Supplement to “Interaction structure constrains the emergence of conventions in group communication”

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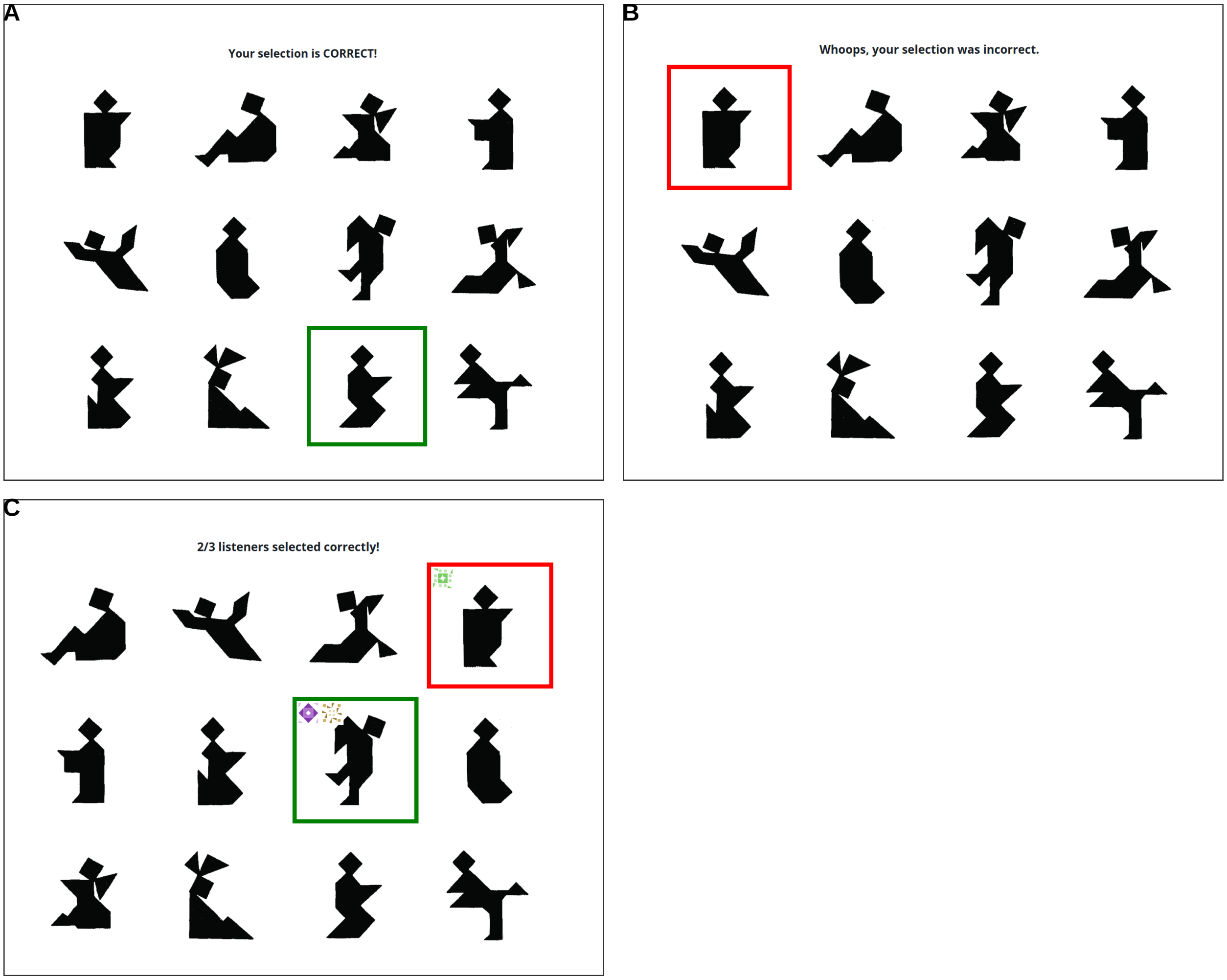
Number of games

In experiment 3, the 6* player games did not all have 6 players, both because games continued as participants dropped out and because if there weren’t enough players after 5 minutes of waiting, the game would start with whoever was there. All analyses use “intent to treat” and call these 6 player games.



Your selection is CORRECT!

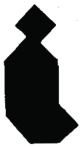
Whoops, your selection was incorrect.

2/3 listeners selected correctly!

