar het festival dat morgen in het dorp plaatsvindt?
- 5-5-C Ga jij naar het festival dit morgen in het dorp plaatsvindt?
- 5-6-A Wij gaan naar het museum die net geopend is.
- 5-6-B Wij gaan naar het museum dat net geopend is.
- 5-6-C Wij gaan naar het museum dit net geopend is.
- 5-7-A Ik kies het bed die in de hoek van de kamer staat.
- 5-7-B Ik kies het bed dat in de hoek van de kamer staat.
- 5-7-C Ik kies het bed dit in de hoek van de kamer staat.
- 5-8-A Wij kregen een stuk vlees die niet goed gaar was.
- 5-8-B Wij kregen een stuk vlees dat niet goed gaar was.
- 5-8-C Wij kregen een stuk vlees dit niet goed gaar was.
- 5-9-A Jan drinkt graag het sap die vers geperst is.
- 5-9-B Jan drinkt graag het sap dat vers geperst is.
- 5-9-C Jan drinkt graag het sap dit vers geperst is.
- 5-10-A Waar zag je het huis die te koop staat?
- 5-10-B Waar zag je het huis dat te koop staat?
- 5-10-C Waar zag je het huis dit te koop staat?
- 5-11-A Ik heb zijn boek die net is uitgebracht gelezen.
- 5-11-B Ik heb zijn boek dat net is uitgebracht gelezen.
- 5-11-C Ik heb zijn boek dit net is uitgebracht gelezen.
- 5-12-A Ze hebben het buurtcentrum die al jaren leegstaat gesloopt.
- 5-12-B Ze hebben het buurtcentrum dat al jaren leegstaat gesloopt.
- 5-12-C Ze hebben het buurtcentrum dit al jaren leegstaat gesloopt.
- 5-13-A Het grasveld die door de gemeente wordt onderhouden is helemaal geel.
- 5-13-B Het grasveld dat door de gemeente wordt onderhouden is helemaal geel.
- 5-13-C Het grasveld dit door de gemeente wordt onderhouden is helemaal geel.
- 5-14-A Laatst is het huis die pas was verkocht afgebrand.
- 5-14-B Laatst is het huis dat pas was verkocht afgebrand.
- 5-14-C Laatst is het huis dit pas was verkocht afgebrand.
- 5-15-A Het schilderij die boven de kachel hing is gevallen.
- 5-15-B Het schilderij dat boven de kachel hing is gevallen.
- 5-15-C Het schilderij dit boven de kachel hing is gevallen.
- 5-16-A Dat is het bestek die mijn grootouders mij hebben nagelaten.
- 5-16-B Dat is het bestek dat mijn grootouders mij hebben nagelaten.
- 5-16-C Dat is het bestek dit mijn grootouders mij hebben nagelaten.
- 5-17-A Ik respecteer het besluit die de voorzitter heeft genomen.

- 5-17-B Ik respecteer het besluit dat de voorzitter heeft genomen.
- 5-17-C Ik respecteer het besluit dit de voorzitter heeft genomen.
- 5-18-A Dit is het wasmiddel die deze week in de aanbidding is.
- 5-18-B Dit is het wasmiddel dat deze week in de aanbidding is.
- 5-18-C Dit is het wasmiddel dit deze week in de aanbidding is.
- 5-19-A Gooi jij het bord die Peter heeft gebroken weg?
- 5-19-B Gooi jij het bord dat Peter heeft gebroken weg?
- 5-19-C Gooi jij het bord dit Peter heeft gebroken weg?
- 5-20-A Daarachter ligt het gebied die de boer heeft opgekocht.
- 5-20-B Daarachter ligt het gebied dat de boer heeft opgekocht.
- 5-20-C Daarachter ligt het gebied dit de boer heeft opgekocht.
- 5-21-A Is het bureau die daar staat voor mij bedoeld?
- 5-21-B Is het bureau dat daar staat voor mij bedoeld?
- 5-21-C Is het bureau dit daar staat voor mij bedoeld?
- 5-22-A Waar ligt het schip die de aanvaring heeft veroorzaakt?
- 5-22-B Waar ligt het schip dat de aanvaring heeft veroorzaakt?
- 5-22-C Waar ligt het schip dit de aanvaring heeft veroorzaakt?
- 5-23-A Wat vindt hij van het cadeau die hij gekregen heeft?
- 5-23-B Wat vindt hij van het cadeau dat hij gekregen heeft?
- 5-23-C Wat vindt hij van het cadeau dit hij gekregen heeft?
- 5-24-A Lisa is dol op het paard die ze al twee jaar verzorgt.
- 5-24-B Lisa is dol op het paard dat ze al twee jaar verzorgt.
- 5-24-C Lisa is dol op het paard dit ze al twee jaar verzorgt.
- 5-25-A Wij zitten op het terras die op de Maas uitkijkt.
- 5-25-B Wij zitten op het terras dat op de Maas uitkijkt.
- 5-25-C Wij zitten op het terras dit op de Maas uitkijkt.
- 5-26-A Hij was niet blij met het filmpje die van hem was gemaakt.
- 5-26-B Hij was niet blij met het filmpje dat van hem was gemaakt.
- 5-26-C Hij was niet blij met het filmpje dit van hem was gemaakt.
- 5-27-A Vera is in het vliegtuig die naar Londen gaat gestapt.
- 5-27-B Vera is in het vliegtuig dat naar Londen gaat gestapt.
- 5-27-C Vera is in het vliegtuig dit naar Londen gaat gestapt.
- 5-28-A Gaat Kees ook naar het evenement die vandaag in de stad is?
- 5-28-B Gaat Kees ook naar het evenement dat vandaag in de stad is?
- 5-28-C Gaat Kees ook naar het evenement dit vandaag in de stad is?
- 5-29-A Op het feest die erg laat begon kwamen weinig mensen.
- 5-29-B Op het feest dat erg laat begon kwamen weinig mensen.
- 5-29-C Op het feest dit erg laat begon kwamen weinig mensen.
- 5-30-A Door het scherm die ervoor stond kon niemand de voorstelling zien.
- 5-30-B Door het scherm dat ervoor stond kon niemand de voorstelling zien.
- 5-30-C Door het scherm dit ervoor stond kon niemand de voorstelling zien.

