Decision-Making Behaviour and Minimal Social Conditions: Economic versus Moral Choices

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Abstract

Although decision-making processes are typically studied with isolated individuals in the laboratory to control external factors, we mostly make decisions in a social environment in the presence of other individuals. The aim of the current study was to investigate the effects of social conditions on individuals' decision-making performance in economic and moral contexts. Forty-four pairs of participants of the same gender (42 females and 46 males) constituted the sample for this study. Each pair was required to complete both economic and moral tasks under three types of social conditions, namely, "individual," "joint," and "joint with gaze-cueing." Furthermore, eye- and mouse-tracking technologies were utilized to record the participants' responses to the decision tasks. We hypothesized that even a minimal social context would influence people's decisions, as manifested in their gaze and mouse responses. The results revealed that the minimalist social condition in which participants do not communicate or interact with each other affected their decision-making performance. The interplay among social conditions, diverse task types, and stimuli type were identified as some of the factors that impact the decision-making process in this setting.

Keywords: decision-making; moral dilemma; peer influence; minimal social context; risk preference

Introduction

Theories of decision-making have been widely investigated during the last few decades. However, the majority of the literature investigates the mechanisms underlying decision-making processes, and moral decision-making in particular, in a controlled laboratory setting. Moreover, the literature mostly investigates the group decision-making process under the circumstance that participants interact with each other to perform the task or at least communicate with each other. Consequently, most of the results in this area are based on participants' interactions and not just merely being part of a group. However, out of the lab setting, there are circumstances in which we decide individually, but our decisions may have onlookers as well.

According to social facilitation theory (Triplett, 1898; Zajonc, 1965), if a person is performing a difficult task in the presence of a second person, her or his reaction time increases and the performance's accuracy decreases. In contrast, we observe more accurate responses and shorter response times for easy tasks when a second person observes her or his performance. Gardner & Steinberg (2005) examined the impact of peers on risk taking, risk preference, and risky decision-making across three age groups. The results of their study revealed that chronological age had a significant effect on risk-taking and risky decision-making. As one's age increased, risk-taking behavior and preferences for risk decreased. Additionally, participants made riskier choices when they were in the group setting and with their peers, and the influence of their peers was significantly correlated with their ages. Sebanz et al. (2006) emphasized on the significance of investigating joint action in order to comprehend cognitive and neural processes within social contexts. They claimed that traditional cognitive psychology examines perception, action, and higher-level cognitive processes by studying individual minds in isolation. However, joint action research challenges this notion.

Furthermore, Richardson, Hoover & Ghane (2008) presented a new aspect of the impact of minimal social context on the gaze patterns of participants. They claimed that the other person's presence and the participants' beliefs about their confederate altered their gaze pattern. Following the findings of their 2008 study, Richardson et al. (2012) examined the impact of minimal social context on participants' perceptual processes. Taking into account the fact that individuals align their emotions with the dominant emotion of the group, they argued that even a minimal social context can elicit this emotional alignment toward negative images or more salient stimuli.

Moreover, Laforest, MacGillivray, & Lam (2021) investigated the effects of minimal social context on gaze patterns. They explored how social connections, such as friendship, could modulate these effects. The results of their study revealed that sharing a visual experience with a friend with whom we have a social connection modulates what holds our attention, whereas viewing an image in a minimal social context with a stranger only modulates what captures our attention.

According to Coan & Sbarra (2015), Social Baseline Theory (SBT) integrates social connections with behavioral ecology, cognitive neuroscience, attachment, and perception science. Moreover, risk distribution and load sharing are two mechanisms through which perception and effort affect social proximity. As the size of the group gets smaller,

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individuals become more vigilant across a wide range of social species. Being part of a group offers several advantages, such as shared risks and collaborative efforts towards achieving common goals. Moreover, people may experience an expanded self-concept when they form social relationships with acquaintances, but not with strangers. Furthermore, Chou & Nordgren (2017) investigated the effects of the mere presence of others on the risk-taking behavior of the participants. In general, their findings revealed that participants took more risks in the presence of other people. They mentioned the concept of feeling more secure for the condition where participants find themselves part of a bigger group. They claimed that feeling secure led participants to have riskier behavior. However, they emphasized a few points that may change this result in a totally different way, namely; the nature of the risky tasks, whether risky gambles obtain options to gain more or to lose more, the relation between those people who have been physically present during the experiment by the participants, whether they know each other already or they are completely strange, the numbers of the audiences or onlookers.

