The temporal dynamics of bilingual moral decision making:

An eye-tracking study on moral dilemma judgement in the native and foreign language

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Abstract

Previous research has shown an increase in the rate of utilitarian decisions when participants were presented with moral dilemmas in their foreign language rather than their native language. This so-called moral foreign language effect (MFLE) has been investigated in bilinguals who typically had to respond with an offline yes or no decision to moral dilemmas in written or auditory form. The aim of the current study was not only to investigate the presence of the MFLE, but also to track bilinguals' eye gaze preferences before and after making such moral decisions. 40 Dutch-English bilinguals participated in a visual world eye-tracking paradigm while listening to personal and impersonal moral dilemmas in either their native or their second language. On the visual display, they saw two pictures of parties they could either save or victimize.

The offline results demonstrated, as predicted, an MFLE for the personal dilemmas. Furthermore, the eye gaze results on the personal dilemmas showed that there was a similar pattern in both the native and the foreign language condition in the time window before bilinguals' offline decision. However, in the time window after bilinguals made a moral decision, they seemed to avoid looking at the party they victimized in the native language condition. In the foreign language condition they preferred to look at the picture that was predetermined to belong to the answer that saved the most people (utilitarian) when they gave a utilitarian answer. This suggests that there might be a difference in the way utilitarian decisions for moral dilemmas are processed in both language conditions.

Keywords: bilingualism, eye-tracking, moral foreign language effect, moral decision making

Introduction

Moral decision making takes place on a daily basis for almost everyone, in every part of the world. Moral decision making can be defined as "evaluating the (good vs. bad) actions or character of a person that are made with respect to a set of virtues held to be obligatory by a culture or subculture" (Haidt, 2001, p. 817). This definition indicates that moral decision making and the outcome of these decision processes can differ from person to person and from group to group. An everyday example of a moral dilemma could be the following:

> You are walking down the street when you come across a wallet lying on the ground. You open the wallet and find that it contains several hundred dollars in cash as well as the owner's driver's license. From the credit cards and other items in the wallet it is very clear that the wallet's owner is wealthy. You, on the other hand, have been hit by hard times recently and could really use some extra money. You consider sending the wallet back to the owner without the cash, keeping the cash for yourself. Would you keep the money you found in the wallet in order to have more money for yourself? (Greene et al., 2008).

People from different backgrounds might react differently to this dilemma. The aim of this study is to examine to what extent someone's linguistic background influences moral decision making.

According to the Dual-Processing Theory there is a complex interaction between rational and emotional processes when it comes to making moral decisions (Greene et al., 2001; Kahneman, 2003). The rational processes are usually directed towards decisions that benefit the greater good at the expense of the individual. These types of decisions are deemed 'utilitarian' decisions, after the philosophical school of John Stuart Mill (1863). The emotional decision making processes are more intuitive and are generally directed towards the basic rights, duties, and social obligations of the people involved. These decisions are more centered around the individual and are based on principles. There are standard rules for what is right and what is wrong, which everyone should uphold. These decisions are called 'deontological' decisions, after the philosophical school of Immanuel Kant (1785).

Moral decision making is often investigated by asking people to respond to fictitious moral dilemmas. The most famous moral dilemma is the so-called Footbridge dilemma in which one has to decide whether to kill a large man by pushing him in front of a trolley in order to save five workmen from getting killed by the trolley (Thomson, 1985). The deontological choice in this dilemma would be to not push the large man in front of the trolley. According to

deontologists, it is morally wrong to actively kill a person. You should thus do nothing, even though the workmen would die. The utilitarian choice, however, would be to push the large man in front of the trolley. Utilitarians believe that the moral thing to do is what is best for the largest amount of people. In this case, when you push the large man off the footbridge and in front of the trolley, the workmen would be saved. One person would die, and five people would be saved.

It has been found that an important factor for (moral) decision making is the language that is used in a decision situation. This is due to the strong link of emotionality and language, with a substantial amount of research showing a significant change in emotional distance when people use their second language instead of their native language (cf. Caldwell-Harris, 2014). Learning a language from puberty onward results in a greater emotional distance from things presented in the second language than in the native language. This is most likely the case because the first emotional encounters took place in the native language, and the second language has seen less emotional encounters (DeWaele, 2010; Gawinkowska et al., 2013; Altarriba, 2003; Krapf, 1955; Aragno & Schlachet, 1996; Pavlenko, 2005). Keysar et al. (2012) coined this phenomenon the Foreign Language Effect.

The previous research has primarily collected offline, metalinguistic data. In this study, the aim is to investigate the Foreign Language Effect by looking at participants' online responses to moral dilemmas. Using a visual world paradigm with an eye-tracking device (Huettig et al., 2011; Berends et al., 2015; Salverda & Tanenhaus, 2017; Tanenhaus & Spivey-Knowlton, 1996; Cooper, 1974), the eye gaze of bilinguals will be recorded to get an insight into the temporal dynamics of their decision process.

Theoretical background

Moral Foreign Language Effect

The Moral Foreign Language Effect (MFLE) was originally found by Costa et al. (2014). They tested whether or not the language in which a moral dilemma was presented influenced the decisions people made in these dilemmas. They tested different groups of bilinguals with two moral dilemmas, the footbridge and the switch dilemma, which were presented to them in writing. According to Greene et al. (2008) "[the] Footbridge dilemma is a personal dilemma because it involves (a) serious bodily harm (b) to one or more particular individuals, where (c) this harm is not the result of deflecting an existing threat." (p. 1146). In contrast, the Switch dilemma, in which a person is asked whether they would flip a switch to change the track of the

trolley to kill less people on another track, is an impersonal dilemma as it lacks one of the characteristics of the personal dilemma; it deflects an existing threat. Costa et al. (2014) expected there to be an MFLE for the personal dilemmas only. They found that, in all language pairs, the people in the foreign language condition chose more utilitarian answer options for both dilemmas. The difference with the native language condition for the impersonal switch dilemma was not significant. Additionally, results of a language proficiency test in the Costa et al. (2014) study showed that the participants who had a higher proficiency in the foreign language, were less likely to choose the utilitarian option than the participants with a lower proficiency in the foreign language. They suggest that the emotionality of the language becomes more grounded as proficiency increases. This indicates that being presented with a moral dilemma in one's second language causes people to systematically assess this problem in a more utilitarian way, especially so for personal dilemmas. These findings were later replicated in several other studies (e.g. Cipolletti et al., 2016; Hayakawa et al., 2017; Geipel et al., 2015).

The previous research on the concept of MFLE suggests that the MFLE might be caused by a reduced emotional response, which subsequently affects deontological processes to be less present. This reasoning has been supported by a study by Hayakawa et al. (2017). They investigated whether slowing down processing in the second language caused more deliberate consideration of the problem (more utilitarian) or whether it blunted any deontological considerations. Previous research in the realm of the MFLE has put the deontological account and the utilitarian account on the same spectrum, which does not allow for an analysis of where the differences between monolinguals and bilinguals takes place. They decided to calculate a score for deontological judgements and a separate score for utilitarian judgements. They found a decrease in deontological choices, but there was no increase in utilitarian choices, leading to the conclusion that deontological processes are blunted which causes decisions to appear more utilitarian.

The studies by Costa et al. (2014) and Hayakawa et al. (2017) were both conducted with written moral dilemmas. Additionally, the study by Costa et al. (2014) found that the foreign language[1] proficiency of the participants could make a difference in their judgements. A study by Brouwer (2019) took these variables into account by testing highly proficient Dutch-English bilinguals who either listened to or read moral dilemmas. The results demonstrated that there

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[1] The terms foreign language and second language are both used in this study. The term 'foreign language' fits the abbreviation MFLE best, while the term 'second language' might be more suitable in some instances, as the participants in this research are all highly proficient speakers of the non-native language. The language is thus relatively natural to them and the term 'foreign language' might undermine their proficiency. Depending on the context in which the concept is used, the most suitable term will be chosen.

was no MFLE for the group that read the dilemmas but there was for the group who listened to them. It could thus be the case that some contexts, such as language proficiency and the modality in which the dilemmas are presented, decrease or increase the magnitude of the MFLE. The interaction effect between modality and language, however, was not directly tested, as the two studies differed not only in modality but also in language. Costa et al. (2014) used Spanish, Korean, French and Hebrew versus English, whereas Brouwer (2019) used Dutch versus English.

In a follow-up study, Brouwer (2020) focused not only on the modality (written vs. auditorily) in which the dilemmas were presented, but also on the amount of emotion involved by including both personal and impersonal moral dilemmas in both Dutch and English. Here the results showed that the MFLE (interaction between Language and Dilemma Type) was only present for personal dilemmas. There was also an effect of modality, which indicated that the auditorily presented dilemmas were overall judged in a more utilitarian way than the written dilemmas.

Taken together, the studies that found the MFLE suggest that bilinguals make more utilitarian decisions in a second than a first language (Costa et al., 2014; Cipolletti et al., 2016; Hayakawa et al., 2017). This MFLE seems to be especially strong for personal dilemmas (Greene et al., 2008; Brouwer, 2020) and it has been replicated in an auditory setting (Brouwer, 2019).

However, there is a crucial component that cannot be evaluated when using the methodologies that have thus far been used. Previously conducted research on moral decision making had participants read or listen to moral dilemmas, and answer questions with either 'yes' or 'no'. The participants had more than enough time to reflect on the dilemmas and choose an answer that they deemed appropriate. The problem with written dilemmas, however, is that they get removed from context, which raises issues of generalizability of the results of such studies. In addition to this, the forced 'yes' or 'no' answer choice simplifies and fails to completely portray the decision process that is going on. An eye-tracking technique will allow for real-time precise measurements during the decision making process, which alleviates the shortcomings of the previous research (Fiedler & Glöckner, 2015). In the current study this technique will also be used.

