

Appendix 1: Mean arousal and valence ratings per experimental condition**Table A1.1***Mean word arousal ratings across participants per experimental condition for each study*

Condition			Study 1 (N = 36)		Study 2 (N = 72)		Combined analysis (N = 108)	
Agent	Emotion	Communication	Arousal	95% CI	Arousal	95% CI	Arousal	95% CI
Condition								
Human	Negative	Com	3.94	3.83 - 4.06	3.99	3.91 - 4.08	3.98	3.91 - 4.04
Human	Negative	NonCom	3.72	3.61 - 3.84	3.9	3.81 - 3.98	3.84	3.77 - 3.91
Human	Neutral	Com	3.09	2.98 - 3.2	2.88	2.8 - 2.95	2.95	2.89 - 3.01
Human	Neutral	NonCom	2.96	2.86 - 3.07	2.89	2.81 - 2.96	2.91	2.85 - 2.97
Human	Positive	Com	3.85	3.73 - 3.96	3.6	3.52 - 3.68	3.68	3.62 - 3.75
Human	Positive	NonCom	3.67	3.55 - 3.78	3.53	3.45 - 3.61	3.58	3.51 - 3.64
Android	Negative	Com	3.96	3.83 - 4.08	3.99	3.91 - 4.08	3.98	3.91 - 4.05
Android	Negative	NonCom	3.86	3.74 - 3.98	3.96	3.88 - 4.04	3.93	3.86 - 3.99
Android	Neutral	Com	3.07	2.95 - 3.18	2.87	2.79 - 2.95	2.94	2.87 - 3
Android	Neutral	NonCom	3.01	2.9 - 3.12	2.84	2.76 - 2.92	2.9	2.83 - 2.96
Android	Positive	Com	3.76	3.64 - 3.87	3.6	3.51 - 3.68	3.65	3.58 - 3.72
Android	Positive	NonCom	3.76	3.64 - 3.88	3.58	3.49 - 3.66	3.64	3.57 - 3.7
Robot	Negative	Com	3.99	3.87 - 4.11	3.97	3.89 - 4.06	3.98	3.91 - 4.05
Robot	Negative	NonCom	3.89	3.77 - 4.01	3.94	3.85 - 4.02	3.92	3.85 - 3.99
Robot	Neutral	Com	3.08	2.96 - 3.19	2.93	2.85 - 3.01	2.98	2.91 - 3.04
Robot	Neutral	NonCom	2.94	2.83 - 3.05	2.9	2.82 - 2.98	2.92	2.85 - 2.98
Robot	Positive	Com	3.8	3.68 - 3.92	3.57	3.49 - 3.65	3.65	3.58 - 3.72
Robot	Positive	NonCom	3.73	3.61 - 3.85	3.58	3.5 - 3.66	3.63	3.56 - 3.7

Note. Com = Communicative, NonCom = Non-Communicative.

Table A1.2*Mean word valence ratings across participants per experimental condition for each study*

Condition			Study 1 (N = 36)		Study 2 (N = 72)		Combined analysis (N = 108)	
Agent	Emotion	Communication Condition	Valence	95% CI	Valence	95% CI	Valence	95% CI
Human	Negative	Com	2.23	2.15 - 2.32	2.21	2.15 - 2.26	2.21	2.17 - 2.26
Human	Negative	NonCom	2.25	2.16 - 2.33	2.23	2.17 - 2.29	2.24	2.19 - 2.29
Human	Neutral	Com	4.35	4.27 - 4.43	4.29	4.23 - 4.35	4.31	4.26 - 4.36
Human	Neutral	NonCom	4.36	4.28 - 4.44	4.3	4.24 - 4.35	4.32	4.27 - 4.36
Human	Positive	Com	5.47	5.38 - 5.56	5.4	5.34 - 5.46	5.43	5.38 - 5.48
Human	Positive	NonCom	5.46	5.36 - 5.55	5.42	5.37 - 5.48	5.44	5.39 - 5.49
Android	Negative	Com	2.2	2.11 - 2.28	2.26	2.2 - 2.32	2.24	2.19 - 2.29
Android	Negative	NonCom	2.27	2.18 - 2.35	2.24	2.18 - 2.3	2.25	2.2 - 2.3
Android	Neutral	Com	4.35	4.27 - 4.44	4.27	4.21 - 4.32	4.29	4.25 - 4.34
Android	Neutral	NonCom	4.35	4.26 - 4.43	4.3	4.25 - 4.36	4.32	4.27 - 4.36
Android	Positive	Com	5.47	5.39 - 5.56	5.4	5.34 - 5.46	5.42	5.37 - 5.47
Android	Positive	NonCom	5.4	5.31 - 5.5	5.42	5.36 - 5.48	5.41	5.36 - 5.46
Robot	Negative	Com	2.23	2.14 - 2.32	2.2	2.14 - 2.26	2.21	2.16 - 2.26
Robot	Negative	NonCom	2.19	2.11 - 2.27	2.23	2.17 - 2.29	2.22	2.17 - 2.26
Robot	Neutral	Com	4.36	4.28 - 4.44	4.25	4.2 - 4.31	4.29	4.24 - 4.33
Robot	Neutral	NonCom	4.31	4.23 - 4.39	4.28	4.23 - 4.34	4.29	4.25 - 4.34
Robot	Positive	Com	5.5	5.42 - 5.59	5.36	5.3 - 5.42	5.41	5.36 - 5.46
Robot	Positive	NonCom	5.45	5.36 - 5.54	5.41	5.35 - 5.47	5.42	5.37 - 5.47