Social/Semantic Items

ID	Sentence
1-1-A-S	De kat was verwaarloosd toen ze terugkwamen van vakantie.
1-1-B-S	De kat was blij toen ze terugkwamen van vakantie.
1-1-C-S	De kat was paars toen ze terugkwamen van vakantie.
1-2-A-S	De hond was verwaarloosd toen ze hem ophaalden na de vakantie.
1-2-B-S	De hond was blij toen ze hem ophaalden na de vakantie.
1-2-C-S	De hond was paars toen ze hem ophaalden na de vakantie.
2-1-A-S	De jongen spuugde op de grond in de feestzaal.
2-1-B-S	De jongen zat op het bankje in de feestzaal.
2-1-C-S	De jongen zat op een regenboog in de feestzaal.
2-2-A-S	De fysiotherapeut spuugde op de grond tijdens de massage.
2-2-B-S	De fysiotherapeut stelde haar een vraag tijdens de massage.
2-2-C-S	De fysiotherapeut betaalde haar een vraag tijdens de massage.
3-1-A-S	Tijdens de les kneep hij het puistje uit op zijn voorhoofd.
3-1-B-S	Tijdens de les haalde hij het pluisje weg van zijn voorhoofd.
3-1-C-S	Tijdens de les haalde hij de droom weg van zijn voorhoofd.
3-2-A-S	Op het schoolplein kneep hij het puistje uit in zijn nek.
3-2-B-S	Op het schoolplein haalde hij het pluisje weg uit zijn nek.
3-2-C-S	Op het schoolplein haalde hij het vliegtuig weg uit zijn nek.
4-1-A-S	De pastoor sloeg een kindje tijdens de mis.
4-1-B-S	De pastoor sloeg een kruisje tijdens de mis.
4-1-C-S	De pastoor sloeg een cadeau tijdens de mis.
4-2-A-S	De priester sloeg een kindje in de kerk.
4-2-B-S	De priester sloeg een kruisje in de kerk.
4-2-C-S	De priester sloeg een cadeau in de kerk.
5-1-A-S	Hij zat in de trein met zijn voeten op de bank.
5-1-B-S	Hij zat in de trein naast zijn vriend op de bank.
5-1-C-S	Hij zat in de trein naast zijn flatgebouw op de bank.
5-2-A-S	Zij zat in de kerk met haar voeten op de bank.
5-2-B-S	Zij zat in de kerk naast haar vriend op de bank.
5-2-C-S	Zij zat in de kerk naast haar flatgebouw op de bank.
6-1-A-S	Hij liep met ontbloot bovenlijf de supermarkt in op zondag.
6-1-B-S	Hij liep met ontbloot bovenlijf de badkamer in op zondag.
6-1-C-S	Hij liep met ontbloot bovenlijf de theepot in op zondag.
6-2-A-S	De bestuurder zet zijn auto op twee parkeerplaatsen tijdens de drukte.
6-2-B-S	De bestuurder zet zijn auto in het vak tijdens de drukte.
6-2-C-S	De bestuurder zet zijn auto op de lucht tijdens de drukte.
7-1-A-S	De kapster knipte haar teennagels in de kapsalon.
7-1-B-S	De kapster knipte de klant in de kapsalon.
7-1-C-S	De kapster knipte de koektrommels in de kapsalon.
7-2-A-S	De conducteur knipte zijn nagels in de trein.
7-2-B-S	De conducteur knipte de kaartjes in de trein.
7-2-C-S	De conducteur knipte de koektrommels in de trein.
8-1-A-S	De klant floste zijn tanden in de wachtkamer van de notaris.
8-1-B-S	De klant las een tijdschrift in de wachtkamer van de notaris.