Greene et al. (2001) examined emotional engagement in moral judgments of the participants with fMRI. There are three types of dilemmas in their study, namely, "non-moral", "impersonal" and "personal" dilemmas. In the personal dilemmas, a situation is described in which we need to act directly on a victim. In contrast, in the impersonal dilemmas, we need to act indirectly. Interpretation of the responses to moral dilemmas is controversial in the literature, however, Greene et al. (2001) claimed that "this is an appropriate act" is a common response of the participants to the impersonal dilemmas. In contrast, "this is an appropriate act" is a less common response to the personal dilemmas in which the person herself or himself should, for instance, sacrifice one person to save more people. They explain that giving "appropriate" response to the personal dilemmas can be considered as an incongruent situation; thus, they predicted that participants who respond to the personal dilemmas as "appropriate" have a longer reaction time. In general, their results showed that participants' performance was significantly different for personal dilemmas compared to non-moral and impersonal dilemmas.

In their study, Gürçay & Baron (2017) examined whether the response time of participants in their moral judgments and types of dilemmas (i.e., personal versus impersonal) can be considered as a predictor for the participants' responses (utilitarian versus deontological). The results of their study showed that neither response time nor types of dilemmas are good predictors of the final judgment of the participants. Their findings suggest that when participants experience conflict between two response alternatives, the integration of personality and the dilemma type affect their final choice. The authors also argued that their results do not confirm the sequential two-system model where participants were supposed to go towards the intuitive response first, and then to override their response by a reflective one. They referred to other studies that propose several additional factors affecting the participants' responses to moral dilemmas, such as increase in cognitive load that may lead to a lower proportion of utilitarian responses (Tremoliere, De Neys, and Bonnefon, 2012) and the language in which the moral dilemmas are presented (Costa et al. 2014). Gürçay and Baron (2017) claimed that the longer response time for specific dilemmas is due to the similarity between the participants' tendency towards both response alternatives, so they need to reflect more in order to make their last choice. Moreover, Evans, Dillon, and Rand (2015) investigated the correlation between response time and cooperation as well as the decision-making process that underlies social dilemmas through a series of studies. They claimed that decision conflict, not intuition or reflection, determines the response time. In other words, greater experimental manipulation of conflict brings longer response time.

Lee, Sul, & Kim (2018) investigated how social observation that induces reputation influences the moral judgments of the participants. They claimed that participants may attempt to infer the decisions of other observers, and that the tendency to receive a positive reputation will influence their moral judgments. In other words, social observation and reputation concerns will activate a set of normative goals that will influence their moral judgment.

By considering the gap between social and traditional cognitive psychology, the current study aimed to investigate whether and how the presence of others affects people's decision-making behavior in economic and moral decision contexts. In contrast to making economic and moral decisions in isolation, how does the mere presence of others (i.e., joint and joint with gaze-cueing conditions) influence individuals' decision-making behavior in terms of the choices that they made, the duration of decision-making, and the process of decision-making as manifested in motor and eye movements. During the economic task, participants were required to select amongst gambling possibilities that varied in terms of their level of risk. During the moral task, participants were presented with a moral dilemma in each trial and they were required to select either "No" or "Yes" response options. Each of these tasks, namely economic and moral, consisted of distinct social-presence conditions, namely individual, joint, and joint with gaze-cueing.

Materials and Methods

Participants

Ninety-two participants (44 female, 48 male) were assigned to the experiment. Informed consent was obtained, and they participated in the experiment for course credit. The data of four participants were excluded due to technical issues, so the data of 88 participants (42 female, 46 male) was included in the analysis. Participants' age ranged from 18 to 28 years (M= 22.64. SD=2.11). 86 out of 88 (97.7%) participants were right-hand dominant (one was left-hand, and one was mixed-hand dominant). The same gender was considered for each pair of participants (21 female pairs, 23 male pairs).

