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The Effects of Social Influence on Time Perception

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The Effect of Social Influence on Time Perception
By
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Abstract

PHOEBE LAVIN: The Effect of Social Influence on Time Perception

The purpose of the present study was to determine whether the time estimate given by a participant is influenced by information they received from a partner. Participants were shown a video followed by several questions including a time estimate about how long a robber in the video was in a museum. Participants also saw answers given by their partners. Participants either saw an overestimate or underestimate given by their partner, or they received no feedback in a control condition. Following a short distraction activity, participants answered the questions again on their own. Results indicated that there was no significant effect on participant’s time estimate between the overestimate and underestimate conditions. However, participants in the overestimate and underestimate conditions performed significantly better than participants who received no feedback. Additionally, participants performed better on the remaining questions when they saw their partners answer them correctly than when they were not provided with feedback. This suggests that participants used the information they received from their partner. Overall, the results suggest receiving an inaccurate estimate of the duration of an even influences subsequent time judgments, albeit not in the predicted manner.
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The Effect of Social Influence on Time Perception

The effects of social pressure have long been investigated by psychologists. As early as 1955, research by Solomon Asch revealed the ability of social pressure to influence a participant’s response (Asch, 1955). In Asch’s now famous experiment, a group of participants were shown a line and asked to identify, out loud and one at a time, which of the other three lines were the same length as the original line. When the confederates all chose the clearly wrong answer prior to the participant answering, the participant was more likely to choose the wrong answer as well. The cognitive process underlying social pressure and the situations in which it would apply has become a well researched area within psychology.

Schneider and Watkins further demonstrated the potential effects of social pressure in their 1996 study (Schneider & Watkins, 1996). Participants were grouped with a confederate and asked to study a list of words. They were later presented with a word and asked to recall one at a time if the word was on the original list. They found that when the confederate answered first, participant's recognition judgments were likely to be influenced by that answer, even when the response was incorrect (e.g., saying a previously non-presented word was presented on the list).

In contrast to the previous experiments, which tested participants in a public setting, Roediger, Meade, and Bergman (2001) explored whether the influence of the confederate would remain in a private setting. Prior experiments only showed social influence on recall immediately following the confederate’s incorrect response and while in the presence of the confederate, demonstrating social pressure and conformity effects. Roediger et al. (2001) removed the aspect of direct social pressure. Participants were asked to study a scene alongside a confederate and were subsequently asked to each recall 6 items from the scene, out loud, and alternating turns. The confederates listed actual items from the scene (e.g., a wrench in a scene depicting a toolbox) as well as two items not from the scene (e.g., a banana from the same scene). The participant was later placed in a room alone and asked to recall as many items from the scene as possible. The results showed that the participant was likely to recall items that the confederate had listed that were not actually depicted in the scene. These results suggest that participants were not simply altering
their answers to avoid social stigma, and that some influence from the confederate remained even when the confederate was not present.

Researchers Meade and Roediger, conducted a similar experiment as discussed above but included other aspects such as a warning given to participants that the confederate’s answers may be incorrect, asking participants to indicate whether they knew or remembered the item, and a recognition/source monitoring test given to participants (Meade & Roediger, 2002). The effect of social influence persisted throughout the four separate experiments providing further evidence that social contagion of memories occurs not only when responding publicly but also when responding later on one's own.

In an attempt to apply this research to a more realistic scenario, researchers at the University of Aberdeen had eyewitnesses view slightly varied videos of the same crime. Participants, however, were led to believe that they had viewed identical footage. After the video, participants engaged in a discussion with their partner and were asked to answer questions about items that were only present in one of the videos. Participants who engaged in these conversations were significantly more likely than the control group to recall items at a later time that were present in their partners video but not their own (Gabbert, Memon, & Allan, 2003).

Taking this method one step further, one study sought to correct several methodological issues including several potentially present in Gabbert et al.’s (2003) study. Using a technique known as the Manipulation of Overlapping Rivalrous Images (the MORI technique) participants experience slightly different stimuli at the same time and on the same screen (Garry, French, Kinzett, & Mori, 2008). Participants watched the same video of a crime but wore special glasses that allowed the experimenters to show different details to each participant. Participants were able to have a shared experience similar to what they might experience in a real world scenario. After viewing the video and discussing certain details with their partner, participants were given a recall test alone that asked about details that differed between participants that had been discussed and details that were different but had not been discussed. The results supported previous research that participants were more likely to incorrectly identify incorrect items that they discussed with their partner than incorrect items they did not discuss.

