

Supplementary Materials for

Children conform, adults resist: A robot group induced peer pressure on normative social conformity

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Supplementary Material

Analysis of logit (logistic regression) model

Data were analyzed using a generalized linear mixed model (GLMM) approach with logit link, binomially distributed residuals, and random intercepts per participant and follow-up logistic regressions for the critical and neutral trials separately. The analysis resulted in the following logistic regression equations.

Experiment 1

$$\ln\left(\frac{p_{corr}}{1-p_{corr}}\right) = 3.954 + 0.037 \cdot robot - 1.221 \cdot human + 0.324 \cdot neutral + 0.143 \cdot robot \cdot neutral \quad (1)$$

where p_{corr} is the probability of giving a correct response, with the predictors *robot* (being in the robot-peer condition), *human* (being in the human-peer condition), *neutral* (having a neutral trial), and effect coding: if it is the robot-peer condition, variable *robot* = 1, variable *human* = 0.

If it is the human-peer condition, variable *robot* = 0, variable *human* = 1. If it is the control condition, variable *robot* = -1, variable *human* = -1.

Experiment 2

$$\ln\left(\frac{p_{corr}}{1-p_{corr}}\right) = 1.735 - 0.116 \cdot robot + 0.119 \cdot neutral - 0.344 \cdot robot \cdot neutral \quad (2)$$

where p_{corr} is again the probability of giving a correct response, with the predictors *robot* (being in the robot-peer condition), *neutral* (having a neutral trial), and effect coding: if it is the robot-peer condition, variable *robot* = 1. If it is the control condition, variable *robot* = -1.

All analyses were performed in the program R.

Additional Figures and Tables

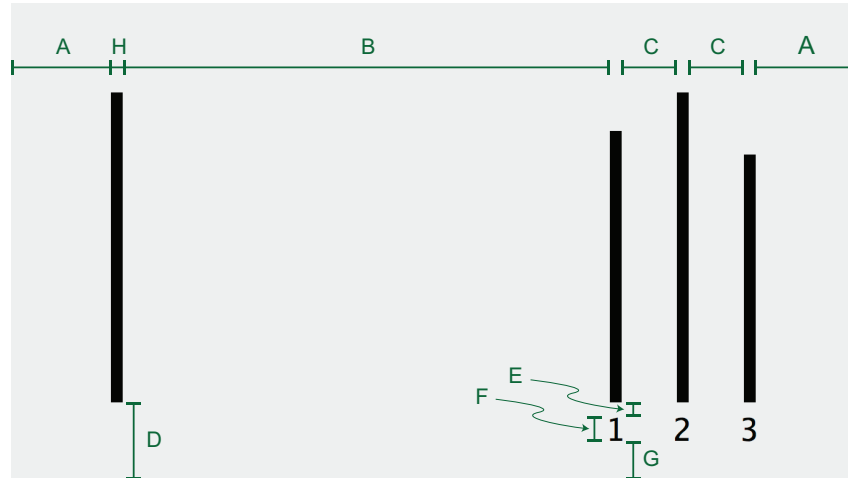


Fig. S1. **Specifications of visual stimuli presented to the participants.** Participants report which of the three lines on the right matches the length of the line on the left. See Table S1 for dimensions; some dimensions differ from Asch's original stimuli to fit on a 32" computer screen.