- 8-1-C-S De klant las een auto in de wachtkamer van de notaris.
- 8-2-A-S De leerling spiekt tijdens het proefwerk.
- 8-2-B-S De leerling gaapt tijdens het proefwerk.
- 8-2-C-S De leerling roeit tijdens het proefwerk.
- 9-1-A-S De reiziger duwde iedereen hard aan de kant.
- 9-1-B-S De reiziger ging voor iedereen aan de kant.
- 9-1-C-S De reiziger ging voor lucht aan de kant.
- 9-2-A-S De man duwde iedereen hard aan de kant.
- 9-2-B-S De man ging voor iedereen aan de kant.
- 9-2-C-S De man ging voor lucht aan de kant.
- 10-1-A-S Pieter hoestte zonder hand voor zijn mond tijdens het gesprek.
- 10-1-B-S Pieter hoestte met hand voor zijn mond tijdens het gesprek.
- 10-1-C-S Pieter hoestte met tol voor zijn mond tijdens het gesprek.
- 10-2-A-S Niels hoestte zonder hand voor zijn mond tijdens het eten.
- 10-2-B-S Niels hoestte met hand voor zijn mond tijdens het eten.
- 10-2-C-S Niels hoestte met tol voor zijn mond tijdens het eten.
- 11-1-A-S De medewerker liet een harde wind in de overvolle lift.
- 11-1-B-S De medewerker liet een pen vallen in de overvolle lift.
- 11-1-C-S De medewerker liet een pen tennissen in de overvolle lift.
- 11-2-A-S De sollicitant liet een harde wind tijdens het sollicitatiegesprek.
- 11-2-B-S De sollicitant liet een pen vallen tijdens het sollicitatiegesprek.
- 11-2-C-S De sollicitant liet een pen tennissen tijdens het sollicitatiegesprek.
- 12-1-A-S De oude man kneep in de billen van het meisje.
- 12-1-B-S De oude man keek naar de tas van het meisje.
- 12-1-C-S De oude man keek naar de oorlog van het meisje.
- 12-2-A-S De jonge man kneep in de billen van het meisje.
- 12-2-B-S De jonge man leende de blauwe pen van het meisje.
- 12-2-C-S De jonge man dronk de blauwe pen van het meisje.
- 13-1-A-S De jongeren roepen het meisje na in het winkelcentrum.
- 13-1-B-S De jongeren begroeten het meisje vrolijk in het winkelcentrum.
- 13-1-C-S De jongeren borduren het meisje vrolijk in het winkelcentrum.
- 13-2-A-S De jongens roepen het meisje na op het schoolplein.
- 13-2-B-S De jongens begroeten het meisje vrolijk op het schoolplein.
- 13-2-C-S De jongens borduren het meisje vrolijk op het schoolplein.
- 14-1-A-S De leraar maakt een racistische opmerking in de klas.
- 14-1-B-S De leraar maakt een mooie tekening in de klas.
- 14-1-C-S De leraar maakt een mooie eerlijkheid in de klas.
- 14-2-A-S Willem maakt een racistische opmerking tijdens de cursus.
- 14-2-B-S Willem maakt een mooie tekening tijdens de cursus.
- 14-2-C-S Willem maakt een mooie eerlijkheid tijdens de cursus.
- 15-1-A-S De zakenman krabt in zijn kruis tijdens de vergadering.
- 15-1-B-S De zakenman drinkt zijn thee op tijdens de vergadering.
- 15-1-C-S De zakenman drinkt zijn salade op tijdens de vergadering.
- 15-2-A-S De werknemer krabt in zijn kruis tijdens het gesprek.
- 15-2-B-S De werknemer drinkt zijn thee op tijdens het gesprek.
- 15-2-C-S De werknemer drinkt zijn salade op tijdens het gesprek.

