The impact of different ethical frameworks underlying a robot's advice on charitable donations*

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***Abstract*— The current work explored to what extent a robot could persuade people to participate in charitable giving by offering moral advice grounded in different ethical theories. In a laboratory, participants, who are students at a university, first performed a task to acquire lottery tickets and then received from a robot information about a charity event organized for students at their university. The robot also offered them moral advice of which the underlying framework was grounded in either deontological or Confucian role ethics to encourage donating their lottery tickets to the event. We found advice grounded in Confucian role ethics to be more effective in inducing donations than advice grounded in deontological ethics. We also found that the more strongly participants felt close to other students at their university, the less donations they would make after receiving advice grounded in deontological ethics. These findings suggest the benefits of framing moral messages of robots based upon theories of Confucian role ethics in promoting prosocial behavior. We discuss potential explanations for the negative relationship between participants' sense of closeness with other students and their donation behavior when the robot's advice focuses on theories of deontological ethics.**

I. INTRODUCTION

Human-Robot Interaction (HRI) researchers have been investigating how social robots, by leveraging their ability to communicate with humans via spoken language, can influence people's behavior. Researchers have studied how robots can encourage interactants to engage in healthy behavior [1], act pro-socially towards robots [2], and attend to designated tasks (thus improving their performance in memory tests) [3]. Further, some HRI researchers have examined how robots can verbally persuade people to follow social norms [4].

One persuasion strategy researchers have been investigating in this work is the use of different ethical theories in framing the robot's message. Importantly, in choosing the underlying ethical frameworks for robots' messages, researchers have not merely focused on Western ethics, such as deontology, but also have broadened their scope by focusing on Eastern ethics, such as Confucian role ethics [5], [6]. For instance, when a robot delivered a message to participants to enhance their task performance, there were positive effects found when the message emphasized participants' relationship with the experimenter and the role-grounded responsibilities of serving as a paid research participant. This strategy was found to be more effective than merely emphasizing participants' general obligation to provide high quality data when receiving monetary compensation [7].

Motivated by these prior studies that utilized a robot's speech capacities to persuade people and influence their behavior [1], [2], [3], [4], [7], in the present research, we examined how a social robot could verbally persuade people to engage in prosocial behavior, specifically, donation-giving behavior. In the prior study [7], robots' messages encouraged participants to engage in behavior that was already implied by the relationship of the participants to the experimenter (i.e., providing good data in return for completing experimental tasks). The robot's messages thus simply reinforced this obligation by either emphasizing the relationship the participants had to the experimenter team or by directly communicating the obligation. Additionally, experiments were conducted virtually in online contexts as a result of the COVID-19 pandemic. In the present study, we sought to extend this work to examine if such messages could be used to elicit not only pro-social but optional (rather than role-obligated) behavior, like charitable giving behavior. Further, we decided to bring the study into the lab to allow for participants to receive the messages from a physically present and co-located robot.

Previous researchers have shown that people's engagement in donation giving can be triggered by various factors in HRI contexts, such as encountering a robot that makes salient and interactive verbal and nonverbal cues [8], a robot that has a human-like appearance [9], or a robot that gives a reciprocal hug [10]. In the current work, we aimed to focus on the effect of specific verbal messages a robot communicates to participants on eliciting charitable giving behavior. Our main goal was to examine whether the effectiveness of messages grounded in Confucian role ethics (relative to messages grounded in deontological ethics), as found in the previous research [7], extends to donation-giving behavior. Theories of deontology support adherence to moral norms, universal principles that guide people to choose morally right actions while avoiding morally wrong actions [11]. In contrast, theories of Confucian role ethics uphold a relational view, in which an individual does not cultivate virtues in

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isolation, but rather acquires them through social roles and daily interactions with others. Thus, responsibilities and expectations associated with a specific role an individual serves often play a crucial role in shaping their character and behavior [12], [13]. We expected that, if underscoring these key elements of Confucian role ethics was effective when a robot was encouraging participants to improve their task performance [7], it may become similarly or even more effective when a robot was encouraging participants to provide a direct help to others in their community, which is to make donations for other students attending the same university as them.

