Bilingualism: Language and Cognition

cambridge.org/bil

The interplay between emotion and modality in the Foreign-Language effect on moral decision making

Susanne Brouwer

Radboud University, Nijmegen, the Netherlands

Research Article

Cite this article: Brouwer S (2021). The interplay between emotion and modality in the Foreign-Language effect on moral decision making. *Bilingualism: Language and Cognition* **24**, 223–230. https://doi.org/10.1017/S136672892000022X

Received: 25 June 2019
Revised: 20 February 2020
Accepted: 21 February 2020
First published online: 27 May 2020

Keywords:
moral decision making; Foreign-Language effect; bilingualism; modality; emotion

Address for correspondence:
Susanne Brouwer, E-mail: s.brouwer@let.ru.nl

Abstract

This study examined whether the *Foreign-Language effect*, an increase in bilinguals' rate of rational decisions to moral dilemmas in their foreign versus their native language, is influenced by emotion and the modality in which the dilemmas are presented. 154 Dutch–English bilinguals were asked to read and listen to personal and impersonal moral dilemmas in Dutch or in English. Importantly, the reading task had the character of a self-paced reading task to resemble the listening task as closely as possible. In both modalities, participants' task was to indicate whether the proposed action was appropriate or not. Results showed that the Foreign-Language effect was present for personal dilemmas only. In addition, an effect of modality demonstrated that participants took overall more rational decisions during the listening than the reading task. These findings give insight in the interplay between language, emotion and task demands, revealing that moral decision making is context-dependent.

Introduction

Living ethically entails that our daily habits and overall intentions must be aligned with a certain moral code. However, as strongly as a person may believe in a certain moral rule, previous research has shown that circumstances can induce rather different moral decisions. For example, bilinguals have shown to be more emotional when responding to moral dilemmas in their native compared to their foreign language (e.g., Costa, Foucart, Hayakawa, Aparici, Apesteguia, Heafner & Keysar, 2014; Geipel, Hadjichristidis & Surian, 2015a, 2015b; Cipolletti, McFarlane & Weissglass, 2016). This finding is in line with the work that has revealed that bilinguals also experience weaker emotional activation upon hearing emotional words in their second than their native language (e.g., Chen, Lin, Chen, Lu & Guo, 2015; Harris, Aycicegi & Gleason, 2003; Sulpizio, Toti, Del Maschio, Costa, Fedeli, Job & Abutalebi, 2019). The current study reports which circumstances may affect this so-called Foreign-Language effect, giving insight into the flexibility of moral decision making.

A dual-process theory has been proposed to account for differences in moral decision making (e.g., Greene, Sommerville, Nystrom, Darley & Cohen, 2001; Kahneman, 2003). This theory assumes that moral decision making is driven by a complex interaction between emotional and rational processes. Typically, emotional processes support judgments that favor the essential rights and duties of a person (i.e., deontological decisions; Kant, 1785/1959), while controlled processes support judgments favoring the greater good by maximizing benefits and minimizing costs across affected individuals (i.e., utilitarian decisions; Mill, 1861/1998). The emotional system is considered to be fast, automatic and affective, indicating unconscious, spontaneous reasoning which occurs mostly involuntarily and is linked to emotions. In contrast, the controlled system is more explicit and asks for deliberative, effortful reasoning and is mostly detached from emotions. It operates slowly and uses abstract, rational knowledge which often requires a certain amount of exercise.

To understand the activation of these systems during moral decision making, Green et al. (2001) showed that it is important to make a distinction between personal and impersonal dilemmas. Personal dilemmas involve (a) serious bodily harm (b) to one or more particular individuals, where (c) this harm is not the result of deflecting an existing threat (e.g., Greene Morelli, Lowenberg, Nystrom & Cohen, 2008, p. 1146). Greene, Cushman, Stewart, Lowenberg, Nystrom, and Cohen (2009) pointed out that the latter criterion requires a revision. Personal dilemmas involve personal force (directness/personalness) which means that "an agent applies personal force to another when the force that directly impacts the other is generated by the agent's muscles, as when one pushes another with one's hands or with a rigid object" (p. 365). It is therefore not surprising that emotionality might increase when the self is involved. It is argued here that when dilemmas are up close and personal they are putatively more emotional. As a personal dilemma, Greene and colleagues presented the well-known Footbridge dilemma (Foot, 1978), in which five people tied to a train track are

© The Author(s), 2020. This is an Open Access article, distributed under the terms of the Creative Commons Attribution licence (http://creativecommons.org/licenses/by/4.0/), which permits unrestricted re-use, distribution, and reproduction in any medium, provided the original work is properly cited.

CAMBRIDGE UNIVERSITY PRESS

about to be killed by an oncoming train. The only way to save them would be to push a fat man onto the tracks, thereby killing him, but stopping the train. The authors also presented an impersonal version of this dilemma, the Switch dilemma, in which a switch can change the train's direction, whereby it runs over one person instead of the five people on the other track. The difference in brain activation during moral decision making was assessed with an fMRI. Their results showed that the personal Footbridge dilemma elicited brain areas associated with emotion to become active, whereas this activation was less for the impersonal Switch dilemma, revealing that emotional processes can influence moral decision making.