- 16-1-A-S De vrouwen schelden het kind uit in de winkel.
- 16-1-B-S De vrouwen knuffelen het huilende kind in de winkel.
- 16-1-C-S De vrouwen breien het huilende kind in de winkel.
- 16-2-A-S De vader scheldt alle kinderen uit na de verloren voetbalwedstrijd.
- 16-2-B-S De vader knuffelt het verdrietige kind na de verloren voetbalwedstrijd.
- 16-2-C-S De vader knutselt het verdrietige kind na de verloren voetbalwedstrijd.
- 17-1-A-S De vrouw schopt haar hond op de markt.
- 17-1-B-S De vrouw aait een hond op de markt.
- 17-1-C-S De vrouw aait de zon op de markt.
- 17-2-A-S De voorbijganger schopt zijn hond op straat.
- 17-2-B-S De voorbijganger aait een hond op straat.
- 17-2-C-S De voorbijganger aait de zon op straat.
- 18-1-A-S De jonge vrouw haalt hem opzettelijk onderuit in de winkelstraat.
- 18-1-B-S De jonge vrouw wandelt hem rustig voorbij in de winkelstraat.
- 18-1-C-S De jonge vrouw vaart hem rustig voorbij in de winkelstraat.
- 18-2-A-S De hardloper haalt hem opzettelijk onderuit tijdens de training.
- 18-2-B-S De hardloper wandelt hem rustig voorbij tijdens de training.
- 18-2-C-S De hardloper vaart hem rustig voorbij tijdens de training.
- 19-1-A-S Zij ging vreemd met de buurman.
- 19-1-B-S Zij ging praten met de buurman.
- 19-1-C-S Zij ging spellen met de buurman.
- 19-2-A-S Susan ging vreemd met haar collega.
- 19-2-B-S Susan ging praten met haar collega.
- 19-2-C-S Susan ging dopen met haar collega.
- 20-1-A-S Hij loopt met modderige schoenen het huis in.
- 20-1-B-S Hij loopt met de boodschappen het huis in.
- 20-1-C-S Hij loopt met de vulkanen het huis in.
- 20-2-A-S De buschauffeur reed snel weg toen hij de vrouw zag aankomen.
- 20-2-B-S De buschauffeur wachtte nog even toen hij de vrouw zag aankomen.
- 20-2-C-S De buschauffeur maakte een koprol toen hij de vrouw zag aankomen.
- 21-1-A-S Hij kreeg de slappe lach tijdens de begrafenis.
- 21-1-B-S Hij kreeg erg veel steun tijdens de begrafenis.
- 21-1-C-S Hij kreeg erg veel torens tijdens de begrafenis.
- 21-2-A-S Tim had de slappe lach tijdens de crematie van Kim.
- 21-2-B-S Tim had het heel moeilijk tijdens de crematie van Kim.
- 21-2-C-S Tim had een paar kerken tijdens de crematie van Kim.
- 22-1-A-S De puber stak zijn middelvinger op naar zijn vader.
- 22-1-B-S De puber gaf zijn goede rapport aan zijn vader.
- 22-1-C-S De puber gaf zijn zure ramen aan zijn vader.
- 22-2-A-S De tiener stak zijn middelvinger op naar zijn docent.
- 22-2-B-S De tiener gaf zijn gemaakte huiswerk aan zijn docent.
- 22-2-C-S De tiener gaf zijn gebreide ideeën aan zijn docent.
- 23-1-A-S Hij zet een fictieve baan op zijn CV.
- 23-1-B-S Hij zet zijn netste handtekening op zijn CV.
- 23-1-C-S Hij zet een bruine kameel op zijn CV.
- 23-2-A-S De buurman is hartstikke agressief op zijn eigen feest.

