Small-Scale Utilitarianism:
High Acceptance of Utilitarian Solutions to Trolley Problems among a Horticultural Population

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Abstract

The study of moral dilemmas enables researchers to investigate the specific factors that influence humans' judgments of the appropriateness of different actions. A common construction of this dilemma is the so-called Trolley Problem, which pits an obvious utilitarian solution, one which saves the largest number of lives, against a common deontological dictum to not do harm to others. Participants vacillate on their preferred preferences based on a number of well-documented contextual factors. Although the literature is replete with cross-cultural studies validating the robustness of such biases, the sampled cultural variation within this literature is largely limited to Western, industrialized, educated, rich, and democratic (WEIRD) populations. Here we expand this variation by investigating preferred solutions to common Trolley Problem scenarios among a Mayangna community, a small-scale indigenous population residing in northern Nicaragua. Compared to previously sampled populations, the Mayangna participants report much higher levels of acceptance of utilitarian solutions. Furthermore, while some tests suggest a contact/means bias, there is no evidence of an omission bias. We examine spontaneously reported justifications to explore how Mayangna culture might lead participants to take into account considerations that are largely absent in WEIRD populations.

1. Introduction

The Trolley Problem is a well-studied moral dilemma in which a runaway trolley speeds towards five unsuspecting victims. On a side track stands only one potential victim. Next to the tracks is a bystander who sees everything that is happening, and next to him is a lever, which when activated, switches the trolley to the track with only one individual. He must decide whether to pull the lever, thus killing one person but saving five (Thomson 1984). The problem pits an unmistakable utilitarian solution against a common deontological dictum to not actively do harm to others. Under this traditional version, approximately four-fifths of sampled participants agree that pulling the lever is it is the appropriate thing to do (Awad et al. 2020). However, researchers have modified this original scenario into an array of related dilemmas, each including the same consequences—the same utilitarian equation of five deaths versus one—but varying by subtle contextual factors (Bruers and Braeckman 2014). Often, these contextual changes lead participants to reject the utilitarian solution. By studying these biases, researchers can isolate the factors that influence participants' perceptions of the acceptability of utilitarian actions and thus more accurately define humans' moral deontology.

For instance, in an early variant of the Trolley Problem, instead of a lever, the bystander stands next to a large man on a pedestrian bridge suspended over the track. The bystander has the option to push the man from the bridge so that his body would stop the trolley. In this variant, participants are much less accepting of the decision to push the large man, and only approximately half report that pushing the man is the right thing to do (Awad et al. 2020). Research has revealed that this variant contains two factors associated with perceptions of acceptability—first, the action that results in the death of the large man requires physical touch (*contact bias*) (Cushman et al. 2006; Greene et al. 2001), and second, the large man serves as the means by which the trolley is stopped (*means bias*) (Bruers and Braeckman 2014; Hauser et al. 2007). The combination of these two biases is probably why fewer are willing to accept the utilitarian solution in this scenario. A third factor which is evident in both the traditional and the bridge scenario is the fact that the bystander must *act* in order to bring about the utilitarian solution, as opposed to simply allowing for the utilitarian solution to come about naturally (*omission bias*) (Abarbanell and Hauser 2010; Haidt and Baron 1996; Hauser et al. 2009; Ritov and Baron 1992).

Studies of such biases are often presented as if revealing fundamental elements of human moral psychology (Awad et al. 2020). While this tendency relates to the metaphysical debate concerning moral absolutism versus relativism, it more clearly asserts a form of empirical moral absolutism. This is the idea that we, as humans, share an evolved capacity for moral reasoning that transcends cultural group. Indeed, there is a great deal of evidence for an overarching nature that defines human morality (Graham et al. 2013; Mikhail 2007). However, as described by Graham and colleagues (2013), such absolutism need not be unidimensional, nor cross-culturally universal. If humans are bestowed with an underlying capacity for multidimensional moral reasoning, different cultures might emphasize some dimensions more than others. The *degree* of cross-cultural variation in moral reasoning is an empirical question, however, that can be revealed only through a broad cross-cultural record.