Eyewitnesses may report wrong information for varying reasons. These can include normative influences, informational influences, or memory distortions (Wright, 2009). In the previous studies
discussed, it is unclear if the effect of social influence came from an integration of the false information into the participant’s memory (memory distortions) or if the participant simply trusted that the confederate was accurate (informational influences). Researchers Oeberst and Seidemann were interested in narrowing down the source of memory conformity through strict testing conditions to eliminate as many other factors as possible. One aspect of this was explaining the true purpose of the experiment to the participants prior to their individual recall test. This ensured that the participant was aware that their partner heard a slightly different stimulus than them and was intended to more accurately test each participant’s own memory. It was found that memory conformity effects persisted, however, participants were highly accurate in source-monitoring attributions (Oeberst & Seidemann, 2014). This suggests that the source of conformity effects came from informational influence rather than normative influence or memory distortions.

Another study by Mori and Kishikwa looked at memory conformity effects on auditory memory. Participants watched the same video while hearing different auditory stimuli through headsets. Participants were then given a recall test with 12 questions, 4 of which were critical items (items that each participant heard differently). They then were led into a discussion of details by completing a multiple choice test together; two critical items were discussed and two were not discussed. Afterwards they were tested individually and then tested again one week later. The results showed that participants were more likely to conform to their partner on the discussed critical items than on the critical items not discussed (Mori & Kishikwa, 2014). Similar to Oeberst and Seidemann’s (2014) experiment, participants performed exceptionally well on source monitoring tests despite the potential for conformity effects. It was found, however, that the recall test administered a week later contained more source monitoring errors. This suggests that participants may be affected by informational influences soon after discussing a stimulus but may shift to memory distortion after more time has passed.

Although a large amount of research has been conducted on social influence and conformity effects on various aspects of memory, research regarding the effects on time perception is under developed. The existing literature on time suggests that it is complex, involving many different cognitive processes and influenced by several factors (Mathews & Meck, 2016; Jisha & Thomas, 2015). The influence that the presence of other people may have on time perception was evaluated by researcher Lucian Gideon Conway III. In this study, participants either worked with a group or by themselves on mind puzzles. Participants
were then asked to estimate how much time had passed. Participants in the group conditions had more within-group consensus suggesting that even though they did not discuss time estimates prior to the test, being in the group had somehow influenced their perception of time (Conway, 2003).

In the present study, participants were shown a video and asked subsequent questions regarding the video. Participants in two conditions were presented with both misinformation and correct information from a purported partner. The misinformation was either an overestimate of the duration of an event or an underestimate. Our primary hypothesis was that, as in the previous studies regarding social influence, the misinformation would have a significant effect on the subsequent time estimate that participants provided, with the underestimate leading to a lower time estimate and the overestimate leading to a higher time estimate. Our second hypothesis was that the correct information presented by the partner would lead the participant to be more likely to answer correctly when asked to recall this information on a subsequent test.

Methods

Design

This was a between subjects design consisting of one primary independent variables (time estimate condition) and one main dependent variable (the time estimate given). In addition, participants were exposed to correct responses to questions in two conditions and did not receive any feedback in a control condition.

Participants

90 University of Mississippi undergraduate students participated in this study in fulfillment of partial course requirements. There were 35 participants in the 'alone' or no feedback control condition, 30 participants in the overestimate condition, and 25 participants in the underestimate condition. Several participants that did not follow instructions were excluded from the analyses.

Apparatus and material

All materials were presented and all responses were recorded using personal computers. Participants completed the study on a computer in the cognitive psychology lab on campus. A one minute
and twenty second surveillance video of a robbery at the Gallery D’Orsay was used. The video was obtained from YouTube and can be found on the reference page.

Procedure

Participants were shown a one minute and twenty second video on the middle computer. The participants then returned to their separate computers on either side of the middle computer. The participants read instructions that can be found in appendix A. Participants were placed in one of three conditions: alone, over, or under. Participants in the alone condition did not receive any feedback from a virtual confederate or perceived “partner”. For the participants in the over and under conditions, the participants would alternate between answering a question and then typing a letter string while their partner answered a separate question. After typing the letter string, the participants were shown what they believed to be a response from their partner. More specifically, although participants were told that they would be able to see responses typed by a group member, those responses were controlled by the experimenter. The participants were all exposed to the following questions:

1. How long was the robber in the art gallery?
2. What color jacket was the robber wearing?
3. How many chairs were visible in the surveillance footage?
4. How many paintings did the robber steal?
5. Did the robber appear to be male or female?
6. From the robber's perspective, was the left or right door window broken into?