- 23-2-B-S De buurman is hartstikke blij op zijn eigen feest.
- 23-2-C-S De buurman is hartstikke ovaal op zijn eigen feest.
- 24-1-A-S Hij heeft de geleende spullen niet teruggegeven aan zijn buurvrouw.
- 24-1-B-S Hij heeft de geleende spullen gisteren teruggegeven aan zijn buurvrouw.
- 24-1-C-S Hij heeft de geleende spullen snel uitgelegd aan zijn buurvrouw.
- 24-2-A-S Jurgen heeft de geleende spullen niet teruggegeven aan zijn collega.
- 24-2-B-S Jurgen heeft de geleende spullen gisteren teruggegeven aan zijn collega.
- 24-2-C-S Jurgen heeft de geleende spullen snel uitgelegd aan zijn collega.
- 25-1-A-S In de klas lacht de docent hem uit om zijn hobby.
- 25-1-B-S In de klas hoort de docent hem uit over zijn hobby.
- 25-1-C-S In de klas werkt de docent hem uit over zijn hobby.
- 25-2-A-S Tijdens de bijeenkomst lacht de voorzitter hem uit om zijn mening.
- 25-2-B-S Tijdens de bijeenkomst hoort de voorzitter hem uit over zijn mening.
- 25-2-C-S Tijdens de bijeenkomst werkt de voorzitter hem uit over zijn mening.
- 26-1-A-S Sharon gooit met stenen naar het buurmeisje.
- 26-1-B-S Sharon gooit het balletje naar het buurmeisje.
- 26-1-C-S Sharon gooit het kampvuur naar het buurmeisje.
- 26-2-A-S Pieter gooit met stenen naar de kleuters.
- 26-2-B-S Pieter gooit het balletje naar de kleuters.
- 26-2-C-S Pieter gooit het kampvuur naar de kleuters.
- 27-1-A-S De docenten roddelen over de nieuwe leerling.
- 27-1-B-S De docenten praten met de nieuwe leerling.
- 27-1-C-S De docenten snurken met de nieuwe leerling.
- 27-2-A-S De leidsters roddelen over het kind.
- 27-2-B-S De leidsters praten met het kind.
- 27-2-C-S De leidsters snurken met het kind.
- 28-1-A-S Hans kijkt naar pikante films op zijn werk.
- 28-1-B-S Hans kijkt naar het dossier op zijn werk.
- 28-1-C-S Hans kijkt naar de gedachten op zijn werk.
- 28-2-A-S Rachid kijkt naar pikante films in het tussenuur.
- 28-2-B-S Rachid kijkt naar zijn rooster in het tussenuur.
- 28-2-C-S Rachid kijkt naar de gedachten in het tussenuur.
- 29-1-A-S Hij blaast de rook in haar gezicht na het avondeten.
- 29-1-B-S Hij blaast de rook uit het raam na het avondeten.
- 29-1-C-S Hij blaast de rook op de dierentuin na het avondeten.
- 29-2-A-S Stefan liep over de graven van de begraafplaats.
- 29-2-B-S Stefan liep over de paden van de begraafplaats.
- 29-2-C-S Stefan liep over de dierentuin van de begraafplaats.
- 30-1-A-S Hij vertrok zonder te groeten van het feestje.
- 30-1-B-S Hij vertrok met goed humeur van het feestje.
- 30-1-C-S Hij vertrok met goed riet van het feestje.
- 30-2-A-S Sasha ging zonder te groeten weg van het kerstdiner.
- 30-2-B-S Sasha ging met goed humeur weg van het kerstdiner.
- 30-2-C-S Sasha ging met goed riet weg van het kerstdiner.
- 31-1-A-S De jongens maakten geen plaats voor de ouderen in de bus.
- 31-1-B-S De jongens maakten graag plaats voor de ouderen in de bus.