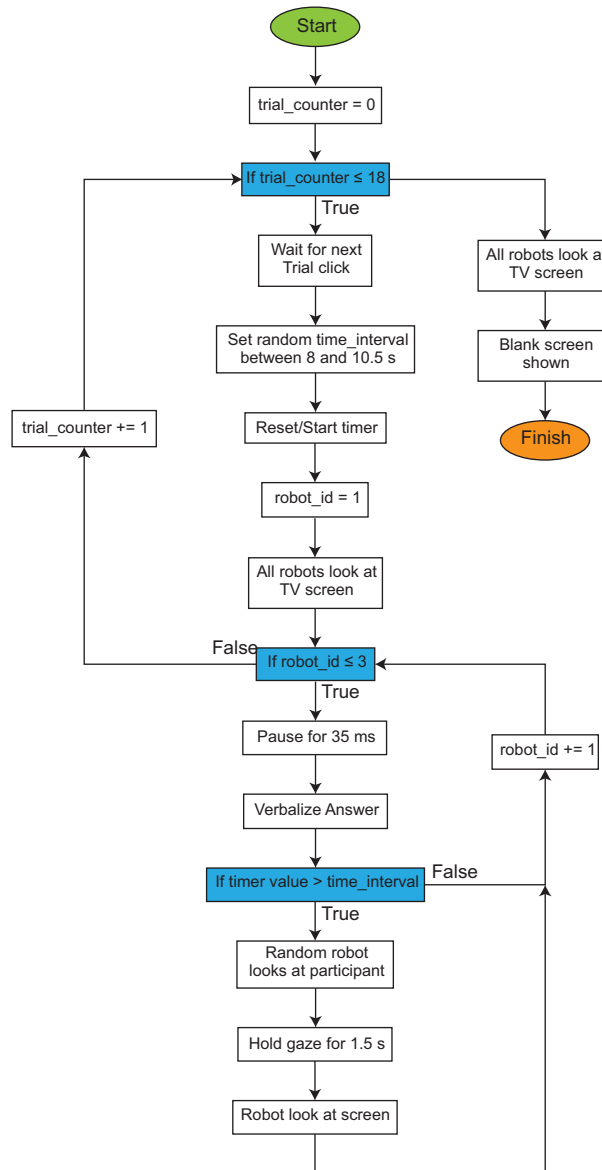


Fig. S2. **Flow diagram of the scripted robot behaviour during the experimental trials.** This is the behaviour orchestration as scripted by the software on the experimenter's laptop. At the start of the trials a trial counter is set to zero. Each time the experimenter uses their laptop to display the next trial the scripted behaviour begins and all the robots are instructed to gaze toward the TV screen. An iterator then runs over each robot instructing it to verbalise the desired response for the given trial.

Table S1. **Discrimination accuracy across conditions** (and 95% Confidence Interval), see also Fig. 2.

Experiment	Trial Type	Condition		
		Control	Robot	Human
Adult	Critical	0.99 (0.11)	0.98 (0.14)	0.82 (0.38)
	Neutral	0.96 (0.20)	0.94 (0.23)	0.93 (0.26)
Children	Critical	0.87 (0.34)	0.75 (0.43)	/
	Neutral	0.75 (0.44)	0.82 (0.39)	/

Table S2. **Specification of standard and comparison line lengths**, as well as the answers provided by the confederates for each of the trials. Table adapted from Asch, S. E. Studies of independence and conformity: I. a minority of one against a unanimous majority. Psychological monographs: General and applied **70**, 1–70 (1956).

Trial	Target Line	Comparison Line			Error	Confederate Answer
		1	2	3		
1	10	8.75	10	8	0	2
2	2	2	1	1.5	0	1
3*	3	3.75	4.25	3	+0.75	1
4*	5	5	4	6.5	-1	2
5	4	3	5	4	0	3
6*	3	3.75	4.25	3	+1.25	2
7*	8	6.25	8	6.75	-1.25	3
8*	5	5	4	6.5	+1.25	3
9*	8	6.25	8	6.75	-1.75	1
10	10	8.75	10	8	0	2
11	2	2	1	1.5	0	1
12*	3	3.75	4.25	3	+0.75	1
13*	5	5	4	6.5	-1	2
14	4	3	5	4	0	3
15*	3	3.75	4.25	3	+1.25	2
16*	8	6.25	8	6.75	-1.25	3
17*	5	5	4	6.5	+1.25	3
18*	8	6.25	8	6.75	-1.75	1

Table S3. Dimensions of the stimuli presentation.

Measure	Distance (inches)	Identical to Asch
A	$3\frac{1}{2}$	No
B	$15\frac{6}{8}$	No
C	$1\frac{3}{4}$	Yes
D	$2\frac{1}{2}$	Yes
E	$\frac{1}{2}$	Yes
F	$\frac{3}{4}$	Yes
G	$1\frac{1}{4}$	Yes
H	$\frac{3}{8}$	Yes

Data

Data S1. Text file of adult participant responses in experiment 1. First row of data contains variable names: Subject number (`subj`), gender (`gend`), age (`age`), condition (`cond`), trial number (`trial`), trial type (`type`), correct response (`corr`), confederate response (`conf`), participant response (`rsp`), correct response equals participant response (`acc`).

Data S2. Text file of child participant responses in experiment 2. First row of data contains variable names: Subject number (`subj`), gender (`gend`), age (`age`), condition (`cond`), trial number (`trial`), trial type (`type`), correct response (`corr`), confederate response (`conf`), participant response (`rsp`), correct response equals participant response (`acc`).

Further Data

Adult participants in the human and robot confederate conditions completed a questionnaire which collected demographic data (age, gender, highest level of education), familiarity with robots, perception of the robots' abilities, what they believed the experiment was measuring, whether they believed they answered correctly, whether they believed the robots gave wrong answers, and whether they were familiar with the Asch paradigm. Participants also took a brief personality test and reasoning test. Due to the small sample size ($N = 20$ in the human and $N = 20$ in the robot condition) insufficient data was available to make any significant conclusions on correlations.