This distinction between personal and impersonal dilemmas also appears to be important for the presence of the Foreign-language effect. On the basis of the dual-process account, Costa et al. (2014) argued that a foreign language should induce more utilitarian decisions than a native language due to emotional distance. Furthermore, they reasoned that the Foreign-Language effect may be stronger for personal than impersonal dilemmas. The researchers demonstrated that people make different moral decisions based on which language they are communicating in. On the personal Footbridge dilemma, merely 18% of participants pushed the fat man (utilitarian decision) when it was presented in their native language, whereas 44% did so when it was presented in their foreign language. However, this pattern was not replicated on the impersonal Switch dilemma, providing evidence that a certain amount of emotionality needs to be involved (see also Cipolletti et al., 2016, for similar results).

However, Geipel et al. (2015b) found that moral decision making was not driven by an attenuation of emotions. They presented multiple personal and impersonal dilemmas to participants. Surprisingly, their results showed that the Foreign-Language effect was absent on some personal dilemmas, and at the same time, present on some impersonal dilemmas. To explain this pattern, the researchers argued that the Foreign-Language effect only occurs when dilemmas violate social or moral norms (see also Dewaele, 2010; Gawinkowska, Paradowski & Bilewicz, 2013).

Considering the above findings, it seems like the Foreign-Language effect is a rather robust phenomenon. However, some studies have not been able to show this effect on dilemmas other than Footbridge (e.g., Chan, Gu, Ng & Tse, 2016; Hayakawa, Tannenbaum, Costa, Corey & Keysar, 2017; Muda, Niszczota, Białek & Conway, 2018) or were not able to show the effect at all (e.g., Brouwer, 2019; Ĉavar & Tytus, 2018). For example, Ĉavar and Tytus (2018) questioned whether the effect might disappear in highly proficient and acculturated bilinguals. They tested a group of such highly proficient bilinguals and indeed found consistent moral decisions in both languages, arguing for the need to take measures like language proficiency and age of acquisition into account. Similarly, Brouwer (2019) was also not able to replicate the Foreign-language effect in Dutch–English bilinguals, which seems to indicate that high proficiency in the foreign language promotes emotional grounding. Moreover, the author argued that the emotional fluency in this group may also be connected to the close cultural and typological relation between Dutch and English.

Besides looking at the Foreign-language effect in highly proficient bilinguals, Brouwer (2019) also investigated whether moral decision making is modality-specific. Previous work on moral decision making has predominantly asked bilinguals to READ text-based stimuli, while many decisions are actually made when LISTENING to a foreign language. Reading and listening are interrelated and have in common that they are both language comprehension or receptive skills. In general, written information can be considered as relatively permanent and spoken information as relatively transient (Leahy & Sweller, 2011). For instance, it is possible to readily switch back and forth between written sentences without memorizing them, while this is not the case for spoken sentences which need to be memorized. This may result in a cognitive advantage for written compared to auditory information. At the same time, previous work has shown that auditory information preserves temporal information more fully than visual presentation (Jakimik & Glenberg, 1990) because the written word lacks features such as prosody or stress that are only present in the auditory modality and may facilitate comprehension.

In addition to differences in use of cognitive resources, evidence suggests that certain kinds of words and phrases may be more emotionally intense in participants' native language when heard than when read (Caldwell-Harris & Ayçiçeği-Dinn, 2009; Dewaele, 2004; Harris et al., 2003; Harris, Gleason & Ayçiçeği, 2006, but see Jankowiak & Korpal, 2018). For example, Harris et al. (2003) recorded skin conductance responses of late proficient Turkish–English bilinguals to emotionally-laden stimuli in their native or foreign language. The researchers found that skin conductance responses were more pronounced for the native than the foreign stimuli. Importantly, they observed an effect of modality in the native language only. That is, an increased skin conductance response to native stimuli was found in the auditory compared to the visual modality.

There are several explanations of why the auditory modality elicits greater arousal than the visual modality in the native language. Harris et al. (2003, p. 573) argued that language acquired early in life is typically acquired via the auditory modality, as reading is a skill that needs to be learnt over time. This could imply that auditory and visual stimuli activate modality-specific lexical representations (Anooshian & Hertel, 1994). This modality-specific vocabulary may be tightly linked to brain systems for emotional arousal, given the proliferation of neural connections in early and middle childhood. Additionally, the visual modality requires an increase in neural activity compared to the auditory modality (e.g., Chen et al., 2015). Furthermore, auditory language may also have more diverse and more emotionally rich associations than written language, leading to an increase in specific (emotional) associations and memories (Harris et al., 2003). Similarly, Bloom and Beckwith (1989) claim that representations that are learnt early become connected with emotional regulation systems, which is why the auditory modality may be more closely connected to emotional arousal than the visual modality (see also Caldwell-Harris, 2014). Note that this line of reasoning may not work for a foreign language, as this language has been acquired later in life, at least for sequential bilinguals.

As a consequence, the magnitude of the Foreign-Language effect may be influenced by modality (visual vs. auditory), as it has been associated with affective processing. More specifically, this would mean that listening to moral dilemmas increases affective responses in the native language, which in turn gives more opportunity for the Foreign-Language effect to operate. If modality has no effect, this goes against many studies on the Foreign-Language effect which found that it operates via attenuation of emotions (e.g., Costa et al., 2014: Hadjichristidis, Geipel & Savadori, 2015) and provides support for studies that found no such connection (e.g., Chan et al., 2016; Geipel et al. 2015a, b).

