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Child, would you sacrifice yourself? A study on the Foreign Language Effect in children

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Research Notes

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Abstract

The moral foreign-language effect (M-FLE) translates into more utilitarian choices, even when given the option of self-sacrifice. We explore the M-FLE in 85 children, who were presented with seven moral dilemmas varying in utilitarianism, aversiveness, and whether they allowed the option of self-sacrifice; 42 answered to the dilemmas in their native language (Spanish), and 43 in a foreign language (English). Participants were more utilitarian and willing to sacrifice themselves when using their foreign language. Educational and developmental implications are discussed, especially in the context of bilingual education.

Introduction

The "Moral Foreign Language Effect" (M-FLE) (Costa, Foucart, Hayakawa, Aparici, Apesteguia, Heafner & Keysar, 2014; Hayakawa, Costa, Foucart & Keysar, 2016) shows that making decisions in a foreign (vs. native) language reduces biases. It has been studied in adults (e.g., Costa et al., 2014; Geipel, Hadjichristidis & Surian, 2015; Hayakawa et al., 2016; Romero-Rivas, López-Benítez & Rodríguez-Cuadrado, 2022), but not in children, where studies on reasoning and moral judgements have only relied on their native languages (e.g., Bucciarelli, 2015; Mikhail, 2011; Pellizzoni, Siegal & Surian, 2010). Considering that moral reasoning is a developmental process, and the rise of bilingual education worldwide (i.e., in the Autonomous region of Madrid, during the 19/20 academic year, the Spanish-English bilingual programme was present in 50% of public schools; Mañas Antón, 2019), understanding how the M-FLE might affect decision-making in children is particularly relevant, as children might be educated about morality and related topics (i.e., ethics, affection) in their second language (L2).

M-FLE in adults

Costa et al. (2014, Experiment 2) presented two versions of the trolley dilemma. In the "footbridge" version (highly aversive), an on-coming train is about to kill five people and the only way to stop it is pushing a heavy man off the footbridge, falling in front of the train, and dying. In the less-aversive "switch" version, participants can flip a switch; if they do not, the train will kill five people, and if they do, it will kill one person. Responses are classically dichotomic: they can be utilitarian, thus supporting the common good, or deontological, supporting a person's rights. In Costa et al.'s (2014) study, the percentage of utilitarianism varied by aversiveness and language: when aversiveness was high, utilitarian choices were made by 18% of the L1 and 44% of the L2 participants; when aversiveness was low, percentages were 81% and 80%, respectively. Costa et al. (2014) concluded that using the L2 increases emotional distance, leading to more utilitarian judgements in emotionally aversive scenarios. Differences on the M-FLE depending on the degree of aversiveness could depend on the activation of different processing routes (Greene, Nystrom, Engell, Darley & Cohen, 2004). Aversive dilemmas would activate a route based on automatic emotional processing, usually leading to deontological judgements, whereas less aversive dilemmas would activate conscious routes that prompt utilitarian decisions (Geipel et al., 2015). However, Geipel et al. (2015) also proposed that the M-FLE could derive from a limited access to social or moral norms. Critically, Bialek, Paruzel-Czachura and Gawronski (2019) explored whether the M-FLE was motivated by differences in sensitivity to consequences (in a utilitarian sense), to norms (in a deontological sense), or in general action tendencies. People showed a reduced sensitivity to both consequences and norms when using their L2; therefore, these seem more relevant when using our L1 vs. our L2.

To further explore how M-FLE operates, Romero-Rivas et al. (2022) sought for the locus of this reduced sensitivity in the M-FLE by distinguishing between emotions related to the self and empathy. The classic "footbridge" and "switch" versions of the trolley dilemma were presented either in participants' L1 or L2 adding the third response option of self-sacrifice. Results agreed with the attenuated emotionality account of M-FLE (e.g., Costa et al., 2014; Hayakawa, Tannenbaum, Costa, Corey & Keysar, 2017), as participants in the L2 group were more willing to

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Table 1. Proportion of responses in each dilemma, and statistics associated with each dilemma.

	% Option a)		% Option b)		% Option c)		Language		Gender		Age		Grade	
Dil. #	L1	L2	L1	L2	L1	L2	X^2	*V*	X^2	*V*	X^2	*V*	X^2	*V*
1	33.33	2.36	40.48	13.95	26.19	83.72	29.82***	.59	2.34	.17	1.88	.10	2.21	.11
2	19.05	6.98	80.95	93.02	–	–	2.75	.18	.49	.08	1.28	.12	.90	.10
3	47.62	76.74	52.38	23.26			7.68**	.30	.02	.01	.85	.10	.56	.08
4	21.43	.00	47.62	16.28	30.95	83.72	26.05***	.55	.01	.01	4.21	.16	2.89	.13
5	35.71	6.98	64.29	93.02	–	–	10.51***	.35	.26	.05	1.94	.15	2.91	.18
6	38.09	.00	40.48	25.58	21.43	74.42	30.18***	.60	.23	.05	2.56	.12	.75	.07
7	33.33	11.63	66.67	88.37	–	–	5.77*	.26	1.72	.14	1.93	.15	3.56	.21

V = Cramer's V (effect size); *** = $p < .001$; ** = $p < .01$; * = $p < .05$.

self-sacrifice in both versions of the dilemma irrespective of participant's empathy levels, suggesting that emotional attenuation applies mostly to emotions related to the self.