Eye-tracking and moral judgement

Until now, only two studies have been conducted which used an eye-tracking methodology during moral decision making. Firstly, a study by Kastner (2010) focused on the

questions whether or not an individual would focus their gaze on the person or the group they decide to sacrifice when presented with a moral dilemma and a visual display illustrating the main two parties of this dilemma. It was expected that people would look less at the person or group they sacrificed than at the person or group they saved, because "people are generally motivated to keep their initial judgment consistent and therefore seek confirming information, perhaps through visual means." (p. 118). The participants were presented with a moral dilemma, in writing, and were then presented with the two parties that they could either save or kill. They subsequently judged a moral dilemma question on a 7-point Likert scale, in which 1 was strongly negative and 7 was strongly positive. The results of the study confirmed the expectations. Participants showed shorter fixation times on the individual or group they sacrificed than on the individual or group they saved.

Secondly, the study by Skulmowski et al. (2014) demonstrated the exact opposite results. They tested people in a virtual reality setting, in which they were immersed in the Switch-dilemma. They controlled the trolley, and were able to make the trolley change tracks, to prevent it from hitting another trolley. The tracks they could choose had an individual or a group on them. Some items were a choice between two individuals. The avatars on the track differed in terms of gender, ethnicity, and the direction they were facing. This is an interesting manipulation in and of itself, but for the current study it is not of interest. They hypothesized that the participants would have shorter gaze fixations on the person or group they sacrificed than on the ones they saved, in line with the findings by Kastner (2010). However, they found that overall, the participants spent more time looking at the side of the screen that showed the victimized party than the side showing the saved party.

Skulmowski et al. (2014) suggest that the difference between the findings of the two studies is due to the fact that they analyzed gaze duration *during* the decision making process, whereas Kastner (2010) analyzed gaze duration *after* decision making. They suggest that "Our participants may have directed their attention longer at the victim in order to reassure themselves of making a "right" decision. This search for reassurance or clues might be the reason why participants looked longest at their victim." (p. 13).

In sum, the eye-tracking studies by Kastner (2010) and Skulmowski et al. (2014) show conflicting findings but this might be explained by the different time windows that have been analyzed. In the current study both time windows will be analyzed. Participants' eyes will be tracked while the question is being asked, during the decision making time, and after the participants have made an offline decision using a button box.

The present study

The current study will follow-up on the eye-tracking research by Kastner (2010) and Skulmowski et al. (2014). The central research question is: How does the moral decision making process unfold over time when Dutch-English bilinguals listen to moral dilemmas in their native compared to their second language? The analyses will focus on the offline decision data and the online eye gaze data. In particular, the offline decision data will give insight into the question whether or not there is a MFLE for Dutch-English bilinguals. The eye-tracking data will not be analyzed statistically but only descriptively by showing what bilinguals look at during the time window before their offline decisions and after their offline decisions.

Dutch-English bilinguals will be tested in a visual-world eye-tracking paradigm (Huettig et al., 2011; Berends et al., 2015; Salverda & Tanenhaus, 2017; Tanenhaus & Spivey-Knowlton, 1996; Cooper, 1974). They will be listening to several personal and impersonal moral dilemmas in either their native (Dutch) or their second language (English). After hearing each moral dilemma, two pictures will be shown side-by-side that refer to the saved party on one side and the victimized party on the other side. Participants are asked to answer a yes/no question about which of the two parties they would victimize and which they would save, while their eye movements to the two pictures are recorded during the question (i.e., before their offline decision) and after their offline decision.

Hypotheses

(1) *Offline decisions.* Following Brouwer (2020), it is expected that a MFLE will be found for the personal dilemmas only. This means that bilinguals who are presented with the personal moral dilemmas in English (second language) will make more utilitarian decisions than bilinguals who are presented with the moral dilemmas in Dutch (native language).

(2) a. *Online eye gaze.* In contrast to Skulmowski et al. (2014), the proportion fixations on the saved party will be higher than on the victimized party *before* the participant makes an offline moral decision. Skulmowski and colleagues found that the fixation times on the victim were longer in this time window but the decision time these participants were given was very short. The participants of this study have as much time as they need to make an offline moral decision. It is therefore likely that the proportion fixations are following the same pattern as in the Kastner (2010) study, in which the participants focused on the saved party after offline decision, despite the difference in time window.

The participants in Kastner's study could take as much time as they needed to make the decision independent of language.

b. Following Kastner (2010), the proportion fixations on the saved party will be higher than on the victimized party *after* the participant makes an offline moral decision independent of language.

Method

Participants

40 participants in total took part in this study. One participant was excluded because they had more than one native language. 39 participants were analyzed (age range = 19 – 55, M_{AGE} =25;9, 23 female). 25 participants took part in the native language condition (age range = 19 – 55, M_{AGE} = 27;1, 15 female). 14 participants took part in the foreign language condition (age range = 20 – 29, M_{AGE} = 23;4, 8 female). All participants are native speakers of Dutch with normal or corrected to normal vision. They learned English as a second language at the average age of $M = 11;2$ years ($SD = 1.917$). The LexTALE test for English proficiency (Lemhöfer & Broersma, 2012) demonstrated that the participants had a high average level of English proficiency with an average score of 80.51%. In a questionnaire, they self-rated their English proficiency for speaking, listening, writing, and reading. 43.59% rated their speaking skills as advanced and 56.41% as average. 71.79% rated their listening skills as advanced and 28.21% as average. For writing, 46.15% rated their skills as advanced, 48.72% as average, and 5.13% as beginner. And finally, 71.79% of participants rated their reading skills as advanced, 25.64% as average, and 2.56% as beginner. Participants who scored lower than 50% on the LexTALE test or rated themselves as a beginner for listening skills were excluded from analysis. On the basis of these criteria, no additional participants were excluded from analysis.

Materials

Audio stimuli

In each condition (native versus foreign language), 20 experimental dilemmas, 10 personal and 10 impersonal, and two filler items were presented to participants (Greene et al., 2008; See Appendix A). The stimuli were pseudo-randomized in eight different lists per language condition. The lists always started with the Switch dilemma and the Footbridge dilemma and ended with two filler items. The order of the first two dilemmas was counterbalanced. Personal and impersonal dilemmas were presented maximally three times in

a row. As stated in the theoretical background section of this thesis, Greene et al. (2008) describes this distinction as follows: "The Footbridge dilemma is a personal dilemma because it involves (a) serious bodily harm (b) to one or more particular individuals, where (c) this harm is not the result of deflecting an existing threat." (p. 1146). The scenarios were always decisions between two negative things. In all personal items there is a smaller group and a larger group that will survive, benefit, or suffer less from the choice that is to be made, but this was not always the case for the impersonal dilemmas. This survival, benefit, or less suffering leads to a conflict between a deontological choice and a utilitarian choice. The participant could either choose to cross a deontological boundary and save the largest amount of people (utilitarian), or they could choose to not cross that boundary and stay true to their deontological beliefs (deontological). In the case of the Footbridge dilemma, for example, this would be to actively push the large man on the tracks (utilitarian) or to not do anything and let the trolley kill the workmen (deontological). All experimental items were narrated in the second person to ensure that the participants would feel that the story refers to them and their choices directly.

The dilemmas and filler items were originally written in English. They were translated into Dutch by two native Dutch speakers who are highly proficient in English (both C2 level). The translations were then compared and adjusted in consultation. The stimuli were recorded by a female native Dutch actress (23 years old). This speaker recorded both the Dutch and the English dilemmas to prevent any influence of speaker characteristics on the results. She was selected as the speaker because her English was at a high proficiency level (C2 level). She read out the stimuli calmly and without any tone that could suggest either one of the answers to be the correct one.

All items were split into an audio fragment in which the story was presented and a fragment in which a question was presented. The moral dilemmas were followed by yes/no questions, of which the "yes" answer option was always the utilitarian option. All of these questions follow the format of "Would you VERB… in order to…?".

There were 2 filler items, in which there was a story about someone in the third person. These stories did not contain a dilemma of any sort. The participants were asked a comprehension question and were given four answer options, in order to determine whether the participant used their full attention for the experiment and, for the foreign language condition, had a proficiency level that is sufficient.

Visual stimuli

The visual stimuli for this study are 40 500x500 pixel pictures drawn with black lines on a white background by a professional artist (Rombouts, 2020; See Appendix A). They were used for both language conditions. The visual display always consisted of two pictures presented next to each other in the middle of the screen. The two pictures displayed key items or people that were mentioned in the dilemmas and the questions that follow the dilemmas. The negative aspects of the stories, such as killing or dying, are not visible in the pictures, but only the groups that are involved were displayed. Figure 1 shows the two pictures that co-occurred in the Footbridge dilemma, with the large man on the left (utilitarian) and the workmen on the right (deontological). The pictures are not utilitarian or deontological per se, but in the context of this experiment and the MFLE it is important to give them these labels to be able to conduct an analysis. These labels are based on the group or person the participant would victimize when choosing an answer. Which picture portrays the victimized party is thus dependent on the participants' offline moral decision. The items are displayed next to each other on the middle of the screen. The position of the pictures was counterbalanced for the 8 lists.