There is a rapidly growing literature concerning cultural variation in moral judgment and actions, detailing these major dimensions along which moral systems vary cross-culturally and the factors that are associated with such variation (Awad et al. 2020; Graham et al. 2016; Henrich et al. 2004; Purzycki et al. 2018). For example, populations that are Western, educated, industrialized, rich, and democratic (WEIRD) tend to emphasize individual liberties and independence compared to non-WEIRD cultures. In contrast, non-WEIRD populations exhibit a greater focus on communal obligations and codes of behavior (Buchtel et al. 2015; Guerra and Giner-Sorolla 2010; Henrich et al. 2010b). The dimension of collectivist/individualist, often mirrored by WEIRD/non-WEIRD, also affects whether fairness is

perceived as a matter of overall equality, which is more common among collectivist cultures, or a matter of equity—in which the quantity one gets is related to quantity one invests (Schäfer et al. 2015; Wu et al. 2014).

Regarding studies of Trolley Problem scenarios, many have purportedly validated the cross-cultural robustness of the biases that have been detected (Awad et al. 2020; Hauser et al. 2007). For instance, in a recent online survey that included participants from 42 countries, Awad et al. (2020) found that while there was a great deal of variation in overall acceptance rates across populations, the samples from all 42 countries exhibited both contact and means biases. However, many of the cultures included in these studies epitomize aspects of WEIRD populations (Henrich et al. 2010a). That is, while a number of studies include participants from non-Western countries, such countries are often highly developed and share numerous cultural and socioeconomic characteristics with Western nations. Finally, the participant pools within these populations are often limited to undergraduate students or internet users, further limiting the range of variation in perspectives. This is a longstanding bias in psychological research that few researchers have consistently acknowledged and addressed until recently (Gurven et al. 2013; Henrich et al. 2004; Tiokhin et al. 2019; Winking et al. 2018).

For example, in one study of the Trolley Problem employing a non-Western population, Gold et al. (2015) argued that a philosophical trend toward fatalism in China—allowing events to run their course—explained a greater reluctance among Chinese participants to act in Trolley-type problems. However, while not Western, the sample used by Gold et al. was still derived from a university population living in an urbanized setting in a developed nation, and therefore likely shares a number of cultural aspects with the WEIRD study populations from previous studies. By contrast, small-scale populations remain largely uninvestigated. Although there is no one defining element of small-scale populations, and while these populations represent a diverse menagerie of cultures that exist around the world, they share a number of social, demographic, and cultural elements that differentiate them from WEIRD populations (Winking et al. 2018). Population centers tend to be much smaller and arranged by kinship. Societies therefore tend to be more close-knit, and day-to-day social life is dominated by interactions among individuals who know one another quite well. This familiarity facilitates communal labor, which tends to be more common than in WEIRD populations. Finally, reproductive histories and economic strategies are often less variable, leading to more predictable life course trajectories and likely less variation in lived experience.

In one of only two studies to date of Trolley Problems conducted among small-scale populations, Abarbanell and Hauser (2010) found that participants in a Maya community in Mexico exhibited contact and action biases, but did not exhibit an omission bias. They suggested that the absence of the omission bias might be due to a number of cultural elements that differentiate Mayan beliefs from Western cultures, such as the ways in which interpersonal conflicts are considered, how retaliation can be supernaturally pursued by wronged parties, and how justice is considered to be a restorative process. Another possible explanation they offered followed from the logic of Haidt and Baron (1996), who showed that participants judge infractions against friends harshly regardless of whether the decision involves action or inaction. Abarbanell and Hauser suggested that the higher connectedness among participants in small-scale societies might explain the lack of an omission bias among Mayan participants, as they might project this connectedness onto the actors in the scenarios. If this is the case, omission biases might be an artifact of large, impersonal, Western societies, and far less common among small-scale populations in general.