However, the M-FLE is not found ubiquitously, as it has been identified by recent meta-analyses (Circi, Gatti, Russo & Vecchi, 2021; Del Maschio, Crespi, Peressotti, Abutalebi & Sulpizio, 2022; Stankovic, Biedermann & Hamamura, 2022). Also, while identifying what influences the M-FLE, their conclusions sometimes differ. For example, L1-L2 similarity affected the M-FLE in Circi et al. (2021), but not in Stankovic et al. (2022), and proficiency predicted the M-FLE in Stankovic et al. (2022), but not in Circi et al. (2021) or Del Maschio et al. (2022). In addition, none of these meta-analyses have considered children. Given the long tradition of understanding moral reasoning as a developmental process (e.g., Piaget, 1932), learning about the M-FLE in children will add knowledge about the mechanisms responsible for this effect.

Moral reasoning in children

Moral reasoning in children has been only investigated using participants' L1. Studies have used different protocols and children of different ages, but, in summary, they tend to find that children are utilitarian. Pellizzoni et al. (2010, studies 1 and 2) presented the "footbridge" and a variant of the "switch" versions of the trolley dilemma to children aged 3-5 and adults. Children, like adults, were more utilitarian in the less aversive (i.e., "switch") scenario (but see Stey, 2014), as in adult studies manipulating aversiveness (e.g., Costa et al., 2014). With similarly aged children (3-6), Dworazik, Kärtner, Lange, and Köster (2019) explored how they (and their mothers) responded to different versions of the trolley dilemma, finding a preference for utilitarian responses. Dworazik et al. (2019) argue that their results support the Universal Moral Grammar Theory (UMG; Cushman, Young & Hauser, 2006) as human morality would be innate and judgements will be built in the family. However, children were more utilitarian than adults in the footbridge version, contrary to Pellizzoni et al. (2010), implying that there would be nuances regarding the UMG as some principles could apply differently to young children and adults.

Bucciarelli (2015) presented moral dilemmas to children aged 9-10, adolescents aged 13-14, and adults. Manipulating aversiveness and utilitarianism (i.e., anti-utilitarian dilemmas implied killing five to save one, and pro-utilitarian killing one to save five), she found that children were more utilitarian than adults (replicated by Daniele & Bucciarelli, 2016). Bucciarelli (2015) and Daniele and Bucciarelli (2016) state that their results agree with the "mental model theory". This theory states that moral judgements would not rely as much on emotion as they do on reasoning, reflecting cognitive capacities which advance with age, thus accounting for the differences between children and adults.

Finally, in relation to sacrifice, Weller and Hansen Lagattuta (2013) studied how race influences prosocial moral judgements and attributions of emotion in children aged 5-13. They identified that the satisfaction experienced by helping others, even if sacrificing one's own desires, emerges at the age of seven. Therefore, considering the aforementioned evidence, and that dilemmas will be presented in the L2, we chose children aged 9-12 as the target group to explore the M-FLE.

The current study

Our main aim is to explore the M-FLE in children. Considering research on 1) M-FLE (e.g., Costa et al., 2014; Romero-Rivas et al., 2022) and 2) moral judgements in children (Bucciarelli,

Table 2. Response options for each of the dilemmas.

Dil. #	Option 1	Option 2	Option 3
1	Deontological (Do nothing)	Utilitarian (Sacrifice other)	Utilitarian (Self-sacrifice)
2	Deontological (Self-sacrifice)	Utilitarian (Sacrifice other)	
3	Utilitarian (Do nothing/Self-sacrifice)	Pull lever to kill five	
4	Deontological (Do nothing)	Utilitarian (Sacrifice other)	Utilitarian (Self-sacrifice)
5	Deontological (Self-sacrifice)	Utilitarian (Sacrifice other)	
6	Deontological (Do nothing)	Utilitarian (Sacrifice other)	Utilitarian (Self-sacrifice)
7	Deontological (Self-sacrifice)	Utilitarian (Sacrifice other)	

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Table 3. Dilemmas used in the study.