- 31-1-C-S De jongens maakten graag lucht voor de ouderen in de bus.
- 31-2-A-S De kinderen maakten geen plaats voor de gehandicapten in de kantine.
- 31-2-B-S De kinderen maakten graag plaats voor de gehandicapten in de kantine.
- 31-2-C-S De kinderen maakten graag lucht voor de gehandicapten in de kantine.
- 32-1-A-S De lange man in het publiek praat hardop tijdens de toespraak.
- 32-1-B-S De lange man in het publiek is stil tijdens de toespraak.
- 32-1-C-S De lange man in het publiek is lila tijdens de toespraak.
- 32-2-A-S De beledigde politicus in het publiek praat hardop tijdens de troonrede.
- 32-2-B-S De beledigde politicus in het publiek is stil tijdens de troonrede.
- 32-2-C-S De beledigde politicus in het publiek is lila tijdens de troonrede.
- 33-1-A-S De oude dame kruipt voor in de rij bij de kassa.
- 33-1-B-S De oude dame sluit achteraan in de rij bij de kassa.
- 33-1-C-S De oude dame fietst achteraan in de rij bij de kassa.
- 33-2-A-S De jonge man kruipt voor in de rij bij de bioscoop.
- 33-2-B-S De jonge man sluit achteraan in de rij bij de bioscoop.
- 33-2-C-S De jonge man fietst achteraan in de rij bij de bioscoop.
- 34-1-A-S De leerling plakt de kauwgom onder zijn stoel op school.
- 34-1-B-S De leerling gooit de kauwgom in de prullenbak op school.
- 34-1-C-S De leerling plakt de baksteen onder zijn stoel op school.
- 34-2-A-S De kerkganger plakt de kauwgom onder de bank in de kerk.
- 34-2-B-S De kerkganger gooit de kauwgom in de prullenbak in de kerk.
- 34-2-C-S De kerkganger plakt de baksteen onder de bank in de kerk.
- 35-1-A-S Zijn vader laat een flinke boer tijdens het diner.
- 35-1-B-S Zijn vader laat zijn servet vallen tijdens het diner.
- 35-1-C-S Zijn vader laat zijn giraffe vallen tijdens het diner.
- 35-2-A-S Zijn oom laat een flinke boer tijdens de lunch.
- 35-2-B-S Zijn oom laat zijn servet vallen tijdens de lunch.
- 35-2-C-S Zijn oom laat zijn giraffe vallen tijdens de lunch.
- 36-1-A-S De manager neemt alle pennen van kantoor mee naar huis.
- 36-1-B-S De manager neemt al het overige werk mee naar huis.
- 36-1-C-S De manager neemt alle vogels op kantoor mee naar huis.
- 36-2-A-S De directeur neemt meubilair van kantoor mee naar huis.
- 36-2-B-S De directeur neemt werk van kantoor mee naar huis.
- 36-2-C-S De directeur neemt paarden van kantoor mee naar huis.
- 37-1-A-S Het baasje laat de hondenpoep liggen op de stoep.
- 37-1-B-S Het baasje pakt zijn puppy op van de stoep.
- 37-1-C-S Het baasje pakt de rivier op van de stoep.
- 37-2-A-S De buurvrouw laat het vuilnis liggen in haar voortuin.
- 37-2-B-S De buurvrouw ruimt het vuilnis op in haar voortuin.
- 37-2-C-S De buurvrouw ruimt de rivier op in haar voortuin.
- 38-1-A-S Hij ging naar het feest zonder een cadeau voor de jarige.
- 38-1-B-S Hij ging naar het feest met een cadeau voor de jarige.
- 38-1-C-S Hij ging naar het feest met een olifant voor de jarige.
- 38-2-A-S De vader ging naar de bruiloft zonder een cadeau voor het bruidspaar.
- 38-2-B-S De vader ging naar de bruiloft met een cadeau voor het bruidspaar.
- 38-2-C-S De vader ging naar de bruiloft met een olifant voor het bruidspaar.

- 39-1-A-S Ad zingt in de stiltecoupé met zijn vriend.
- 39-1-B-S Ad zingt in een koor met zijn vriend.
- 39-1-C-S Ad zingt in de prullenmand met zijn vriend.
- 39-2-A-S Janneke zong in de stiltecoupé met haar vriendin.
- 39-2-B-S Janneke zong in een koor met haar vriendin.
- 39-2-C-S Janneke zong in de prullenmand met haar vriendin.
- 40-1-A-S De vrouw ging door met bellen terwijl ze aan het afrekenen was.
- 40-1-B-S De vrouw maakte een kort praatje terwijl ze aan het afrekenen was.
- 40-1-C-S De vrouw maakte een korte naaimachine terwijl ze aan het afrekenen was.
- 40-2-A-S De caissière ging door met bellen terwijl ze de boodschappen scande.
- 40-2-B-S De caissière maakte een kort praatje terwijl ze de boodschappen scande.
- 40-2-C-S De caissière maakte een korte naaimachine terwijl ze de boodschappen scande.
- 41-1-A-S Het kind speelt vals tijdens het ganzenborden.
- 41-1-B-S Het kind eet chips tijdens het ganzenborden.
- 41-1-C-S Het kind eet laarzen tijdens het ganzenborden.
- 41-2-A-S De jongen speelt vals tijdens het pokeren.
- 41-2-B-S De jongen eet chips tijdens het pokeren.
- 41-2-C-S De jongen eet laarzen tijdens het pokeren.
- 42-1-A-S De vrouw smakte hard tijdens het eten.
- 42-1-B-S De vrouw dronk thee tijdens het eten.
- 42-1-C-S De vrouw dronk lampen tijdens het eten.
- 42-2-A-S Onze gast smakte hard tijdens de picknick.
- 42-2-B-S Onze gast dronk thee tijdens de picknick.
- 42-2-C-S Onze gast dronk lampen tijdens de picknick.
- 43-1-A-S Vincent waste zijn handen niet na het toiletbezoek.
- 43-1-B-S Vincent waste zijn handen grondig na het toiletbezoek.
- 43-1-C-S Vincent waste zijn handen vierkant na het toiletbezoek.
- 43-2-A-S Marlie waste haar handen niet na het plassen.
- 43-2-B-S Marlie waste haar handen grondig na het plassen.
- 43-2-C-S Marlie waste haar handen vierkant na het plassen.
- 44-1-A-S De jongen plast tegen een boom in het park.
- 44-1-B-S De jongen leunen tegen een boom in het park.
- 44-1-C-S De jongen plukken tegen een boom in het park.
- 44-2-A-S De oude man plast tegen de muur.
- 44-2-B-S De oude man leunt tegen de muur.
- 44-2-C-S De oude man plukt tegen de muur.
- 45-1-A-S De gastspreker was veel te laat voor zijn lezing.
- 45-1-B-S De gastspreker was exact op tijd voor zijn lezing.
- 45-1-C-S De gastspreker kroop exact op tijd voor zijn lezing.
- 45-2-A-S De baas was veel te laat voor de vergadering.
- 45-2-B-S De baas was precies op tijd voor de vergadering.
- 45-2-C-S De baas kroop precies op tijd voor de vergadering.