In another study, Sorokowski et al. (2020) found that the Yali of Papua New Guinea are very reluctant to engage a utilitarian solution. They argue that this is likely due to cultural norms that promote retaliation against individuals who are responsible for another's death (as well as retaliation toward those individuals' families). Both of these studies illustrate how moral decision making can be impacted by cultural contexts that are likely absent among the samples derived from highly-educated populations in developed nation-states.

Here we contribute to this literature by presenting a study of Trolley Problems among a small-scale population in Nicaragua. We include a study of omission bias in order to examine the degree to which such an effect is an artifact of Western populations. We also include an assessment of comments made during the survey to explore reasons behind individuals' responses.

2. Material and Methods

2.1 The Mayangna and Miskito Population

Research took place in a village of approximately 350 indigenous Mayangna and Miskito horticulturalists in Nicaragua's Bosawas Biosphere Reserve. The Miskito and Mayangna are closely-related indigenous populations that reside in eastern Nicaragua and Honduras. Despite some historical animosity between the two populations, they commonly intermarry and there exists a shared sense of indigeneity that separates them from the larger Mestizo population (Koster 2007). The study village is culturally Mayangna, although a number of Miskito individuals have married into the community, which is composed of approximately 45 households.

The indigenous populations have a centuries-long history of interaction with the colonizing British. The Miskito populations interacted more closely with the British whereas Mayangna individuals frequently express pride that their culture was less impacted. Despite this, English loan words are omnipresent in both of the indigenous languages, such as "Plis" [Please], "Excus" [Excuse me], and "Want" [Want]. More recently, cultural shifts have been occurring due to increasing access to technology and government policies/programs that are now reaching the village. In the years preceding this study, for example, villagers have benefited from a medical team that would visit approximately once per month. Then, starting in 2018, a health post was established that is intermittently staffed by a nurse. Around five resident adults are employed by the government as schoolteachers in the under-sized two-room school building. Enrollment in the school is universal among children and a daily meal of rice and beans is supplied by the government. Approximately three households now own boat motors and chainsaws, and several more now have solar panels. In 2015, cell-phone towers were constructed along the Coco River and cell service now reaches within a three-hour walk from the community.

Although the Moravian Church has a longer history and a larger reach in the Mayangna population, nearly all members of the research community are Catholic. Church services delivered in the Mayangna language are regularly attended by community members at the recently constructed church. However, a number of beliefs and practices deviate from modern doctrine. These include the belief that individuals can be possessed by demons, the devil, or evil forces, as well as the practice of social marriage—living together and having children—for a number of years before, if ever, pursuing a formal religious marriage.

Despite the numerous changes, many aspects of life for this Mayangna village are likely very similar to those of previous generations (Conzemius 1932). The community is largely oriented around the nuclear family, with related families often building their houses near one another. Marriage is nearly universal by the early twenties and fertility is high, with total fertility rates exceeding seven births per woman

(Winking and Koster 2015). Most of the food consumed by families is directly produced. They maintain agricultural fields in which they grow rice, beans, and other crops, and also keep chickens, pigs, and, for many households, cows. They supplement this with earnings from the selling of produce and livestock, as well as panning for gold.

The community exhibits a greater collective identity and motivation compared to Western populations. Private ownership is widely recognized, although inter-household food sharing is relatively common, particularly for meat (Koster and Leckie 2014). The collective nature of the community is best illustrated by regular communal labor. This includes labor tasks that benefit the community at large, such as clearing the soccer field, renovating the church floor, or constructing a communal granary. The tasks are organized by the village leaders and by the community at large in community-wide meetings, and households are typically expected to contribute comparable amounts of labor. For large projects, such as the construction of a church, formal schedules are created with teams working in multiple-day shifts. When individuals are unable or unwilling to contribute their expected labor, they must pay a fine in money or food.

While community work is frequently performed without pay, when laborers are required for individual projects, such as the clearing of a new field or the construction a house, the beneficiary is typically expected to pay the laborers a daily wage. This can even include occasions in which a man helps his brother, although this depends on the agreement between the two. These exchanges extend to urgent situations as well. For instance, after a cow died of a snake bite, the owner had to pay his brother to help him bury it.