Experiment Environment and Materials

We designed and carried out the experiment using the MouseTracker software in order to examine the motor dynamics of hand movements (Freeman & Ambady, 2010). The mouse's sampling rate was 70 Hz, which refers to how frequently it recorded its position on the screen. Each participant had a desk with a keyboard, mouse, and computer monitor on it. Two synchronized remote EyeTribe eye trackers were used to record the participants' eye movements during the experiment at a sampling rate of 30 Hz. We used a chin-rest apparatus to fix the head position of the participants at a distance of 60 cm from the monitors. Two participants were involved in the experiment at the same time. The experimenter was present at the location, sat behind the two participants, and directed the experiment simultaneously. The experimenter's computer recorded the eye tracking data streamed from the participant's computers. The two streams were aligned offline with a custom script developed in Java, where two measurements that are separated within 1/30 = 0.033 seconds were treated to occur at the same time.

With 180-degree perspectives, two tables were positioned on either side of the lab, and a third table was positioned in the middle. There were specific partitions separating the tables to prevent participants from being able to see their peers' screens. Participants were not permitted to speak to one another or the experimenter during the experiment.

The experiment consisted of two sections, economic and moral experiments. The experiments were run in a predetermined order, with the economic task coming first and the moral task following after.

Tasks

Economic Task The stimuli were primarily adapted from Frederick (2005). Greater rewards were defined as high-risk options with percentages of the likelihood of earning them. The reward with a specific amount, on the other hand, was regarded as the low-risk option. We also included a few neutral economic choices as filler trials. The economic task consisted of three blocks, including eight decisions each with four risk-seeking economic decisions and four neutral decisions. Each block was assigned to a specific social condition (i.e., individual, joint, or joint with gaze-cueing).

Following the practice runs and reading the instructions, participants were presented with a blank white slide with a START button at the bottom-middle of the screen. To advance to the next slide, they must left-click on the START button. Next, the question "Which one is your choice?" appeared for 1.5 seconds in the middle of the screen. Following its disappearance, the participants were automatically shown the following slide, which contained the response options. Each trial had two response options, which were displayed at the top left or right corners of the screen. Participants could choose one of the available response options by directing the mouse cursor toward that specific option and left-click on its box. The locations of the low- or high-risk choices were counterbalanced across responses.

Moral Task The moral dilemmas that served as the moral task's stimuli were selected from Greene et al. (2001). The moral task, like the economic task, was composed of three blocks, each of which was in a different social-presence condition (individual, joint, or joint with gaze-cueing). Each of these blocks contains twelve moral dilemmas: four impersonal, four personal, and four non-moral.

The economic task was followed by a brief break. After the experimenter gave a brief explanation of the moral task's procedure and how these questions differ from the economic task, participants began the practice trials for the moral task. They were asked to put themselves in each dilemma's scenario before selecting one of the two possible answers.

During the experiments, trials began once participants left-clicked on the START button at the bottom middle of the screen. Next, the first section of the dilemma including the whole story of that particular dilemma was displayed. These sentences appeared at the center of the screen in black font over white background. There was no time restriction for reading the scenario. After reading the first part of the dilemma, participants pressed the ENTER key on their keyboard to advance to the next slide, which included the main question regarding the specific moral dilemma.

The question was displayed in the middle of the screen. Simultaneously with this question, two response alternatives (Yes or No) appeared on the top-right and top-left corners of the screen. As a result, after reading the first section of the dilemma and pressing the ENTER button, the participants moved on to the next slide, which contained the dilemma's main question and the two response options. Participants responded by moving their mouse and left-clicking on one of the response buttons. Once they made their choice, the next trial began with pressing a START button, and the trials continued in this manner until the end of the 12th trial. Then they completed the next block of trials in a different social condition. To avoid any order and response location effects, the three social conditions and the locations of the "Yes" or "No" responses were counterbalanced.

Three Social-Presence Conditions

Joint Condition In this condition, participants were informed that that they were observing the same questions at the same time. The experimenter synchronized the onset of each pair's trial. Decision-making had no time limit, so if a participant responded earlier, she/he was expected to wait for the experimenter's signal to continue.

