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Prosocial Effects of Perpective-Taking Through LEGO Play

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https://dx.doi.org/10.32597/honors/185/
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J. N. Andrews Honors Program
Andrews University

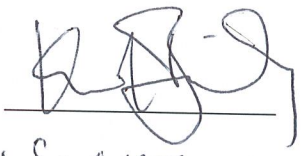
HONS 497
Honors Thesis

Prosocial Effects of Perspective-Taking Through LEGO Play

Carlyle Francis C. Tagalog

April 9, 2018

Advisor: Dr. Karl G. D. Bailey

Primary Advisor Signature: 

Department: BEHAVIORAL SCIENCES

Abstract

This study examined the claims in the LEGO Six Bricks Booklet regarding perspective-taking outcomes related to prosocial behaviors intended to benefit another (The LEGO Foundation, 2015; Dunfield, 2014). In helping situations, trait kindness also predicts prosocial behaviors (Lefevor et al., 2017). Sixty-eight subjects were randomly assigned to one of three conditions that varied perspective-taking. We conducted one-way ANOVAs with Bonferroni-Holm post-hoc tests to compare performances on the prosocial measure in the three conditions. The results showed no significant difference between means of the prosocial behaviors in each condition. Kindness levels also demonstrated no significant difference within each experimental group. It is unclear whether the LEGO task Back-to-Back or our measure of prosocial behavior significantly activate the perspective-taking needed to measure prosocial outcomes. Future research needs to improve the sensitivity of the prosocial tools and measurements to better examine the effects of LEGO tasks.

Prosocial Effects of Perspective-Taking Through LEGO Play

In 2015, LEGO Foundation released pamphlet of tasks, the Six Bricks Booklet, that contains activities for children to develop certain skills such as creativity, organization, descriptive language use, problem-solving, social cooperation, and perspective-taking (LEGO Foundation, 2015). Recently, these tasks are also being encouraged for college students as a tool in the classroom for social cooperation (Golinkoff, 2017). However, to our current knowledge, no research has been conducted to test the effectiveness of these LEGO tasks and on expected cognitive outcomes. As a first step, the current study seeks to explore LEGO claims on one particular task, the Back-to-Back task. Results from research on this LEGO task can be helpful shaping the way we develop, prompt, or foster social skills in a variety of settings including classrooms, businesses, workplaces, and other situations that involve team or group dynamics.

Literature Review

Perspective-taking is defined as the mental capability to adopt another's perspective and consider another's thoughts, feelings, and internal mental states (Epley & Caruso, 2009). Perspective-taking requires stepping outside of the self, viewing others as separate from the self, and recognizing that others may have differing mental states. Because the nature of such an ability merges the perspectives of self and other, research on perspective-taking can allow us to better investigate the social interactions that occur when dealing or cooperating with others—family, friends, co-workers, classmates, and perhaps even complete strangers.

Perspective-taking can be understood within several frameworks. The first of these is Theory of Mind (ToM). ToM is typically defined as the insight into other people's minds and reasoning about how mental states influence behavior (Imuta et al., 2016). Because of how it also involves projecting outside of the conscious self, the ToM framework has been traditionally used

to operationalize perspective-taking studies (Barnes-Holmes, McHugh, & Barnes-Holmes, 2004).

Another model, Relational Framework Theory (RFT) is defined as a behavioral and functional account of language and cognition and is thought to be the underlying process responsible for processes such as naming, storytelling, spirituality, and perspective-taking (Barnes-Holmes et al., 2004). Because RFT involves several overlapping language faculties unrelated to perspective-taking, this study does not use this framework.

Lastly, perspective-taking can be placed within a self-other overlapping perspective that incorporates and induces the self to the other or vice versa (Galinsky, Ku, & Wang, 2005). ToM and self-other overlap theories provide the framework for the deliberate acknowledgement of another sentient mind and the investigating and adopting of another perspective. Because of its focus on selflessness, perspective-tasking frameworks have been involved in studies regarding everyday social interactions including stereotype reduction, altruism, social coordination, social bonds, and prosocial behaviors (Epley & Caruso, 2009; Galinsky et al., 2005). Among these variables, prosocial behaviors involve not only recognizing the perspective of another, but also includes interacting with and meeting the others' needs—that is, social cooperation. According to these theoretical frameworks, certain activities, such as working cooperatively, likely involve perspective-taking.