In Brouwer (2019) it was tested whether LISTENING to moral dilemmas in a foreign compared to a native language can affect moral decision making, providing new ecologically valid insights in how moral decision making takes place in everyday listening

https://doi.org/10.1017/S136672892000022X Published online by Cambridge University Press

situations. The results of that experiment showed that individuals make more utilitarian decisions when listening to a moral dilemma in their foreign than their native language (i.e., AUDITORY FOREIGN-LANGUAGE EFFECT). Nevertheless, the effect of language did not interact with dilemma type (personal versus impersonal) but showed similar patterns as were found in Geipel et al. (2015b). A shortcoming of this study is that it was not possible to directly compare the results on the reading and listening experiment because of differences between the two experimental set-ups. More specifically, in the reading experiment, participants received the dilemmas on paper. Each dilemma was presented on one page. This gave participants the opportunity to read a scenario multiple times. However, in the listening experiment, participants were sitting behind a laptop and, inherent to the auditory character, each scenario needed time to unfold. Participants were only able to listen to each dilemma once and were not allowed to listen to parts of the scenario again. A direct comparison between the results of the two experiments, and thus the effect of modality or presentation mode, was therefore invalid. The current study aims to fill this gap by designing two experiments which were as similar as possible and by using a within- instead of a between-participants design.

The aim of the current study was to examine under which circumstances the (AUDITORY) FOREIGN-LANGUAGE EFFECT holds. In particular, it will extend the previous work by manipulating the task (reading versus listening) and type of dilemma (personal versus impersonal) in a single experiment presented to highly proficient Dutch–English bilinguals. The current experimental set-up took into account the previous shortcomings, i.e., differences in timing and ability to review each dilemma, by presenting the written dilemmas as a self-paced reading task (see Method section for details).

The question is whether the changes in the experimental set-up influence moral decision making. On the one hand, it is possible that this change will not be different from the previous findings (e.g., Brouwer, 2019; Ĉavar & Tytus, 2018; Costa et al., 2014). In this case, it is expected that highly proficient bilinguals will show a reduced or no Foreign-Language effect in the reading task of the experiment but will show an *auditory* Foreign-Language effect in the listening task. Furthermore, it is predicted that type of dilemma, personal versus impersonal, will play no significant role. On the other hand, it is possible that the changes in experimental set-up modify these expectations. That is, testing the same participants on tasks that are more similar to each other may elicit a Foreign-Language effect for personal dilemmas only, although it may be reduced because the participants are highly proficient.

Furthermore, with this new set-up it is possible to examine directly whether there are task effects (reading versus listening). Previous work has shown that utilitarian decisions are supported by cognitive control processes (e.g., Greene, 2007). It is therefore predicted that taxing cognitive resources (which thus reduces the use of controlled processes) may decrease the rate of utilitarian decisions (Cummins & Cummins, 2012). Although the task demands in the current study are more similar to each other than in the previous work, the cognitive load in the reading task particularly increased, which may therefore lead to fewer utilitarian decisions on that task overall.

Method

Participants

In total, 159 participants were tested, of which five participants were excluded due to having hearing problems or not having Dutch as a first language. Seventy-five participants were randomly assigned to the native language condition (Dutch, 45 females, M_{AGE}=25;5 years, SD_{AGE}=12;3) and 79 to the foreign language condition (English, 48 females, M_{AGE}=22;7 years, SD_{AGE}=6;9). Participants in both conditions were primarily highly educated (96%) and did not statistically differ in age ($t(114) = 1.72$, $p = .09$).

Participants filled out a short background questionnaire in which they had to self-rate their Dutch and English proficiency skills on a 5-point Likert scale (1 = no knowledge, 2 = beginner, 3 = average, 4 = advanced, 5 = native-like). They indicated to be nativelike on Dutch ($M = 4.95$, $SD = .21$, min = 4, max = 5) and to have advanced English proficiency skills ($M = 4.02$, $SD = .64$, min = 2.5, max = 5). Participants started learning English at a mean age of 9 years ($SD = 2.66$, min = 0, max = 13). Several independent t-tests showed that participants of the native language group did not differ on these skills from the foreign language group (listening in Dutch: $t(152)=-.90$, $p = .37$; reading in Dutch: $t(152)=-.67$, $p = .51$; listening in English: $t(141) = .13$; $p = .90$; reading in English: $t(131)=-1.03$, $p = .30$; Age of English onset: $t(152)=-.13$, $p = .90$). This reveals that, although results are based on a between-subjects design, the participants assigned to the native or foreign language condition were comparable.

Participation was voluntary and the experimental protocol was approved by the independent ethics committee of the Radboud University Nijmegen.

Materials

The same moral dilemmas were used as in Brouwer (2019, see Appendix for complete descriptions), except for one additional practice item. The dilemmas originated from Greene Nystrom, Engell, Darley, and Cohen (2004). Three personal (i.e., Footbridge, Crying baby, Vitamins) and three impersonal dilemmas (i.e., Switch, Lost wallet, Taxes) were presented. Koenigs, Young, Adolphs, Tranel, Cushman, Hauser, and Damasio (2007) demonstrated that the personal dilemmas ($M = 6.5$, on a 7-point scale) were overall rated as more emotional than the impersonal dilemmas ($M = 3.6$). Note that most of the previous work on the Foreign-Language effect included fewer dilemmas (e.g., Cipolletti et al., 2016; Costa et al., 2014; Costa, Corey, Hayakawa, Aparici, Vives & Keysar, 2019; Geipel et al., 2015b). In addition, two practice items and two fillers were presented.