Joint with Gaze-cueing Condition Everything was the same as the joint condition, with the exception that each participant in this condition had access to their confederate's eye gaze cue. In other words, they could see a transparent marker indicating where their confederate was looking on the screen while they were performing their task. Similar to the joint condition, the experimenter synchronized the trials and

informed the participants that they were making decisions for the same questions. In this condition, there was no time restriction either.

Individual Condition The experiment's setup was the same for the individual condition as it was for the joint and joint with gaze-cueing conditions, with a few changes in the procedure. Although the two participants were still in the same room, they were shielded from one another's mouse noise by noise-cancelling headphones. The experimenter also informed them that the questions for the trials were completely different from the questions of their confederate.

Design

The experiment consisted of two distinct tasks, economic and moral. Each task was conducted in three blocks of social-presence condition (i.e., individual, joint, and joint with gaze-cueing). The social-presence condition was considered as the within-subjects variable. Another within-subjects variable was the type of stimuli used in the economic (risk-seeking versus neutral) and moral tasks (non-moral, impersonal, and personal). Based on this design, we recorded participants' response time and the type of their choices. In other words, we evaluated the proportion of choosing "low- versus high-risk" options in the economic task and "Yes" and "No" options in the moral task. Aside from these classical measures, gaze-similarity and mouse trajectory measures (e.g., area under the curve, maximum deviation, x- and y-flips, change of mind) were evaluated. However, we only report the results regarding the area under the curve and maximum deviation in this manuscript.

In general, we hypothesized that even a minimal social context provided by the presence of the other confederate would influence people's decision-making behavior as manifested in their choices, reaction times, gaze, and mouse movements. For the economic task, we expected participants to take more risk in the joint and joint with gaze-cueing condition. Furthermore, based on the social facilitation theory, we anticipated that the joint and joint with gaze-cueing conditions would have quicker response times than the individual condition. For the moral task, based on relevant theoretical works in moral decision-making, we hypothesized that participants' choices of "No" (deontological) and "Yes" (utilitarian) responses would be divergent across three social conditions. Although we expected a kind of variation in people's decision-making performance across social conditions, we did not expect a linear change for any dependent values such as RT, choice proportions, AUC, MD, x-flips, or y-flips.

Results

Economic Task

Each block of the economic task comprised of 4 neutral and 4 risk-seeking decision trials. Therefore, each participant made decisions for 24 trials across individual, joint and joint with gaze-cueing conditions. The neutral trials were considered as filler besides risk-seeking trials. As it was expected, participants dominantly chose the options with a larger amount of reward in the neutral choices (96.2%, N = 1012 out of 1052 neutral trials). To prevent bias in our evaluation, we excluded the results of the neutral trials from the remainder of our analyses. Participants chose high-risk responses in 37.6 percent of their choices (N = 396 out of 1052 risky trials).The percentage of choosing high-risk responses hit the highest point (45.1%, N = 157 out of 348 trials) in the joint condition and the lowest point in the joint with gaze-cueing condition (31.5%, N = 111 out of 352 trials). The percentage of taking the risk in the individual condition was slightly higher than the joint with gaze-cueing condition (36.4%, N = 128 out of 352 trials).

The analysis of response times in the economic task revealed that participants made their choices slower in the individual condition (M = 2502.21 msec, SE = 74.95) in comparison with the joint (M = 2300.17 msec, SE = 71.12) and joint with gaze-cueing (M = 2252.34 msec, SE = 70.93) conditions. They had their lowest RT in making their choices in the joint with gaze-cueing condition. The results of the Greenhouse-Geisser corrected (ε = 0.80) 3x2 repeated measures ANOVA revealed that there was a significant difference in the average RTs between three social conditions, F (1.60, 137.85) = 6.905, $p < .01$, $\eta_p^2 = .074$.

The average of RTs in making decisions for the risk-seeking questions (M = 2658.56, SE = 74.31) had its highest amount in comparison with the neutral questions (M = 2044.59, SE = 51.99). Moreover, the results of 3*2 repeated measures ANOVA revealed that there was a significant difference in the average of RTs between risk-seeking and neutral questions, $F(1, 86) = 163.92$, $p < .001$, $\eta_p^2 = .656$. The interaction of conditions and questions' type were also significant in terms of RTs, $F(1.78, 153.27) = 9.73$, $p < .001$, $\eta_p^2 = .10$, G-G corrected ($\varepsilon = 0.89$).