In their Six Bricks Booklet, the LEGO foundation explicitly claims that working with their activities using DUPLO® blocks can allow students to practice coordination and perspective-taking (LEGO Foundation, 2015). One of the perspective tasks, Back-to-Back, involves two persons sitting back-to-back and building LEGO models only via communication and cooperation. This task is intended to teach children to: "think from another person's

perspective." Unable to see the workings of the person behind them, the participant is forced to cognitively or imaginatively adopt the perspective of the other. However, do LEGO Six Bricks tasks match the predictions of perspective-taking theories?

According to literature, any perspective-taking is an ability that follows an specific process: Perspective-taking involves (1) activating the ability by ascertaining the existence of another's mind, (2) adjusting the egocentric default on perspective, and (3) accessing accurate information about others by overcoming stereotypical information (Epley & Caruso, 2009). Efficient and accurate perspective-taking requires this three-step processes, especially in filtering undiagnostic information, in order to better merge the self-other perspective. By forcing individuals to cooperate in building undirected LEGO models, LEGO Six Bricks tasks seem to follow the ability process and thus can legitimize perspective-taking abilities.

However, perspective-taking occurs in different domains. Perspective-taking tasks have been generally categorized into three different types: visuospatial, cognitive, and affective perspective-taking (Erle & Topolinski, 2017). The back-to-back LEGO task falls under the description of visuospatial tasks, which challenge visuospatial frames of reference. Yet, because it also forces participants to be blind to their partner's model or actions, the LEGO Back-to-Back task also involves cognitive and affective (also regarded as psychological) perspective-taking. Regardless of its specific categorization, LEGO perspective-taking tasks hinge on the process of merging self and other (Epley & Caruso, 2009). However, because of the physical nature, Six Bricks tasks may also provide a fitting process for priming perspective-taking in the visual domain.

Finally, LEGO tasks have been investigated in previous literature as potential tools to invoke social cooperation. In LeGoff's (2004) study of LEGO individual therapy, two children

cooperated to complete a building task—one as "engineer" and the other as "builder". Similar to the LEGO Six Bricks Back-to-Back task, the LEGO therapy involved one child seeing the model plan and explaining it to the other child, who builds the model and listens to instructions. The research indicates that LEGO play is an effective medium for social skills intervention. Perhaps such a phenomenon can be revealed within prosocial behaviors of emerging adults exercising these LEGO tasks as well.

Perspective-taking is related to a broader concern in social psychology: prosocial behavior. Prosocial behavior is defined as behavior that benefits another and is intended to do so in actions that include (but are not limited to) sharing, comforting, and helping (Dunfield, 2014). Prosocial behaviors within an individual may vary and are generally influenced by two situational determinants: 1) striking or unique events 2) temporary external conditions or transient emotions. These circumstances seem to fit the purpose of perspective-taking tasks that are purposed to prime prosocial behavior. In a recent article, higher scores for prosocial behavior were found in children who scored high on ToM (Imuta et al., 2016). This study revealed that there may be a reciprocal relationship between prosocial behaviors and ToM, the theoretical framework for perspective-taking. With the definitions and results of these studies, it may be likely that engaging in perspective-taking tasks indeed affect prosocial behaviors.

In helping situations, situational tasks may not be the only factor that influences prosocial behavior. According to a recent meta-analysis article regarding situational factors and helping behaviors, resulting overall patterns make it clear that traits and individual differences act as sources of influences within helping behaviors (Lefevor et al., 2017). Thus, it is crucial to investigate helping tendencies inherent within individuals to avoid confounding situational factors and trait dispositions. In Lefevor's recent dissertation, the trait kindness was used as

predictor for helping behaviors (Lefevor, 2016). While traits like agreeableness and participant moods failed to predict helping behaviors, kindness trait measures had a significant correlation. Thus, including virtue-centered trait measures, such as kindness, with perspective-taking tasks may provide a better understanding on how prosocial behaviors are influenced.