Appendix III: Questionnaire and paper-and-pencil test

Questionnaire

1. Persoonlijke gegevens

Geslacht M V

Geboortedatum

Geboorteplaats

Waar bent u opgegroeid?

Bent u opgegroeid met dialect?
Zo ja, met welk(e) dialect(en)?

Spreekt u nog andere talen?
Zo ja, welke talen

Als u nog andere talen beheerst, geef hieronder dan aan wat uw niveau is. Doe dit voor spreken, luisteren, lezen en schrijven.

Taal 1:.....

Spreken <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> erg slecht uitstekend	Luisteren <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> erg slecht uitstekend	Lezen <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> erg slecht uitstekend	Schrijven <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> erg slecht uitstekend
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Taal 2:.....

Spreken <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> erg slecht uitstekend	Luisteren <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> erg slecht uitstekend	Lezen <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> erg slecht uitstekend	Schrijven <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> erg slecht uitstekend
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Taal 3:.....

Spreken <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> erg slecht uitstekend	Luisteren <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> erg slecht uitstekend	Lezen <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> erg slecht uitstekend	Schrijven <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> erg slecht uitstekend
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Taal 4:.....

Spreken <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> erg slecht uitstekend	Luisteren <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> erg slecht uitstekend	Lezen <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> erg slecht uitstekend	Schrijven <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> erg slecht uitstekend
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Paper-and-pencil test

Test na afloop van het experiment

Deel 1. Sociaal (on)acceptabel

Instructie

Het zou kunnen dat u een aantal van deze zinnen in het experiment bent tegengekomen.

Ik wil u vragen om van de onderstaande zinnen aan te geven hoe sociaal acceptabel u de situatie vindt die deze zin uitdrukt.

Dit kunt u aangeven op een schaal van 1 tot en met 5, waarbij 1 staat voor 'Sociaal onacceptabel' en 5 voor 'Sociaal acceptabel'.

Denk niet te lang na, maar ga af op uw intuïtie.

Zin								
Zijn oom laat een flinke boer tijdens de lunch.	Sociaal onacceptabel	1	2	3	4	5	Sociaal acceptabel	
In de klas hoort de docent hem uit over zijn hobby.	Sociaal onacceptabel	1	2	3	4	5	Sociaal acceptabel	
De pastoor sloeg een kindje tijdens de mis.	Sociaal onacceptabel	1	2	3	4	5	Sociaal acceptabel	
De baas was veel te laat voor de vergadering.	Sociaal onacceptabel	1	2	3	4	5	Sociaal acceptabel	
Hij kreeg erg veel steun tijdens de begrafenis.	Sociaal onacceptabel	1	2	3	4	5	Sociaal acceptabel	
Vincent waste zijn handen grondig na het toiletbezoek.	Sociaal onacceptabel	1	2	3	4	5	Sociaal acceptabel	
De leidsters roddelen over het kind.	Sociaal onacceptabel	1	2	3	4	5	Sociaal acceptabel	
Sharon gooit met stenen naar het buurmeisje.	Sociaal onacceptabel	1	2	3	4	5	Sociaal acceptabel	
De manager neemt al het overige werk mee naar huis.	Sociaal onacceptabel	1	2	3	4	5	Sociaal acceptabel	
De jongens maakten graag plaats voor de ouderen in de bus.	Sociaal onacceptabel	1	2	3	4	5	Sociaal acceptabel	
De jonge vrouw haalt hem opzettelijk onderuit in de winkelstraat.	Sociaal onacceptabel	1	2	3	4	5	Sociaal acceptabel	
De oude man keek naar de tas van het meisje.	Sociaal onacceptabel	1	2	3	4	5	Sociaal acceptabel	

Deel 2. Grammaticaal/ongrammaticaal

Instructie

Het zou kunnen dat u een aantal van deze zinnen in het experiment bent tegengekomen.