Participants were asked to answer questions 2, 4, and 6, and they were asked to type a letter string in response to questions 1, 3, and 5. Additionally, participants in the group conditions saw correct responses to questions purportedly answered by their group member. The correct answers to all 6 questions are as follows:

1. 47 seconds
2. Black
3. 2
4. 3
5. Male
6. Left

In the over condition, participants received feedback that their partner thought that the robber was in the museum for 1 minute and 30 seconds. In the under condition, participants received feedback that their partner thought the robber was in the museum for 30 seconds. For questions 3 and 5, the “partner” provided the correct answer. Similar to participants in the 'group' conditions, participants in the alone condition answered questions 2, 4, and 6 but did not receive any feedback in response to the other questions. After completing the first part of the study, participants completed a distraction task consisting of simple math problems for 60 seconds. They were then asked to answer all of the questions (1 – 6) on their own.

Results

In the present experiment, participants watched a video of a robbery, then answered three questions about information presented during the course of the video. In two conditions (the overestimate condition and the underestimate condition) participants additionally saw responses to another three questions that they were told had been generated by a group member. Two of these responses from a purported group member included correct information. One response ostensibly generated by a partner, the answer to the question, “How long was the robber in the art gallery?” included misinformation. We originally intended to present participants with a 30 s overestimate in one condition and a 30 s underestimate in another condition. However, due to a coding error, we ended up including a 43 s overestimate in one condition and a 17 s underestimate in the other condition. In a third control condition (the 'alone' condition) participants did not receive any feedback (either misleading or correct information). After viewing a video of a robbery and alternating between answering questions and seeing responses from purported group members (or not) participants solved simple addition or subtraction problems for 60 s and were then asked to answer all 6 questions (including the time estimate question) on their own.

Our primary dependent variable was the extent to which misinformation about the duration of the robbery would influence participants' subsequent time estimates. To determine whether this misinformation influenced participants' subsequent time estimates, a One-way Analysis of Variance (ANOVA) was conducted. The result of that analysis was statistically significant, \( F(2,87) = 4.55, p < .05 \). Thus, although the magnitude of the overestimate and underestimate differed due to the coding error mentioned above, the
feedback did appear to affect participants’ retrospective time estimates. The mean time estimates as a function of condition are displayed in Figure 1. Planned comparisons revealed that participants appeared to produce higher estimates in the absence of any feedback than in the overestimate condition, \( t(63) = 1.89, p = .06 \), although the difference was only marginally significant. In addition, participants were more likely to overestimate the duration of the robbery in the absence of feedback than in the underestimate condition, \( t(58) = 2.49, p < .05 \). However, contrary to predictions, participants' time estimates were statistically equivalent in both the overestimate and the underestimate conditions, \( t(53) = 1.44, p = .16 \). Thus, contrary to expectations, in the absence of feedback, participants' average time estimates for the duration of the robbery were about 60 s too long, whereas participants generated more accurate estimates when presented with misleading feedback.

In addition to examining the effect of misinformation on subsequent time judgments, we were also interested in the extent to which seeing correct information presented by a purported group member would influence later recall of details from the robbery video. We predicted that seeing correct responses to questions would improve later recall performance. The first question that participants responded to asked them to remember the color of the jacket that the perpetrator was wearing in the video. Collapsing across conditions (because no participants were provided with the correct information to this question) it was observed that participants correctly remembered this detail quite accurately (\( M = .81 \)). The second recall prompt asked participants to recall the number of chairs that were visible in the surveillance video. About one third of the participants (those in the control condition) did not have the opportunity to view a purported group member's correct response to this question. Those participants were much less likely to answer the question correctly (\( M = .31 \)) than the nearly two thirds of participants who had previously seen the correct response generated by a purported group member (\( M = .71 \)). This difference was statistically significant, \( t(88) = 3.94, p < .0001 \). Thus, as predicted, prior exposure to the correct answer improved subsequent memory performance.

The third prompt asked participants to recall the number of paintings taken by the perpetrator during the course of the robbery. Again, no participants saw the correct answer to this question prior to the final test and only about a quarter of participants correctly answered this relatively difficult question (\( M = .24 \)). The fourth prompt asked participants whether the robber in the video appeared to be female or male.
As with the question about the number of chairs, participants in the virtual group conditions saw the correct answer to this question earlier whereas those in the control condition did not. Unfortunately, this question proved quite easy to answer and no differences were observed as a function of whether the participants had previously seen the correct answer (M = .98) or not (M = .97). This minor numerical difference was not statistically significant, t (88) = 0.32, p > .05. Finally, participants were asked to describe the window that the robber broke into to access stolen artwork (was it on the left side of the door or the right, from the robber's perspective?). This detail concerning the video also proved to be quite easy for participants to remember with almost all participants successfully recalling this bit of information (M = .96).