The dilemmas were originally written in English (except for the self-made practice dilemmas). They were translated into Dutch by two native Dutch speakers who are highly proficient in English (C1 and C2 level). The translations were compared and, if necessary, adjusted in consultation. For those words that could be translated in multiple ways, the translators chose for the one most frequently used. The word count of the dilemmas in both languages were kept as equal as possible ($M = 103.3$ for Dutch and $M = 103.2$ for English).

For the listening task, the dilemmas were recorded by a native Dutch speaker (male, 28 years old), who finished his BA, MA and PhD at the English Language and Culture department of the Radboud University (32 bit, 44100 Hertz, using Adobe Audition©). This speaker was used for both the Dutch and the English dilemmas to prevent any influence of speaker characteristics on the results. He was chosen as our speaker because his English was of very high proficiency (C2 level).

Participants in the foreign language condition were asked whether they thought that English was the native language of the

https://doi.org/10.1017/S136672892000022X Published online by Cambridge University Press

speaker on a 5-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = strongly agree). On average, they rated the speaker with a score of 4.15 (SD = .99). Participants also rated the speaker to be intelligible (M = 4.52; SD = .71).

Procedure

Participants were tested in a quiet room. After filling out a consent form, they were seated in front of a laptop. The experiment was run using the open source program *OpenSesame* (Mathôt, Schreij & Theeuwes, 2012). The instructions and moral dilemmas were presented in the language of the condition they were randomly assigned to (Dutch or English). Half the participants started with the reading task, whereas the other half started with the listening task of the experiment. Participants were presented with a mix of personal and impersonal dilemmas. Note that if one dilemma was presented in one task, it would not appear again in the other task to prevent practice effects. This resulted in an unequal amount of personal and impersonal dilemmas in each task.

Listening task

The listening task was almost identical to the one reported in Brouwer (2019). Participants were wearing headphones. The experiment always started with the same practice item to familiarize participants with the task. After that, four moral dilemmas, three experimental and one filler, were presented in pseudorandomized order across participants.

Each trial had the following structure. First, a fixation cross appeared in the center of the screen and participants heard the title of the dilemma followed by a second of silence. Next, the participant heard the rest of the dilemma, followed by a second of silence before it was asked whether the proposed action was appropriate or not. Immediately after this, the fixation cross disappeared and the words "yes" and "no" appeared on the screen. Participants' task was to press a button for "yes" (utilitarian decision, indicated with a green sticker) or one for "no" (deontological decision, indicated with a red sticker). The button position was counterbalanced to avoid giving dominant hand responses. Participants had 20 seconds to respond before the next trial initiated.

Reading task

The reading task had the character of a self-paced reading task such that it resembled the listening task as much as possible. This task always started with the same practice item to familiarize participants with the procedure. After this, four dilemmas, three experimental and one filler, were presented in pseudorandomized order across participants.

Each trial had the following structure. First, a fixation cross appeared in the center of the screen and participants could read the title of the dilemma. After a second, participants could read the first one or two sentences of a dilemma. On each screen maximally two sentences were presented such that each dilemma consisted of maximally six different screens. The Dutch and English version of each dilemma were almost identical in terms of number of screens. Participants could use the space bar to continue to the next screen. After presentation of the full dilemma, participants' task was to judge the appropriateness of the proposed action. This question was asked on a separate screen. Participants had to press a button on the keyboard for "yes" (utilitarian decision, indicated with a green sticker) or one for "no" (deontological decision, indicated with a red sticker). The button position was counterbalanced to avoid giving dominant hand responses. They had 20 seconds to respond before the next trial initiated.

After the experiment, participants filled out a short questionnaire with questions about their linguistic background and about the speaker used in the experiment. The whole session lasted about 20 minutes.

Analysis

A mixed effects logistic regression model was used (Jaeger, 2008) to assess the influence of dilemma type (personal vs. impersonal), language (native vs. foreign), and task (listening vs. reading) on moral decision making. Moral decision was entered as a binary dependent variable (0 = deontological, no; 1 = utilitarian, yes). A logistic linking function was used to deal with the categorical nature of the dependent variable. In this case, the dependent variable is not directly fitted but it models the probability (in terms of logits) associated with the values of the dependent variable.

The predictors were included in the model as contrast-coded fixed effects. For Dilemma type, personal (reference, coded as -.5) was contrasted with impersonal (coded as .5). For Language, native (reference, coded as -.5) was contrasted with foreign (coded as .5). For Task, listening (reference, coded as -.5) was contrasted with reading (coded as .5). The random effects structure included intercepts for participants but not for items, given that only six items were included. Random slopes for the fixed effects by participants were added but those models never converged. For each model, a selection procedure was conducted in which insignificant predictors were removed to obtain the most parsimonious model. Significance was assessed via likelihood ratio tests and by comparing AIC values (small indicates a better fit) across models.