Another feature which might influence perceptions of moral dilemmas is the greater familiarity with death compared to Western contexts. Reproductive histories of community members and their parents suggest a child (under-five) mortality rate of approximately 96 per 1,000 live births (Winking et al. 2018). In the U.S., this figure is 6.5 (The World Bank 2018). Similarly, over the past five years, three individuals have died due to violence or accident, a rate of approximately 170 per 100,000 per annum compared to 75 per 100,000 injury-related deaths per annum in the U.S (U.S. Department of Health and Human Services Centers for Disease Control 2019). Furthermore, many of the older men took part in the wars in the 1980s, fighting as Contras against the Sandinista army.

2.2 Procedure

Two separate studies took place, one in the winter of 2018 and the other in the summer of 2019. The first study served in part as a pilot study to validate that the scenarios and task could be well understood by participants (previous experiences with comparable projects have met with mixed success in this population). In the initial study, four Trolley Problem vignettes were translated into Mayangna by two translators who are fluent in Spanish and Mayangna (see the Electronic Supplementary Material for translations).

Adults in the community were invited to the project house to participate in interviews relating to social transactions (for an unrelated study), and the Trolley Problem vignettes were administered at the conclusion of these interviews. For each interviewee, one of the four scenarios was randomly selected. These individuals were shown a picture of the scenario and read the accompanying vignette (for four individuals who were not fluent in Mayangna, the vignettes were translated verbally into Miskito). The research design included multiple rounds of interviews, and 46 individuals ended up responding to two Trolley Problem vignettes. For these participants, the respective vignettes were administered and evaluated on separate days, usually at least one week apart. As the scenarios were selected at random,

17 individuals were presented with the same scenario twice, in which case we retained only their first response for the analysis. All individuals in the community who are older than 18 responded to at least one vignette, but three individuals did not respond or provided a response that could not be coded,

All interviews were conducted by a local research assistant fluent in all three local languages. The vignettes included the traditional Trolley Problem scenario involving the switch (Trolley Switch), as well as the scenario involving the large man on a bridge (Trolley Push) (Figure 1). In order to provide more culturally salient versions, we recreated these scenarios involving a stampede of cattle in which a man had the opportunity to 1) push a gate closed that directed the stampede away from five men and toward one man (Stampede Gate), and 2) push a man sitting on a fence into the opening in the fence, thereby killing the man, stopping the stampede, and saving five men beyond the opening (Stampede Push). Participants were then asked if they would take the necessary action. Combined with the other interviews, the process took approximately 45 minutes and participants received 60 Cordobas (approximately US\$2).

In the second study, eight Trolley Problem vignettes were translated into Mayangna by the same two translators (Electronic Supplementary Material). They were then back translated into Spanish by a third translator. The few differences were then discussed and changes were agreed upon. Participants were invited to come to the project house where the interviews took place. Following Abarbanell and Hauser (2010), the second project aimed to explore individuals' perceptions of the appropriateness of the utilitarian decisions. Participants were presented with a visual five-point scale which ranged from "Very Bad" ("Uba Dutni") to "Very Good" ("Uba Yamni"). These dichotomous phrases were deemed to be optimal anchors as they are frequently spoken and represent the major bad/good spectrum that is regularly used in the community. The three other options on the scale were "Bad" ("Dutni"), "Neither good nor bad, but in the middle" ("Yamni awasa, dutni awasa, papaskat"), and "Good" ("Yamni"). Faces exhibiting frowns and smiles accompanied the large icons and text to help those who were sub- or illiterate. Two examples were provided using the scale, and we further queried the participants until we were confident that they understood the scale. The vignettes were accompanied by pictures and were read in Mayangna (four individuals who were more fluent in Spanish preferred them to be read in the original Spanish), and participants were asked if they understood the vignette and if they had any questions. They were then asked what they thought of the man's decision (which was always the utilitarian solution). All interviews were conducted by JW and the same research assistant from the original study.