To assess the effects of a robot's advice on promoting charitable giving, we conducted a laboratory experiment where we asked participants to first complete a task that required both accuracy and speed, and in return for their performance, we offered participants lottery tickets. We then had participants interact with a Pepper robot (SoftBank), which gave them an introduction to a charity event taking place at the university participants attend. The robot then proceeded to deliver moral advice on charitable giving. We varied the underlying ethical frameworks of this advice by grounding the robot's advice in either deontological or Confucian role ethical theories. We examined participants' engagement in donation-giving behavior by comparing the number of donated lottery tickets when deontological ethics was the underlying framework of the robot's advice with the number of donated tickets when Confucian role ethics was the underlying framework of the robot's advice. We hypothesized that when a robot offered moral advice to encourage charitable giving, moral advice grounded in Confucian role ethics would lead participants to donate more lottery tickets to a charity event than moral advice grounded in deontological ethics (H_1).

In this work, we also aimed to examine if participants would show stronger prosocial behavior when they feel more close to beneficiaries of their behavior. Existing social psychological research has shown that people are prone to help others more when they perceive them as members of a group with which they identify more so than a group with which they do not identify [14], [15]. We, thus, hypothesized that the stronger our (university student) participants perceived their closeness to other students at their university, the more they would donate their lottery tickets to students in need of help (H_2).

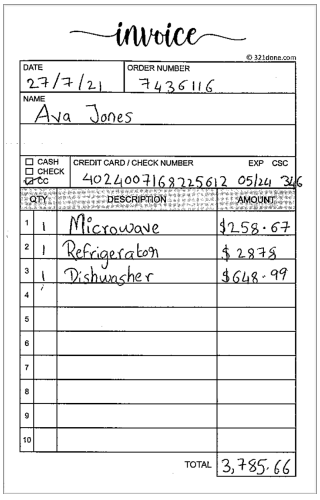
II. Methods

A. Participants

We recruited participants who were 18 years or older and undergraduate students at George Mason University. Seventy three participants participated in the experiment, but data collected from 12 of these participants were excluded from data analysis for one or combinations of the following reasons: They did not follow the task instructions, there were technical errors in the computers or the robot, and the participants reported that they were not an undergraduate student at the university. Therefore, in this paper, we report data obtained from the remaining 61 participants (M_{Age} = 20.56, SD_{Age} = 3.31, 25 male, 31 female, 4 other, 1 prefer not to say). After the completion of data collection, 10 participants were randomly selected to receive a $50 Amazon gift card as a prize.

B. Materials

Invoice entry task. For this experiment, we developed an *invoice entry* task which participants needed to complete to earn lottery tickets that would give them access to the potential monetary prize. The participants were informed that they were to help import sample invoice entries into an online system so that we could test the quality of a software package for invoice coding and entry. On each trial, participants were presented with a digital image copy of a hand-written store invoice, a legal document that itemizes and records each transaction between a store and their customers (See Figure 1 for a sample invoice). They were also presented with a blank invoice form presented on a computer screen, which represented the software package they were testing. Participants were instructed to type information that appeared on each invoice into the blank invoice form as accurately and quickly as possible. Participants could scroll up and down to compare the information written on the invoice and copy it line by line into the blank form. In total, 18 hand-written invoices were used. All instructions and materials for this task were presented via the Qualtrics research administration platform. Participants were given about 15 minutes to enter as many invoices as possible, and once the time was up, they were presented with a number of lottery tickets they had earned from the task.


invoice

© 321done.com

DATE 27/7/21 | ORDER NUMBER 7436116

NAME Ava Jones

☐ CASH ☐ CHECK ☑ CC | CREDIT CARD / CHECK NUMBER 4024007168225612 | EXP 05/24 | CSC 346

	QTY	DESCRIPTION	AMOUNT
1	1	Microwave	$258.67
2	1	Refrigerator	$2878
3	1	Dishwasher	$648.99
4			
5			
6			
7			
8			
9			
10			

TOTAL 3,785.66

Fig. 1. A sample image of store invoice used in the invoice entry task.