Figure 1: Feedback shown to participants. In low-coherence games, matchers saw feedback as shown in A and B. In all games, describers saw feedback like in C; icons were associated with players and indicated who selected which. In high feedback games, matchers saw grids like C, but with text as in A and B.

The number of games goes up in some cases because only complete blocks (where the describer said something every trial) are analysed. If there was initial confusion and a desciber missed a trial, that block was excluded.

Table 1: Additional examples from 6-player thick games for the same image across repetitions. Describers are indicated with an asterisk.



6-person thick game	
Rep 1: 5/5 correct	
Q*	oh no. okay. this one is similar to the one i called minnesota, so like pretty simple, with just a distinct “head” diamond and then a body beneath
Q*	the body has sort of sloping shoulders
P	BEAN SHAPED BODY?
O	with a small triangle on the bottom right?
Q*	yeah i think so! bean is a good description lol
Q*	bean body
Rep 2: 5/5 correct	
Q*	bean body!!
Rep 3: 5/5 correct	
Q*	bean body!
Rep 4: 5/5 correct	
Q*	bean body!
Rep 5: 5/5 correct	
Q*	you guys are doin’ great. :) bean body for this one
Rep 6: 5/5 correct	
Q*	bean body for this one

6-person thick game	
Rep 1: 2/5 correct	
V*	This shape hasn’t got much sticking out. Small triangle pointing right, tilted square on top
Y	Is the triangle on the right at the bottom?
V*	Long tall shape, not far off symmetrical.
V*	Yes triangle bottom right
W	Are their two triangles on it?
X	does it look like a rabbit?
V*	Not the rabbit
X	does it look like someone on their back kicking a square soccer ball
V*	It’s like one block like a gemstone
V*	but square on top
V*	Not on back
V*	It’s the one with the least sharp corners I think
V*	One long gem shape with small triangle bottom right, tilted square on top
Rep 2: 4/5 correct	
V*	Long tall shape. Little triangle sticking out bottom right. Diamond on top
Rep 3: 3/5 correct	
V*	Long tall hexagon, triangle bottom right, diamond on top
Rep 4: 4/5 correct	
V*	Long hexagon
V*	little triangle bottom right
V*	Diamond top
Rep 5: 4/5 correct	
V*	Long hexagon.
V*	Diamond on top
V*	little triangle bottom right
Rep 6: 4/5 correct	
V*	Long hexagon
V*	Triangle bottom right

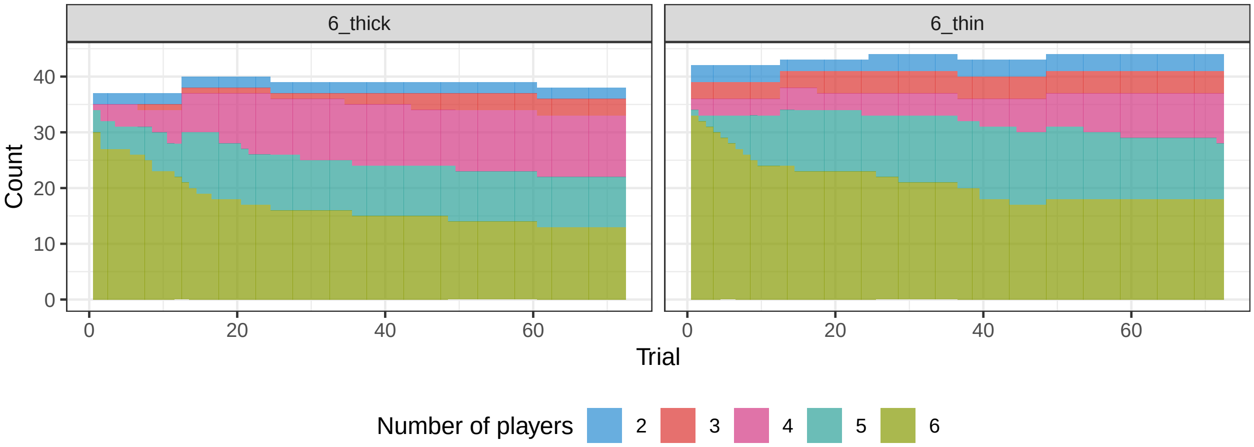


Figure 2: Number of players during 6 thin and 6 thick games in experiment 3. Blocks that were incomplete were excluded, so if a describer said nothing during a trial, that block was excluded.