The vignettes included the four versions in the first study as well four additional vignettes aimed at exploring the omission bias (Electronic Supplemental Material). These included two scenarios in which a truck was speeding toward a group of five pedestrians and the bystander had the opportunity to or 1) refrain from cautioning a man who was already about to walk into the truck's path (Truck Silent), or 2) call a man on the other side of the road to walk into the truck's path (Truck Call). Again, to provide a more culturally salient option, we included scenarios in which a stampede of cattle was running toward a group of five men beyond an opening in the fence and the bystander had the opportunity to 1) refrain from cautioning a man from walking into the stampede's path in the fence opening (Stampede Silent), or 2) call a man over toward the fence opening and in the stampede's path (Stampede Call). Participants were presented with four scenarios. These consisted of one scenario from each of the four pairs of scenarios: 1) Trolley Switch or Trolley Push; 2) Stampede Gate or Stampede Push; 3) Truck Silent or Truck Call; 4) Stampede Silent or Stampede Call. The order of the four pairs was randomized, as was which scenario of each pair was included. This was done for three participants, and then for the next three, the reciprocal of the preceding three was used in order to ensure balance. Order was again

Trolley Switch

Trolley Push

Stampede Gate

Stampede Push

Truck Silent

Truck Call

Stampede Silent

Stampede Call

randomized. The interviews took approximately 20 to 30 minutes and participants received 50 Cordobas (approximately \$1.50).

While we strived for standardization, the reading of long, strange stories involving extraordinary circumstances and foreign objects naturally led to numerous questions by participants. Members of this community are accustomed to such peculiar methods due to years of anthropological research conducted by the authors; however, conversational interaction is still much more culturally familiar than reading (either aloud or to oneself) compared to Western contexts. This presents the familiar tradeoff in cross-cultural research between standardization and comprehension (Tiokhin et al. 2019). The research assistant was trained to answer the questions in ways that were least likely to evoke notions of rightness or wrongness. For instance, he would answer questions using the phrases “one would die” and “five would not die” instead of saying “killed” or “saved.”

Any spontaneous comments made during the rating process were translated by the research assistant and recorded by JW. These were subsequently categorized by JW into four categories—those offering a utilitarian rationalization (such as “It’s better for one to die than five.”), those offering a general deontological principle (such as, “All human life has value.”), those offering a specific deontological principle (such as, “It’s wrong because he pushed the man.”), and those acknowledging a tradeoff between the options (such as, “It’s wrong to kill a man, but saving five is better.”). All coding was done after data collection and while blind to the participants’ ratings.

3. Results

3.1. Study 1

The first study includes responses to a total of 146 scenarios by 95 unique individuals, including 48 women and 47 men. As can be seen in Figure 2, the contact/means biases are apparent when asking how individuals would act in these situations, particularly for the culturally salient scenario (Stampede Gate: 93.9%, Stampede Push: 62.1%, $\chi^2=9.461$, $p=0.002$) compared to the traditional version (Trolley Switch: 93.5%, Trolley Push: 78.1%, $\chi^2=1.929$, $p=0.080$). In both versions, however, the proportions responding that they would push the individual are higher than the 50% that are reported elsewhere (Awad et al. 2020). Compared to the acceptance rates of utilitarian solutions in the recent large-scale cross-cultural study (ibid.), the rates reported here would exceed those of all 42 countries for scenarios involving both mechanisms (switch/gate) and pushing a man except for one comparison (the Trolley Push acceptance rate in Vietnam is slightly higher than that reported here for the Stampede Push scenario). A comparison between the first and second round reveal significant differences, however, suggesting doubt in the internal reliability of the measure.¹