Moral advice. After participants completed the invoice entry task, they each received nine lottery tickets. They then received information about a charity event and moral advice from a robot encouraging them to donate lottery tickets to support fellow students in need at the university. The robot offered either the *rule*-based moral advice or the *role*-based moral advice. In the rule condition, the advice was framed to

highlight the key elements of deontological ethics. The advice contained messages emphasizing universally applicable moral principles that dictate what are morally right or wrong actions.

Specifically, the robot advised as follows:

"Whether you choose to donate your lottery tickets or not is entirely up to you. Although you may not be sure exactly how these people would benefit from your donation, what is important is that every human is obligated to act in accordance with principles of morality. There are actions that are morally right and there are actions that are morally wrong. In this case, we have people who are in need of help and the principle of morality that applies to this case is to help people who are in need. When there are people who are experiencing difficulties, choosing to offer help by making a donation is a morally right action."

In the role condition, the advice was framed to highlight the key elements of Confucian role ethics. The advice contained messages drawing participants' attention to moral responsibilities grounded in their role as a Mason's student and their relationship with fellow Mason students.

Specifically, the robot advised as follows:

"Whether you choose to donate your lottery tickets or not is entirely up to you. Although you may not be sure exactly how these people would benefit from your donation, what is important is that you are a student of George Mason University, and, as a member of the Mason's student community of Patriots, there are moral roles and responsibilities that you are obligated to fulfill. You, as a Mason student and a Patriot, are connected to other students through various relationships associated with the Mason's student community. Your friend, a friend of your friend, or a fellow Patriot may be in need of help. In this case, your role as their friend requires you to fulfill a moral responsibility of helping them. When there are friends who are experiencing difficulties, a morally responsible friend would choose to look after them by making a donation."

Donation-giving measure. Each participant had an opportunity to decide how many of the lottery tickets they would like to keep for themselves and how many they would like to donate for the charity event. The donation-giving behavior was measured by counting the number of the lottery tickets participants chose to donate.

Subjective closeness to other students measure. We administered the Inclusion of Others in the Self (IOS) [16] to measure the degree to which participants felt close with other students that attend the same university as them. Participants were presented with seven pairs of circles. In each pair, one circle had a label "You" and the other circle had a label "X," which represented other students at the university participants also attend. The distance between the two circles varied across the seven different pairs. In the first pair, the two circles were placed adjacent to each other but there was a small gap, keeping the circles separate from each other. This distance between the two circles was reduced incrementally for the other six pairs, and in the last pair, the two circles were almost completely overlapped with each other. Participants were asked to indicate which of these seven pairs of circles best described to what extent them and other students at the same university are connected. If the participants selected the first circle, the response was coded as '1,' and if they selected the seventh circle, the response was coded as '7.' Thus, this measure was treated as a 7-point-rating scale.

C. Design and Procedures

The design of the current experiment was a one-way between-subjects design in which the ethical theories underlying the robot's moral advice were either deontological or Confucian role ethics. This experiment was reviewed and approved by George Mason University's Institutional Review Board.

When participants arrived at the waiting area of the lab suite, an experimenter first provided them with a copy of informed consent form. After the participants signed the consent form, the experimenter took them to a nearby room where a computer was placed on a desk. The experimenter asked participants to sit at the desk and explained about the invoice entry task and started the practice trial, in which one sample invoice was presented, on the computer. While participants did the practice trial, the experimenter stood next to them to provide assistance as they complete the trial. After the practice, the experimenter started the main session on the computer and left the room.