Figure 1 *Footbridge dilemma screen with utilitarian (left) and deontological picture (right*)
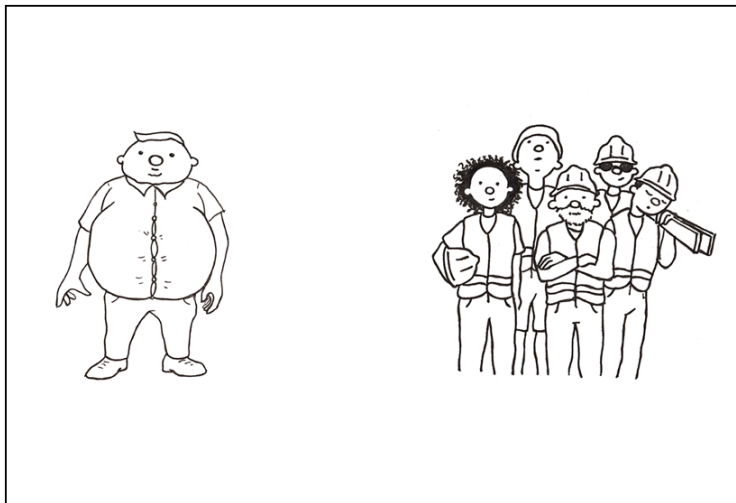
Procedure

Participants came to the eye-tracking lab of the Radboud University in Nijmegen, which is located in the Erasmus building on the campus of the university. An Eye-link 1000 Plus eye-tracker was used. The participants were welcomed and instructed in the language that corresponded to the language condition they were in. The participants were asked to sit down and place their heads in the support system. They were presented with 20 audible moral

dilemmas and two filler items. A fixation cross appeared on the screen while the participants listened to the story. After each moral dilemma, they were presented with an audio fragment that presented a question about the dilemmas. The pictures corresponding to this item were presented 1000 milliseconds before the question was heard and thus replaced the fixation cross that was on the screen. This preview time was installed so that the participant could see what was in the pictures but could not make a decision yet. As the dilemmas were all similar in set-up, the preview time was short, since a longer preview time could cause the participant to make a decision before the timeframe that was of interest. The participants' dominant eye-gaze was tracked throughout the asking of the question, the preview time, the decision time and the 2000 milliseconds that followed the decision. These timepoints were recorded as separate data.

After the eye-tracking task, the participants were asked to do the LexTALE test (Lemhöfer & Broersma, 2012). This was followed by a questionnaire. In this questionnaire they were asked questions about their age, their language background, gender, level of education, and if they had any vision and/or hearing problems (See Appendix B). It took the participants approximately 45 minutes to complete the whole experimental process.

Design

For this research, a 2 (language: native versus foreign language, between-subjects) x 2 (type of dilemma: personal versus impersonal, within-subjects) mixed design was used. The dependent variables were the percent of utilitarian choices (responses to dilemma questions) and the proportion fixations to the two pictures on the visual display.

Results

Offline decisions

Table 1 presents the mean percentage of utilitarian decisions participants made in the native (Dutch) and foreign condition (English) for each dilemma type (personal vs. impersonal). In the native language condition (N=25), participants chose the utilitarian answer option for the personal dilemmas $M = 42\%$ ($SD = 16.58$) of the time, which is less often than for the impersonal dilemmas $M = 60.40\%$ ($SD = 11.72$). In the non-native language condition (N=14), participants chose the utilitarian answer option for the personal dilemmas slightly less often $M = 55.71\%$ ($SD = 22.43$) than for the impersonal dilemmas $M = 57.86\%$ ($SD = 11.72$).

A 2 (Language: native vs. foreign, between-subjects) x 2 (Dilemma type: personal vs. impersonal, within-subjects) mixed ANOVA was conducted on the mean percentage of utilitarian decisions. Mauchly's Test of Sphericity showed that the assumption of sphericity

was not met ($\chi^2 = 0.000$, $p < 0.001$) and therefore a Greenhouse-Geiser correction was used. Levene's test showed that the variances for the percentage of utilitarian choices for personal dilemmas ($F(1, 37) = 1.612$, $p = 0.212$) and for impersonal dilemmas were both equal (F (1, 37) = 0.000, $p = 0.991$).

The results demonstrated a significant main effect of dilemma type, $F(1.000, 37.000) = 8.559$, $p = 0.006$, $\eta p^2 = 0.188$. There was no significant main effect of language, $F(1, 37) = 2.054$, $p = 0.160$, $\eta p^2 = 0.053$, but there was a significant interaction effect between dilemma type and language, $F(1.000, 37.000) = 5.360$, $p = 0.026$, $\eta p^2 = 0.127$. Following this interaction with a Bonferroni pairwise comparison, it showed that the participants made significantly more utilitarian decisions for personal dilemmas when they were presented in the foreign language than in the native language ($F(1, 37) = 4.752$, $p = 0.036$, $\eta p^2 = 0.114$). They did not make significantly more utilitarian decisions when they were presented with impersonal dilemmas in the foreign language than in the native language (F(1, 37) = 0.418, $p = 0.522$, $\eta p^2 = 0.011$).

Table 1

Mean percentages and SDs of utilitarian decisions on personal versus impersonal dilemmas in the native versus the foreign language condition.

Dilemma type	Language condition			
	Native (*N*=25)		Foreign (*N*=14)	
	M	*SD*	*M*	*SD*
Personal	42.00	16.58	55.71	22.43
Impersonal	60.40	11.72	57.86	11.72

Online eye gaze data

Figure 2 demonstrates the proportion of fixations to the utilitarian and the deontological pictures for the native (Panel A+C) and the foreign language condition (Panel B+D) from preview time onwards until the beginning of the question, and from the beginning of the question onwards until 2000ms into the question for the personal dilemmas. The figure is split by participants' offline moral decision, i.e. utilitarian (Panel A+B) or deontological (Panel C+D). Note that the results will not be statistically analyzed due to the small sample size but will only be analyzed descriptively.

Panel 2A shows that the participants in the native language condition, when they made a utilitarian offline decision, had a preference for the utilitarian pictures during the preview time, with the proportion fixations starting around 0.6 and decreasing to around 0.5 when the question

started. The proportion fixations on the deontological pictures increased from around 0.4 to around 0.5 in the timeframe between the start of the preview time until the question was presented. The proportion fixations then switch, meaning that the deontological proportion fixations increase to about 0.6 and the utilitarian proportion fixations decrease to about 0.4 in the time window after the start of the question.

Panel 2B reveals that participants in the foreign language condition, that made a utilitarian decision, seem to have a strong preference for the utilitarian pictures during the preview time, with proportion fixations around 0.6, while the proportion fixations for the deontological pictures in this time window are around 0.4. As the question is presented, the preference for the utilitarian pictures switches to a preference for the deontological pictures. The proportion fixations for the deontological pictures are now around 0.6., while those on the utilitarian pictures decreases to around 0.4. This preference for the deontological pictures remains throughout the asking of the question.

Panel 2C reveals the proportion fixations for the participants in the native language condition when they responded with the deontological answer option. The proportion fixations for the utilitarian pictures start out around 0.6 and they increase slightly to 0.7 at about 400ms, indicating a strong preference during the preview time. The proportion fixations on the deontological pictures start out around 0.4 and decrease slightly to 0.3 around 400ms. The proportion fixations on the utilitarian pictures decrease to about 0.45 when the question is presented. After that, they increase to about 0.55, after the start of the question being asked. In this time window, the deontological proportion fixations keep slightly increasing to 0.6 at 1500ms, and they slightly decrease after that. The utilitarian proportion fixations show a slight decrease until about 1500ms to 0.4. After that, they show a slight increase.

Panel 2D reveals a clear preference for the utilitarian pictures during the preview time for participants that gave a deontological answer in the foreign language condition. After about 250ms, the proportion fixations on the utilitarian pictures peaks to 0.7, and the proportion fixations on the deontological pictures decrease to about 0.3. Around 800ms the proportion fixations cross each other and the participants thus switch in preference. The deontological proportion fixations increase to about 0.75, while the proportion fixations on the utilitarian pictures decrease to 0.25 in the time window from the beginning of the question to 1500ms. After 1500ms, the proportion fixations come closer together, between 0.4 and 0.6, but the participants still clearly prefer the deontological pictures.

Figure 2

Proportion fixations on the deontological and the utilitarian pictures from the start of the preview until after the start of the question for all conditions.
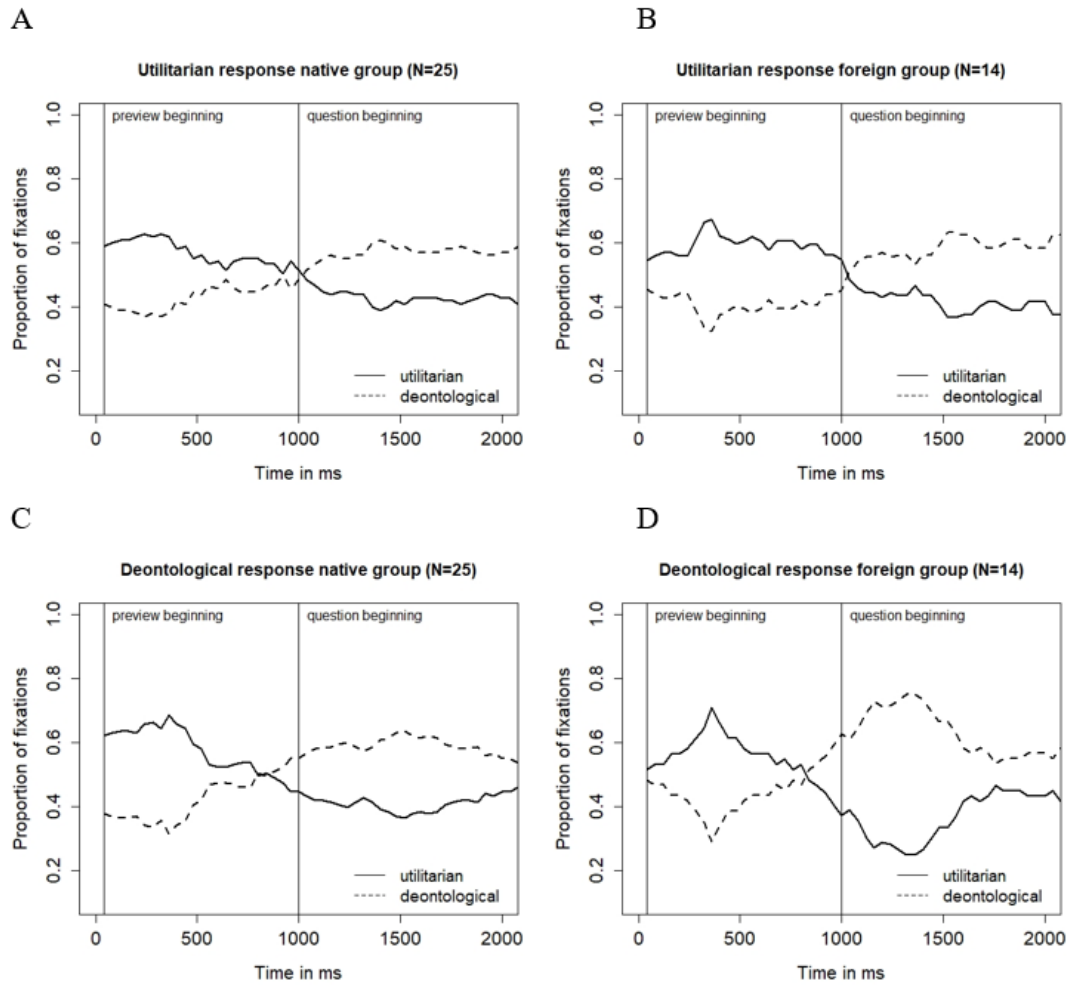