The current study examines the explicit claims of LEGO Six Bricks regarding perspective-taking. If the LEGO Six Bricks tasks do prime or develop perspective-taking mindsets, then they may be useful tools in developing prosocial behaviors. Such findings can prove useful within educational and professional context to foster cooperation, interdependency, and teamwork. According to current knowledge, investigations of LEGO Six Bricks tasks have not been reported in any research journal. Yet, previous literature revealed the connection between perspective-taking and prosocial behavior, which also suggest investigating trait measures as well. Thus, the hypothesis posited that engaging in LEGO Six Bricks perspective-taking tasks increases prosocial behaviors, regardless of trait kindness.

Methods

Subjects

In total, we recruited 68 subjects for this study. All subjects recruited were Andrews University students who are at least 18 years of age. Student participants were recruited from the Behavioral Research participation pool, in which they were awarded one research credit to fulfill the requirement of their class. Convenience sampling and social media solicitation was used to gather more participants. Of these subjects, 41 were females (60.3%) and 27 were males (39.7%). Of the 68 subjects, six were marked as problematic. However, removing their data made no significant changes with the results. Therefore, those six subjects were kept for data analysis. The mean age of the sample was 20. The demographic representation of the subjects

was 13% African American, 47% Asian / Pacific Islander, 8% West Indian, 22% White Non-Hispanic, 13% Latino, and 7% Multiracial (some subjects check more than one box).. Religiously, the sample was highly Seventh-day Adventist (94.1%). There were 11 subjects who were strangers relative to the experimenter (16.2%), 21 who were acquaintances (30.9%), and 36 who were friends (52.9%).

This study was approved by the Andrews University Institutional Review Board.

Materials

Perspective-taking tasks was implemented using the Back-to-Back task from the LEGO Six Bricks booklet of tasks (2015) and modified versions to manipulate perspective-taking. Six multicolored LEGO bricks (2 x 8 dimensions) were given to each participant. Participants were assigned to one of three experimental conditions: help-encouraging (Back-to-Back), neutral pair (Face-to-Face), or neutral solo conditions.

Trait kindness was measured using the Kindness Scale from the VIA Inventory of Strengths (McGrath, 2014). In the study, the scale was utilized as a posttest to account for individual trait differences in the virtue of kindness. According to Lefevor and colleagues (2017), the kindness scale can best predict helping behaviors. To complete this scale, participants rate how much a statement describes them using a five-point Likert scale (1 = "very much like me" to 5 = "very much unlike me"). Examples of statements in this scale include: "*I am never too busy to help a friend*" and "*I go out of my way to cheer people up who appear down.*"

The prosocial measure in this study was the Michigan Prosocial Game (MPG), which is based on the Zurich Prosocial Game (ZPG) (Leiberg, Klimecki, & Singer, 2011). In the ZPG, the participants can help each other by using their own keys to open the gates of the other player, but at the cost of not having that key available if they need it later on in the game. After the game,

the percentage of helping vs. non-helping actions are calculated as a prosocial measure. There were a number of issues that prevented the use of the ZPG in this study. The first is that the code to run the ZPG is not publically available.

There are also possible issues with the design of the ZPG game. One problem is that the ZPG assumes that participants will notice that they could help the other player. The ZPG also makes calculating for the number of possible helping events or opportunities difficult. Thus, we designed the MPG, which is based on the ZPG, was simply designed to calculate for proportions of helping times vs. proportion of possible helping times.

In the MPG, players navigate a spaceship to collect eight resources that match their spaceship color as fast possible. Although optional, players also have the opportunity to help another spaceship collect their matching-colored resources at the cost of their own time. Possible helping times are defined as times when the player passes over resources that match the other player. The measurable outcome of helping proportions was calculated by the number of resource collection (helping times) divided by the possible helping times or opportunities. For example, if a player collected all of the resources when they passed them, their helping proportion would be 1.00. Through the MPG, prosocial helping can, in theory be accurately measured. Both MPG and ZPG fall under "helping," which alleviates an instrumental need, where an individual has difficulty completing goal directed behavior (Dunfield, 2014). The MPG was designed and constructed in the Andrews University Cognitive Psychology Lab by Dr. Karl Bailey as part of a broader program of research.