Note. Com = Communicative, NonCom = Non-Communicative.

Appendix 2: Response time analyses

A2.1. Details on data preparation for the response time analyses

Analyses of response times for arousal and valence ratings were conducted for the combined sample. According to pre-registered specifications, the following data were removed before analyses: Response times lower than 200 ms were excluded from the analyses. In addition, separately for valence and arousal response times, response time outliers on the upper bound were identified per participant and per condition using Tukey hinges, that is, all response times 1.5 times the interquartile range above the third quartile were excluded from the analyses. In the case of the valence response times, prior to applying this criterion, reaction times larger than 10000 ms were removed. This was necessary to ensure a normal distribution of residuals as a basis for the linear mixed model analysis. As pre-registered, participants with data loss of more than 20% (for either valence or arousal response times, or both) were excluded from all response time analyses.

Table A2.1

Mean response times across participants per experimental condition for the combined analysis (N = 83)

Agent	Emotion	Communication	Arousal	95% CI	Valence	95% CI	Mean	Mean
		Condition	Response	(Arousal)	Response	(Valence)	Raw	Raw
			Time		Time		Arousal	Valence
			(log)		(log)		RT (ms)	RT (ms)
Human	Negative	Com	7.06	7.04 - 7.08	7.11	7.09 - 7.14	1323	1398
Human	Negative	NonCom	7.04	7.02 - 7.06	7.09	7.07 - 7.12	1291	1382
Human	Neutral	Com	6.95	6.93 - 6.97	7.11	7.09 - 7.14	1188	1416
Human	Neutral	NonCom	6.91	6.89 - 6.93	7.1	7.08 - 7.12	1139	1424
Human	Positive	Com	6.99	6.97 - 7.01	7.14	7.11 - 7.16	1228	1459
Human	Positive	NonCom	6.98	6.96 - 7	7.11	7.09 - 7.13	1218	1403
Android	Negative	Com	7.05	7.03 - 7.07	7.1	7.08 - 7.13	1304	1389
Android	Negative	NonCom	7.03	7.01 - 7.05	7.1	7.08 - 7.13	1282	1411
Android	Neutral	Com	6.91	6.89 - 6.93	7.1	7.08 - 7.13	1124	1402
Android	Neutral	NonCom	6.91	6.89 - 6.93	7.11	7.09 - 7.13	1126	1426
Android	Positive	Com	6.99	6.97 - 7.01	7.12	7.1 - 7.15	1227	1431
Android	Positive	NonCom	6.97	6.95 - 6.99	7.12	7.1 - 7.15	1203	1446
Robot	Negative	Com	7.02	7 - 7.04	7.08	7.06 - 7.1	1258	1351
Robot	Negative	NonCom	7.03	7.01 - 7.05	7.09	7.07 - 7.11	1277	1386
Robot	Neutral	Com	6.9	6.88 - 6.92	7.08	7.06 - 7.1	1116	1389
Robot	Neutral	NonCom	6.91	6.89 - 6.93	7.09	7.07 - 7.12	1133	1427
Robot	Positive	Com	6.95	6.93 - 6.97	7.11	7.09 - 7.13	1183	1418
Robot	Positive	NonCom	6.98	6.96 - 7	7.09	7.06 - 7.11	1219	1360

Note. The statistical analyses were conducted on the log-transformed response times. Mean raw response times are provided for reference. Com = Communicative, NonCom = Non-Communicative.