¹ Looking only at individuals who participated in both rounds ($n=47$), the proportion of individuals not acting was lower in the first round (Trolley Switch: 0/13; Trolley Push: 2/13; Stampede Gate: 0/11; Stampede Push: 2/10) than in the second round (Trolley Switch: 3/14; Trolley Push: 5/12; Stampede Gate: 1/9; Stampede Push: 5/12), with the overall percentage of not acting rising from 8.5% to 27.7%. To test this, we conducted a mixed probit regression exploring the impact of round on likelihood of choosing to act, with scenario as a binary predictor variable and subject ID as a random effect (Electronic Supplementary Material Table S1). The model suggests that in the second round of data collection, participants were significantly less likely to report an intention to act. Explanations for this decline are necessarily speculative, but potentially relate to other aspects of the unrelated interviews that were conducted prior to the Trolley study. That is, there were two rounds of data collection in part due to a clerical mistake that necessitated a repeat of one component of these interviews. Most participants were aware of this error, though not in detail, and they may have inferred that they were being encouraged to change their responses, including to the Trolley scenarios in this study.

Figure 2. Proportion of Participants Saying They Would Act to Save the Five

No Contact/No Means, Trolley, $n=32$; Contact/Means, Trolley, $n=32$; No Contact/No Means, Stampede, $n=33$; Contact/Means, Stampede, $n=29$. Error bars are binomial Standard Errors.

3.2. Study 2

In the second study, 120 individuals participated, including 62 women and 58 men. While there was a possible contact/means effect in the Stampede version (Cohen's $d=0.24$, $p=0.19$), the Trolley version showed no such difference ($d=0.06$, $p=0.72$) (Table 1). In both tests of the omission bias, there were no discernible effects and the differences were in the opposite direction than predicted (Truck: $d=0.08$, $p=0.66$; Stampede: $d=0.15$, $p=0.40$) (Table 1). With these sample sizes, a medium effect size of 0.6 could be detected in each test with $\beta=0.90$ and $\alpha=0.05$.

Similar to Study 1, there is a remarkably high level of acceptance of the utilitarian solutions. Rates of rejection, those rating the action as Bad or Very Bad, ranged from a minimum of 10.3% for the Trolley Switch scenario to a maximum of 21.9% for the Stampede Push scenario. In every scenario, at least 60% judged the action to be Good or Very Good. In a robustness check, we examined the possibility of order effects, and although this supplementary analysis provided evidence for a moderate effect, the inferences for the comparisons between the scenarios remain consistent (Electronical Supplemental Materials, Tables S2a–d).

Table 1. Comparisons of the Acceptability of Utilitarian Decisions across Trolley Scenarios.

	<i>n</i>	Mean ^a	<i>SD</i>	95% CI	<i>d</i>	<i>p</i>
Trolley Switch	61	3.70	0.92	3.47-3.94	0.06	0.72
Trolley Push	59	3.64	0.94	3.40-3.89		
Stampede Gate	60	3.68	0.93	3.44-3.92	0.24	0.19
Stampede Push	61	3.44	1.09	3.16-3.72		
Truck Silent	59	3.51	0.86	3.28-3.73	0.08	0.66
Truck Call	60	3.58	0.96	3.33-3.83		
Stampede Silent	60	3.53	0.97	3.28-3.78	0.15	0.40
Stampede Call	60	3.68	0.98	3.43-3.94		

^aRanging from 1="Very Bad" to 5="Very Good".

Table 2. Percentage of Participants Offering Spontaneous Comments During Ratings, by Comment Category and Scenario

	Utilitarian	Deontological- General	Deontological- Specific	Tradeoff
Trolley Switch	44.3 (%)	1.6	0.0	14.8
Trolley Push	42.4	1.7	0.0	15.3
Stampede Gate	38.3	3.3	0.0	15.0
Stampede Push	45.9	1.6	6.6	8.2
Truck Silent	39.0	0.0	0.0	5.1
Truck Call	60.0	3.3	0.0	13.3
Stampede Silent	41.7	3.3	5.0	15.0
Stampede Call	38.3	0.0	0.0	10.0
Total	43.8	1.9	1.5	12.1