Figure 3 demonstrates the proportion of fixations to the utilitarian and the deontological pictures for the native (Panel A+C) and foreign language condition (Panel B+D) from offline decision onwards until the end of the trial, and from the end of the trial until 250ms after the end of the trial for the personal dilemmas. The figure is split by participants' offline decision type, i.e. utilitarian (Panel A+B) or deontological (Panel C+D).

Panel 3A reveals that, after the offline decision is made, the participants in the native language condition that gave a utilitarian answer seem to have a preference for the deontological pictures. The proportion fixations on the deontological pictures are between 0.5 and 0.6 and they slightly increase over time. The proportion fixations on the utilitarian pictures are between 0.4 and 0.5 and they slightly decrease over time.

Panel 3B shows that the participants who have made a utilitarian decision in the foreign language condition have a clear preference for the utilitarian pictures from offline decision

onwards until the end of the trial. The proportion fixations on the utilitarian pictures stays around 0.6 for the duration of the time window, while the proportion fixations on the deontological pictures stay around 0.4.

Panel 3C indicates that after the participants in the native language condition had made the deontological offline decision, their proportion fixations stayed around 0.5 for the entire further duration of the trial for both the utilitarian and the deontological pictures.

Panel 3D reveals that for the participants in the foreign language condition who made a deontological decision, the proportion fixations on both the utilitarian pictures and the deontological pictures fluctuate around 0.5 throughout the duration of the time window after offline decision. Between 100ms and 400ms there seems to be a slight preference for the utilitarian pictures, but after that the proportion fixations lay very closely together until the end of the trial.

Figure 3
Proportion fixations on the deontological and the utilitarian pictures from the offline decision until the end of the trial for all conditions.
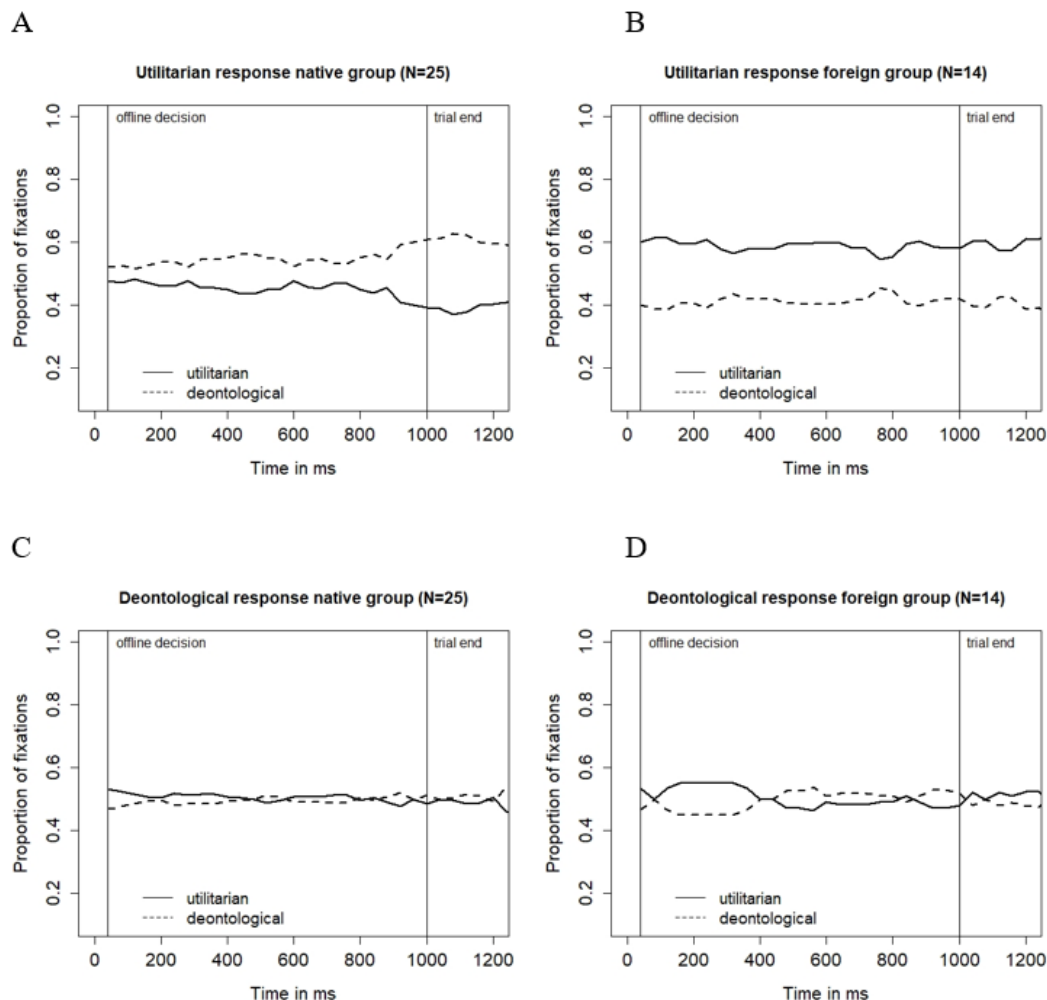
General discussion

The aim of this study was to get a deeper understanding of the temporal dynamics of moral decision making for bilinguals in their first and their second language. This was investigated by using a visual world eye-tracking paradigm (Huettig et al., 2011; Berends et al., 2015; Salverda & Tanenhaus, 2017; Tanenhaus & Spivey-Knowlton, 1996; Cooper, 1974). Participants listened to personal and impersonal moral dilemmas, followed by a question that could be answered with either yes (utilitarian) or no (deontological). On the visual display, they saw two pictures for each dilemma which represented the two answer options. The pictures showed the parties that could be victimized by answering yes or no to the question using a buttonbox. The researchers predetermined whether the picture was deemed utilitarian or deontological.

The current results showed three main findings. First, the offline decision data demonstrated a MFLE. This result is in line with the first hypothesis (i.e., there is a MFLE for personal dilemmas) and the previous literature (e.g., Brouwer, 2020; Cipolletti et al., 2016; Costa et al., 2014; Hayakawa et al., 2017; Geipel et al., 2015; Greene et al., 2008). The high proficiency level of the participants did not help them overcome the MFLE, as has been found before (Brouwer, 2020; Costa et al., 2014).

Second, the online eye-tracking data on the personal dilemmas showed that there was a preference for utilitarian pictures during the preview time for both the participants in the native and the foreign language condition when they made either the utilitarian or the deontological decision. This seems to be in contrast to hypothesis 2a, in which it was expected that the participants would fixate more on the saved party, which they have not yet chosen. Skulmowski et al. (2014) found that the participants would look more at the victimized party before they made the decision to sacrifice them. However, the participants in the current research had higher proportion fixations on the deontological pictures, from the beginning of the question onwards, even if it was not the victimized party. A possible explanation for this difference is that the utilitarian pictures only showed one or two people at a time, whereas the deontological pictures where often more complicated and showed more than one person at a time. The utilitarian pictures are perhaps easier to process, as there is less visual information than in the deontological pictures. As soon as the question starts, the extra information that is provided by the deontological pictures might be of higher interest for making the decision.

The Skulmowski et al. (2014) study investigated a timeframe before the offline decision that was very short and there was no introductory story or question for each trial. The participants were presented with the same dilemma for all trials, which was explained to them

once before the start of the experiment. They found that the participants overall made utilitarian choices, despite of the condition they were in. It is not likely that the preference for the utilitarian pictures before the start of the question found in the current study is the same effect as in the Skulmowski et al. study. That is because, for this study, different dilemmas were used for each trial. Kastner (2010) suggests that the participants have a preference for the deontological pictures after they have made a utilitarian decision. The suggested reason for that is that moral anxiety causes the participants to avoid the pictures of the people they have sacrificed and seek comfort in focusing on the ones they have saved. It could be the case that the participants of the current study have a similar reaction when the question starts. It is, however, not possible to see whether or not the participants look at the picture of the group they have victimized for confirmation of having done the right thing (when they gave a deontological answer), or avoid looking at the deontological picture because of moral anxiety (when they gave a utilitarian answer). Further research into this matter is necessary.

Third, the eye-tracking data after bilinguals' offline decision showed that, in the native language condition, they preferred to look at the deontological picture after they gave a utilitarian answer. This is exactly in line with hypothesis 2b (i.e. proportion fixations on the saved party will be higher than on the victimized party after offline decision), based on the findings by Kastner (2010) for this particular time window. A potential explanation for this is that the participants wanted to seek for validation in their decision by looking at the saved party or try to avoid looking at the victimized party. The participants in the native language condition who responded with the deontological answer option did not show a preference for either the deontological or the utilitarian pictures. These proportion fixations are possibly influenced by the participants seeking for validation from the party that they saved and by their moral anxiety. It is interesting to see is that in the foreign language condition the utilitarian pictures are preferred over the deontological pictures after a utilitarian offline decision. This could be because the participants seek for validation of their answer, in line with Skulmowski et al. (2014). This is the exact opposite of what happens in the native language condition, indicating a difference in the processing of a utilitarian moral decision in either the native or the foreign language. In the cases where the participants gave a deontological offline answer, there is no clear preference for any of the two pictures, just as in the native language condition. The relationship between MFLE and eye gaze data should be further investigated in future research to be able to draw deeper conclusions.

