

Robot Etiquette; How to Approach a Pair of People?

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When robots in public spaces want to interact with people, they should approach them to initiate the interaction. Therefore, solutions for robots approaching groups of people who are focused on something other than the robot or who are walking together should be defined. Depending on the group formations, the robot will not be able to approach each person from their preferred approach direction. In this poster we present findings of a robot approaching a pair of people that are playing a game together.

Hypothesis

When people are doing something together in pairs, in various formations, they prefer to be approached by a robot from a frontal position. This is the position where the robot is in the field of view for both persons.

Manipulations

Three different formations: Three different formations for pairs; 1) standing next to each other, 2) standing in V-formation, 3) standing opposite to each other.

Robot approaching people: While the participants played the game, the robot drove in circles around them and drove towards them from eight different directions.

Participants

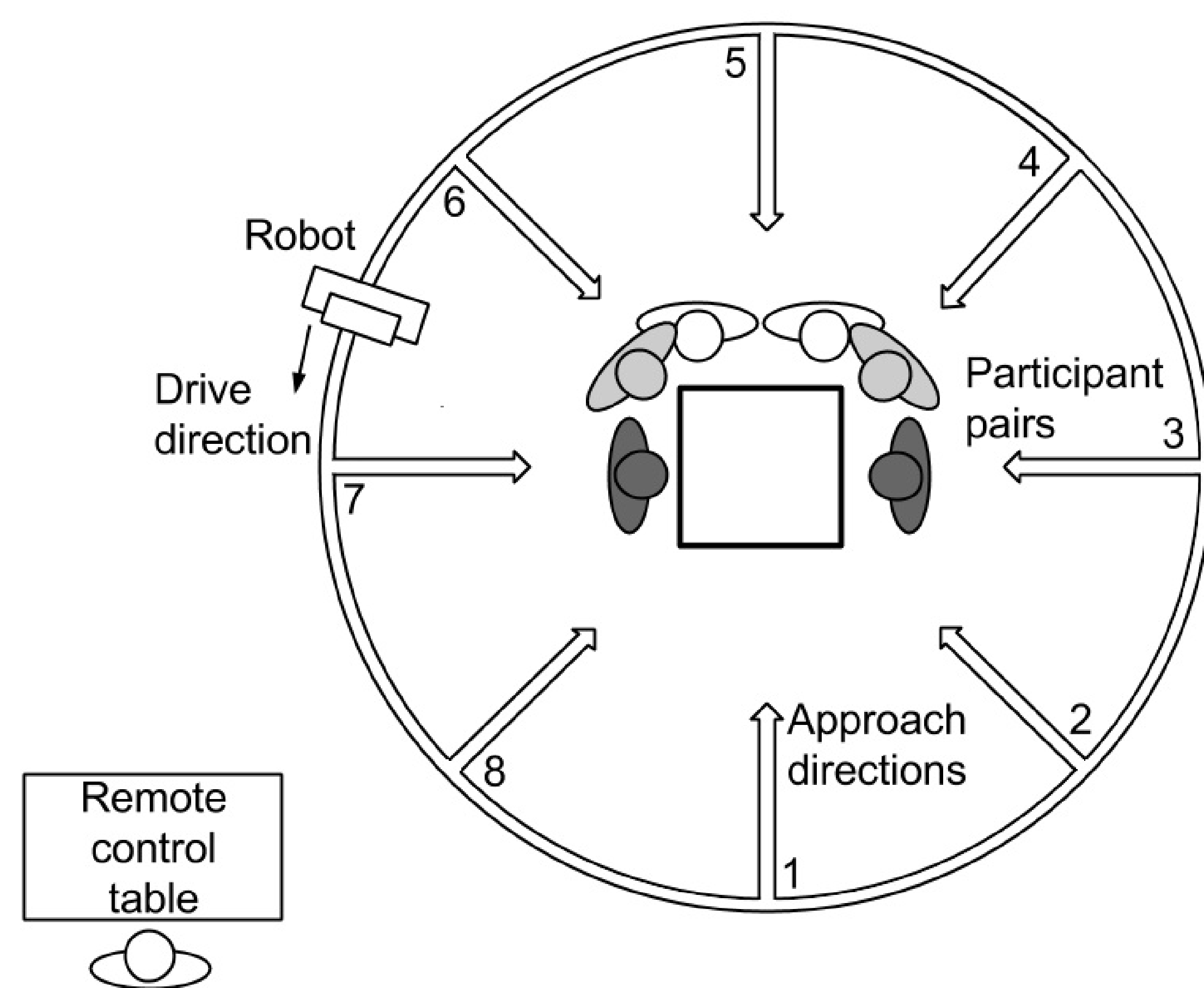
Thirty students and staff members of the University of Twente in the Netherlands participated in 15 randomly combined pairs. Average age of the participants was 21.4 ($SD=1.92$). Of the participants 27 were male and 3 were female, leading to 12 male-male pairs and 3 female-male pairs.