Overall, these results indicate that, as predicted, the misinformation provided to participants concerning the duration of an event did impact their subsequent retrospective time judgments. However, rather than leading to more inaccurate judgments, the over and underestimates actually led to more accurate judgments. More specifically, participants' estimates in the absence of feedback were about twice as long as the duration of the actual robbery event. Thus, by bringing their estimates more in line with those of a purported group member, participants in both misinformation conditions ended up with judgments closer to the actual duration of the event. Furthermore, in the one case where it was possible for us to analyze the effect of previously viewing correct information on later recall performance (specifically addressing the question about the number of chairs present in the video) seeing a purported group members' correct response led to more accurate subsequent performance.

Discussion

The purpose of this study was to evaluate if the information (misinformation or correct information) presented by a “partner” would have a significant effect on the responses later recalled by the participant. Regarding the time estimates, it was hypothesized that there would be a significant difference between the participants presented with misinformation from a partner and participants working alone with participants in the over and under condition having less accurate time estimates than participants in the alone condition. It was also hypothesized that there would be a significant difference between time estimates given by participants in the over condition and time estimates given by participants in the under
condition, with participants in the over condition perceiving the robber was in the museum for more time and participants in the under condition perceiving the robber was in the museum for less time.

There was a significant difference between participants presented with information (over/under condition) and participants not presented with information (alone condition). The effect was consistent with previous studies in that feedback from a partner influenced the participants subsequent answer. However, this result was interesting because participants in the over and under condition were significantly more accurate in their time estimated than participants in the alone condition. Participants in the alone condition greatly over estimated the time that the robber was in the museum. Participants in the alone condition estimated an average time of 118.6 seconds. This was an average of 35.8 more seconds than estimated given by participants in the over condition and 55.44 more seconds than estimates given by participants in the under condition. Participants in the over and under conditions were able to make a more accurate prediction despite being presented with misinformation potentially because they had an estimate to base their estimate on that was closer to the actual duration of the event. Additional research into the accuracy of time perception under normal conditions would need to be evaluated to fully understand this result.

Although there was a numerical difference in mean values, the over and under conditions led to no significant effects between the time estimates of the two groups. This interesting finding suggests that participants were influenced by their partner but were not influenced by the magnitude of the estimate.

Regarding correct information provided to participants, there was a significant effect between participants receiving feedback (over/under condition) and participants receiving no feedback (alone condition) for difficult questions. Participants that received correct feedback regarding the number of chairs present (one of the more difficult questions based on the percentage of participants that answered correctly without feedback), were more likely to answer correctly than participants who did not receive this feedback. These results are consistent with previous studies that suggest participants will utilize feedback from their partner to answer questions later presented in a private setting.

Limitations and future research

One limitation of this study was the coding error that led to the magnitude of the difference in the overestimate and underestimate condition not being equal. The over condition was 43 seconds more than
the actual time whereas the under condition was only 17 seconds less than the actual time. These differences could affect the influence that the misinformation has on the participant’s time estimates and therefore in future research should be equal.

Another limitation of the study was the limited number of participants. Given the requirement of having two participants come in at the same time, it proved difficult to collect data in the over and under conditions.

Additionally, the perceived social pressure may not have been very realistic as participants were “interacting” through a computer rather than in person and it is possible that some participants did not believe that the feedback was truly coming from a partner. Future research should utilize a more realistic scenario with equal magnitudes of difference between the over and under conditions.

Research could also examine why participants were so inaccurate in their time perceptions when working alone, under what conditions participants are more likely to be accurate, and what conditions might participants be influenced by the magnitude of the misinformation.
References


Figure 1. Mean values of time estimate for each condition measured in seconds

<table>
<thead>
<tr>
<th>Condition</th>
<th>Mean Time Estimates (seconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under Condition</td>
<td>60</td>
</tr>
<tr>
<td>Over Condition</td>
<td>80</td>
</tr>
<tr>
<td>Alone Condition</td>
<td>120</td>
</tr>
</tbody>
</table>
Appendix
Appendix A

Instructions for over and under condition: “Today you will be answering some questions about the video that you watched with the help of your group. After reading each question, one of you will be asked to type the answer to the question and one of you will be asked to retype some letters. Finally, you will be asked to solve some simple math problems. Do you have any questions? If you do not have any questions, please press ENTER key now.”

Instructions for alone condition: “Today you will be answering some questions about the video that you just watched. After reading each question, one of you will be asked to type the answer to the question and one of you will be asked to retype some letters. Finally, you will be asked to solve some simple math problems. Do you have any questions? If you do not have any questions, please press ENTER key now.”