Table A2.2

Linear mixed model results for the analysis of log-transformed response times in the word arousal rating task, investigating effects of emotion and communication condition within each agent type

Fixed Effects	<i>b</i>	SE	df	<i>t</i>	<i>p</i>
(Intercept)	6.97	0.04	83.22	187.72	<.001
Agent(Human-Robot)	0.02	0.01	25625.76	3.35	.001
Agent(Android-Human)	-0.01	0.01	25635.21	-1.39	.165
Robot/Emotion(Neu-Neg)	-0.12	0.02	206.67	-6.75	<.001
Human/Emotion(Neu-Neg)	-0.12	0.02	205.87	-7.08	<.001
Android/Emotion(Neu-Neg)	-0.13	0.02	205.50	-7.28	<.001
Robot/Emotion(Pos-Neu)	0.06	0.02	254.41	3.60	<.001
Human/Emotion(Pos-Neu)	0.06	0.02	255.53	3.70	<.001
Android/Emotion(Pos-Neu)	0.07	0.02	254.37	4.14	<.001
Robot/Communication(Com-NonCom)	-0.02	0.01	1348.39	-2.02	.044
Human/Communication(Com-NonCom)	0.02	0.01	1354.45	2.56	.011
Android/Communication(Com-NonCom)	0.01	0.01	1336.89	1.00	.318
Robot/Emotion(Neu-Neg):Communication(Com-NonCom)	-0.004	0.02	1368.25	-0.21	.835
Human/Emotion(Neu-Neg):Communication(Com-NonCom)	0.02	0.02	1361.29	1.27	.205
Android/Emotion(Neu-Neg):Communication (Com-NonCom)	-0.01	0.02	1336.76	-0.68	.499
Robot/Emotion(Pos-Neu):Communication(Com-NonCom)	-0.01	0.02	1336.02	-0.51	.612
Human/Emotion(Pos-Neu):Communication(Com-NonCom)	-0.03	0.02	1358.07	-1.56	.120
Android/Emotion(Pos-Neu):Communication(Com-NonCom)	0.02	0.02	1331.84	1.04	.298

Note. Com = Communicative, NonCom = Non-Communicative.

Table A2.3

Linear mixed model results for the analysis of log-transformed response times in the word arousal rating task, investigating effects of communication condition per individual emotion condition within each agent type

Fixed Effects	<i>b</i>	SE	df	<i>t</i>	<i>p</i>
(Intercept)	6.97	0.04	83.22	187.72	<.001
Agent(Human-Robot)	0.02	0.01	25625.76	3.35	.001
Agent(Android-Human)	-0.01	0.01	25635.21	-1.39	.165
Robot/Emotion(Neu-Neg)	-0.12	0.02	206.67	-6.75	<.001
Human/Emotion(Neu-Neg)	-0.12	0.02	205.87	-7.08	<.001
Android/Emotion(Neu-Neg)	-0.13	0.02	205.50	-7.28	<.001
Robot/Emotion(Pos-Neu)	0.06	0.02	254.41	3.60	<.001
Human/Emotion(Pos-Neu)	0.06	0.02	255.53	3.70	<.001
Android/Emotion(Pos-Neu)	0.07	0.02	254.37	4.14	<.001
Robot/EmotionNegative:Communication(Com-Com)	-0.01	0.01	1373.34	-0.73	.467
Human/EmotionNegative:Communication(Com-NonCom)	0.01	0.01	1347.10	1.02	.309
Android/EmotionNegative:Communication(Com-NonCom)	0.01	0.01	1346.93	0.72	.470
Robot/EmotionNeutral:Communication(Com-NonCom)	-0.01	0.01	1363.21	-1.02	.306
Human/EmotionNeutral:Communication(Com-NonCom)	0.04	0.01	1375.55	2.80	.005
Android/EmotionNeutral:Communication(Com-NonCom)	-0.003	0.01	1326.63	-0.23	.816
Robot/EmotionPositive:Communication(Com-NonCom)	-0.02	0.01	1309.07	-1.75	.080
Human/EmotionPositive:Communication(Com-NonCom)	0.01	0.01	1340.78	0.61	.543
Android/EmotionPositive:Communication(Com-NonCom)	0.02	0.01	1337.14	1.24	.215

Note. Com = Communicative, NonCom = Non-Communicative.