Procedure

The general procedure is outlined as follows. In the lab, one participant entered per 30-minute experiment session. To prevent jeopardizing the goals of the experiment, participants

were told that the study examined personality and efficiency in LEGO tasks and games. After providing consent, each participant was randomly assigned to one of the three LEGO Six Bricks task conditions (help-encouraging, neutral paired, or neutral solo).

In condition 1, help-encouraging, the participants did the Back-to-Back task as described in the Six Bricks Booklet (LEGO Foundation, 2015). The researcher sat back-to-back with the participant, who built any model combination of the provided six bricks. To the best of their ability, each participant verbally explained their model and coordinated with the researcher until the researcher successfully copied the model. The researcher sometimes asked to clarify instructions from subjects. In condition 2, neutral paired, the participant and the researcher sat face-to-face. The subject built any model and the researcher simply copied the model. In condition 3, neutral solo, players were asked to create any LEGO structure with the bricks and then simply show it to the researcher. The tasks of each condition were repeated 4 times. These experimental conditions were designed to ensure it is exactly the perspective-taking element (not social presence or creativity) of task that influences prosocial outcome. An experimental script was used by the researcher to provide consistency and to eliminate unwanted variations with each experiment.

Afterwards, the participant played the MPG six times (only the last four trials were used in the calculation of helping proportion). Lastly, the participants completed a demographic survey and the kindness trait survey implement online through Lime Survey 2.05+. In the game, players collect 8 colored asteroids that match the color of their ship as fast as possible. They had the opportunity to help the other computerized player complete their goal as well, but at the cost of some time, just as in the original Zurich Prosocial Game (Leiberg, Klimecki, & Singer, 2011). On the odd-numbered trials, the other player was not helpful by default, but had a one-third

chance of becoming helpful every time the player helped them. On even-numbered trials, the other player was helpful from the beginning of the trial. The demographic survey involved questions about gender, age, class standing, ethnicity, and religious affiliation. The kindness scale instrument was a posttest in order to prevent priming the participant to be mindful or kind to others. After the experiment, the research supervisor fully debriefed the participant regarding the experiment.

Analysis

The study used a one-way analysis of variance (ANOVA) and a Bonferroni-Holm post-hoc to compare the interactions between the three experimental conditions (help-encouraging, neutral paired, and neutral solo) in accordance to the prosocial measure. The kindness scale was factored as a covariant. Descriptive statistics were used to characterize the sample.

Results

An analysis of variance (ANOVA) was used to investigate the prosocial effects of the three LEGO task conditions. Although six trials of the MPG were played by each participant, only the last four trials were analyzed in order to buffer for learning a new game. The results showed no significant difference between the prosocial behaviors (measured as helping proportion) of LEGO task condition 1 ($M = 0.439$, $SD = 0.338$), condition 2 ($M = 0.412$, $SD = 0.397$), and condition 3 ($M = 0.550$, $SD = 0.349$), $F(2, 65) = 0.913$, $p = 0.406$, $\eta^2 = 0.027$ (See Table A1 in Appendix A and Table B1 in Appendix B). Additionally, the ANOVA results showed no significant differences between the kindness scale score of LEGO task condition 1 ($M = 4.09$, $SD = 0.404$) condition 2 ($M = 3.74$, $SD = 0.758$), and condition 3 ($M = 3.95$, $SD = 0.587$), $F(2, 65) = 1.96$, $p = 0.149$, $\eta^2 = 0.057$. With no statistical difference between the LEGO

conditions in prosocial behavior or kindness scale, no Bonferroni-Holm post-hoc results were significant (See Table A1 in Appendix A and Table B2 in Appendix B).

To further explore the circumstances surrounding prosocial effects, an ANOVA was used on other variables or factors and groups involved in this experiment. Results showed no significant difference between and helping proportions and the relationships to the researcher whether stranger ($M = 0.597$, $SD = 0.319$), acquaintance ($M = 0.482$, $SD = 0.345$), or friend ($M = 0.291$, $SD = 0.381$), $F(2, 65) = 2.93$, $p = 0.06$, $\eta^2 = 0.083$ (See Table C1 in Appendix C and Table D1 in Appendix D). Neither were relationships significant in their interaction with kindness scores, as a stranger ($M = 3.78$, $SD = 0.933$), acquaintance ($M = 3.89$, $SD = 0.614$), or friend ($M = 4.00$, $SD = 0.483$), $F(2, 65) = 0.595$, $p = 0.554$, $\eta^2 = 0.018$ (See Table C1 in Appendix C and Table D2 in Appendix D).