More on matcher utterances

Matchers' use of backchannel declined over the course of the game. The use of emoji in the thin games is not directly comparable to matcher language use in thick games, since some emoji usage (such as the green checkmark) are most likely equivalent to non-referential matcher language ("got it" etc.) that was excluded. The higher rate of emoji use versus referential language thus could be due to its non-equivalence, a lower level of accuracy in thin games, or matchers having a lower threshold for sending emojis compared to writing out clarifications.

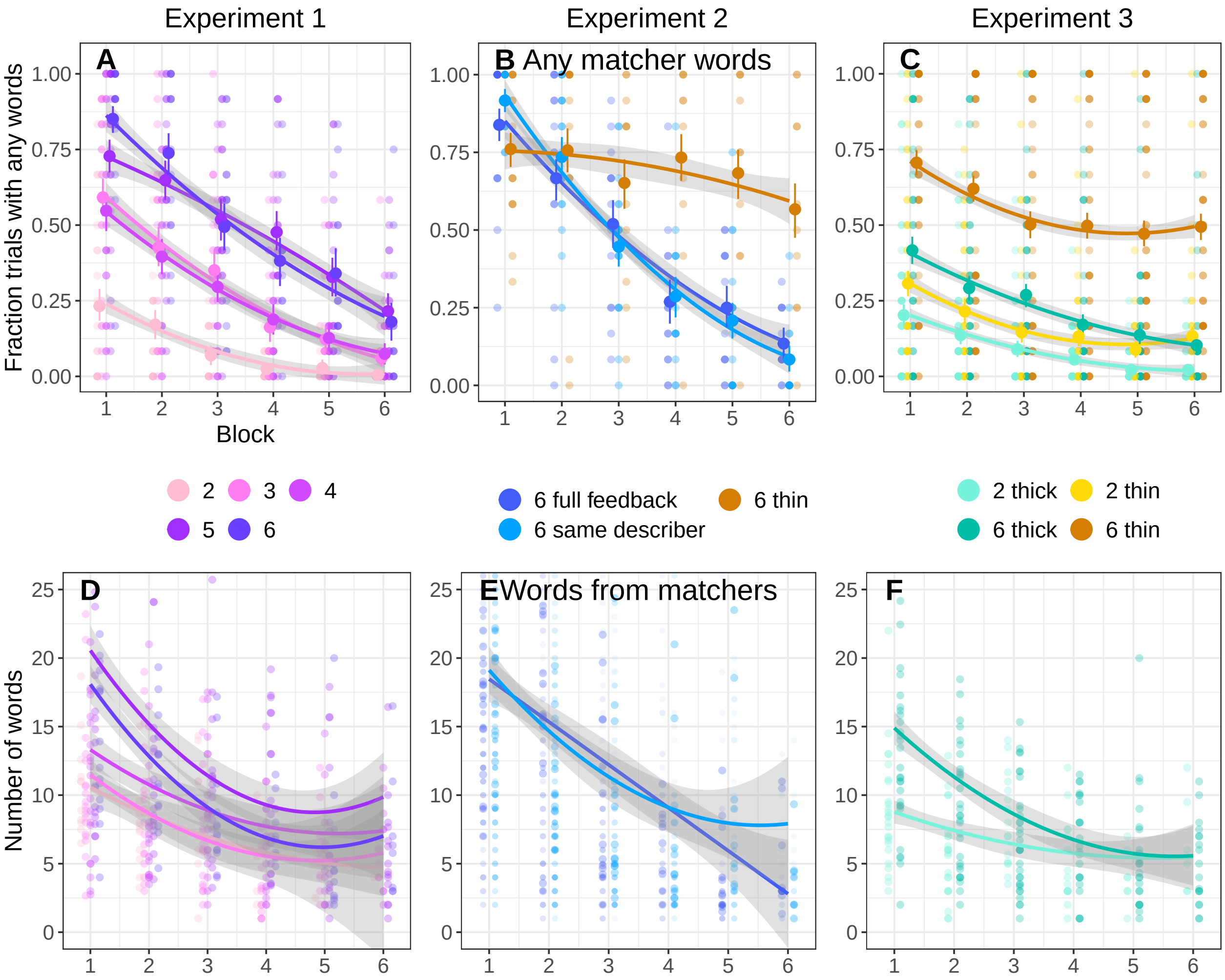


Figure 3: Matcher contributions. A-C: Fraction of trials where any matcher said anything that was referential. Dots are per game averages. Smooths are binomial fit lines. D-F: On trials where at least one matcher contributed, the number of words of referential language produced by matchers. Dots are per game averages. Smooths are quadratic fit lines. Y-axis is truncated, and a few outliers points are not visible.