#	Dilemma in English	Dilemma in Spanish	Utilitarianism	Self-sacrifice?	Aversiveness
1	An empty train is going to hit five people standing on the rail track, and it will kill them. You are in a bridge watching the scene. If you push a man onto the track or if you jump onto the track, the train will hit only one person, so either the man or you will die, but the five people on the rail track will be safe. What should you do? a) Nothing. b) Push the man onto the rail track. c) Jump onto the rail track.	Un tren vacío va a atropellar a cinco personas que están paradas en las vías del tren y las matará. Tú estás en un puente viendo la escena. Si empujas a un hombre a la vía o si tú saltas a la vía, el tren solo atropellará a una persona, así que el hombre o tú moriréis, pero las cinco personas que están en la vía estarán a salvo. ¿Qué deberías hacer? a) Nada. b) Empujar al hombre a la vía. c) Saltar a la vía.	Utilitarian	Yes	High
2	You are standing on the rail track. An empty train is going to hit you and it will kill you. There is a person watching the scene. If this person pulls a lever, the train will go to another track where there are five people, so the train will hit them and they will die, but you will be safe. What should that person do? a) Nothing. b) Pull the lever.	Estás en la vía del tren. Un tren vacío va a atropellarte y te matará. Hay una persona viendo la escena. Si esta persona tira de una palanca, el tren irá hacia otra vía donde hay cinco personas, así que el tren las atropellará y morirán, pero tú estarás a salvo. ¿Qué debería hacer esta persona? a) Nada. b) Mover la palanca.	Utilitarian	No	Low
3	You and other four people are standing on the rail track. An empty train is going to hit you and it will kill you. There is one person watching the scene. If this person pulls a lever, the train will go to another track where there is another person standing on it, so the train will hit this person and he or she will die, but you and the other four people will be safe. What should that person do? a) Nothing. b) Pull the lever.	Tú y otras cuatro personas estáis en la vía del tren. Un tren vacío va a atropellaros y os matará. Hay una persona viendo la escena. Si esta persona mueve una palanca, el tren irá hacia otra vía donde hay otra persona, así que el tren la atropellará y morirá, pero tú y las otras cuatro personas estaréis a salvo. ¿Qué debería hacer esta persona? a) Nada. b) Mover la palanca.	Anti-utilitarian	No	Low
4	Five swimmers are drowning. You can drive a motorboat towards them and save them, but your boat is too heavy. If you push one of your passengers into the sea or if you jump into the sea, either the passenger or you will drown because you cannot swim, but the five swimmers will be safe because they can get into the boat. What should you do? a) Nothing. b) Push the passenger into the sea. c) Jump into the sea.	Cinco nadadores se están ahogando. Puedes conducir una lancha motora hacia ellos y salvarlos, pero tu lancha pesa demasiado. Si empujas a uno de tus pasajeros al mar o si te tiras al mar, el pasajero o tú os ahogaréis porque no sabéis nadar, pero los cinco nadadores estarán a salvo porque podrán subirse a la lancha. ¿Qué deberías hacer? a) Nada. b) Empujar al pasajero al mar. c) Tirarte al mar.	Utilitarian	Yes	High
5	You and other four swimmers are drowning. A person can drive a motorboat toward you and save you. If this person pushes one of the passengers into the sea, the passenger will drown because he/she cannot swim, but you and the other four swimmers will be safe because you will be able to get into the boat. What should that person do? a) Nothing. b) Push the passenger into the sea.	Tú y otros cuatro nadadores os estáis ahogando. Una persona puede conducir una lancha motora hacia vosotros y salvaros. Si esta persona empuja a uno de sus pasajeros/as al mar, el pasajero/a se ahogará porque no sabe nadar, pero tú y los otros cuatro nadadores estaréis a salvo porque podréis subiros a la lancha. ¿Qué debería hacer esta persona? a) Nada. b) Empujar al pasajero al mar.	Utilitarian	No	High
6	There is a bomb on the ground about to explode. Five people are approaching the bomb and will touch it, so the bomb will explode killing all of them. If you push a	Hay una bomba en el suelo a punto de explotar. Cinco personas se están acercando y la tocarán, así que la bomba explotará matándolos a todos. Si tú	Utilitarian	Yes	High

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Table 3. (*Continued.*)