At the beginning of the main session, participants were informed that they would be given about 15 minutes to do the invoice entry task and, depending on their performance, they would receive lottery tickets. They were informed that at least 10% of the participants would be selected as winners after the completion of data collection, and each winner would receive a $50 Amazon gift card. A total of 18 different invoices were presented in random order. When participants finished entering the last invoice they started working on within the 15-min time limit, they were presented with a message indicating that they earned nine lottery tickets. When participants notified the experimenter who was waiting outside that they finished the invoice entry task, the experimenter handed over a roll of lottery tickets and told them to take as many lottery tickets as they earned without telling the experimenter. The experimenter asked participants to write down their participant number, which was a random number assigned to each participant, on each of the lottery tickets and put the tickets in a container.

Next, the experimenter asked participants to carry the container and follow them to another room that was located next to the first room. In this second room, there was a Pepper robot and an empty chair facing the robot. Also, there was a computer placed on a table next to the robot. The experimenter introduced the Pepper robot to the participants as a robotic research assistant that would walk them through the next study. Participants were asked to seat across the robot, facing it. The experimenter encouraged participants to say hello to the robot or make an eye contact with it, explaining that it responds to social cues. Once the experimenter

confirmed that the robot was facing the participants, they left the room and started a program prepared on Choregraphe. The robot started to describe the charity event organized to raise funds to help students who are attending the university and experiencing challenges, including economic and financial concerns and physical and mental health issues. This charity event was chosen from a list of fundraising events taking place at the university, and screenshot images of the university website introducing the event was presented on the robot's tablet, as the robot talked about the event (See Figure 2).

Fig. 2. An image of the Pepper robot used in the current experiment. On the robot's tablet, the website showing the information about the fundraising event was presented.

After the robot gave participants the introduction to the charity event, the robot offered participants moral advice, which was grounded in either deontology or Confucian role ethics, to encourage them to donate their lottery tickets to the charity event. Then the robot expressed that it would shut down their system to allow participants to make their decision in private and asked the participants to wake the computer sitting on the table to proceed. The robot was programmed to put on the rest mode, which made the robot face downward and then pause.

When participants woke the computer, they saw a series of instructions, which included asking them to write down a letter 'D' on the lottery tickets they would like to donate and put all the lottery tickets into the box placed on the table. On the top of the box, there was a long and narrow slot that was large enough for participants to put their tickets into the box but was not large enough for them to look inside. Participants were then asked to answer the IOS scale to indicate how closely they felt connected to other students attending the same university as them, and whether they were familiar with the experimenter prior to the experiment, along with basic demographics questions, such as age, gender, and ethnicity. When participants were done with all the tasks, they were asked to come outside and the experimenter debriefed them on the details of the experiment and answered any questions they asked about the experiment.

III. Data Analysis and Results

We expected that, when a robot offered a piece of moral advice on charitable-giving, the advice grounded in Confucian role ethics would induce a greater amount of donation than the advice grounded in deontological ethics (H_1). Supporting H_1, we found that the number of donated lottery tickets was greater in the role condition (Median = 7, IQR = 5.75, n = 30) than in the rule condition (Median = 4, IQR = 4, n = 31). As the Shapiro–Wilk tests indicated that the data distributions in both conditions significantly deviated from a normal distribution ($W = 0.89$, $p = .004$ for the rule condition; $W = 0.83$, $p < .001$ for the role condition), we performed a Mann-Whitney test (one-tailed). This analysis revealed a statistically significant support for H_1, U = 351, $p = .048$. The medians of the number of donated tickets in the rule and the role conditions are shown in Figure 3. Therefore, these results indicated that, in the context in which a robot attempts to persuade participants to give donations to a charity event, it is more effective to frame its message based upon Confucian role ethics than deontological ethics.