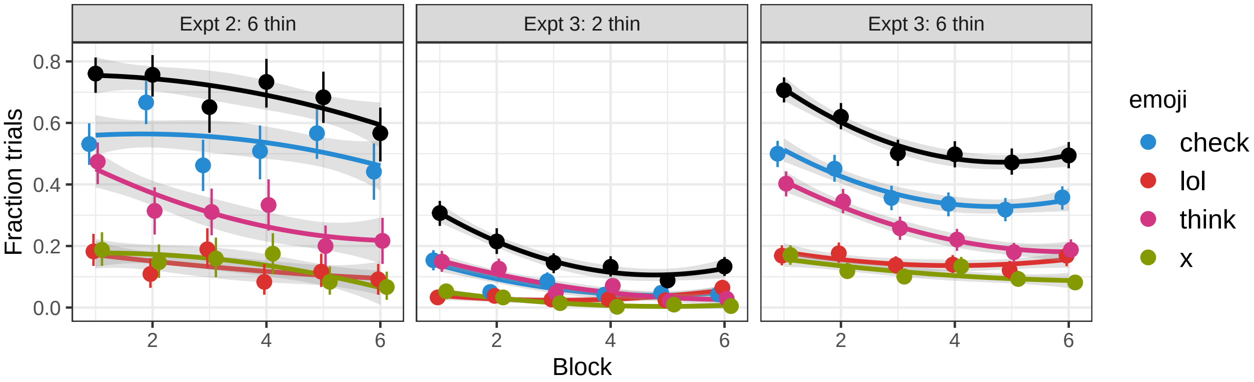


Figure 4: Fraction of trials on which at least one matcher produced the labelled emoji. Fraction of trials when any emoji was produced are shown in black. Dots are per condition, per block estimates with 95% bootstrapped CIs. Smooths are binomial fit lines.

We note a deviation from the pre-registration here in the analysis of the emojis. In the pre-registration we said we would "analyse the distribution of emoji's produced as a function of block and its relation to accuracy and speaker utterance length." We did not do this beyond the visualization shown here.

Additional measure of convergence

The main text included the graph for convergence comparing utterances from blocks 1-5 to the utterance from block 6. Here we show two other measures of semantic shifts for descriptions for the same tangram in the same game: similarity to the first utterance and similarity to the next utterance.

Similarity to the first utterance is not very informative (but we pre-registered it). Similarity to the next utterance is what actually drives the convergence phenomena: pairs of utterances from adjacent blocks become closer together over time.