There are a couple of limitations in this study. First of all, the two groups were not of equal size, which was caused by a lack of participants signing up for the study due to the

COVID-19 crisis that has been going throughout the whole research process. This crisis also made it more difficult to solve problems with the eye-tracker, as the lab technician worked from home most of the time. This left the research to a rough start and it led to less time to test participants. Equal groups of participants might yield different results, especially for the eye-gaze data. A follow-up study should therefore be conducted on equal groups of participants.

Additionally, there was no pre-test that showed whether or not the participants thought the speaker of the English dilemmas was a native speaker of English or not. This could be a good addition in future research, as the participants might consider the dilemmas in a different way when they are presented with an accented speaker. Further research in the realm of accent could also give different insights. One could delve into the question whether or not there is an effect of accented speech in the foreign language or even in the native language.

The pictures that were used for the experiment have not been standardized or rated before they were put into use. A pre-test of the pictures would be a nice addition in any follow-up research. Standardized rules about the amount of people in the pictures, or the amount of detail that could distract the participants should be rated beforehand.

The questions that were presented to the participants after the moral dilemmas were all of a different length. This meant that the participants had more or less time to look at the pictures depending on the length of the question. These proportion fixations are all represented in the same graphs (Figure 3), which were constructed on the basis of the longest question duration. A similar length for all of the questions might yield more dependable results.

Conclusion

The aim of this study was to not only investigate the presence of the MFLE, but also to track bilinguals' eye gaze preferences before and after making moral decisions. This study was the first to analyze the eye-tracking data from the preview time before asking the question, during the offline question, and after giving the offline answer. This gave an insight into the temporal dynamics of decision making and the difference between hearing dilemmas in a native or foreign language. The outcome of the study showed that there is a similar pattern in both native language processing and in foreign language processing in the time window before offline decision. However, in the time window after offline decision, the people who heard the dilemmas in their native language and made a utilitarian decision seem to want to avoid looking at the party they victimized. In the situations where the people heard the dilemmas in their foreign language and made a utilitarian decision, they preferred to look at the party they victimized. When the participants made a deontological decision, regardless of language

condition, there was no preference for either one of the types of pictures. These opposing results after a utilitarian answer in both language conditions suggest that the language in which a moral dilemma is presented determines the way in which a person processes utilitarian decisions after the decision is made. Further research should focus on this phenomenon and investigate if the participants want to avoid looking at their victims or seek confirmation about their choices depending on their offline answers to the dilemmas. The relationship between the MFLE and the eye gaze data should also be investigated in a causal relationship in future research.

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Appendices

Appendix A Experimental dilemmas

The dilemmas that were used for this study were taken from Greene et al. (2008) and were translated by a native speaker of Dutch who has a near native proficiency level of English. The translated dilemmas were then checked by a second near native speaker of English and adjusted when necessary. The mean emotion ratings and the level of conflict for the dilemmas were taken from the study by Koenigs et al. (2007). The pictures were drawn by Anne Rombouts (2020).

Personal dilemmas

1. Footbridge **Mean emotion rating: 6.0** **High-conflict**

A runaway trolley is heading down the tracks toward five workmen who will be killed if the trolley proceeds on its present course. You are on a footbridge over the tracks, in between the approaching trolley and the five workmen. Next to you on this footbridge is a stranger who happens to be very large.

The only way to save the lives of the five workmen is to push this stranger off the bridge and onto the tracks below where his large body will stop the trolley. The stranger will die if you do this, but the five workmen will be saved.

Would you push the stranger on to the tracks in order to save the five workmen?

1. Voetbrug

Een op hol geslagen tram dendert over het spoor richting vijf werklieden die gedood zullen worden als de tram zijn koers vervolgt.

Jij staat op een loopbrug boven het spoor, tussen de naderende tram en de vijf werklieden. Naast je op de loopbrug staat een onbekende die heel fors is. De enige manier waarop je de levens van de werklui kunt redden, is door deze onbekende man van de brug op het spoor te duwen, zodat zijn forse lichaam de tram zal stoppen. De onbekende zal sterven als je dit doet, maar de vijf werklieden zullen gered zijn.

Zou je de onbekende op het spoor duwen om de vijf werklieden te redden?

Figure A1

Utilitarian picture	*Deontological picture*
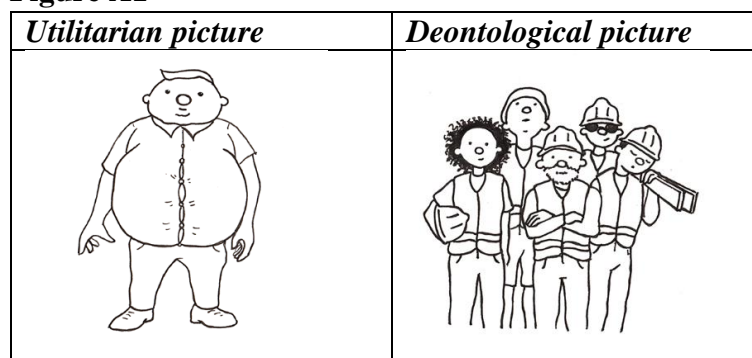
2. Crying Baby **Mean emotion rating: 6.8** **High-conflict**

Enemy soldiers have taken over your village. They have orders to kill all remaining civilians. You and some of your townspeople have sought refuge in the cellar of a large house. Outside you hear the voices of soldiers who have come to search the house for valuables.

Your baby begins to cry loudly. You cover his mouth to block the sound. If you remove your hand from his mouth his crying will summon the attention of the soldiers who will kill you, your child, and the others hiding out in the cellar. To save yourself and the others you must smother your child to death.
Would you smother your child in order to save yourself and the other townspeople?

2. Huilende baby

Vijandige soldaten bezetten je stad. Ze hebben de opdracht om alle achtergebleven bewoners te doden. Jij en een aantal andere inwoners hebben dekking gezocht in de kelder van een groot huis. Buiten hoor je de stemmen van soldaten die gekomen zijn om waardevolle spullen te zoeken in het huis. Jouw baby begint hard te huilen. Je bedekt zijn mond om het geluid te dempen. Als je je hand van zijn mond haalt, zal het huilen de aandacht van de soldaten trekken en zij zullen jou, je kind en de andere mensen die zich in de kelder verstoppen, doden. Om jezelf en de anderen te redden, moet je je kind laten stikken tot hij sterft.
Zou je je kind laten stikken om jezelf en de andere inwoners te redden?

Figure A2

Utilitarian picture	*Deontological picture*

3. Vitamins   **Mean emotion rating: 5.8**   **High-conflict**

You are the leader of a mountaineering expedition that is stranded in the wilderness. Your expedition includes a family of six that has a genetically caused vitamin deficiency. A few people's kidneys contain large amounts of this vitamin.
There is one such person in your party. The only way to save the lives of the six members of this family is to remove one of this man's kidneys so that the necessary vitamins may be extracted from it. The man will not die if you do this, but his health will be compromised. The man is opposed to this plan, but you have the power to do as you see fit.
Would you forcibly remove this man's kidney in order to save the lives of the six vitamin-deficient people?

3. Vitamines

Jij bent de leider van een bergbeklimexpeditie die in de wildernis is gestrand.
Je expeditie omvat een gezin van zes personen met een genetisch veroorzaakt vitaminetekort. De nieren van een paar mensen bevatten grote hoeveelheden van deze vitamine. Een dergelijke persoon is de geologe van je groep. De enige manier om de zes leden van het gezin te beschermen tegen blijvende gezondheidsschade, is door een van haar nieren te verwijderen, zodat de nodige vitamines eruit kunnen worden gehaald. De gezondheid van de geologe zal permanent worden aangetast. Zij is tegen dit plan, maar je hebt de macht om te doen wat je wilt.

Zou je de nier van de geologe tegen haar wil verwijderen om de gezondheid van de zes vitamine-deficiënte mensen te waarborgen?

Figure A3

Utilitarian picture	*Deontological picture*
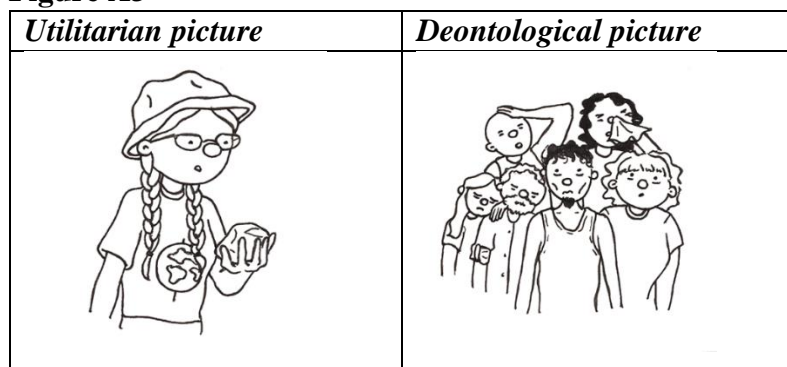
4. Vaccine Test   **Mean emotion rating: 5.8**   **High-conflict**

A viral epidemic has spread across the globe killing millions of people. You have developed two substances in your home laboratory. You know that one of them is a vaccine, but you don't know which one. You also know that the other one is deadly.

Once you figure out which substance is the vaccine you can use it to save millions of lives. You have with you two people who are under your care, and the only way to identify the vaccine is to inject each of these people with one of the two substances. One person will live, the other will die, and you will be able to start saving lives with your vaccine.