Results and discussion

Table 1 shows the mean percentage of utilitarian decisions on each dilemma by language and task. Table 2 outlines the results of the most parsimonious mixed effects logistic regression model based on model comparison ($\chi^2(1) = 39.774$, $p < .0001$). More complex models did not fit significantly better. The best-fitting model demonstrated a significant effect of Language, Task, and a significant interaction between Language and Dilemma type. The effect of Task revealed that the odds of making a utilitarian decision is significantly higher when listening (M = 55%) compared to reading moral dilemmas (M = 34%). The interaction between Language and Dilemma type indicated that the Foreign-Language effect was only present for personal dilemmas (M_{NATIVE}=37%; $M_{FOREIGN}$=52%) and not for impersonal dilemmas (M_{NATIVE}=43%; $M_{FOREIGN}$=45%).

General discussion

The aim of this study was to test under which circumstances the Foreign-Language effect, an increased bilinguals' rate of utilitarian decisions in their foreign versus their native language, holds. More specifically, the influence of task (listening versus reading) and type of dilemma (personal versus impersonal) on the Foreign-Language effect was examined in highly proficient Dutch–English bilinguals. Previous research has looked at the same predictors, task and type of dilemma, but was unable to make a direct comparison between the two presentation modes

https://doi.org/10.1017/S136672892000022X Published online by Cambridge University Press

Table 1. Mean percentage of utilitarian decisions by dilemma type (personal vs. impersonal), language (native language = Dutch vs. foreign language = English), and task (listening vs. reading).

	Listening task		Reading task	
	Native	Foreign	Native	Foreign
Personal dilemmas				
Footbridge	34	73	19	18
Crying baby	47	54	35	55
Vitamins	57	73	28	39
Impersonal dilemmas				
Switch	45	46	74	68
Lost wallet	56	53	8	8
Taxes	63	54	14	38

Table 2. Results of the glmer model.

	Estimate	SE	z-value	p-value
Intercept	-.24	.07	-3.59	<.001
Language	.35	.14	2.56	.01
Dilemma type	-.01	.14	-.09	.93
Task	-.85	.14	-6.23	<.001
Language:Dilemma type	-.60	.27	-2.19	0.03

model = glmer(score ~ Language * Dilemma type + Task + (1|participant), data = data, family = binomial(link = logit))

due to differences in the experimental set-ups (Brouwer, 2019). The current study modified the experimental set-up by using task and dilemma type as within-subjects variables and by changing the reading task into a self-paced reading task in order to be more comparable to the nature of the listening task.

The present study revealed two main findings. First, the Foreign-Language effect was found and modulated by the amount of emotion involved. That is, more utilitarian decisions were made in the foreign language than the native language on personal dilemmas. This pattern was not found on the impersonal dilemmas. This is in line with previous work which has shown that the Foreign-Language effect is constrained to personal dilemmas and the amount of emotionality involved (e.g., Cipolletti et al., 2016; Costa et al., 2014). An explanation for this effect is that the foreign language elicits less emotional responses compared to a native language (e.g., Dewaele, 2004; Caldwell-Harris & Ayçiçeği-Dinn, 2009; Pavlenko, 2005). As it seems like a foreign language induces more controlled processes and decreases emotional responses, the results fit well with the dual-process account, which claims that an interplay between these two processes is at work (e.g., Greene et al., 2001; Greene & Haidt, 2002; Kahneman, 2003).

However, the findings contrast with prior work that argued that highly proficient bilinguals may not or to a lesser extent experience a Foreign-Language effect due to more developed emotionality in their foreign language (Brouwer, 2019; Ĉavar & Tytus, 2018). A possible explanation might be the change in nature of the reading task. That is, the reading task was, on purpose, made more similar to the listening task, on which highly proficient bilinguals have shown an *auditory* Foreign-Language effect (Brouwer, 2019). This suggests that the mode of presentation (reading versus listening) might be of less importance for the Foreign-Language effect to occur. Instead, it is possible that the increase in task difficulty, i.e., being under extra time pressure and taxing additional cognitive resources such as working memory, caused a change in performance in the current highly proficient bilinguals. Perhaps highly proficient bilinguals need sufficient time to consciously reflect on dilemmas in their foreign language to show "nativelike" moral decision behaviour.

Another explanation for the absence of a Foreign-language effect in the previous studies (Brouwer, 2019; Ĉavar & Tytus, 2018) might be a lack of power (Bialek & Vogelsang, 2019). In the current study, almost 80 participants were tested on each language, whereas the previous studies tested 30 participants on a similar number of stimuli. Note that other studies on moral decision making have often included more participants but those studies presented fewer moral dilemmas (e.g., Cipolletti et al., 2016; Costa et al., 2014; Costa et al., 2019; Geipel et al., 2015b). Future research should take into account more moral dilemmas to examine whether the current results generalize to a larger set of personal versus impersonal dilemmas.