Ik wil u vragen om van de onderstaande zinnen aan te geven of ze grammaticaal correct zijn of niet door 'ja' of 'nee' te omcirkelen.

Vervolgens kunt u aangeven hoe zeker u bent van uw antwoord op een schaal van 1 tot en met 5, waarbij 1 staat voor 'Heel onzeker' en 5 voor 'Heel zeker'.

Denk niet te lang na, maar ga af op uw intuïtie.

Zin	Grammaticaal correct?							
Hebben jullie net zo genoten als ik van de voorstelling?	ja/nee	Heel onzeker	1	2	3	4	5	Heel zeker
Hij smeekte hun om niet te gaan.	ja/nee	Heel onzeker	1	2	3	4	5	Heel zeker
Sanne ruimt vaker dan omdat haar kamer op.	ja/nee	Heel onzeker	1	2	3	4	5	Heel zeker
Volgens mij zijn ze vanochtend vroeg vertrokken.	ja/nee	Heel onzeker	1	2	3	4	5	Heel zeker
Hopelijk heeft Jan hun wel goed begrepen.	ja/nee	Heel onzeker	1	2	3	4	5	Heel zeker
Misschien moeten jullie hen maar eens bellen.	ja/nee	Heel onzeker	1	2	3	4	5	Heel zeker
Gijs is slimmer dan de andere leraren.	ja/nee	Heel onzeker	1	2	3	4	5	Heel zeker
Heb jij net zo veel zin als mij in het eten?	ja/nee	Heel onzeker	1	2	3	4	5	Heel zeker
Hij is gevoeliger dan ik voor dat soort dingen.	ja/nee	Heel onzeker	1	2	3	4	5	Heel zeker
Waarom werken zij sneller als de andere ploeg?	ja/nee	Heel onzeker	1	2	3	4	5	Heel zeker
Vanochtend hebben hun de trein gemist.	ja/nee	Heel onzeker	1	2	3	4	5	Heel zeker
Waar ligt het schip dat de aanvaring veroorzaakt heeft?	ja/nee	Heel onzeker	1	2	3	4	5	Heel zeker
Het schilderij dit boven de kachel hing is gevallen.	ja/nee	Heel onzeker	1	2	3	4	5	Heel zeker
Lotte is niet zo handig als mij in dat soort dingen.	ja/nee	Heel onzeker	1	2	3	4	5	Heel zeker
Ga jij naar het festival die morgen in het dorp plaatsvindt?	ja/nee	Heel onzeker	1	2	3	4	5	Heel zeker
Vanavond zal de burgemeester hen feliciteren met de overwinning.	ja/nee	Heel onzeker	1	2	3	4	5	Heel zeker
Afgelopen vrijdag gingen hun eerder weg van school.	ja/nee	Heel onzeker	1	2	3	4	5	Heel zeker
Samen hebben ze heel veel plezier.	ja/nee	Heel onzeker	1	2	3	4	5	Heel zeker
Wij kenden zij nog van vroeger.	ja/nee	Heel onzeker	1	2	3	4	5	Heel zeker
Hij moet zij op tijd wakker maken.	ja/nee	Heel onzeker	1	2	3	4	5	Heel zeker

Vera is in het vliegtuig dat naar Londen gaat gestapt.	ja/nee	Heel onzeker	1	2	3	4	5	Heel zeker
Mijn collega gaat langer dan omdat weg in de vakantie.	ja/nee	Heel onzeker	1	2	3	4	5	Heel zeker
Hoe doen hem dat zo snel?	ja/nee	Heel onzeker	1	2	3	4	5	Heel zeker
Mijn kat is dikker als de kat van Bram.	ja/nee	Heel onzeker	1	2	3	4	5	Heel zeker
Ze hebben het buurtcentrum die al jaren leegstaat gesloopt.	ja/nee	Heel onzeker	1	2	3	4	5	Heel zeker
Die jongen vergeet meer wie zijn dementerende opa.	ja/nee	Heel onzeker	1	2	3	4	5	Heel zeker
Bestaat er ook gras dit je nooit hoeft te maaien?	ja/nee	Heel onzeker	1	2	3	4	5	Heel zeker
Vandaag is het veel warmer dan het tot nu toe is geweest.	ja/nee	Heel onzeker	1	2	3	4	5	Heel zeker
Morgen zullen hem verder gaan met afwassen.	ja/nee	Heel onzeker	1	2	3	4	5	Heel zeker
Studenten drinken meer wie andere mensen.	ja/nee	Heel onzeker	1	2	3	4	5	Heel zeker