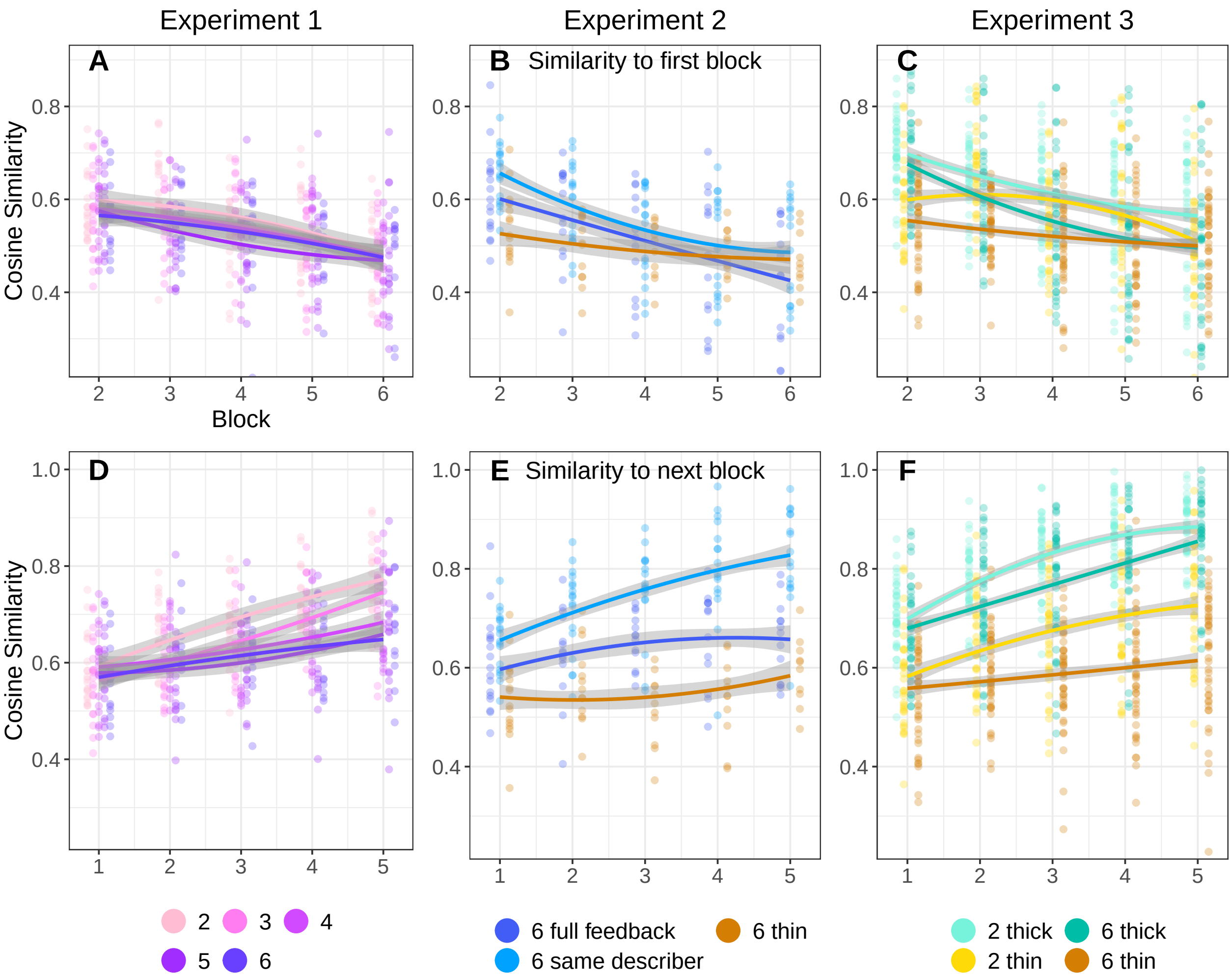


Figure 5: Additional measures of convergence and divergence. A-C is the similarity between utterances on a given block to the first block utterance for the same image, in the same game. Dots are per-game averages, smooths are quadratic. D-F is the similarity between utterances on a given block to the corresponding utterances in the next block. Dots are per-game averages, smooths are quadratic.

Distinctiveness of tangrams

An additional measure of convergence/divergence patterns is how different tangrams get described in the same game – as nicknames evolve, different tangrams get more different descriptions.