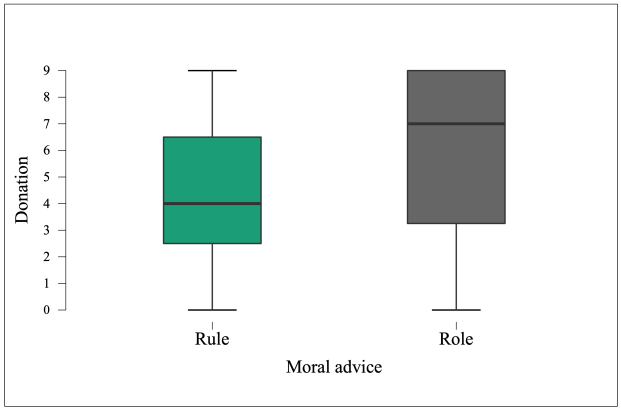


Fig. 3. A boxplot showing the medians, the 25th percentiles, and the 75the percentiles of the number of donated lottery tickets in the rule (green) and the role (gray) condition. The number of donated tickets ranged from 0 to 9.

Another hypothesis we tested was that, the stronger participants felt close toward other students, who are attending the same university as them, the more donation they would make to help students in need of help at their university (H_2). We carried out a correlation analysis (one-tailed) on the IOS ratings and the number of donated lottery tickets, but we did not find support for H_2 ($p > .05$). However, when we visualized a linear relationship between the IOS ratings and the number of donated tickets, the pattern suggested a meaningful but unexpected relationship between the participants' subjective closeness with other students and the amount of donation they made. We thus performed a two-tailed correlation analysis on the two variables to statistically verify the relationship. In contrast to H_2, we found a statistically significant support for a negative relationship between the two variables ($r = -0.29$, $p = .02$). Therefore, the closer participants felt toward other students at their university, the fewer lottery tickets they were to donate to the charity event.

As these results were the opposite of what we had expected (H_2), we attempted to better understand the results by performing additional analyses. We examined if this negative relationship would be held constant for both of the moral advice conditions by conducting two-tailed correlational analyses separately for the rule condition and the role condition. These analyses revealed that, while there was no relationship between the IOS ratings and the number of donated tickets for the role condition ($r = 0.009$, $p = .96$), there was a significant negative correlation between the IOS ratings and the number of donated tickets for the rule condition ($r = -0.61$, $p = .0003$). This contrast between the two conditions in terms of the relationship between the subjective closeness with other students and the amount of donation is depicted in Figure 4. Thus, the negative correlation found in the data containing both the rule and role conditions seemed to have mainly been driven by the rule condition.

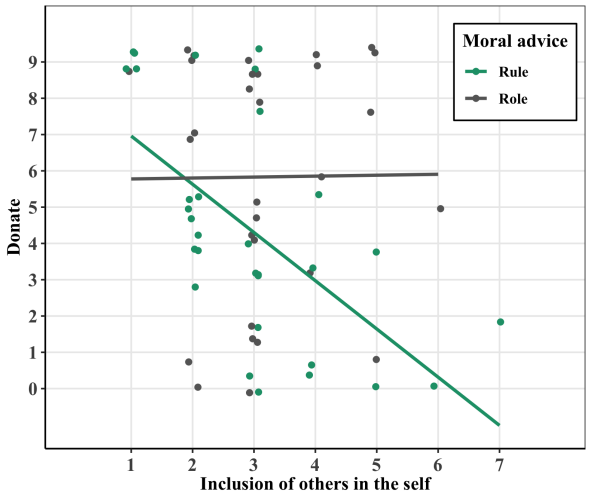


Fig. 4. In the rule condition (green), there was a negative correlation between the degree to which participants felt close to other students at their university and the number of lottery tickets they donated, and in the role condition (gray), there was no significant correlation between the degree to which participants felt close to other students at their university and the number of lottery tickets they donated.