Discussion

This study explored the prosocial effects of the perspective-taking LEGO task, the Back-to-Back from the Six Bricks Booklet released by the LEGO Foundation (2015). The ANOVA results revealed that there were no significant differences portrayed between each LEGO task condition (Back-to-Back, Face-to-Face, and Solo) and their prosocial behavior scores measured by helping proportions. This result reveals that no LEGO task had an immediate effect on the helping performance of each participant in the MPG. Condition 2 and 3 (Face to Face and Solo) were expected to have low scores of helping proportion. The results, however contradict our hypothesis of condition 1 (Back-to-Back) as the most help-encouraging task. Even with its exclusive nature of perspective-taking (in comparison to the other conditions), the perspective-taking LEGO task does not seem to reveal prosocial effects.

The results show a contradiction of our understanding of perspective-taking in its relation to prosocial behaviors. Literature links perspective-taking with prosocial behavior due to their shared nature in selflessness and the adoption of another person's mindset (Epley & Caruso, 2009; Galinsky et al., 2005; Imuta et al., 2016). Therefore, it is possible that the Back-to-Back LEGO task isn't a strong influencer of perspective-taking despite the task's claim to help participants "think from another person's perspective" (LEGO Foundation, 2015). Perhaps the Back-to-Back task did not successfully aid the self-other overlap that could result in prosocial attitudes and behaviors (Galinsky et al., 2005). Another possible explanation for the failure of the Back-to-Back task may be the short exposure to the perspective-taking phenomenon. The experimental design allowed subjects to participate in perspective-taking for only a short period of time (about 10 minutes max). However, studies like LeGoff's study (2004) reveal that LEGO play showed positive results for social intervention those tasks were practiced on a regular basis. Perhaps, the Back-to-Back task will better promote perspective-taking mindsets and prosocial effects when the activity is regularly introduced over an extended period of time instead of just within a couple trials within a short time. Because each of the LEGO task conditions showed no significant effect on prosocial outcomes, we decided to consider the influence of inherent traits as measured by the kindness scale.

In taking into account kindness scores, the ANOVA results also appeared insignificant in the way it influenced helping behaviors. High kindness scores did not seem to drive higher scores in prosocial performance manifested in Helping Proportions. The data does not support the meta-analysis and literature on kindness traits and its role as a predictor of helping behaviors (Lefevor et al., 2017). Preliminary analysis on earlier data showcased that kindness scales indicated a stronger prosocial influence than our LEGO task conditions. However, as we

collected more subjects this tentative pattern subsided. It's plausible that an individual's accumulated experiences, personality factors, and inherent traits may be a more powerful prosocial influencer than situational factors of a 30-minute experiment. Yet, our results indicated otherwise. Even the addition of factoring relationships between the participants and the researcher unveiled no significant influence on prosocial outcomes. Within this experiment, it seems that prosocial behaviors were neither significantly influenced by the perspective-taking LEGO task nor the levels of kindness. This body of research thus exposes limitations not only in the understanding of the factors surrounding prosocial behaviors but also the methodology of measuring helping outcomes.

Aside from the lack of participants, perhaps the biggest limitation of this study is the experimental design of the prosocial measure. It is possible that perspective-taking did occur but the design of game wasn't able to properly measure prosocial behaviors. Although each subject played through six trials of the MPG, only the last four trials were taken for analysis in order to buffer for the learning of a new game. Perhaps the number of trials for each participant was too little for truly measuring their prosocial behaviors. Additionally, the ZPG used a face feature in their prosocial game that may have impacted the nature of prosocial behavior within their participants (Leiberg et al., 2011). The MPG, on the other hand, removed this face element and framed the game as social only by reporting to each participant that "another player is playing online with them." Although given specific instructions, MPG players may have not treated the game as a social cooperation game but instead as a competitive, goal-directed game, or as an individual self-competition game. These participant understandings may have resulted in little to no prosocial behaviors.