#	Dilemma in English	Dilemma in Spanish	Utilitarianism	Self-sacrifice?	Aversiveness
	person towards the bomb or if you touch the bomb, the person or you will die, but the five people who are approaching it will be safe. What should you do? a) Nothing. b) Push a person towards the bomb. c) Touch the bomb.	empujas a una persona hacia la bomba o si tú tocas la bomba, esa persona o tú moriréis, pero las cinco personas que se están acercando estarán a salvo. ¿Qué deberías hacer? a) Nada. b) Empujar a una persona hacia la bomba. c) Tocar la bomba.			
7	There is a bomb on the ground about to explode. You and other four people are approaching the bomb and will touch it, so it will explode and you all will die. There is a person watching the scene. If he/she pushes a person towards the bomb, the person will die, but you and the other four people will be safe. What should that person do? a) Nothing. b) Push a person towards the bomb.	Hay una bomba en el suelo a punto de explotar. Tú y otras cuatro personas os estáis acercando y la tocaréis, así que la bomba explotará y todos moriréis. Hay una persona viendo la escena. Si esta persona empuja a otra persona hacia la bomba, esta persona morirá, pero tú y las otras cuatro personas estaréis a salvo. ¿Qué debería hacer esta persona? a) Nada. b) Empujar a una persona hacia la bomba.	Utilitarian	No	High

2015; Daniele & Bucciarelli, 2016; Pellizzoni et al., 2010; Weller & Hansen Lagattuta, 2013), we expect that, when using their L2, children will be more: a) utilitarian; and b) willing to self-sacrifice.

We also studied whether aversiveness affects children's decision-making. That would be expected following Pellizzoni et al. (2010) or Costa et al. (2014, adult study), but data from Bucciarelli (2015) or Dworazik et al. (2019) would predict the opposite, as children were utilitarian even in highly aversive scenarios (unlike most adults). Also, we included an anti-utilitarian dilemma. Bucciarelli (2015, experiment 2) presented "pro" and "anti-utilitarian" versions of their dilemmas to explore whether children are biased to act, which they were not. We expect a similar outcome.

Finally, we cannot make solid predictions about grade or age. First, past literature did not explicitly assess grade. However, we included this factor as an exploratory measure of moral development besides age, as each grade combines several ages (i.e., grade 4: 9-10; grade 5: 10-11; grade 6: 11-12), where different social interactions could occur at each grade level. Second, Pellizzoni et al. (2010) compared children aged 3-5 and adults finding no differences, whereas Bucciarelli (2015) and Daniele and Bucciarelli (2016) found children to be more utilitarian. We did not include adults, but we will analyse whether age is a factor modulating decision making during childhood. As per gender, Pellizzoni et al. (2010) did not find differences, and although Bucciarelli (2015) only considered female data, their results were replicated by Daniele and Bucciarelli (2016) including male and female participants. Therefore, no effect of gender is expected.

Methods

Participants

Eighty-five children aged 9-12 (12 girls and six boys aged 9, 11 girls and 22 boys aged 10, 10 girls and 13 boys aged 11, and five girls and six boys aged 12) participated. They belonged to six classes distributed in three grades in a public bilingual school in Madrid: 4th (28 children), 5th (29 children) and 6th (28 children) year of Primary Education (4th: mean age = 9.35, *SD* = 0.48, 16 girls, 12 boys; 5th: mean age = 10.20, *SD* = 0.41, eight girls, 21 boys; 6th: mean age = 11.39, *SD* = 0.49, 14 girls, 14 boys).

All were native speakers of Spanish and L2 speakers of English (in Spain, a foreign language is learned from the first year of compulsory education; Ley Orgánica de Modificación de la LOE or LOMLOE, 2020), randomly allocated to the native (L1) or foreign (L2) group. English proficiency was assessed through the average mark of each class in the subject "Foreign language: English", which did not significantly differ between groups (average mark out of 10 and *SD*s for 4th year, L1: 8.29 (1.20), L2: 8.71 (1.07); 5th year, L1: 7.60 (1.06), L2: 7.72 (1.05); 6th year, L1: 8.29 (1.20), L2: 8.40 (1.06). All children gave informed consent and participated voluntarily.

Materials

Seven dilemmas were selected from and based on Bucciarelli (2015, experiment 1), with some modifications (see Table 3). Language was simplified and the gender of the actor and victim (s) were omitted. There were several response options – namely, a) "do nothing"; b) "push person/pull lever"; c) "self-sacrifice" (for self-sacrifice trials only).

The dilemmas varied in a) UTILITARIANISM: pro-utilitarian (sacrificing one to save five; dilemmas 1, 2, 4, 5, 6, 7) or anti-utilitarian (sacrificing five to save one, yourself; dilemma 3); b) AVERSIVENESS: highly aversive (physical contact with a person, e.g., "push the person"; dilemmas 1, 4, 5, 6, 7) or less aversive (physical contact with an object, e.g., "pull the switch"; 2, 3); and c) SELF-SACRIFICE: sacrificing themselves to save five people instead of sacrificing another person (dilemmas 1, 4, 6). The "trolley" dilemma was used for dilemmas 1-3, the "boat" dilemma for 4-5 and the "bomb" dilemma for 6-7. They were translated from English to Spanish and back-translated for comparability (Brislin, 1970). Participants were given the option to justify their responses (see Table 4).

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Table 4. Justifications given for some of the dilemmas.