IV. GENERAL DISCUSSION

The purpose of this research was to investigate the effectiveness of a robot's moral advice in inducing prosocial behavior of charitable-giving. We put forth two specific aims which were, first, to compare the effects of moral advice grounded in deontological ethics and Confucian role ethics and, second, to examine the relationship between participants' sense of feeling close to others who share a common group membership with them (e.g., other students at the university they are enrolled) and the amount they donate to a charity event prepared for those who also share the same group membership with them. The evidence from this research suggests that, when the basic framework of a robot's advice focused on theories of Confucian role ethics, it was more successful at raising donations than when the basic framework of a robot's advice focused on theories of deontological ethics. These findings are consistent with the existing view that points out Confucian ethics as promising ethical theories for designing a robot's natural language [5] and the extant HRI findings that showed the relative strengths of applying the core elements of Confucian role ethics in improving participants' task performance [7]. Further, considering that this prior work was carried out as an online experiment where a robot appeared in video clips, the current work demonstrates potential benefits of Confucian role ethics in settings where participants have face-to-face interactions with a robot in a laboratory.

However, we also acknowledge that these beneficial effects of Confucian role ethics could have been prominent in this experiment because of specific relational contexts participants dealt. The recipients of the donations in this experiment were the students at the university the participants also attended. In this situation, it could have been particularly effective to draw the participants' attention to their moral responsibilities associated with their relationships with other students who could also be their close friends, classmates, roommates, or teammates. This, on the other hand, also suggests that there could be other contexts where Confucian role ethics may not be particularly effective in inducing prosocial behavior. To illustrate, if the decision participants faced was to distribute their resources between a group which they are affiliated with and a group which they are not affiliated with, it may be difficult to rule out a possibility that focusing on the theories of Confucian role ethics could motivate people to exhibit in-group favoritism, which often can trigger out-group discrimination [17]. Therefore, we view that it would be critical to take into consideration characteristics of specific relational contexts when different ethical theories are used to increase the persuasive power of a robot's message in influencing people's prosocial behavior.

In the present research, we also discovered that, when participants received from a robot moral advice focused on deontological ethics, it was those who felt strongly close to other students at their university that were *less likely* to donate than those who felt weakly close to other students. This result went against our predictions, and moreover, was inconsistent with the previous findings about how people prefer to help others who share the same group membership with them [14], [15]. It is noteworthy that this negative relationship is probably linked to the framing of the robot's advice, which focused on deontological ethics. We argue this because, when participants received from a robot moral advice focused on Confucian role ethics, there was no significant relationship between how closely participants felt connected with other students at their university and their charitable giving behavior. We conjectured that, when a robot gives moral advice grounded in deontological ethics, it may inhibit, rather than activate, participants' motivations to comply with the advice, resulting in them making a smaller donation than they would if the advice was not given to them or if a different type of advice was given. It is possible that when these participants were asked to

express how closely they felt toward other students at their university, they may have reported feeling strongly close to other students as an attempt to make up for their previous decision to donate not as much as they would have under different circumstances. We interpreted this as a variation of moral cleansing behavior [18], which refers to responses people show subsequent to their involvement in wrongful or regretful deeds in order to restore their moral self image [19]. These interpretations are only speculative, however, and are based upon correlational data. Hence, future work would be needed to systematically validate these interpretations of the current findings.

Finally, there were a few factors in the current research that would require further investigations. First, it is unclear to what extent cultural background of participants influence the effect of messages grounded in Confucian role ethics because we recruited participants only from the U.S. In the future, it would be necessary to conduct cross-cultural comparisons by recruiting participants from East Asian countries where the ideologies of Confucianism have long been integrated into society and culture. Next, it remains to be answered what effects the same moral advice may have on people's decisions when it was delivered by a human, instead of a robot. Addressing this question would better our understanding of the contributions the advice itself make in convincing people to give donations.

V. CONCLUSION

In this work, we found promising evidence to suggest that social robots with their communication capacities can effectively persuade people to engage in charitable giving behavior. Moreover, the current experiment demonstrated potential benefits of considering ethical theories that encompass both Eastern and Western philosophy of ethics in promoting charitable donations. We suggest adopting diverse views in exploring persuasion in HRI in future research.

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