The second main finding of the present study is that an effect of task was found. That is, participants responded overall less utilitarian on the reading than the listening task. Previous work has demonstrated that an increase in cognitive resources could decrease the rate of utilitarian decisions (Cummins & Cummins, 2012). In line with this finding, it is possible that the current reading task was cognitively more taxing than the listening task, resulting in a reduction of utilitarian responses. Although a visual format typically allows participants to revisit material, the current experiment gave less opportunity to revisit information, as participants had to click through the scenario to receive the full story. This set-up could have therefore increased cognitive processes. In addition, an advantage of listening to auditory information compared to reading visual information is that auditory cues, such as prosody or stress, may facilitate comprehension (Jakimik & Glenberg, 1990), and may have therefore also decreased the use of cognitive resources. However, at the same time, previous research has demonstrated that learning complex new material through an auditory format constitutes a higher cognitive load than through a visual format (Leahy & Sweller, 2011; Sweller, Ayres & Kalyuga, 2011). Moreover, participants were allowed more time during the self-paced reading task than during the auditory task and they could also set the timing according to their convenience. It would be important for future research to include different native-foreign language pairs and participants with different proficiency levels to investigate whether this effect of task can be replicated.

On the basis of the previous findings (Brouwer, 2019), it was expected that there would be a significant interaction between language (native vs. foreign) and task (listening vs. reading), revealing that highly proficient bilinguals would at least show an auditory Foreign-Language effect. This idea is also based on the literature that has shown that the auditory modality elicits greater arousal than the visual modality in the native language (e.g., Caldwell-Harris, 2014; Harris et al., 2003; Bloom & Beckwith, 1989), possibly leading to an increase in the size of the *(auditory)* Foreign-Language effect. This, however, was partly borne out as it was found that the Foreign-Language effect was present but not task-dependent. As modality showed no effect, this may also provide support for studies that found that the Foreign-Language effect does not necessarily operate via attenuation of emotions

https://doi.org/10.1017/S136672892000022X Published online by Cambridge University Press

(e.g., Chan et al., 2016; Geipel et al. 2015a, b). Furthermore, the current data extends the work by Brouwer (2019) showing that a(n) (*auditory)* Foreign-Language effect is elicited when participants have to listen and read moral dilemmas in one experimental session. This provides new ecologically valid insights in how moral decision takes place in different situations, which may have societal consequences, as foreign languages are often used during meetings in international institutes and in international companies in general. For future research it would be interesting to examine participants' moral behaviour on more real-life dilemmas (cf. Geipel et al., 2015a).

There are a couple of limitations of this study. First, although the visual and auditory task were made more similar to each other than previous research has done, the two procedures were not yet fully comparable. The remaining difference between the two setups is that the self-paced reading task allowed participants to have a certain amount of control over the continuation of information, whereas participants lacked this control in the auditory task. One possible solution to tackle this remaining difference would be to present the written information as continuously as the auditory information (e.g., word by word, or even letter by letter). Another follow-up idea would be to change the auditory task in a self-paced listening task, in which the amount of given information is identical to the self-paced reading task.

Another limitation of this study is that participants' second language proficiency has been assessed with a subjective measure. Most of these type of studies have used self-ratings although they are considered as less reliable (Brantmeier, 2006; Sitzmann, Ely, Brown & Bauer, 2010). Future research could, for example, use a more objective measure, such as the LexTALE test (Lemhöfer & Broersma, 2012), to assess second language proficiency. The reason why a subjective assessment has been used is due to the low time requirement and ease of implementation, but also because of the fact that the Netherlands has been named the first country in the world (out of 80) with the highest proficiency in the English language (Education First, 2012). It was therefore expected that the current bilinguals would overall be highly proficient.

Next to using subjective second language proficiency ratings, most of the previous work on the Foreign-Language effect has presented the factor language in a between-subjects design in order to prevent participants from understanding the aim of the study. It would be interesting for follow-up research though to also examine whether it matters if language is used as a within-subjects factor. It is possible that the size of the Foreign-Language effect will be reduced in a within- compared to a between-subjects design.

In conclusion, this study is the first to combine a moral reading and listening task in one experimental session. The current results demonstrated a Foreign-Language effect for personal dilemmas, indicating that highly proficient bilinguals take more utilitarian decision when reading or listening to moral dilemmas in a foreign versus a native language. Moreover, more utilitarian decisions were taken on the listening than the reading task. These findings reveal that moral decision making depends on the amount of emotion and task demands involved.

Acknowledgements. I thank Esmée Broek, Julia Munsters, Lara Stricker, and Ellen Vos for their enthusiasm, assistance with participant running, and fruitful discussions. I also like to thank Ruud van den Beuken for lending his voice.

References

Anooshian JL and Hertel TP (1994) Emotionality in free recall: Language specificity in bilingual memory. *Cognition and Emotion* **8**, 503–514.

Bialek M and Vogelsang J (2019) No evidence for decreased foreign language effect in highly proficient and acculturated bilinguals: a commentary on Čavar and Tytus (2018). *Journal of Multilingual and Multicultural Development* **40**, 679–686. doi: 10.1080/01434632.2018.1547072.

Bloom L and Beckwith R (1989) Talking with feeling: Integrating affective and linguistic expression in early language development. *Cognition and Emotion* **3**(4), 313–342. doi: https://doi.org/10.1080/02699938908412711

Brantmeier C (2006) Advanced L2 learners and reading placement: Self-assessment, CBT, and subsequent performance. *System* **34**, 15–35. doi: https://doi.org/10.1016/j.system.2005.08.004

Brouwer S (2019) The auditory Foreign-Language Effect of moral decision making in highly proficient bilinguals. *Journal of Multilingual and Multicultural Development*. doi: https://doi.org/10.1080/01434632.2019.1585863.