Would you kill one of these people with a deadly injection in order to identify a vaccine that will save millions of lives?

4. Vaccinatietest

Een virale epidemie heeft zich over de hele wereld verspreid, waardoor miljoenen mensen overlijden. Je werkt in je thuislaboratorium en hebt twee stoffen ontwikkeld. Je weet dat een van de twee stoffen een vaccin is, maar je weet niet zeker welke. Je weet ook dat de andere stof dodelijk is. Als het je lukt te ontdekken welke van de twee het vaccin is, kun je miljoenen levens redden. Je hebt twee patiënten onder je hoede, en de enige manier om erachter te komen welke het vaccin is is beide patiënten een van de stoffen in te spuiten. Eén patiënt zal sterven, één zal blijven leven, en daarna kun je beginnen levens te redden.

Zou je een van de patiënten een dodelijke injectie geven om erachter te komen welke het vaccin is dat levens kan redden?

Figure A4

Utilitarian picture	*Deontological picture*
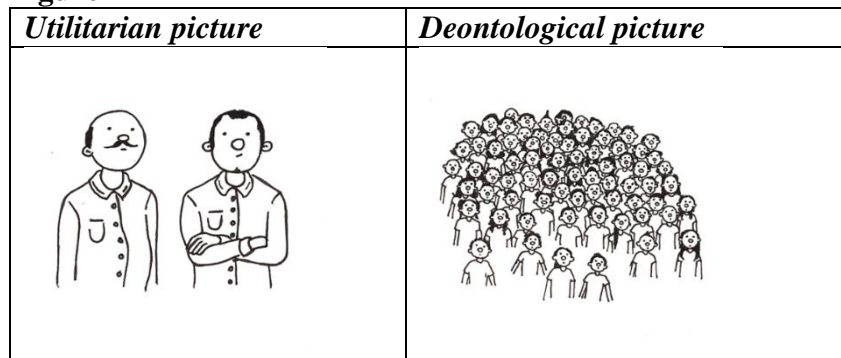
5. Sacrifice   **Mean emotion rating: 6.7**   **High-conflict**

You, your husband, and your four children are crossing a mountain range on your return journey to your homeland. You have inadvertently set up camp on a local clan's sacred burial ground. The leader of the clan says that according to the local laws, you and your family must be put to death. However, he will let yourself, your husband, and your three other children live if you yourself will kill your oldest son.

Would you kill your oldest son in order to save your husband and your other three children?

5. Offer

Jij, je partner, en jullie vier kinderen steken bergen over op jullie weg terug naar jullie land. Je hebt perongeluk een tentenkamp opgezet op een begraafplaats van een lokale stam. De leider van deze stam vertelt dat jij en je familie gedood moeten worden hiervoor volgens hun wetten. De leider zal jou, je partner, en drie van jullie kinderen laten leven als je je oudste zoon zelf vermoordt.

Zou je je oudste zoon vermoorden om je partner en je drie andere kinderen te redden?

Figure A5

Utilitarian picture	*Deontological picture*
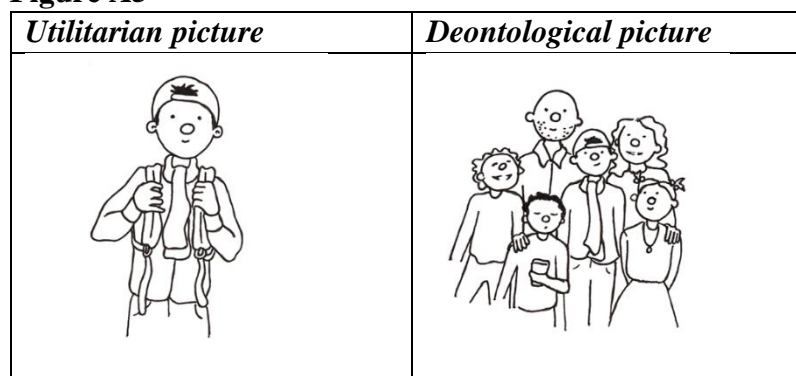
6. Sophie's Choice   **Mean emotion rating: 6.6**   **High-conflict**

It is wartime and you and your two children, ages eight and five, are living in a territory that has been occupied by the enemy. At the enemy's headquarters is a doctor who performs painful experiments on humans that inevitably lead to death.

He intends to perform experiments on one of your children, but he will allow you to choose which of your children will be experimented upon. You have twenty-four hours to bring one of your children to his laboratory. If you refuse to bring one of your children to his laboratory he will find them both and experiment on both of them.

Would you bring one of your children to the laboratory in order to avoid having them both die?

6. Sofies keuze

Het is oorlog en jij en je twee kinderen, van acht en vijf jaar oud, leven in een gebied dat in de handen is van de vijand. Er is een dokter bij het hoofdkwartier van de vijand die pijnlijke experimenten doet op mensen, die onvermijdelijk dodelijk zijn. De dokter is van plan een experiment te doen met een van jouw kinderen, maar hij laat jou kiezen met welk kind. Je hebt 24 uur om een van je kinderen naar zijn laboratorium te brengen. Als je weigert om een van je kinderen te brengen, dan zal hij je kinderen vinden en experimenten uitvoeren op beide kinderen.

Zou je een van je kinderen naar het laboratorium brengen om te voorkomen dat ze allebei sterven?

Figure A6

Utilitarian picture	*Deontological picture*

7. Lifeboat   Mean emotion rating: 5.1   High-conflict

You are on a cruise ship when there is a fire on board, and the ship has to be abandoned. The lifeboats are carrying many more people than they were designed to carry. The lifeboat you're in is sitting dangerously low in the water—a few inches lower and it will sink.

The seas start to get rough, and the boat begins to fill with water. If nothing is done it will sink before the rescue boats arrive and everyone on board will die. However, there is an injured person who will not survive in any case. If you throw that person overboard the boat will stay afloat and the remaining passengers will be saved.

Would you throw this person overboard in order to save the lives of the remaining passengers?

7. Reddingsboot

Je bent op een cruiseschip op het moment dat er brand uitbreekt en het schip moet worden verlaten. De reddingsboten dragen veel meer mensen dan er eigenlijk in kunnen. Jouw reddingsboot zal zinken als het nog een paar centimeter zakt. De zee wordt onrustig en de boot vult met water. Als er niets gebeurt, zal de reddingsboot zinken voordat hulp arriveert en dan zal iedereen aan boord verdrinken. Er is een gewond persoon aan boord die het sowieso niet gaat redden. Als je deze persoon overboord gooit, zal de boot blijven drijven en zijn de andere passagiers gered.

Zou je deze persoon overboord gooien om de levens van de andere mensen te redden?

Figure A7

Utilitarian picture	*Deontological picture*

8. Ecologists   **Mean emotion rating: 6.1**   **High-conflict**

You are part of a group of ecologists who live in a remote stretch of jungle. The entire group, which includes eight children, has been taken hostage by a group of paramilitary terrorists. One of the terrorists takes a liking to you. He informs you that his leader intends to kill you and the rest of the hostages the following morning.

He is willing to help you and the children escape, but as an act of good faith he wants you to kill one of your fellow hostages whom he does not like. If you refuse his offer all the hostages including the children and yourself will die. If you accept his offer then the others will die in the morning but you and the eight children will escape.

Would you kill one of your fellow hostages in order to escape from the terrorists and save the lives of the eight children?

8. Ecologen

Je bent aangesloten bij een groep ecologen die in een verlaten deel van de jungle woont. De hele groep, met acht kinderen, wordt gegijzeld door een groep terroristen. Een van de terroristen mag jou. Hij vertelt jou dat zijn leider van plan is jou en de rest van je groep te vermoorden in de ochtend. Hij wil jou en de kinderen helpen ontsnappen, maar de terrorist wil in ruil daarvoor dat jij iemand uit jouw groep vermoordt omdat de terrorist deze persoon niet mag. Als je zijn aanbod weigert, zal iedereen inclusief de kinderen sterven. Als je zijn aanbod aanneemt, zal jij met de kinderen kunnen ontsnappen maar de anderen van jouw groep zullen sterven.

Zou je iemand uit jouw groep vermoorden om te kunnen ontsnappen en de levens van acht kinderen redden?

Figure A8

Utilitarian picture	*Deontological picture*

9. Modified Bomb   **Information**   **is**   **missing**

You are negotiating with a powerful and determined terrorist who is about to set off a bomb in a crowded area. Your one advantage is that you have his teen-age son in your custody.

There is only one thing that you can do to stop him from detonating his bomb, which will kill thousands of people if detonated. To stop him, you must contact him over the satellite hook-up that he has established and, in front of the camera, break one of his son's arms and then threaten to break the other one if he does not give himself up.

Would you break the terrorist's son's arm in order to prevent the terrorist from killing thousands of people with his bomb?

9. Bom
Je bent aan het onderhandelen met een machtige en vastberaden terrorist die op het punt staat een bom af te laten gaan in een druk gebied. Jouw enige voordeel is dat je zijn tienerzoon gegijzeld hebt. Er is maar één ding dat je kunt doen om te voorkomen dat hij zijn bom laat ontploffen. Een ontploffing zou betekenen dat duizenden mensen sterven. Om hem te stoppen moet je contact met hem zoeken via de satelliet aansluiting die hij heeft opgezet en voor de camera een van de armen van zijn zoon breken en dreigen de andere arm ook te breken als hij zichzelf niet overgeeft.
Zou je de arm van de zoon van de terrorist breken om te voorkomen dat de terrorist duizenden mensen dood met zijn bom?