Mouse-tracking Analysis Results The complexity of the decisions were evaluated based on the area under the curve (AUC) and the maximum deviation (MD) values extracted from the mouse trajectories. The MouseTracker software considers an idealized straight line between the START and the response buttons. When participants make their decisions in each trial, there is also an actual trajectory between the START button and the final response button. The largest perpendicular deviation between the idealized and actual trajectories is defined as MD. The larger the MD value, the greater the tendency to the unchosen response. Moreover, the geometric area between the ideal and the actual trajectory line is defined as the area under the curve (AUC).

The average of AUCs in the joint condition (M = .73, SE = .08) had its highest amount in comparison with the individual (M = .57, SE = .08) and joint with gaze-cueing (M = .49, SE = .06) conditions. The results of 3x2 repeated measures ANOVA revealed that there was a significant difference in the average of AUCs between three social conditions, $F(2, 172) = 4.74$, $p < .05$, $\eta_p^2 = .052$.

The average AUC values for the risk-seeking questions (M = .79, SE = .08) had its highest amount in comparison with the neutral questions (M = .41, SE = .06). The results of the Greenhouse-Geisser corrected (ε = 0.906) 3x2 repeated measures ANOVA on average AUCs revealed that there was a significant difference between risk-seeking and neutral questions, $F(1, 86) = 30.95$, $p < .001$, $\eta_p^2 = .27$. The interaction of conditions and question type was also significant, $F(1.81, 155.80) = 3.35$, $p < .05$, $\eta_p^2 = .04$.

Furthermore, the average of MDs in the joint condition (M = .33, SE = .04) had its highest amount in comparison with the individual (M = .24, SE = .04) and joint with gaze-cueing (M = .24, SE = .03) conditions. The results of 3x2 repeated measures ANOVA revealed that there was a significant difference between the three social conditions, $F(2, 172) = 4.07$, $p < .05$, $\eta_p^2 = .05$.

The average of MDs in making decisions for the risk-seeking questions (M = .35, SE = .04) had its highest amount in comparison with the neutral questions (M = .19, SE = .03). Moreover, the results of 3x2 repeated measures ANOVA revealed that there was a significant difference in the average MD between risk-seeking and neutral questions, $F(1, 86) = 32.24$, $p < .001$, $\eta_p^2 = .27$. The interaction effect was also significant, $F(1, 172) = 3.42$, $p < .05$, $\eta_p^2 = .04$.

Eye-tracking Analysis Results To analyze the eye-tracking data, we compared the x and y coordinates of the time-aligned eye-gaze locations of the participants. If the Euclidean distance between the two gaze coordinates were less than 2 visual degrees (i.e., 108 pixels on a 1024x1080 monitor at a distance of 60 cm), then the participants were assumed to be looking at the same location. The percentage of such cases to the whole data provided the gaze overlap percentage occurred at a time lag of 0 seconds, which corresponds to instants where both participants were looking at the same place at the same time. Next, we consider different time lag increments to conduct a gaze recurrence analysis (Richardson & Dale, 2005) to investigate the distribution of gaze overlap across different social-presence conditions. The results revealed a greater overlap in the joint with gaze-cueing condition compared to the individual and joint conditions, as shown in Figure 1. Moreover, the results revealed that the average gaze recurrence in +/- 1 sec buffer had its lowest value in the individual condition (M = 9.85, SE = .49) in comparison with the joint (M = 12.72, SE = .62) and joint with gaze-cueing conditions (M = 16.84, SE = .63). Therefore, we observe the highest amount of gaze overlap in +/- 1 sec buffer at the joint with gaze-cueing condition. These results also confirmed by a one-way repeated measures ANOVA indicating that social-presence conditions significantly affected gaze recurrence of the participants, $F(2, 86) = 78.40$, $p < .001$, $\eta_p^2 = .65$.