Caldwell-Harris CL (2014) Emotionality differences between a native and foreign language: Theoretical implications. *Frontiers in Psychology* **5**, 1–4. doi: 10.3389/fpsyg.2014.01055

Caldwell-Harris CL and Ayçiçeği-Dinn A (2009) Emotion and lying in a non-native language. *International Journal of Psychophysiology* **71**, 193–204. doi: 10.1016/j.ijpsycho.2008.09.006

Ĉavar F and Tytus AE (2018) Moral judgment and foreign language effect: when the foreign language becomes the second language. *Journal of Multilingual and Multicultural Development* **39**, 17–28. doi: https://doi.org/10.1080/01434632.2017.1304397

Chan Y-L., Gu X, Ng J and Tse C-S. (2016) Effects of Dilemma Type, Language, and Emotion Arousal on Utilitarian Vs Deontological Choice to Moral Dilemmas in Chinese-English Bilinguals. *Asian Journal of Social Psychology* **19**, 55–65. doi: https://doi.org/10.1111/ajsp.12123

Chen P, Lin J, Chen B, Lu C and Guo T, (2015) Processing emotional words in two languages with one brain: ERP and fMRI evidence from Chinese-English bilinguals. *Cortex* **71**, 34–48. doi: 10.1016/j.cortex.2015.06.002

Cipolletti H, McFarlane S and Weissglass C (2016) The moral foreign-language effect. *Philosophical Psychology* **29**, 23–40. doi: https://doi.org/10.1080/09515089.2014.993063

Costa A, Corey JD, Hayakawa S, Aparici M, Vives M-L and Keysar B (2019) The role of intentions and outcomes in the foreign language effect on moral judgements, *Quarterly Journal of Experimental Psychology* **72**, 8–17. doi: https://doi.org/10.1177/1747021817738409

Costa A, Foucart A, Hayakawa S, Aparici M, Apesteguia J, Heafner J and Keysar B (2014) Your morals depend on language. *PLoS One* **9**, e94842. doi: https://doi.org/10.1371/journal.pone.0094842

Cummins DD and Cummins RC (2012) Emotion and deliberative reasoning in moral judgment. *Frontiers in Psychology* **3**, 1–16. doi: https://doi.org/10.3389/fpsyg.2012.00328

Dewaele J-M. (2004) The Emotional Force of Swearwords and Taboo Words in the Speech of Multilinguals. *Journal of Multilingual and Multicultural Development* **25**, 204–222. doi: https://doi.org/10.1080/01434630408666529

Dewaele J-M. (2010) 'Christ fucking shit merde!' Language preferences for swearing among maximally proficient multilinguals. *Sociolinguistic Studies* **4**, 595–614.

Foot P (1978) The problem of abortion and the doctrine of the double effect. In Foot P (ed.), *Virtues and Vices and Other Essays in Moral Philosophy*. Berkeley: University of California Press, 19–32.

Geipel J, Hadjichristidis C and Surian L (2015a) How foreign language shapes moral judgment. *Journal of Experimental Social Psychology* **59**, 8–17. doi: http://dx.doi.org/10.1016/j.jesp.2015.02.001

Geipel J, Hadjichristidis C and Surian L (2015b) The foreign language effect on moral judgment: The role of emotions and norms. *PLoS ONE* **10**, e0131529. doi: https://doi.org/10.1371/journal.pone.0131529

Gawinkowska M, Paradowski MB and Bilewicz M (2013) Second language as an exemptor from sociocultural norms. Emotion–related language choice revisited. *PLoS ONE* **8**, e81225. doi: https://doi.org/10.1371/journal.pone.0081225

https://doi.org/10.1017/S136672892000022X Published online by Cambridge University Press

Greene JD (2007) The secret joke of Kant's soul. In Sinnott-Armstrong W (ed.), *Moral psychology, Vol. 3: The neuroscience of morality: Emotion, brain disorders, and development*. Cambridge, MA: MIT Press, pp. 35–80.

Greene J, Cushman FA, Stewart LE, Lowenberg K, Nystrom LE and Cohen JD (2009). Pushing moral buttons: The interaction between personal force and intention in moral judgment. *Cognition* **111**, 364–371. doi: 10.1016/j.cognition.2009.02.001

Greene J and Haidt J (2002) How (and where) does moral judgment work? *Trends in Cognitive Science* **6**, 517–523.

Greene J, Morelli S, Lowenberg K, Nystrom L and Cohen J (2008) Cognitive load selectively interferes with utilitarian moral judgment. *Cognition* **107**, 1144–1154. doi: 10.1016/j.cognition.2007.11.004

Greene JD, Nystrom LE, Engell AD, Darley JM and Cohen JD (2004) The neural bases of cognitive conflict and control in moral judgment. *Neuron* **44**, 389–400. doi: 10.1016/j.neuron.2004.09.027

Greene JD, Sommerville RB, Nystrom LE, Darley JM and Cohen JD (2001) An fMRI investigation of emotional engagement in moral judgment. *Science* **293**, 2105–2108. doi:10.1126/science.1062872

Hadjichristidis C, Geipel J and Savadori L (2015) The effect of foreign language in judgments of risk and benefit: The role of affect. *Journal of Experimental Psychology: Applied* **21**(2), 117–129. doi: https://doi.org/10.1037/xap0000044

Harris C, Ayçiçeği A and Gleason J (2003) Taboo words and reprimands elicit greater autonomic reactivity in a first than in a second language. *Applied Psycholinguistics* **4**, 561–578. doi: 10.1017.S0142716403000286

Harris C, Gleason J and Ayçiçeği A (2006) When is a first language more emotional? Psycholinguistic evidence from bilinguals. In Pavlenko A (ed.), *Bilingual minds: Emotional experience, expression, and representation*. Clevedon, UK: Multilingual Matters, pp. 257–284.