Table A2.4

Linear mixed model results for the analysis of log-transformed response times in the word valence rating task, investigating effects of emotion and communication condition within each agent type

Fixed Effects	<i>b</i>	SE	df	<i>t</i>	<i>p</i>
(Intercept)	7.10	0.03	85.27	223.47	<.001
Agent(Human-Robot)	0.02	0.01	80.68	2.46	.016
Agent(Android-Human)	0.001	0.01	82.17	0.09	.932
Robot/Emotion(Neu-Neg)	0.01	0.02	236.26	0.25	.805
Human/Emotion(Neu-Neg)	0.01	0.02	235.19	0.34	.733
Android/Emotion(Neu-Neg)	0.01	0.02	235.46	0.36	.720
Robot/Emotion(Pos-Neu)	0.01	0.02	266.95	0.27	.785
Human/Emotion(Pos-Neu)	0.02	0.02	266.06	0.93	.354
Android/Emotion(Pos-Neu)	0.01	0.02	265.38	0.68	.494
Robot/Communication(Com-NonCom)	0.002	0.01	355.81	0.23	.815
Human/Communication(Com-NonCom)	0.02	0.01	353.07	2.19	.029
Android/Communication(Com-NonCom)	0.0004	0.01	353.74	0.04	.966
Robot/Emotion(Neu-Neg):Communication(Com-NonCom)	0.01	0.02	25316.37	0.42	.678
Human/Emotion(Neu-Neg):Communication(Com-NonCom)	-0.01	0.02	25303.23	-0.45	.649
Android/Emotion(Neu-Neg):Communication(Com-NonCom)	0.003	0.02	25309.32	0.15	.881
Robot/Emotion(Pos-Neu):Communication(Com-NonCom)	0.03	0.02	25309.28	1.23	.220
Human/Emotion(Pos-Neu):Communication(Com-NonCom)	0.01	0.02	25315.69	0.39	.700
Android/Emotion(Pos-Neu):Communication(Com-NonCom)	0.004	0.02	25304.51	0.16	.874

Note. Com = Communicative, NonCom = Non-Communicative.

Table A2.5

Linear mixed model results for the analysis log-transformed response times in the word valence rating task, investigating effects of communication condition per individual emotion condition within each agent type