Moral Task

The results of one-way repeated measures ANOVA revealed a significant effect of the conditions on providing utilitarian ("Yes") response by the participants, $F(2, 174) = 6.63$, $p < .01$, $\eta_p^2 = .071$. Participants provided the highest percentage of "Yes" responses to impersonal and personal dilemmas in the joint with gaze-cueing condition (M = 39.20%) compared to the joint (M = 32.24%) and individual (M = 36.22%) conditions. The percentage of utilitarian ("Yes") response had its lowest amount in the joint condition.

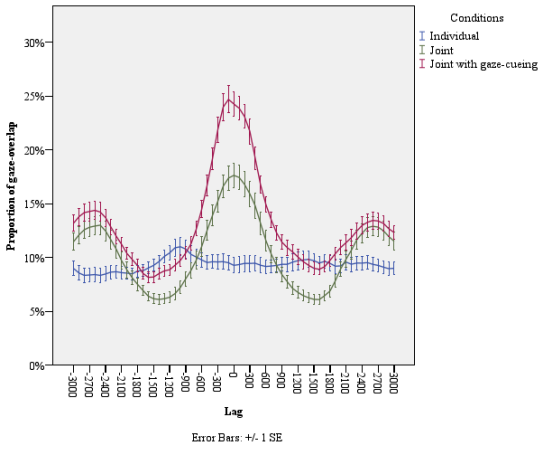

Figure 1 : Gaze overlap of the participants in three social conditions of the economic task

The analysis of participants' response times in the moral task showed that participants made their choices slower in the joint with gaze-cueing condition (M = 6325.21 msec, SE = 152.48) in comparison with the joint (M = 5208.41 msec, SE = 128.09) and individual (M = 5514.00 msec, SE = 147.25) conditions. The participants had their highest speed (lowest RT) in making their choices in the joint condition.

Moreover, the results of 3x3 repeated measures ANOVA revealed that there was a significant difference in the average of RTs between three social conditions, $F(1.85, 161.17) = 40.56$, $p < .001$, $\eta_p^2 = .32$, G-G corrected (ε = 0.93). The average of RTs in making decisions for the nonmoral dilemmas (M = 6348.32, SE = 135.59) had its highest amount in comparison with the impersonal (M = 5287.56, SE = 128.02) and personal dilemmas (M = 5411.73, SE = 146.07). Moreover, the results of 3x3 repeated measures ANOVA revealed that there was a significant difference in average RTs between three types of dilemmas, $F(1.85, 161.18) = 60.08$, $p < .001$, $\eta_p^2 = .41$, G-G corrected (ε = 0.93). The interaction of conditions and dilemmas' type were also significant in terms of RTs, $F(3.28, 285.55) = 4.896$, $p < .01$, $\eta_p^2 = .05$, G-G corrected (ε = 0.82).

Mouse-tracking Analysis Results The average of the AUCs in the joint condition (M = .761, SE = .089) had its highest amount in comparison with the individual (M = .71, SE = .08) and joint with gaze-cueing (M = .75, SE = .07) conditions. The results of 3x3 repeated measures ANOVA revealed no significant effect of condition on AUC (p = .701).

The average of AUCs in making decisions for the impersonal dilemmas (M = .82, SE = .08) had its highest amount in comparison with the nonmoral (M = .70, SE = .08) and personal dilemmas (M = .69, SE = .07). Moreover, the

results of 3x3 repeated measures ANOVA revealed that there was not any significant effect of dilemmas on AUCs (p = .071). The interaction of condition and dilemma on the AUC was not significant (p = .576).

The average of MDs in the joint with gaze-cueing condition (M = .35, SE = .03) had its highest amount in comparison with the individual (M = .33, SE = .03) and joint (M = .34, SE = .03) conditions. The average of MDs in making decisions for the impersonal dilemmas (M = .36, SE = .03) had its highest amount in comparison with the nonmoral (M = .33, SE = .03) and personal dilemmas (M = .34, SE = .03). However, the results of 3x3 repeated measures ANOVA revealed no significant effects of the conditions (p = .682) and dilemmas (p = .357) on MD.