Figure A9

Utilitarian picture	*Deontological picture*

10. Lawrence of Arabia   Mean emotion rating: 6.1   High-conflict
You are the leader of a small army that consists of warriors from two tribes, the hill tribe and the river tribe. You belong to neither tribe. During the night a hill tribesman got into an argument with a river tribesman and murdered him. The river tribe will attack the hill tribe unless the murderer is put to death, but the hill tribe refuses to kill one of its own warriors.
The only way for you to avoid a war between the two tribes that will costs hundreds of lives is to publicly execute the murderer by cutting off is head with your sword.
Would you cut off this man's head in order to prevent the two tribes from fighting a war that will cost hundreds of lives?

10. Stammen
Je bent de leider van een klein leger dat bestaat uit krijgers uit twee stammen: de bergstam en de rivierstam. Jij behoort tot geen van de stammen. Afgelopen nacht kreeg een bergstamlid ruzie met een rivierstamlid en bracht hem om het leven. De rivierstam zal de bergstam aanvallen tenzij de moordenaar gedood wordt, maar de bergstam weigert een van zijn mannen te doden. De enige manier om een oorlog te voorkomen en honderden levens te redden is om de man zelf publiekelijk te vermoorden door hem te onthoofden met je zwaard.
Zou je de man onthoofden om een oorlog tussen de stammen te voorkomen en honderden levens te redden?

Figure A10

Utilitarian picture	*Deontological picture*

Impersonal dilemmas

1. Switch   Mean emotion rating: 5.3

You are at the wheel of a runaway trolley quickly approaching a fork in the tracks. On the tracks extending to the left is a group of five railway workmen. On the tracks extending to the right is a single railway workman.

If you do nothing the trolley will proceed to the left, causing the deaths of the five workmen. The only way to avoid the deaths of these workmen is to hit a switch on your dashboard that will cause the trolley to proceed to the right, causing the death of the single workman.

Would you hit the switch in order to avoid the deaths of the five workmen?

1. Wissel

Je zit aan het stuur van een op hol geslagen tram die op een wissel afrijdt.

Op het linkerspoor zijn vijf mensen aan het werk. Op het rechterspoor werkt een enkel persoon. Als je niets doet zal de tram het linkerspoor opgaan en de vijf mensen doden. De enige manier om de dood van deze mensen te voorkomen is het omzetten van een knopje dat ervoor zorgt dat de tram van spoor wisselt en de dood van één persoon zal veroorzaken.

Zou je het knopje indrukken om zo het leven van de vijf mensen te redden?

Figure A11

Utilitarian picture	*Deontological picture*
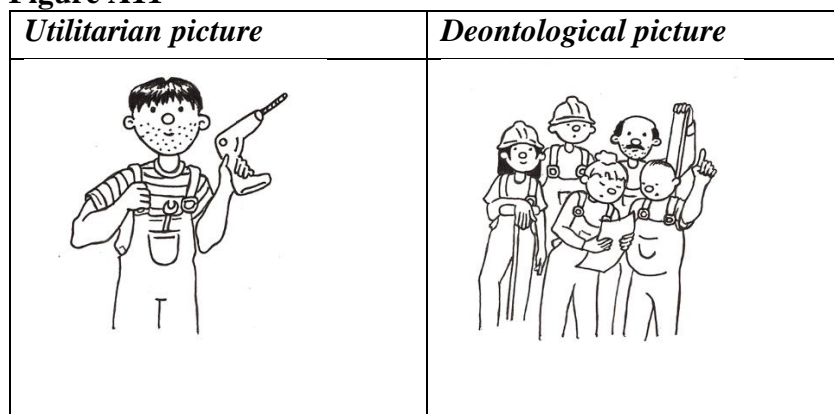
2. Lost Wallet   Mean emotion rating: 2.9

You are walking down the street when you come across a wallet lying on the ground. You open the wallet and find that it contains several hundred dollars in cash as well the owner's driver's license.

From the credit cards and other items in the wallet it's very clear that the wallet's owner is wealthy. You, on the other hand, have been hit by hard times recently and could really use some extra money. You consider sending the wallet back to the owner without the cash, keeping the cash for yourself.
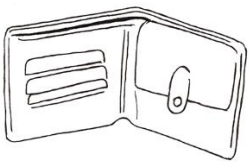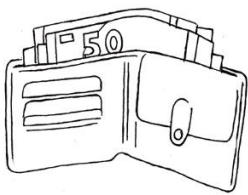
Would you keep the money you found in the wallet in order to have more money for yourself?

2. Verloren Portemonnee

Je loopt door de straat als je langs een portemonnee loopt die op de grond ligt. Je opent de portemonnee en komt erachter dat deze honderden euro's in contanten bevat, maar ook het rijbewijs van de eigenaar. Uit de creditcards en andere spullen in de portemonnee blijkt dat de eigenaar heel erg rijk moet zijn. Jij hebt daarentegen veel meegemaakt de laatste tijd en je zou echt wat extra geld kunnen gebruiken. Je overweegt om de portemonnee terug te sturen zonder het geld, zodat je het geld zelf kunt houden.

Zou je het geld dat in de portemonnee behouden om zo meer geld voor jezelf te hebben?

Figure A12

Utilitarian picture	*Deontological picture*

3. Taxes   **Mean emotion rating: 2.7**

You are the owner of a small business trying to make ends meet. It occurs to you that you could lower your taxes by pretending that some of your personal expenses are business expenses.
For example, you could pretend that the stereo in your bedroom is being used in the lounge at the office, or that your dinners out with your wife are dinners with clients.
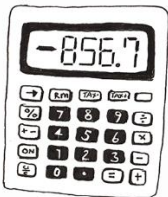*Would you pretend that certain personal expenses are business expenses in order to lower your taxes?*

3. Belasting

Je bent de eigenaar van een klein bedrijf dat de eindjes aan elkaar probeert te knopen. Het komt in je op dat je je belastingen zou kunnen verlagen door te doen alsof sommige persoonlijke uitgaven zakelijke uitgaven zijn. Je zou bijvoorbeeld kunnen doen alsof de stereo-installatie in je slaapkamer gebruikt wordt in de loungeruimte op kantoor of dat je etentjes met je partner etentjes met cliënten zijn.
Zou je doen alsof bepaalde persoonlijke uitgaven zakelijke uitgaven zijn om zo je belastingen te verlagen?

Figure A13

Utilitarian picture	*Deontological picture*

4. Vaccine Policy   **Mean emotion rating: 1.1**

You work for the Bureau of Health, a government agency. You are deciding whether or not your agency should encourage the use of a certain recently developed vaccine. The vast majority of people who take the vaccine develop an immunity to a certain deadly disease, but a very small number of people who take the vaccine will actually get the disease that the vaccine is designed to prevent.
All the available evidence, which is very strong, suggests that the chances of getting the disease due to lack of vaccination are much higher than the chances of getting the disease by taking the vaccine.
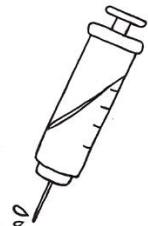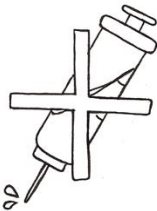
Would you direct your agency to encourage the use of this vaccine in order to promote national health?

4. Vaccinatiebeleid

Je werkt voor het Gezondheidsbureau, een overheidsinstelling. Jij mag beslissen of jouw instelling het gebruik van een nieuw vaccin gaat aanbevelen. Een groot deel van de mensen die het vaccin neemt, wordt immuun tegen een dodelijke ziekte, maar een klein deel van de mensen die het vaccin neemt, krijgt die dodelijke ziekte. Er is sterk bewijs dat laat zien dat de kans groter is dat iemand de ziekte krijgt door niet ingeënt te zijn, dan door het vaccin te nemen.
Zou je jouw gezondheidsinstelling aanmoedigen om dit vaccin aan te bevelen om zo de nationale gezondheid te verbeteren?

Figure A14

Utilitarian picture	*Deontological picture*

5. Sculpture   Mean emotion rating: 3.1

You are visiting the sculpture garden of a wealthy art collector. The garden overlooks a valley containing a set of train tracks. A railway workman is working on the tracks, and an empty runaway trolley is heading down the tracks toward the workman.
The only way to save the workman's life is to push one of the art collector's prized sculptures down into the valley so that it will roll onto the tracks and block the trolley's passage. Doing this will destroy the sculpture.
Would you destroy the sculpture in order to save this workman's life?

5. Standbeeld

Je brengt een bezoek aan de standbeeldentuin van een rijke kunstverzamelaar. De tuin kijkt uit over een vallei waarin een aantal treinrails liggen. Een spoorwegwerker is aan het werk op de rails, terwijl een op hol geslagen tram op de man afrijdt. De enige manier om de spoorwegwerker te redden is om een van de bekroonde standbeelden van de verzamelaar de vallei in te gooien zodat het de tram stopt op het spoor. Dit zal het standbeeld verwoesten.
Zou je het standbeeld verwoesten om het leven van de man te redden?

Figure A15

Utilitarian picture	Deontological picture

6. Speedboat   **Mean emotion rating: 3.0**

While on vacation on a remote island, you are fishing from a seaside dock. You observe a group of tourists board a small boat and set sail for a nearby island. Soon after their departure you hear over the radio that there is a violent storm brewing, a storm that is sure to intercept them. The only way that you can ensure their safety is to warn them by borrowing a nearby speedboat. The speedboat belongs to a miserly tycoon who would not take kindly to your borrowing his property.
Would you borrow the speedboat in order to warn the tourists about the storm?

6. Speedboat

Tijdens een vakantie op een afgelegen eiland ben je aan het vissen van een zeedok. Je ziet een groep toeristen aan boord gaan van een kleine boot en ze varen richting een nabij gelegen eiland. Kort nadat ze weg zijn hoor je op de radio dat er een hevige storm aankomt, waar de toeristen in terecht zullen komen. De enige manier om ze te waarschuwen is door een speedboot te lenen. De speedboot is van een gierige magnaat die boos zal worden als je aan zijn spullen komt.
Zou je de speedboot lenen om de toeristen te waarschuwen?