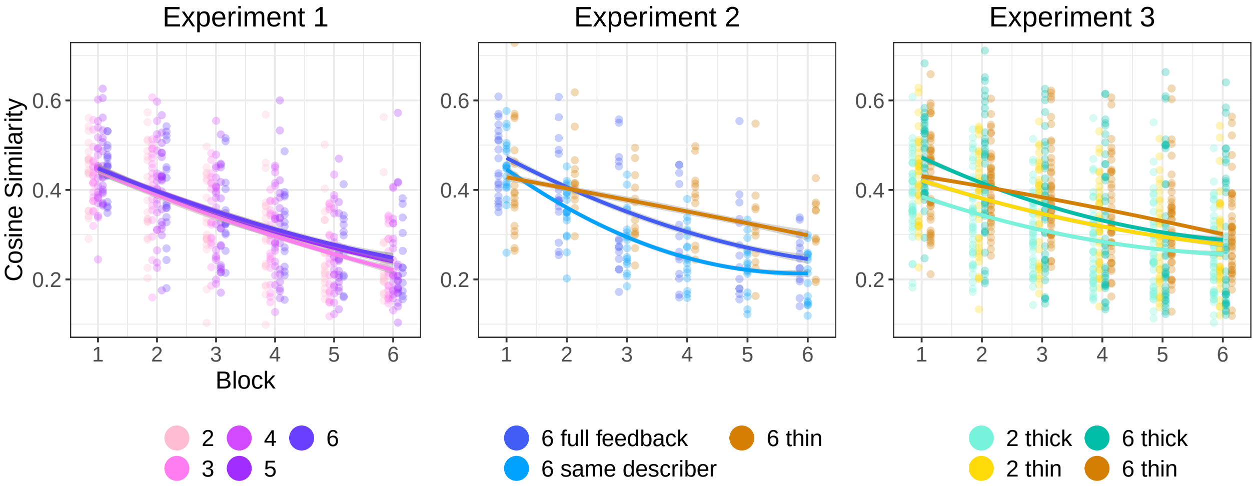


Figure 6: Divergence in descriptions of different tangrams. Cosine similarity between the descriptions of two different tangrams in the same block and group are shown. Dots are per-game averages, smooths are quadratic.

Summaries of model outputs

The following sections contain model outputs. All models were run using BRMS. We report the priors and pre-registration status for each group of models. Tables provide the individual model formulae and the point estimates and 95% credible intervals for the fixed effects.

Note that for all models, block was 0 indexed, so intercepts are what happened during the first block.

Accuracy models

Accuracy models were all run as logistic models with normal(0,1) priors for both betas and sd. This model was not explicitly included in the experiment 1 and 2 pre-registrations; it was included with more ambitious mixed effects (which did not run in a timely manner) in the experiment 3 pre-registration.

Table 4: Experiment 1 logistic model of matcher accuracy: correct.num ∼ block × numPlayers + (1|gameId)

Term	Est.	95% CrI
Intercept	2.10	[1.57, 2.65]
block	0.44	[0.31, 0.58]
block:numPlayers	-0.02	[-0.05, 0.01]
numPlayers	-0.07	[-0.2, 0.05]

Table 5: Experiment 2: 6 same describer logistic model of matcher accuracy: correct.num ∼ block + (1|gameId)

Term	Est.	95% CrI
Intercept	1.78	[1.4, 2.19]
block	0.45	[0.39, 0.52]

Table 6: Experiment 2: 6 full feedback logistic model of matcher accuracy: correct.num ∼ block + (1|gameId)

Term	Est.	95% CrI
Intercept	1.35	[0.59, 2.06]
block	0.47	[0.39, 0.54]

Table 7: Experiment 2: 6 thin logistic model of matcher accuracy: correct.num ∼ block + (1|gameId)

Term	Est.	95% CrI
Intercept	0.88	[0.64, 1.12]
block	0.23	[0.19, 0.28]

Table 8: Experiment 3 logistic model of matcher accuracy: correct.num ~ block × gameSize × channel + (1|gameId)

Term	Est.	95% CrI
Intercept	1.69	[1.39, 1.99]
block	0.41	[0.32, 0.5]
block:channelthin	-0.07	[-0.18, 0.04]
block:gameSize6	-0.34	[-0.43, -0.25]
block:gameSize6:channelthin	0.07	[-0.05, 0.19]
channelthin	-0.36	[-0.78, 0.05]
gameSize6	-0.64	[-1.05, -0.25]
gameSize6:channelthin	0.31	[-0.22, 0.87]

Reduction models

Primary reduction model

Reduction models were run as linear models with an intercept prior of normal(12,20), a beta prior of normal(0,10), an sd prior of normal(0,5) and a correlation prior of lkj(1). This model was pre-registered for each experiment and run with the mixed effects structure as pre-specified.

Table 9: Experiment 1: words ~ block × numPlayers + (block|tangram) + (1|playerId) + (1|tangram:gameId) + (block|gameId)

Term	Est.	95% CrI
Intercept	16.87	[11.63, 21.89]
block	-3.36	[-4.56, -2.18]
block:numPlayers	-0.09	[-0.37, 0.18]
numPlayers	1.60	[0.62, 2.6]

Table 10: Experiment 2: 6 same describer: words ~ block + (block|tangram) + (1|tangram:gameId) + (block|gameId)

Term	Est.	95% CrI
Intercept	29.65	[24.82, 34.49]
block	-5.31	[-6.35, -4.3]

Table 11: Experiment 2: 6 full feedback: words ~ block + (block|tangram) + (1|tangram:gameId) + (block|gameId)

Term	Est.	95% CrI
Intercept	25.79	[20.97, 30.29]
block	-4.64	[-5.81, -3.53]