Participant #	Language	Dilemma	Response	Justification
4	L1	1	Self-sacrifice	Because that person could do other things in their life.
4	L1	6	Push the person	Because I am a better person.
5	L1	1	Push the person	So I don't die.
5	L1	2	Pull the lever	So I don't die.
5	L1	3	Nothing	Because more people will live.
5	L1	4	Push the person	So I don't die.
5	L1	5	Push the person	So I don't die.
5	L1	6	Push the person	So I don't die.
6	L1	4	Push the person	Because then I don't die and other people are saved, even if one person's death has to be mourned.
6	L1	6	Push the person	Because more people are saved than die.
10	L1	2	Pull the lever	Because it is better for 1 person to die than for 5 to die.
11	L1	1	Push the person	Because that's how one person dies and not five.
12	L1	2	Pull the lever	Because it is better for one person to die than for five to die.
12	L1	4	Push the person	Because maybe the passenger has a disease and it is better to save five people on top of that.
12	L1	6	Nothing	I run away because I'm scared.
12	L1	7	Nothing	I am scared.
14	L1	1	Nothing	Because I don't think I am able to push someone onto the track.
14	L1	2	Pull the lever	Because it keeps me and the others safe.
14	L1	3	Pull the lever	I have done it because I do not want to die.
14	L1	4	Push the person	Because I do not want to die.
14	L1	5	Push the person	I am afraid of drowning.
15	L1	3	Nothing	It is better that one person dies rather than five, even if I am only a child.
15	L1	4	Self-sacrifice	I prefer to die myself than for others to die.
17	L1	1	Self-sacrifice	Even if I die, the rest will be safe.
17	L1	4	Self-sacrifice	I'd rather die than feeling guilty.
17	L1	6	Self-sacrifice	I will die, but everyone else will be safe.
19	L1	1	Nothing	It's not my problem but I don't want to kill anyone.
19	L1	3	Nothing	Because it is better that one person dies than that five die, even if I am the one who has to die.
19	L1	6	Nothing	Because if they touch the bomb, it's their problem.
20	L1	1	Push the person	Because even if I run over one, five are saved.
20	L1	2	Pull the lever	Because the other person is just one person, and we are five people.
20	L1	3	Pull the lever	Because I would like to BE SAVED.
20	L1	7	Push the person	Because it's best to save five people.
21	L1	1	Self-sacrifice	Because other people's lives matter.
21	L1	5	Push the person	Because five lives are more than one.
21	L1	6	Nothing	Because it's not my problem if they touch the bomb.
22	L1	1	Self-sacrifice	Because if I do something good, when I die I will be in a good place.
22	L1	2	Pull the lever	Because five people are worth more than one.
22	L1	3	Nothing	Five people are worth more than one, and I do not want to die but whatever…
22	L1	6	Nothing	Because I'd be scared.
23	L1	3	Nothing	Because the other people have children and I am only me, although I have a family too.

(*Continued*)

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Table 4. (*Continued.*)

Participant #	Language	Dilemma	Response	Justification
26	L1	2	Pull the lever	It's better that fewer people die.
26	L1	3	Pull the lever	Because I want to be saved.
27	L1	4	Nothing	I do not want to feel guilty.
28	L1	3	Pull the lever	Because I want to live.
29	L1	3	Pull the lever	I do not want to die.
29	L1	7	Nothing	Maybe the person I have to push is someone I dislike.
31	L1	1	Nothing	I'd feel very guilty.
31	L1	3	Nothing	I would rather die myself than five people.
32	L1	6	Nothing	I fear the bomb.
33	L1	3	Pull the lever	I am afraid of being run over and killed.
33	L1	5	Push the person	So that as few people as possible die.
33	L1	6	Self-sacrifice	I'd rather die myself because it's very selfish to kill someone else.
34	L1	1	Push the person	I'd rather someone else die than me.
34	L1	3	Nothing	Because I prefer to die myself than five people die.
34	L1	4	Push the person	If it's between their life and mine, I'd rather have mine.
34	L1	7	Push the person	I prefer that as few people as possible die.
35	L1	1	Nothing	I prefer not to feel guilty and follow destiny.
35	L1	2	Pull the lever	Because I do not want to die.
36	L1	3	Nothing	It is better than one person dies than five dies.
37	L1	1	Nothing	That's the destiny.
38	L1	1	Push the person	You always have to protect yourself.
38	L1	2	Pull the lever	Because as many people as possible must be protected.
38	L1	3	Nothing	At least only myself will die and not five people.
38	L1	6	Push the person	Because I am a child.
39	L1	1	Nothing	I would be afraid to die that way and I do not want to push anybody.
39	L1	3	Self-sacrifice	I am only one person and there are five people there, so one life for five lives.
39	L1	6	Nothing	I would rather die myself but I am afraid of this death.
39	L1	7	Nothing	I would rather die than another innocent person, even if more people die this way.
40	L1	1	Push the person	I do not want to die being run over.
40	L1	2	Pull the lever	Because you have to think about other people.
40	L1	3	Pull the lever	I do not want to die being run over.
40	L1	4	Self-sacrifice	You have to think of others and I would be doing a good deed, so I would die happy.
41	L1	1	Nothing	I'd rather not die.
42	L1	1	Pull the lever	Because I will be alive to prevent other accidents.
42	L1	3	Pull the lever	Even if there are five people for one, I am a child and the others will be older than me.
42	L1	4	Push the person	Because they are more people.
42	L1	6	Nothing	They are going to touch it, it is not the fault of the person who is going to push, who would die being innocent.
42	L1	7	Push the person	Because five people are more worthy than one.
43	L2	1	Self-sacrifice	I'd rather die and more people live.
43	L2	2	Pull the lever	There are more people that survived.
43	L2	3	Nothing	I will die but more people live.
43	L2	4	Self-sacrifice	I prefer to die.

