Computer mouse tracking studies of adult belief processing

Explanation of Methodology and Datasets

Methodology

Participants and Procedure

250 participants took part in three experiments (Experiment 1 n = 83; Experiment 2 n = 82; Experiment 3 n = 85). Participants were all members of the project host institution community (e.g., students and staff members). All participants had normal or corrected to normal vision, were fluent English speakers and normally used a computer mouse with their right hand.

In all experiments, participants completed a lab-based theory of mind task. Experiments were run using MouseTracker (Freeman & Ambady, 2010). On each trial participants clicked a start button, located in the bottom centre of the screen, and a short video played. In each video two untrained actors, one male, one female, sat across from each other at a table on which there were a set of keys, a red cup and a blue cup. The male actor first put the keys in one cup and then the female actor left the room. In false belief (FB) scenarios, the male actor then moved the keys to the second cup, and then the female actor returned. In true-belief (TB) scenarios, the female actor returned and then the male actor moved the keys to the second cup.

At the end of every video the final frame remained on-screen and a question appeared beneath. The two experimental questions were “Where does she think the keys are?” (belief question) and “Where are the keys currently hidden?” (reality question). Participants also received filler trial questions asking “Which cup is nearest to her / him?” and “What shirt is he / she wearing?” with the gender of the target actor changing from trial to trial.

When the question appeared, the mouse cursor position was reset to the bottom-centre of the screen. Participants gave their answer on each trial by clicking on one of the two response boxes, located in the top left- and top right-hand corners of the screen. The answers to all questions was always either “red” or “blue”, with a 50% distribution of which answer was correct across all videos. The location of the “red” and “blue” response boxes was held constant across trials for a participant, and counter-balanced between participants.

Participants were instructed to answer as quickly and as accurately as possible. Participants were also told to start moving their mouse as soon as the question appeared, even if they were unsure of their answer. If participants didn’t initiate their first mouse movement within 1000ms of the question appearing, they received an onscreen warning telling them to move faster on subsequent trials.

Across 128 trials, delivered in 2 blocks of 64 trials, participants answered 32 belief questions (16 following FB scenarios, 16 following TB scenarios), 32 reality questions (16 following FB scenarios, 16 following TB scenarios) and 64 filler questions (32 following FB scenarios, 32 following TB scenarios). Participants had a short break after the first 64 trials.

In **Experiment 1**, FB and TB scenario videos had the same overall length, but varied as the to length of time that elapsed between the final hiding event and the appearance of the onscreen question -- TB scenarios had a shorter delay compared to FB scenarios.

In **Experiment 2**, this delay was kept constant between both scenarios, but FB and TB scenario videos varied in overall length, with TB videos lasting longer than FB videos.

In **Experiment 3**, participants received the same videos as in Experiment 1, but were now instructed to attend to the female actor's belief while watching the videos. After the first 64 trials, and again after the final trial, participants were asked whether they had followed these instructions and paid attention to the female actor's belief on every, or nearly every, trial. Participants responded by clicking "yes" or "no" with the mouse. Within each block of 64 trials, participants also received 4 randomly distributed reminder notices to continue paying attention to the female actor's belief.

Datasets

Three .csv files are provided, one for each experiment. Data files are provided in long format, with one trial per row. The following column headings are used:

subjID: Participant ID assigned by researcher

order: Numerical order in which the trial appeared. Note there is no trial #1 in any experiment as this was the instruction screen. In Experiments 1 and 2 there is no trial #66, as this was the break screen. In Experiment 3, on trial #71 and #142 participants were presented with the manipulation check question, as per the information above. There are no trial #70, or #141 for any participants on Experiment 3, as these were the instruction screens for answering the manipulation check question, and no #72 as this was the break screen. In Experiment 3, any further "missing" trial numbers are when participants were randomly reminded to continue attending to the female actor's beliefs, as per the information above (8 overall).

condition: Experimental condition code. The element prior to the hyphen refers to the video scenario played on that trial (FB = false belief; TB = true belief). The element after the hyphen refers to the question displayed. Belief and Reality questions were the main experimental trials and Cup and Shirt questions were filler trials, as per the information above. For trials #71 and #142 in Experiment 3 the condition cell is blank: these were the manipulation check questions, as per the information above.

resp_1 and resp_2: The answers presented in the left- and right-hand response boxes respectively.

error: Whether participants answered correctly (value = 0) or incorrectly (value = 1). For trials #71 and #142 in Experiment 3 answers of "No" to the manipulation check question were coded as "incorrect".

resp_num: Which response box participants click on (1 = left-hand, 2 = right-hand).

RT: Time elapsed in ms between the question appearing and participants clicking on a response box. This is calculated by MouseTracker.

Init.time: Time elapsed in ms between the question appearing and participants making their first mouse movement. This is calculated by MouseTracker.

distractor: Which response box was the incorrect answer. NB: when resp_num == distractor, error = 1.

X_###; Y_###; T_###: Recorded mouse x-position, y-position, and associated time-stamp respectively. Thus values in columns X_1, Y_1 and T_1 provide the x-position, y-position and timestamp for the first sample for that trial recorded by MouseTracker. Recording started as soon as the question appeared, and ended when the participant clicked on a response box.

Mouse path trajectories are recorded by MouseTracker in "wide" format. In order to analyse the mouse path data, we recommend using the MouseTrap package (Kieslich et al., 2022) in R. Data files should be imported using the mt_import_wide function in the MouseTrap package. Please see the MouseTrap reference manual, examples and resources for further information.