3.3. Content Analysis of Comments

88.3% of participants offered at least one spontaneous comment while communicating a rating. These comments helped to ensure their understanding of the scenarios and to determine the reasoning behind their ratings. Table 2 displays the proportion of comments for each type by scenario. Participants spontaneously offered a comment including utilitarian logic in 43.8% of the ratings, accounting for 76.1% of all comments.² Frequencies of utilitarian comments did not significantly differ across scenarios ($n=480$, $\chi^2=8.69$, $p=0.28$). Utilitarian justifications included comments like, “He did well, because only one will die instead of five,” (in response to Stampede Push), and, “Because he saved more lives, it’s good,” (in response to Stampede Silent). Many participants similarly commented on how bad the alternative would be, such as, “For five to die would be very bad,” (in response to Truck Call), and, “His decision was very good; if he didn’t do that, five would have been killed,” (in response to Stampede Gate). A number even praised the man, saying “If he does this, he is brave, and he kills one and not the five,” (in response to Trolley Push), and, “The man is very intelligent, because if he screams, they wouldn’t hear; for this reason he’s very smart, and it’s good,” (in response to Stampede Push).

Furthermore, utilitarian justifications were offered after 54.5% of the 310 positive ratings (“Good” or “Very Good”), compared to 11.3% of the 80 negative ratings (“Bad” or “Very Bad”) ($n=390$, $\chi^2=47.98$, $p<0.01$). Of the nine who rated the decision negatively *and* offered a utilitarian justification, seven (77.8%) also referenced the tradeoff, compared to only 6.5% of those who rated the decision positively and offered a utilitarian justification ($n=390$, $\chi^2=47.75$, $p<0.01$). For instance, one participant reported, “One died so it’s bad, although five are saved; so it’s not that bad, but it’s still bad,” (in response to Stampede Push).

Far fewer comments relate to deontological principles that disallow the action, accounting for only 5.8% of comments. These are divided into generic principles about the human right to life, such as, “This man also has a right to live,” (in response to Truck Call), and comments specific to the action, such as, “Because he pushed him,” (in response to Stampede Push). Such comments were far more common

² Individuals exhibited moderate agreement within their choices (Cronbach’s $\alpha = 0.78$), which suggests individual-level variation in overall dispositions toward utilitarian solutions.

following negative ratings (8.8% of 80 negative ratings) compared to positive ratings (1.0% of 310 positive ratings) ($n=390$, Fisher's Exact, $p<0.01$).

4. Discussion

Among this Mayangna community, individuals report a much higher level of acceptance of utilitarian solutions to a range of Trolley Problem scenarios compared to previous studies. For example, in comparable tests including a similar scale conducted among a small-scale Maya population, acceptance of the Contact/Mean ($\bar{x}=1.63$), Action ($\bar{x}=1.90$), and No Action ($\bar{x}=1.90$) type scenarios were much lower than the acceptance levels reported here, which were all above 3.4 (Abarbanell et al. 2010). While the initial study (Study 1) was carried out as a pilot study, the results were generally repeated in the second study, with a possible contact/means effect in the culturally-salient scenario. Furthermore, understanding of the task in the second study appeared to be high based on the numerous spontaneous comments.

Of four different tests involving the contact/means bias across the two studies, all four were in the predicted direction, but only one effect was substantial, despite such tests typically revealing large effects in other populations. The two tests of an omission bias revealed no sizeable effect, exhibiting slight differences in the opposite direction than the prediction. Indeed, there were no strong differences among the average ratings among the eight scenarios in the second study, suggesting a greater indifference to the contextual factors.

An important factor that differentiates small-scale populations from WEIRD ones is that social lives of individuals in small-scale populations tend to be defined by greater interconnectedness and stronger interpersonal ties. Kinship is comparatively important in defining residence patterns, and individuals therefore spend more time interacting with individuals with whom they share strong ties (Koster 2018). Haidt and Baron (1996) showed that the action/omission bias was reduced when interactions occurred between friends—all infractions were judged comparably bad. Abarbanell and Hauser (2010) suggested that such an effect might explain the absence of an omission bias among the Mayan population in their study, as individuals might project the high level of interconnectedness onto the interactants in the scenario. This would suggest that omission biases are generally less common in small-scale societies, and we indeed failed to detect one in the current study. However, Haidt and Baron (1996) and Abarbanell and Hauser (2010) found that participants rated decisions in the action and omission scenarios as equally *bad*; among this Mayangna community, they were rated equally *good*.