(*Continued*)

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Table 4. (*Continued.*)

Participant #	Language	Dilemma	Response	Justification
43	L2	5	Push the person	It's cruel but I don't want to die and we are more people.
43	L2	6	Self-sacrifice	It will be a fast death.
43	L2	7	Push the person	More people alive.
44	L2	2	Pull the lever	We are more people.
44	L2	3	Nothing	I prefer to die as more people will be safe.
44	L2	4	Self-sacrifice	I hope my family will be proud of me.
44	L2	5	Push the person	I will be safe and we are more people.
44	L2	6	Push the person	I don't want this death so if I will push someone, I hope he was a bad person.
45	L2	3	Nothing	They are more people so I prefer to die.
46	L2	3	Nothing	I think that this people may have children so they have to live.
46	L2	6	Self-sacrifice	I won't be hurt because it is fast.
46	L2	7	Push the person	We are more people.
48	L2	1	Self-sacrifice	I feel well helping other people.
48	L2	3	Nothing	Life wants this for me.
50	L2	1	Self-sacrifice	I feel better doing this action.
50	L2	2	Pull the lever	Because there are more people living.
50	L2	3	Nothing	More people are living.
50	L2	5	Push the person	Because it's better to save more people.
51	L2	1	Self-sacrifice	My family will be sad but I will feel good.
51	L2	3	Nothing	I feel sad but it is the best option because more people live.
52	L2	3	Pull the lever	I am scared.
52	L2	4	Self-sacrifice	I will be a hero.
52	L2	5	Push the person	I am scared.
53	L2	1	Nothing	They should not be in the rail track.
53	L2	3	Pull the lever	Because, poor people, they did not do anything.
53	L2	6	Self-sacrifice	Poor people.
57	L2	3	Pull the lever	Sorry, I am very young to die.
64	L2	2	Pull the lever	Because I am very young to die.
64	L2	5	Push the person	He must help us.
64	L2	6	Push the person	Because I do not know which person is that and I am a child.
71	L2	1	Self-sacrifice	I prefer that 5 survive than 1 and I prefer to die than to push a person.
71	L2	5	Push the person	Because I want to live.
72	L2	3	Nothing	I am only one person and they are five.
74	L2	1	Self-sacrifice	To save five people and I do not push anyone.
74	L2	3	Nothing	To save five people.
74	L2	6	Self-sacrifice	It is very difficult to choose one.
75	L2	2	Pull the lever	I live and less people die.
75	L2	3	Nothing	I prefer one person to die than five.
75	L2	7	Push the person	Because less people die.
77	L2	1	Self-sacrifice	If I don't do that, I would live with the guilt all my life.
77	L2	2	Pull the lever	If I were alone, I would not care to die, but my friends are very important to me.
77	L2	3	Nothing	I do not care about dying and I want to save them.
77	L2	5	Push the person	Four lives are more than one so I would push him.

(*Continued*)

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Table 4. (*Continued.*)

Participant #	Language	Dilemma	Response	Justification
77	L2	6	Self-sacrifice	I prefer dying to save others, I would die happy.
77	L2	7	Push the person	It's better that only one person dies.
79	L2	1	Self-sacrifice	It's better that only one person dies in the way five people would be safe.

#: participant number; Language: language in which the dilemmas were presented, L1 or L2; Dilemma: number of the dilemma (see Table 3); Response: response given by the participant to that particular dilemma; Justification: justification given by the participant regarding their decision.