Table 12: Experiment 2: 6 thin: words ~ block + (block|tangram) + (1|tangram:gameId) + (block|gameId)

Term	Est.	95% CrI
Intercept	20.3	[17.37, 23.53]
block	-2.1	[-3.37, -1.12]

Table 13: Experiment 3: words ~ block × channel × gameSize + (block × channel × gameSize|tangram) + (1|tangram:gameId) + (block|gameId)

Term	Est.	95% CrI
Intercept	14.74	[11.68, 17.72]
block	-2.24	[-2.92, -1.57]
block:channelthin	0.29	[-0.56, 1.23]
block:channelthin:gameSize6	0.64	[-0.59, 1.81]
block:gameSize6	-1.22	[-2.06, -0.29]
channelthin	0.80	[-2.85, 4.26]
channelthin:gameSize6	-2.21	[-7.16, 3.08]
gameSize6	7.51	[3.63, 11.3]

Extra reduction model

For experiment 1, we also pre-specified a model about whether the describer's correctness on the prior block (when they were a matcher) had an effect on how many words of description they produced. Priors were the same as for primary reduction model.

Table 14: Experiment 1: words ~ block × numPlayers + block × wasINcorrect + (block|tangram) + (1|playerId) + (1|tangram:gameId) + (block|gameId)

Term	Est.	95% CrI
Intercept	12.16	[6.48, 18.07]
block	-2.17	[-3.39, -1]
block:numPlayers	-0.22	[-0.5, 0.06]
block:wasINcorrect	0.24	[-0.24, 0.72]
numPlayers	2.09	[0.88, 3.3]
wasINcorrect	3.07	[1.67, 4.45]

Matcher reduction models

These models were not pre-registered.

For the model of how often any matchers used the backchannel, the priors were normal(0,1) for both beta and sd.

For the model of how much was said on trials when matchers talked, the priors were the same as for the primary (describer) reduction model.

Table 15: Experiment 1: words ~ block × numPlayers + (block|gameId)

Term	Est.	95% CrI
Intercept	4.72	[0.09, 9.44]
block	-0.17	[-1.53, 1.3]
block:numPlayers	-0.41	[-0.72, -0.11]
numPlayers	2.07	[1, 3.12]

Table 16: Experiment 1: is.words ~ block × numPlayers + (1|gameId)

Term	Est.	95% CrI
Intercept	-2.67	[-3.54, -1.79]
block	-0.80	[-0.97, -0.62]
block:numPlayers	0.03	[-0.01, 0.07]
numPlayers	0.79	[0.58, 0.98]

Initial utterance reduction model

These models were not pre-registered. They looked at describer reduction only on words that were produced prior to the first matcher message each trial. These models were only run on experimental conditions where matchers could contribute textual responses.

Reduction models were run as linear models with the same priors as the primary reduction model.

Table 17: Experiment 1: words ~ block × numPlayers + (block|tangram) + (1|tangram:gameId) + (block|gameId)

Term	Est.	95% CrI
Intercept	18.66	[14.58, 22.71]
block	-3.56	[-4.54, -2.55]
block:numPlayers	0.27	[0.03, 0.5]
numPlayers	-0.33	[-1.14, 0.53]

Table 18: Experiment 2: 6 same describer: words ~ block + (block|tangram) + (1|tangram:gameId) + (block|gameId)

Term	Est.	95% CrI
Intercept	18.06	[14.76, 21.44]
block	-2.49	[-3.19, -1.79]

Table 19: Experiment 2: 6 full feedback: words ~ block + (block|tangram) + (1|tangram:gameId) + (block|gameId)

Term	Est.	95% CrI
Intercept	16.69	[13.41, 20.02]
block	-2.49	[-3.34, -1.62]

Table 20: Experiment 3: words ∼ block × gameSize + (block × gameSize|tangram) + (1|tangram:gameId) + (block|gameId)

Term	Est.	95% CrI
Intercept	13.88	[11.62, 16.2]
block	-2.08	[-2.66, -1.47]
block:gameSize6	-0.65	[-1.43, 0.14]
gameSize6	5.13	[2, 7.95]

Linguistic content models

We ran a number of models predicting the cosine similarity between pairs of S-BERT embeddings of utterances. For all of these models, we used linear models with the priors normal(.5,.2) for intercept, normal(0,.1) for beta, and normal(0,.05) for sd.