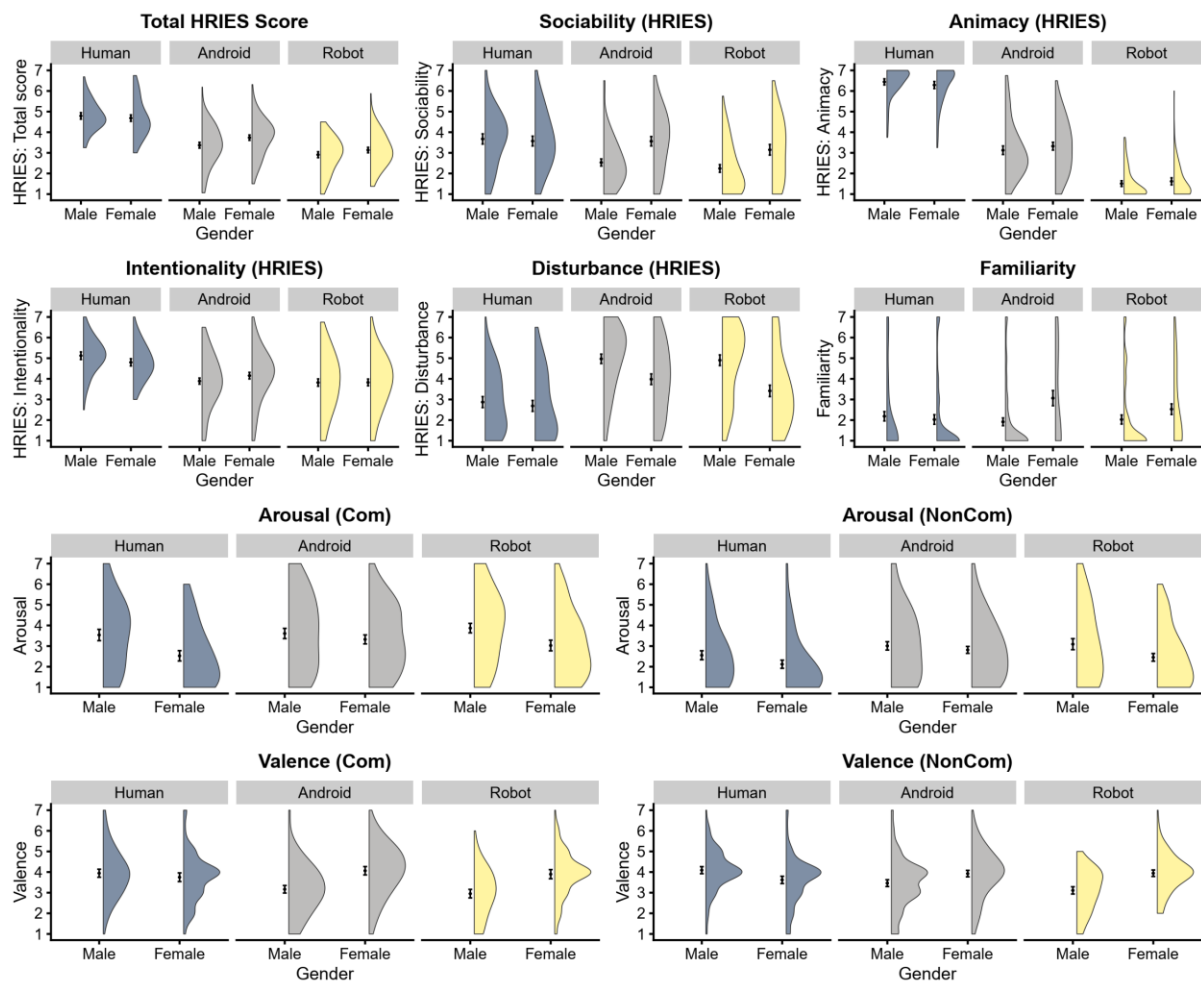
Fixed Effects	<i>b</i>	SE	df	<i>t</i>	<i>p</i>
(Intercept)	7.10	0.03	85.27	223.47	<.001
Agent(Human-Robot)	0.02	0.01	80.68	2.46	.016
Agent(Android-Human)	0.001	0.01	82.17	0.09	.932
Robot/Emotion(Neu-Neg)	0.01	0.02	236.26	0.25	.805
Human/Emotion(Neu-Neg)	0.01	0.02	235.19	0.34	.733
Android/Emotion(Neu-Neg)	0.01	0.02	235.47	0.36	.720
Robot/Emotion(Pos-Neu)	0.01	0.02	266.96	0.27	.785
Human/Emotion(Pos-Neu)	0.02	0.02	266.06	0.93	.354
Android/Emotion(Pos-Neu)	0.01	0.02	265.38	0.68	.494
Robot/EmotionNegative:Communication(Com-NonCom)	-0.01	0.02	2207.62	-0.78	.436
Human/EmotionNegative:Communication(Com-NonCom)	0.03	0.02	2183.06	1.60	.109
Android/EmotionNegative:Communication(Com-NonCom)	-0.003	0.02	2234.81	-0.18	.858
Robot/EmotionNeutral:Communication(Com-NonCom)	-0.004	0.02	2194.12	-0.22	.827
Human/EmotionNeutral:Communication(Com-NonCom)	0.02	0.02	2171.27	0.99	.322
Android/EmotionNeutral:Communication(Com-NonCom)	0.0004	0.02	2128.20	0.02	.982
Robot/EmotionPositive:Communication(Com-NonCom)	0.02	0.02	2190.49	1.44	.150
Human/EmotionPositive:Communication(Com-NonCom)	0.02	0.02	2184.12	1.51	.131
Android/EmotionPositive:Communication(Com-NonCom)	0.004	0.02	2188.98	0.24	.813

Note. Com = Communicative, NonCom = Non-Communicative.

Appendix 3: Agent ratings per agent type and gender

Figure A3.1

Agent ratings per individual agent (male and female agent per type) obtained in the post-experiment questionnaire



Notes. Violin plots show the distribution of ratings based on by-participant means. The black brackets indicate the overall mean per condition with 95% confidence intervals. Total HRIES scores were calculated as the mean of the four individual dimensions, with the disturbance dimension being reverse-coded. Abbreviations: Com = Communicative condition; NonCom = Non-communicative condition.