A likely explanation for the very high endorsement of utilitarian choices is that such solutions are simply deemed more acceptable among this population than among other previously sampled populations. After 43.8% of ratings, the participants spontaneously offered a utilitarian justification to their responses. These comments also provide evidence that the moral reasoning used by these participants includes considerations that are likely not taken into account in WEIRD populations. Many of these relate to the costs of five men dying. These include comments like, "If five die, it is a great cost to the community. It's a lot of work to bury all of them. One is much less." Another reported, "The Mayangna are few in number. If five die, that's a lot. If he calls him, he saves five. It's good because he's thinking of the five." Others discussed the cost to the families, such as, "There's always trouble. If five die, there will be many children who will be abandoned. He was thinking of the five."

Other individuals expressed concerns about additional costs to the action. One individual reported that, "In this culture, if you kill someone, his family will try to kill you. But he still saved the five." Others employed frames of reference that might be less common in Western populations, such as that used by

the individual who reported, “It’s better that one dies instead of five, like in a war, when someone is trying to save a group of kids,” (multiple participants were directly involved in the revolutionary war in Nicaragua in the 1980s).

A follow-up focus group of three men and one woman reinforced the utilitarian motivations. They agreed that it was always important to think of the five and to choose the solution that saved the most lives, regardless of whether this entails pushing a gate or a man. They also agreed that they would push the gate to save the larger group even if there were only two workers instead of five. They were unable to offer any possible reasons why people in their community were more accepting of utilitarian decisions compared to people in other cultures. They did, however, also strongly agree that they would *not* push the gate to save the five if the lone individual on the other side were a woman—“It is not good to see a dead woman,” one man explained.

While there may be some basic overarching precepts that define all of human moral reasoning, researchers are likely to overestimate these precepts when they limit investigations to industrialized populations. Anthropologists are well-versed in ethnographic examples that strain the capacity for cultural relativism among Westerners. Actions forbidden and considered repugnant in one population can be viewed as acceptable, mandatory, or even virtuous in another (Graham et al. 2016). For instance, while infanticide is considered an abhorrent crime in all Western cultures, it is deemed acceptable under certain situations in the *majority* of cultures included in the Human Relation Area Files Probability Sample (at least as reported at the time of ethnographic inquiry) (Daly and Wilson 1984). Infanticide is most often committed for utilitarian reasons—for instance when mothers are unlikely to be able to raise the child successfully due to it being born as a set of twins or too close in time to the previous birth. In many cultures, as disparate as the Ache hunter-gatherers of Paraguay to numerous Hindu cultures across the Indian subcontinent, living relatives were sometimes expected to join deceased relatives in the grave or funeral pyre (Hawley 1994; Hill and Hurtado 1996). In less severe traditions, like those practiced by the Dani of New Guinea, mourners were simply expected to chop off one of their fingers upon the death of a relative (Hampton 1999).

These examples might appear extreme to a Western reader, but they are natural elements of the multidimensional space that defines human moral reasoning. The amount of this space occupied by the cultures of industrialized nation states, even those as different as Great Britain and China, is likely small when compared to the space that includes non-WEIRD cultures. Cultures of nation states feature a number of elements that likely homogenize morality—currency, private property, media, laws, police, judges, etc. This is why a true exploration of human moral deontology must include a broad sampling of cultures, including small-scale populations (Rad et al. 2018). It is not enough, however, to rely on simplistic dichotomies of WEIRD versus non-WEIRD populations. The diverse cultures of the world vary on multiple dimensions of social and political organization, demography, and economic orientation that plausibly interact with an evolved psychology to generate substantial cross-cultural heterogeneity in moral reasoning. It would be beneficial to have theoretical models that can elucidate the underpinnings of cultural variation in utilitarian norms and related biases.

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429

430 Data used in this manuscript can be downloaded here: <https://osf.io/tr84j/>.

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