A disconnect may have occurred with the psychological consequences of perspective-taking (prosocial behaviors) due to the differing tasks themselves. Literature reports perspective-taking frameworks within the context of promoting social bonds and altruism (Epley & Caruso, 2009; Galinsky et al., 2005). However, the boundaries of this effect may only apply to people actively participating in perspective-taking. Thus, although the LEGO task may have properly primed perspective-taking, the prosocial effects may not have been easily carried over from the partner of the task (in this case, the researcher) to a random stranger in an online game. According to Dunfield (2014), prosocial behaviors are helpful actions that come with a cost (whether by time or resources). In this study, many of the participants of the study agreed to participate without any incentive or benefit. Perhaps these participants have already engaged in helpful behavior simply by attending the experiment, which may have reduced their likelihood of enacting prosocial behaviors within the MPG itself. Despite the limitations of the experimental design of the MPG, the study supports the difficult element of research in our understanding prosocial behaviors—appropriate and accurate measures of prosocial outcomes. The current research demonstrates the demand for more sensitive tools and measurements within the prosocial domain of psychology.

In conclusion, it is unclear whether the LEGO Back-to-Back task significantly constitutes the perspective-taking needed to measure prosocial outcomes. Even if it is indeed a powerful tool for developing thinking on another person's perspective, it is difficult to validate the LEGO task's effect on prosocial behaviors. Regardless of its possible prosocial effects, LEGO tasks must still be compared with inherent trait dispositions (such as kindness levels) that play a prevalent influence on helping behaviors (Lefevor et al., 2017). Therefore, it is uncertain whether or not LEGO Six Bricks Booklets need be hurriedly implemented in educational or professional

settings without further research and evidence. Future studies must continue to investigate and explore these explicit outcomes of Six Bricks Booklet tasks and their implications within social settings. Additionally, future research on LEGO tasks may consider creating an experimental design that measures the effects of longer or more regular exposure to specific LEGO activities. Lastly, researchers need to improve the sensitivity of the tools and measurements of prosocial outcomes.

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Appendix A

Table A1

Descriptives

	CATEGORY	HELP PROPORTION	KIND
N	BACK TO BACK	23	23
	FACE TO FACE	23	23
	SOLO	22	22
Missing	BACK TO BACK	0	0
	FACE TO FACE	0	0
	SOLO	0	0
Mean	BACK TO BACK	0.439	4.09
	FACE TO FACE	0.412	3.74
	SOLO	0.550	3.95
Median	BACK TO BACK	0.488	4.00
	FACE TO FACE	0.286	3.83
	SOLO	0.611	4.08
Standard deviation	BACK TO BACK	0.338	0.404
	FACE TO FACE	0.397	0.758
	SOLO	0.349	0.587
Minimum	BACK TO BACK	0.00	3.17
	FACE TO FACE	0.00	1.75
	SOLO	0.00	2.33
Maximum	BACK TO BACK	1.00	4.75
	FACE TO FACE	1.00	4.58
	SOLO	1.00	4.58