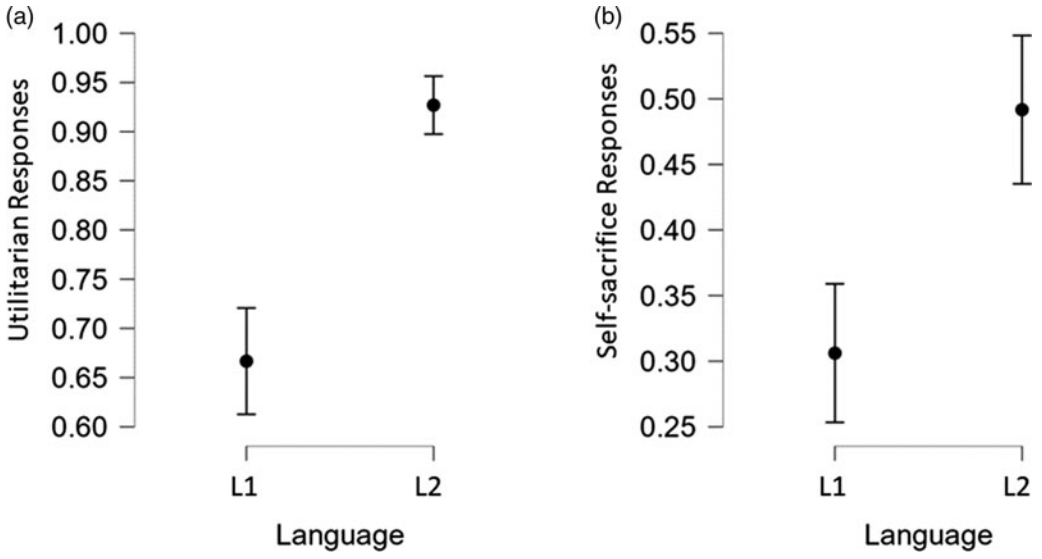


Figure 1. Interval plots for (a) utilitarian responses; and (b) self-sacrifice responses. Both utilitarian and self-sacrifice responses were more frequent when participants responded to the dilemmas in their L2 vs. L1.

Procedure

Data were collected during school hours. At the beginning of the session, instructions were given out loud in the language corresponding to the group (L1 or L2). Dilemmas were randomly presented to each participant. The school board gave their consent and participants were informed that their participation was voluntary. All gave oral consent, none refused to take part, and all participants answered to all dilemmas.

Results

First, we carried out Pearson's Chi-Square tests (X^2) to independently analyse whether responses to each moral dilemma varied according to *language* (L1 vs. L2), *gender* (female vs. male), *grade* (4^{th}, 5^{th}, 6^{th}), or *age* (9, 10, 11, 12). *Language* was the only relevant factor, predicting participants' responses in all dilemmas but #2 ($V > .25$ and $< .61$, indicating moderate to high associations), so children were more utilitarian when responding in their L2 vs. L1 in high and low aversive dilemmas (see Tables 1 and 2). Also, participants chose more often to sacrifice themselves in dilemmas 1, 4, 6 (those having a self-sacrifice option) and 3 (although not having a "self-sacrifice" option, "do nothing" implied that the participant would die) in their L2 vs. L1; but the opposite pattern emerged in dilemmas 5 and 7 (these did not have a "self-sacrifice" option, but the most deontological option [a)] implied both self-sacrifice and killing four to save one). Regarding pro and anti-utilitarianism, a higher proportion of utilitarian responses was observed for most dilemmas (i.e., significant language effects for all dilemmas but #2) when using the participants' L2, even in the anti-utilitarian dilemma (#3).

Then, we used logit linear mixed models to analyse utilitarian (vs. deontological/anti-utilitarian) and self-sacrifice (vs. other) responses, including *language*, *gender*, *grade* and *age*, and the two-ways interactions of these factors, as fixed effects variables, and *participant* and *dilemma* as random effects grouping factors. The specified random effects parameters included random intercepts for *participant* and *dilemma*; random slopes for *dilemma* were not included because they caused numerical problems with the maximum-likelihood estimate. Regarding utilitarian responses, *language* predicted participants' responses, $X^2(1) = 16.96$, $p < .001$; all other variables and interactions were not significant (X^2 values < 4.11, p values $< .17$). As for self-sacrifice responses, *language* again predicted participants' responses, $X^2(1) = 14.87$, $p < .001$; all other variables and interactions were not significant (X^2 values < 4.50, p values $> .16$) (Figure 1).

Conclusions

This study explored the M-FLE in children for the first time. Children aged 9-12 responded either in their L1 or L2 to seven dilemmas, varying in utilitarianism, aversiveness and self-sacrifice.