Figure A16

Utilitarian picture	Deontological picture

7. Guarded Speedboat   **Mean emotion rating: 3.0**

While on vacation on a remote island, you are fishing from a seaside dock. You observe a group of tourists board a small boat and set sail for a nearby island. Soon after their departure you hear over the radio that there is a violent storm brewing, a storm that is sure to intercept them. The only way that you can ensure their safety is to warn them by borrowing a nearby speedboat. The speedboat belongs to a miserly tycoon who has hired a fiercely loyal guard to make sure that no one uses his boat without permission. To get to the speedboat you will have to lie to the guard.

Would you lie to the guard in order to borrow the speedboat and warn the tourists about the storm?

7. Bewaakte Speedboat
Tijdens een vakantie op een afgelegen eiland ben je aan het vissen van een zeedok. Je ziet een groep toeristen aan boord gaan van een kleine boot en ze varen richting een nabij gelegen eiland. Kort nadat ze weg zijn hoor je op de radio dat er een hevige storm aankomt, waar de toeristen in terecht zullen komen. De enige manier om ze te waarschuwen is door een speedboot te lenen. De speedboot is van een gierige magnaat die laatst een sterkte, loyale bewaker heeft aangenomen om ervoor te zorgen dat niemand aan zijn spullen komt. Om de speedboot te kunnen gebruiken, zul je moeten liegen tegen deze bewaker.
Zou je liegen tegen de bewaker om de speedboot te kunnen lenen en de toeristen te kunnen waarschuwen?

Figure A17

Utilitarian picture	*Deontological picture*

8. Resume   **Mean emotion rating: 2.8**
You have been trying to find a job lately without much success. You figure that you would be more likely to get hired if you had a more impressive resume.
You could put some false information on your resume in order to make it more impressive. By doing this you might ultimately manage to get hired, beating out several candidates who are actually more qualified than you.
Would you put false information on your resume in order to help yourself find employment?

8. CV
Je bent al een tijdje aan het zoeken naar een baan, maar zonder succes. Je denkt dat je sneller aan een baan kunt komen als je CV indrukwekkender zou zijn. Je zou valse informatie op je CV kunnen zetten om je CV indrukwekkender te maken. Door dit te doen heb je veel meer kans op een baan, doordat ze jou zouden kiezen in plaats van kandidaten die eigenlijk geschikter zijn dan jij.
Zou je liegen op je CV om jezelf sneller aan een baan te helpen?

Figure A18

Utilitarian picture	Deontological picture

9. Stock Tip   **Mean emotion rating: 2.6**

You are a management consultant working on a case for a large corporate client. You have access to confidential information that would be very useful to investors. You have a friend who plays the stock market. You owe this friend a sizable sum of money.

By providing her with certain confidential information you could help her make a lot of money, considerably more than you owe her. If you did this, she would insist on canceling your debt. Releasing information in this way is strictly forbidden by federal law.

Would you release this information to your friend so that she will cancel your debt?

9. Aandelen

Je bent managementconsultant die werkt aan een zaak voor een grote klant. Jij hebt toegang tot geheime informatie die bruikbaar zou zijn voor investeerders. Je hebt een vriendin die in de aandeelhandel werkt. Je bent deze vriendin een groot geldbedrag schuldig. Door haar deze geheime informatie te geven, kan ze veel geld verdienen; meer dan je haar schuldig bent. Als je dit doet, zou ze je schuld kwijtschelden. Het is illegaal om deze informatie te delen.

Zou je de informatie delen met je vriendin zodat je schuld wordt kwijtgescholden?

Figure A19

Utilitarian picture	Deontological picture

10. Illegal Lunch   **Mean emotion rating: 2.1**

You are a lawyer working on a big case. The judge presiding over the trial happens to be someone you knew from law school. The two of you were rather friendly back then, but now, decades later, it seems that your old friend barely remembers you.

You're quite sure that if you were to talk to him over lunch, you could jog his memory and he would begin to see you as an old buddy, which would be very good for your work on this case. It's illegal for judges and lawyers working on the same case to meet socially.
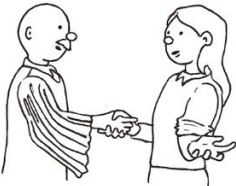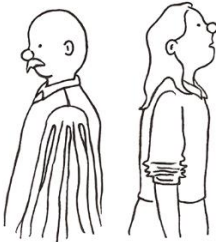
Would you meet with this judge socially in order to help you win your case?

10. Illegale Lunch

Je bent een advocaat die werkt aan een grote zaak. De rechter in deze zaak is iemand waarmee je rechten hebt gestudeerd. Jullie waren toen vrienden, maar nu, jaren later, lijkt het alsof je oude vriend zich jou niet meer herinnert. Je bent er zeker van dat je zijn geheugen op kunt frissen door met hem te praten tijdens lunchtijd, en er zo voor kunt zorgen dat hij je weer ziet als een vriend. Dit zou in jouw voordeel kunnen werken in de zaak. Het is illegaal voor rechters en advocaten om sociaal contact te hebben als ze aan dezelfde zaak werken.

Zou je een gesprek hebben met de rechter om jouw zaak te helpen?

Figure A20

Utilitarian picture	*Deontological picture*

Fillers

These questions (from Hayakawa et al., 2017) are asked to ensure comprehensive ability in noise. Correct answers are marked in **bold.**

1. Adam

Please listen to the story and answer the question.

Adam is a cashier at a mall. He is very good at doing math in his head, so he often calculates the total without using the computer. This is usually a quick and efficient way of doing the job, but sometimes he makes mistakes.

Which of the following statements is TRUE?
  - A. Adam is the owner of a mall.
  - B. Adam is bad at mental math.
  - C. Adam is always making mistakes and so needs to use the computer.
  - **D. Adam often does the math in his head and is usually quite good at it.**

1. Adam

Luister naar het verhaal en beantwoord de vraag.

Adam is een kassamedewerker in een winkelcentrum. Hij kan heel goed uit het hoofd rekenen, dus berekent hij vaak het totaal zonder de computer te gebruiken. Dat is meestal een snelle en efficiënte methode, maar soms maakt hij foutjes.

Welke van de onderstaande zinnen is WAAR?
  - A. Adam is de eigenaar van een winkelcentrum.
  - B. Adam is niet goed in hoofdrekenen.
  - C. Adam maakt altijd fouten en moet daarom de computer gebruiken.
  - **D. Adam rekent vaak uit het hoofd en is er meestal redelijk goed in.**

2. Maria

Please listen to the story and answer the question.

Maria is a student at a university. She receives financial aid, but the amount of money she gets depends on the quality of her grades, so if she fails a class, she receives less money to pay her tuition. This causes her stress, but she is enjoying her classes.

Which of the following statements is TRUE?
  - A. Maria is a teacher.
  - B. Maria dislikes her courses.
  - C. Maria does not receive financial aid and is paying for university by herself.
  - **D. Maria needs to have good grades to get more money to pay her tuition.**

2. Maria

Luister naar het verhaal beantwoord de vraag.

Maria is een studente aan een universiteit. Ze krijgt financiële hulp, maar hoeveel geld ze krijgt, is afhankelijk van de kwaliteit van haar cijfers, dus als ze een vak niet haalt, krijgt ze minder geld om haar collegegeld te betalen. Dit veroorzaakt haar stress, maar ze geniet van haar cursussen.

Welk van de onderstaande zinnen is WAAR?
  - A. Maria is een docente.
  - B. Maria houdt niet van haar cursussen.
  - C. Maria krijgt geen financiële hulp en betaald zelf voor haar studie.
  - **D. Maria moet goede cijfers hebben om meer studiegeld te krijgen.**

Appendix B Demographic and Language Proficiency Questionnaire

1. Participant code
   Participant code

2. List number
   List number

3. LexTALE score
   LexTALE score

4. Geef hieronder aan hoe oud u bent.
   Put your age below

5. Geef hieronder aan wat uw moedertaal is.
   What is your native language?

   – Nederlands
     Dutch

   – Anders, namelijk …
     Other, namely ...

6. Geef hieronder aan wat uw geslacht is.
   What is your gender?

   – Man
     Male

   – Vrouw
     Female

   – Anders
     Other

7. Geef hieronder aan wat uw hoogst genoten opleidingsniveau is.
   What is the highest level of education you have been enrolled in?

   – Basisschool
     Elementary school

   – VMBO
     Preparatory secondary vocational education

   – HAVO
     Senior general secondary school

   – VWO
     Pre-university education

- MBO
  Vocational education

- HBO
  University of Applied Sciences

- Universiteit
  University

8. Heeft u gehoorproblemen?
   Do you have hearing problems?

   - Ja
     Yes

   - Nee
     No

9. Wat is uw kennis van het Engels? Vink aan wat voor u van toepassing is.
   What is your knowledge of English? Tick the boxes that are suitable for you.

	Geen kennis *No knowlegde*	Beginner *Beginner*	Gemiddeld *Average*	Gevorderd *Experienced*	Moedertaal *Mother tongue*
Spreken *Speaking*	○	○	○	○	○
Luisteren *Listening*	○	○	○	○	○
Schrijven *Writing*	○	○	○	○	○
Lezen *Reading*	○	○	○	○	○

10. Op welke leeftijd (in jaren) bent u op een zinvolle manier begonnen Engels te leren?
    At what age (in years) did you start learning English in a meaningful way?

11. Op welke manier heeft u Engels geleerd? Vink aan wat voor u van toepassing is.
    How did you learn English? Tick the answer that is suitable for you.

    - Formele instructie, bijv. cursus/school aanbod
      Formal instruction, e.g. a course/school

    - Immersie, d.w.z. leven in een Engelstalige omgeving/land
      Immersion, i.e. living in an English speaking environment/country

    - Allebei
      Both

12. Hoeveel maanden heeft u in een Engelstalig lang gewoond?
    How many months have you lived in an English speaking country?