Appendix B

Table B1

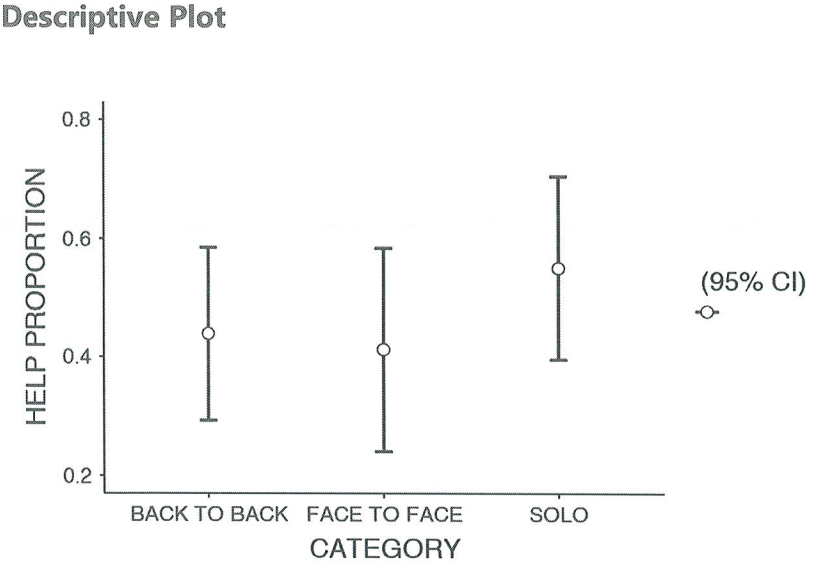
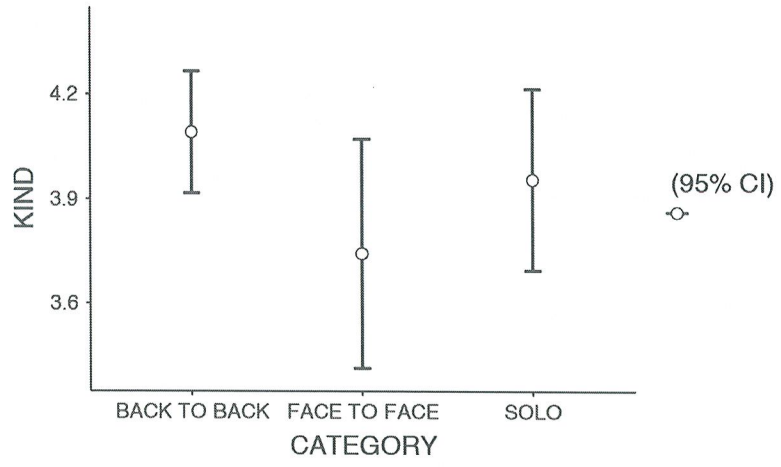


Table B2



Appendix C

Table C1

Descriptives

	RELATIONSHIP	HELP PROPORTION	KIND
N	STRANGER	11	11
	ACQUIANTANCE	21	21
	FRIEND	36	36
Missing	STRANGER	0	0
	ACQUIANTANCE	0	0
	FRIEND	0	0
Mean	STRANGER	0.597	3.78
	ACQUIANTANCE	0.482	3.89
	FRIEND	0.416	4.00
Median	STRANGER	0.725	3.92
	ACQUIANTANCE	0.525	4.08
	FRIEND	0.291	4.00
Standard deviation	STRANGER	0.319	0.933
	ACQUIANTANCE	0.345	0.614
	FRIEND	0.381	0.483
Minimum	STRANGER	0.00	1.75
	ACQUIANTANCE	0.00	1.83
	FRIEND	0.00	2.42
Maximum	STRANGER	1.00	4.58
	ACQUIANTANCE	1.00	4.75
	FRIEND	1.00	4.67

Appendix D

Table D1

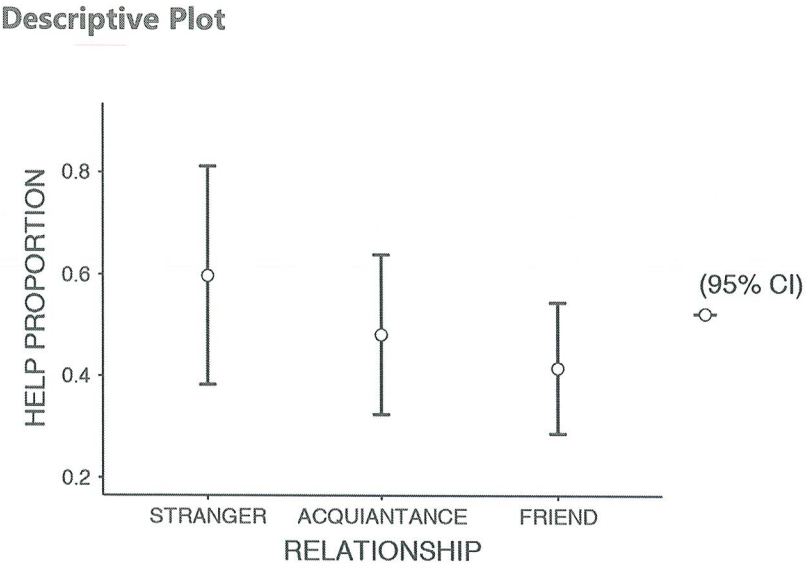


Table D2