Our first prediction was that participants would make more utilitarian judgements and be more willing to self-sacrifice when using their L2 vs. L1. Our results agreed with both predictions,

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supporting that the M-FLE applies to children. Participants were more utilitarian when using their L2 vs. L1 (e.g., Costa et al., 2014; Geipel et al., 2015; Romero-Rivas et al., 2022), regardless of how aversive the scenario was (agreeing, e.g., with Bucciarelli, 2015 or Daniele & Bucciarelli, 2016, but disagreeing with Pellizzoni et al., 2010). The pattern observed in the anti-utilitarian dilemma agrees with Bucciarelli's (2015) conclusions of children not being simply biased to act. Possibly, participants would be more willing to be utilitarian when using their L2 because they are less emotionally activated by that action (e.g., guilt, sadness), avoiding a passive, and thus, deontological (i.e., "do nothing") answer (e.g., Caldwell-Harris, 2014). Congruently, the higher perception of emotionality and aversion in the L1 group would prompt deontological decisions to avoid the impact of performing the action implied by utilitarian judgements. Regarding self-sacrifice, we extend the results of Romero-Rivas et al. (2022) to children. Following Bialek et al. (2019), processing dilemmas in L2 would lead to more emotional distance (e.g., Costa et al., 2014; Geipel et al., 2015), and to a diminished sensitivity to the costs of a particular action. Therefore, participants could interpret the scenario globally, driven by the benefit of the action (i.e., one person dies vs. five) and not by its consequence (the participant's death). Also, the higher proportion of self-sacrifice in L2 could be caused by a reduction in the emotional responses related to the self (Romero-Rivas et al., 2022).

We did not have specific predictions for grade or age, and we did not find either significant effects or interactions involving them. Although no former research has used grade, we included it for exploratory purposes as it provides an additional measure of moral development besides age. As per age, the chosen ages were 9-12. Following previous evidence (Bucciarelli, 2015; Daniele & Bucciarelli, 2016), children 9-10 behave differently to adults, but adolescents do not. This allowed us to investigate moral decisions in children who, additionally, are mature enough to appreciate the gain of self-sacrifice, emerging around 7 years of age (Weller & Hansen Lagattuta, 2013). We did not find age differences within our sample, being plausible that our age rank is not wide enough to appreciate any (contrary to Weller & Hansen Lagattuta, 2013) or that moral development is relatively stable at those ages. Our results agree with Pellizzoni et al. (2010) or Dworazik et al. (2019) and partially disagree with Bucciarelli (2015) or Daniele and Bucciarelli (2016); however, not having an adult group limits our interpretation. Also, future studies comparing Primary school children with adults would allow us to investigate whether the mental model theory holds in a L2. Finally, there was not an effect of gender, congruent with Pellizzoni et al. (2010) and Daniele and Bucciarelli (2016).

Our study makes an initial impactful contribution to a field where many questions remain unanswered. Most literature has tested adults (to our knowledge, only van Hugten & van Witteloostuijn, 2018, investigated the FLE in adolescents, but they explored the "self-serving bias"). For instance, does L1-L2 similarity, proficiency and language dominance influence M-FLE in children as it does in adults (e.g., Circi et al., 2021)? How does culture (e.g., individualistic vs. collectivist) influence making utilitarian or deontological decisions (e.g., Yi & Park, 2003; Costa et al., 2014; Gold, Colman & Pulford, 2014) when the individual is undergoing personal, cultural, emotional and moral development, as children are? This could be particularly relevant as our study is limited to a socio-economically and culturally homogeneous population. Another potential limitation of our study is not considering a range of additional information related to the participants, such as cognitive, socio-economic or personality measures, which alongside some sociolinguistic information (e.g., does the child attend private English lessons?) would expand the description of the M-FLE in children.

To conclude, our work has relevant educational implications. We showed that children support the common good when using their L2. Interestingly, a recent adult study (Rodríguez-Cuadrado & Romero-Rivas, 2021) found no FLE on altruistic and empathic behaviours, so our L2 does not reduce empathy (and empathy neither predicted responses to moral dilemmas). Thus, the evidence supports using the L2 to work on moral development, which should not affect the development of altruism or empathy. Upright (2002) proposed the use of moral dilemmas in the classroom to enhance empathy. Other studies found them to benefit reading comprehension (Clare, Gallimore & Patthey-Chavez, 1996). These results are particularly relevant given the rise of bilingual education (Mañas Antón, 2019), where using a L2 could be a good strategy to illustrate how to achieve the greater good. Further research will allow us to potentially design research-based programmes and strategies using the L2 to favour ethics and moral education.

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Competing interests. The authors declare none.

Data availability. The data that support the findings of this study are openly available in OSF at https://osf.io/pkjxf/?view_only=4175cc6e693c4487a464b6643579d88a

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Appendix

Responses are provided in English for the sake of clarity, although those participants performing the task in their L1 used Spanish in their responses, and participants performing the task in their L2 used English in their responses. Please note that justifications were optional, even though all participants completed all dilemmas, not everyone justified their responses, and some participants justified their responses to some dilemmas but not others.

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