Experiment setup

A quasi-experiment was designed in which participants rated their experience of different approach directions of the robot. Participants entered the experiment room in pairs, and were asked to stand in a predefined formation. The robot would approach each pair from eight directions. A questionnaire was used to measure the participants perceived comfort for all directions from which the robot approached them.

Future work

Future work will include larger groups (up to 5 people), and research in real life settings. We will work on approach of groups of visitors who are focused on the exhibitions and are standing in various formations.



Layout of the room. The experimenter sat at the table and remotely controlled the robot. The robot drove counter clockwise round the participants, and approached them from one of eight directions. The participants stood in one of three formations; white, grey and black.

Results

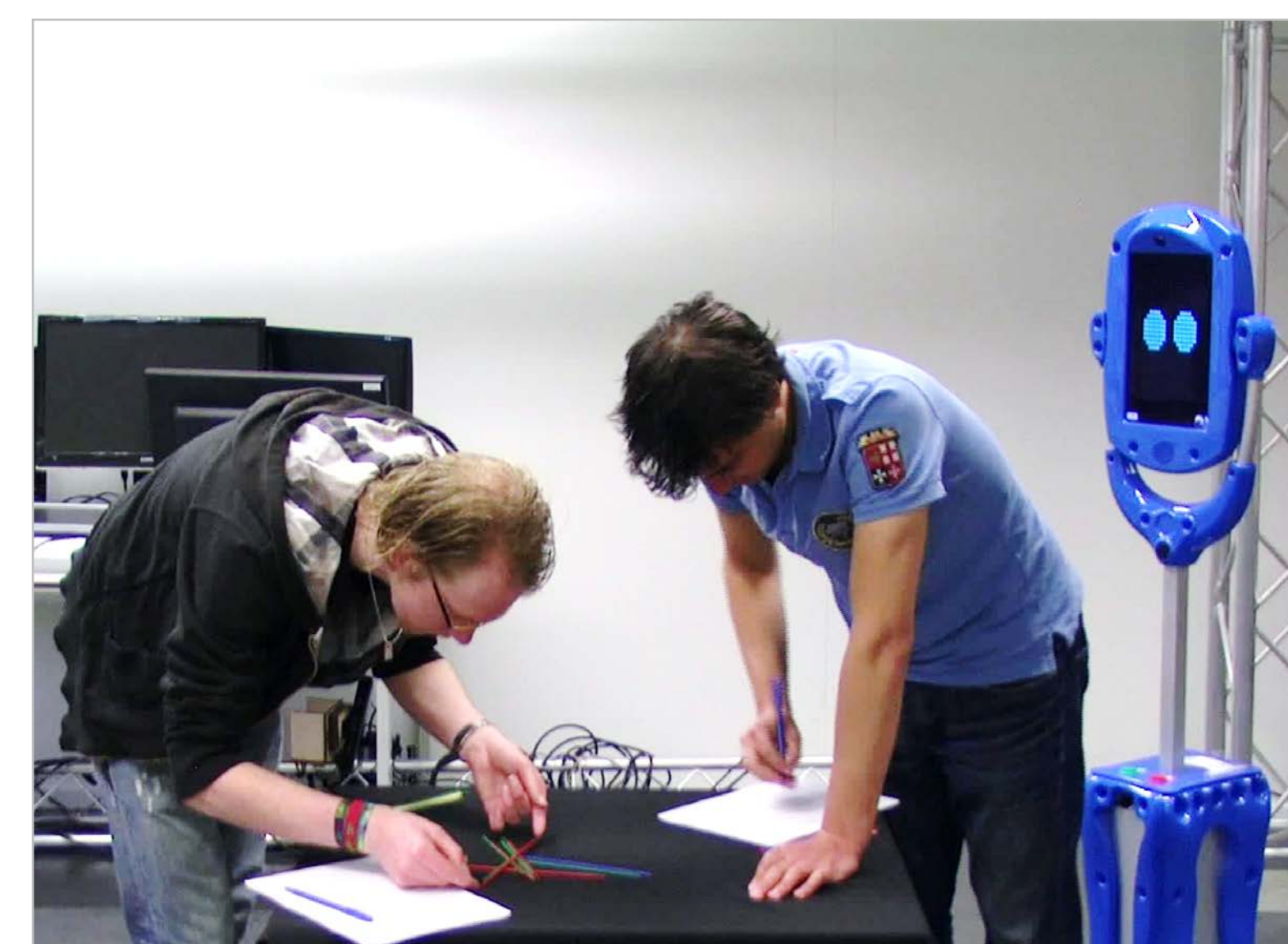
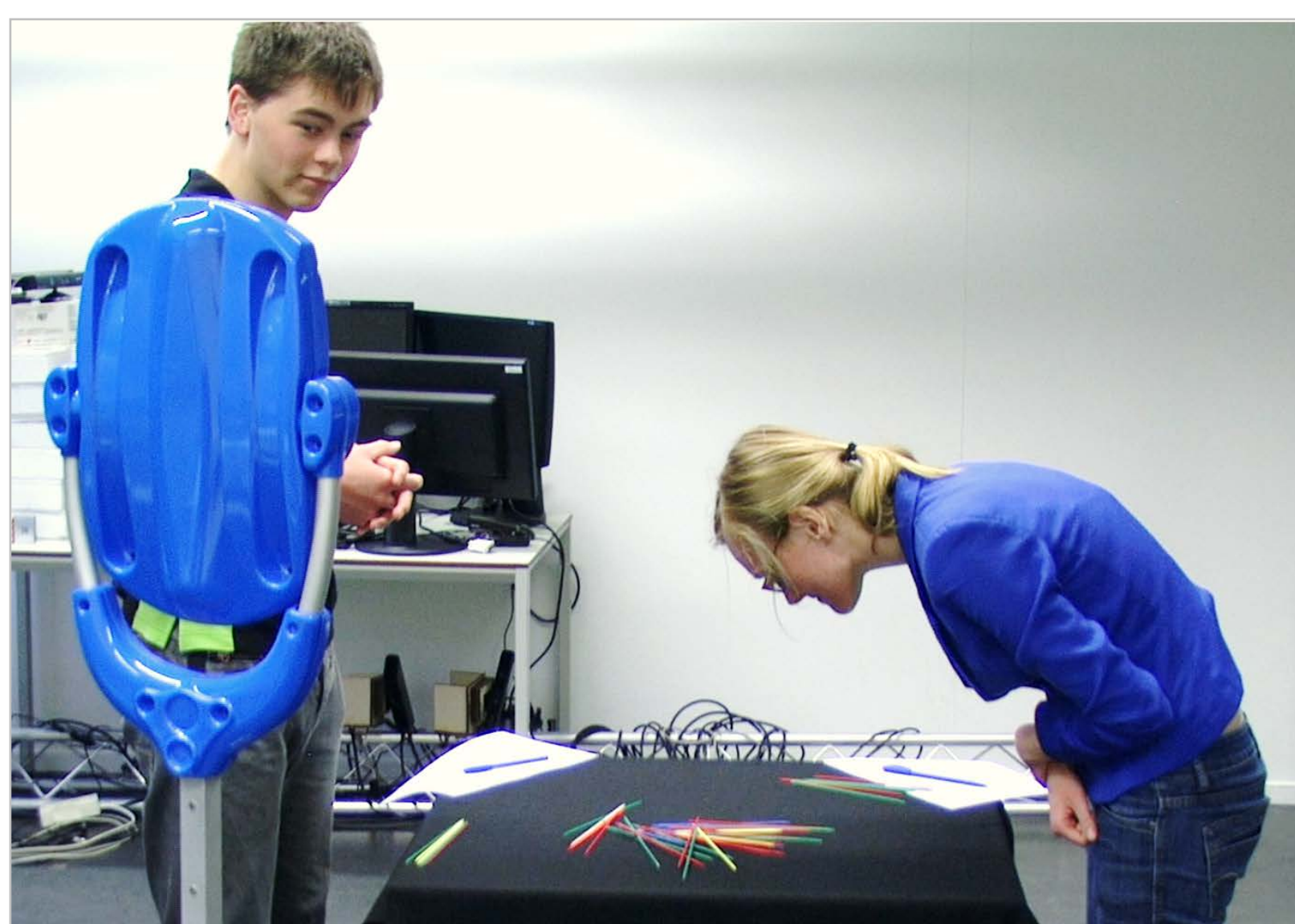
Participants standing next to each other (white pair) rated approach direction 8 as most comfortable ($F(7,71)=4.73$, $p=0.00$).

Participants standing in a V-formation (gray pair), rated approach direction 8 highest on comfort, however, not significant.

Participants standing opposite to each other (black pair) rated approach direction 5 highest on comfort, however, not significant.

A non-significant trend showed that participants gave the highest score for comfort when the robot approached from the individual left or right front and when the task-partner was closest to the robot ($M=3.9$, $SD=0.88$). The average lowest scores were given for the robot approaching from the individual left or right back when they were closest to the robot ($M=2.6$, $SD=1.22$).

Participants preferred the robot to approach from the window-side of the room. The entrance/exit was on the opposite side of the room, so probably people liked to keep the route to the door free.



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