Eye-tracking Analysis Results The results revealed that the average gaze recurrence in +/- 1 sec buffer for the individual condition had its lowest value (M = 10.18, SE = .35) in comparison with the joint (M = 13.60, SE = .54) and joint with gaze-cueing conditions (M = 15.83, SE = .41). These results also confirmed by a one-way repeated measures ANOVA which conditions significantly affected gaze recurrence of the participants, $F(2, 86) = 71.24$, $p < .001$, $\eta_p^2 = .62$. As predicted, the proportion of gaze overlap in the joint with gaze-cuing condition is significantly greater than the individual and joint conditions, as shown in Figure 2.

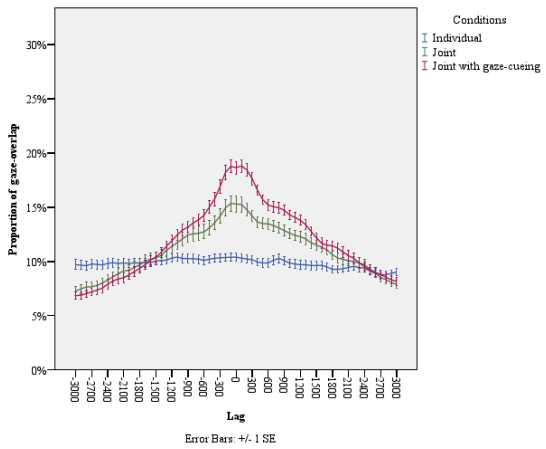

Figure 2 : Gaze overlap of the participants in three social conditions of the moral task

Discussion

The main aim of this study was to evaluate how and to what extent social-presence conditions in two distinct tasks affect the decision-making performance of the participants. The results of the economic task revealed that participants made the most risky choices in the joint condition and the fewest risky choices in the joint with gaze-cueing condition. These findings were also confirmed by analyzing the mouse movements associated with each response type. Moreover, the results of RTs revealed that participants made decisions more quickly in the joint with gaze-cueing condition than in the individual and joint conditions.

The results of the moral task revealed that social-presence conditions had a significant impact on the proportion of utilitarian responses. In the joint with gaze-cueing condition, participants selected the most utilitarian responses, while in the joint condition, they selected the least utilitarian responses. In the joint with gaze-cueing condition, participants' cursors touched the region of the utilitarian response more frequently than in the other two conditions. In addition, we observed the longest RTs in the joint with gaze-cueing condition and the shortest RT in the joint condition. Consequently, participants hesitated more between two options in the joint with gaze-cueing condition.

Overall, the results validated our primary hypothesis, which postulated that the presence of a confederate would influence the decision-making behavior of the participants due to the minimal social context that was established. The results suggest that the minimal social context influenced the participants' choices, response times, gaze-recurrence, and mouse movements. In both economic and moral tasks, they had the most gaze-recurrence in the joint with gaze-cueing condition and the least in the individual condition.

The demands of cognitive load for economic and moral tasks are different. The moral task requires more cognitive resources than the economic task. Therefore, interpretation of the results of the moral task appears to be more complicated than the results of the economic task, as numerous uncontrolled factors, such as the mood of the participants, their personalities, the level of cognitive demand, and the level of difficulty of each dilemma, may affect the results. However, as indicated by the results of both tasks, participants selected more incongruent responses in the joint with gaze-cueing condition of the moral task and assumed greater risks in the joint condition of the economic task. Therefore, they assumed the greatest risk under one of the joint conditions, despite the fact that the pattern differs between the economic and moral tasks. This finding supported the claim stated by Choe and Nordgren (2016) that individuals are more likely to engage in risky behavior when they are in a part of a larger group. If participants' choice is an option with a higher risk or an incongruent response, they subsequently spent more time taking the decision, experiencing more complexity and hesitation reflected in their hand movements. In summary, the interaction between social-presence conditions, various types of tasks and stimuli can be regarded as significant factors that influence the decision-making process.

A key limitation of the current study is that individual variations in temperament, personality traits, or emotional reactions were not accounted for, potentially compromising the broader applicability of the findings. Furthermore, the majority of the pairs were recruited from the same university class; thus, they were neither complete strangers nor did they have extremely close social ties that could have influenced the results. Consequently, these points may be taken into account in future research.

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