Hayakawa S, Tannenbaum D, Costa A, Corey JD and Keysar B (2017) Thinking More or Feeling Less? Explaining the Foreign-Language Effect on Moral Judgment. *Psychological Science* **28**, 1387–1397. doi: 10.1177/0956797617720944

Jaeger TF (2008) Categorical Data Analysis: Away from ANOVAs (transformation or not) and towards Logit Mixed Models. *Journal of Memory and Language* **59**, 434–446. doi: 10.1016/j.jml.2007.11.007

Jakimik J and Glenberg AM (1990) Verbal learning meets psycholinguistics: Modality effects in the comprehension of anaphora. *Journal of Memory and Language* **29**, 582–590. doi: http://dx.doi.org/10.1016/0749-596X(90)90053-3

Jankowiak K and Korpal P (2018) On Modality Effects in Bilingual Emotional Language Processing: Evidence from Galvanic Skin Response. *Journal of Psycholinguistic Research* **47**, 663–677.

Kahneman D (2003) A perspective on judgment and choice: Mapping bounded rationality. *The American Psychologist* **58**, 697–720. doi: http://dx.doi.org/10.1037/0003-066X.58.9.697

Kant I (1785/1959) *Foundation of the metaphysics of morals* (Beck LW, Trans.). Indianapolis: Bobbs-Merrill.

Koenigs M, Young L, Adolphs R, Tranel D, Cushman F, Hauser M and Damasio A (2007) Damage to the Prefrontal Cortex Increases Utilitarian Moral Judgements. *Nature* **446**, 908–911. doi: 10.1038/nature05631

Leahy W and Sweller J (2011) Cognitive load theory, modality of presentation and the transient information effect. *Applied Cognitive Psychology* **25**, 943–951. doi: http://dx.doi.org/10.1002/acp.1787

Lemhöfer K and Broersma M (2012) Introducing LexTALE: A quick and valid Lexical Test for Advanced Learners of English. *Behavior Research Methods* **44**, 325–343. doi: https://doi.org/10.3758/s13428-011-0146-0

Mathôt S, Schreij D and Theeuwes J (2012) OpenSesame: An open-source, graphical experiment builder for the social sciences. *Behavior Research Methods* **44**(2), 314–324. doi: https://doi.org/10.3758/s13428-011-0168-7

Mill JS (1861/1998) *Utilitarianism*. In Crisp R (ed.), New York: Oxford University Press.

Muda R, Niszczota P, Białek M and Conway P (2018) Reading dilemmas in a foreign language reduces both deontological and utilitarian response tendencies. *Journal of Experimental Psychology: Learning, Memory, and Cognition* **44**, 321–326. doi: http://dx.doi.org/10.1037/xlm0000447

Pavlenko A (2005) *Emotions and multilingualism*. New York, NY: Cambridge University Press.

Sitzmann T, Ely K, Brown KG and Bauer KN (2010) Self-Assessment of Knowledge: A Cognitive Learning or Affective Measure? *Academy of Management Learning & Education* **9**, 169–191. doi: https://doi.org/10.5465/amle.9.2.zqr169

Sulpizio S, Toti M, Del Maschio N, Costa A, Fedeli D, Job R and Abutalebi J (2019) Are you really cursing? Neural processing of taboo words in native and foreign language. *Brain and Language* **194**, 84–92. doi: 10.1016/j.bandl.2019.05.003

Sweller J, Ayres P and Kalyuga S (2011) *Cognitive load theory*. New York: Springer.

Appendix: Moral dilemmas

(English versions, mean emotion rating (on a scale from 1 to 7) as reported by Koenigs et al., 2007)

Personal dilemmas

Footbridge (mean emotion rating: 6.0). 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. Is it appropriate for you to push the stranger on to the tracks in order to save the five workmen?

Crying baby (mean emotion rating: 6.8). 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. Is it appropriate for you to smother your child in order to save yourself and the other townspeople?

Vitamins (mean emotion rating: 6.8). 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. Is it appropriate for you to forcibly remove this man's kidney in order to save the lives of the six vitamin-deficient people?

Impersonal dilemmas

Switch (or Trolley) (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. Is it appropriate for you to hit the switch in order to save the lives of the five workmen?

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 euros 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

https://doi.org/10.1017/S136672892000022X Published online by Cambridge University Press

yourself. Is it appropriate for you to keep the money you found in the wallet in order to have more money for yourself?

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 partner are dinners with clients. Is it appropriate for you to pretend that certain personal expenses are business expenses in order to lower your taxes?

https://doi.org/10.1017/S136672892000022X Published online by Cambridge University Press