Table 3.1*Statistical results and descriptive values for differences between the two individual agents (female, male) per agent type*

Rating Dimension	Human (Mean, SD)	Android (Mean, SD)	Robot (Mean, SD)	Human: Male vs. Female	Android: Male vs. Female	Robot: Male vs. Female
Total HRIES score	Female: 4.68 (0.90) Male: 4.79 (0.68)	Female: 3.74 (0.90) Male: 3.37 (0.96)	Female: 3.14 (0.83) Male: 2.91 (0.82)	$t(107) = 1.18$, $p = .239$	$t(107) = -4.56$, $p < .001$	$t(107) = -2.55$, $p = .012$
Sociability (HRIES)	Female: 3.57 (1.38) Male: 3.67 (1.32)	Female: 3.56 (1.43) Male: 2.53 (1.16)	Female: 3.15 (1.49) Male: 2.24 (1.19)	$t(107) = 0.71$, $p = .481$	$t(107) = -8.98$, $p < .001$	$t(107) = -6.84$, $p < .001$
Animacy (HRIES)	Female: 6.29 (0.88) Male: 6.44 (0.70)	Female: 3.32 (1.29) Male: 3.13 (1.32)	Female: 1.62 (0.82) Male: 1.51 (0.70)	$t(107) = 2.65$, $p = .009$	$t(107) = -1.82$, $p = .072$	$t(107) = -1.44$, $p = .152$
Intentionality (HRIES)	Female: 4.80 (0.85) Male: 5.12 (0.86)	Female: 4.16 (1.25) Male: 3.89 (1.26)	Female: 3.83 (1.30) Male: 3.82 (1.40)	$t(107) = 4.26$, $p < .001$	$t(107) = -2.95$, $p = .004$	$t(107) = -0.08$, $p = .940$
Disturbance (HRIES)	Female: 2.69 (1.57) Male: 2.87 (1.46)	Female: 3.98 (1.72) Male: 4.97 (1.58)	Female: 3.42 (1.74) Male: 4.90 (1.71)	$t(107) = 1.42$, $p = .158$	$t(107) = 6.77$, $p < .001$	$t(107) = 8.53$, $p < .001$
Familiarity	Female: 2.03 (1.88) Male: 2.18 (1.96)	Female: 3.06 (2.37) Male: 1.92 (1.71)	Female: 2.53 (1.88) Male: 2.03 (1.77)	$t(107) = 1.69$, $p = .094$	$t(107) = -5.40$, $p < .001$	$t(107) = -3.17$, $p = .002$
Arousal: Com	Female: 2.53 (1.46) Male: 3.54 (1.69)	Female: 3.32 (1.61) Male: 3.61 (1.84)	Female: 3.03 (1.59) Male: 3.87 (1.79)	$t(107) = 6.99$, $p < .001$	$t(107) = 1.92$, $p = .057$	$t(107) = 5.64$, $p < .001$
Arousal: NonCom	Female: 2.12 (1.37) Male: 2.56 (1.44)	Female: 2.82 (1.51) Male: 3.01 (1.69)	Female: 2.45 (1.43) Male: 3.09 (1.80)	$t(107) = 3.54$, $p = .001$	$t(107) = 1.72$, $p = .088$	$t(107) = 4.54$, $p < .001$
Valence: Com	Female: 3.75 (1.18) Male: 3.94 (1.14)	Female: 4.07 (1.22) Male: 3.17 (1.22)	Female: 3.90 (1.11) Male: 2.95 (1.16)	$t(107) = 1.55$, $p = .123$	$t(107) = -7.68$, $p < .001$	$t(107) = -7.05$, $p < .001$
Valence: NonCom	Female: 3.62 (1.18) Male: 4.09 (0.99)	Female: 3.93 (1.16) Male: 3.46 (1.23)	Female: 3.94 (0.92) Male: 3.11 (1.02)	$t(107) = 4.22$, $p < .001$	$t(107) = -4.38$, $p < .001$	$t(107) = -8.74$, $p < .001$

Note. Abbreviations: Com = Communicative condition; NonCom = Non-communicative condition. Further relevant statistical analyses and results (ANOVAs and additional pairwise comparisons) are available in the OSF repository.