These models were verbally described (but not formally specified) in the pre-registrations for experiment 2 in the full feedback and thin conditions and for experiment 3, for looking at divergence between games, convergence within games (compared to first block, next block, and last block utterances), and divergence between tangrams within games.

Convergence within games: comparison to last round

This is the primary convergence metric presented in the main paper.

Table 21: Experiment 1: sim ∼ earlier × condition + (1|tangram) + (1|gameId)

Term	Est.	95% CrI
Intercept	0.517	[0.458, 0.573]
condition	-0.008	[-0.021, 0.005]
earlier	0.089	[0.076, 0.102]
earlier:condition	-0.008	[-0.011, -0.005]

Table 22: Experiment 2: 6 same describer: sim ∼ earlier + (1|tangram) + (1|gameId)

Term	Est.	95% CrI
Intercept	0.499	[0.444, 0.556]
earlier	0.086	[0.078, 0.094]

Table 23: Experiment 2: 6 full feedback: sim ∼ earlier + (1|tangram) + (1|gameId)

Term	Est.	95% CrI
Intercept	0.438	[0.389, 0.487]
earlier	0.062	[0.051, 0.072]

Table 24: Experiment 2: 6 thin: sim ∼ earlier + (1|tangram) + (1|gameId)

Term	Est.	95% CrI
Intercept	0.498	[0.453, 0.54]
earlier	0.023	[0.013, 0.033]

Table 25: Experiment 3: sim ∼ earlier × channel × gameSize + (1|tangram) + (1|gameId)

Term	Est.	95% CrI
Intercept	0.581	[0.542, 0.62]
channelthin	-0.034	[-0.08, 0.011]
channelthin:gameSize6	0.039	[-0.021, 0.097]
earlier	0.080	[0.074, 0.086]
earlier:channelthin	-0.025	[-0.033, -0.017]
earlier:channelthin:gameSize6	-0.035	[-0.047, -0.025]
earlier:gameSize6	0.009	[0.001, 0.017]
gameSize6	-0.069	[-0.113, -0.025]

Divergence across games

This is the divergence metric presented in the paper.

Table 26: Experiment 1: sim ∼ block × condition + (1|tangram)

Term	Est.	95% CrI
Intercept	0.468	[0.429, 0.507]
block	-0.035	[-0.038, -0.032]
block:condition	0.001	[0.001, 0.002]
condition	0.002	[0, 0.004]

Table 27: Experiment 2: 6 same describer: sim ∼ block + (1|tangram)

Term	Est.	95% CrI
Intercept	0.484	[0.442, 0.526]
block	-0.041	[-0.043, -0.039]

Table 28: Experiment 2: 6 full feedback: sim ∼ block + (1|tangram)

Term	Est.	95% CrI
Intercept	0.502	[0.46, 0.546]
block	-0.038	[-0.04, -0.035]

Table 29: Experiment 2: 6 thin: sim ∼ block + (1|tangram)

Term	Est.	95% CrI
Intercept	0.434	[0.406, 0.465]
block	-0.004	[-0.006, -0.001]

Table 30: Experiment 3: sim ∼ block × channel × gameSize + (1|tangram)

Term	Est.	95% CrI
Intercept	0.411	[0.368, 0.453]
block	-0.024	[-0.025, -0.023]
block:channelthin	0.004	[0.002, 0.005]
block:channelthin:gameSize6	0.017	[0.015, 0.019]
block:gameSize6	-0.008	[-0.01, -0.007]
channelthin	0.014	[0.01, 0.018]
channelthin:gameSize6	-0.030	[-0.035, -0.024]
gameSize6	0.051	[0.047, 0.055]

Divergence across tangrams

This is an additional metric comparing the similiarities between descriptions for different tangrams within a game. It measures how distinct the descriptions for different tangram images are.

Table 31: Experiment 1: sim ∼ block × condition + (1|gameId)

Term	Est.	95% CrI
Intercept	0.429	[0.382, 0.473]
block	-0.043	[-0.046, -0.039]
block:condition	0.000	[-0.001, 0.001]
condition	0.003	[-0.008, 0.014]

Table 32: Experiment 2: 6 same describer: sim ∼ block + (1|gameId)

Term	Est.	95% CrI
Intercept	0.416	[0.389, 0.443]
block	-0.046	[-0.048, -0.044]

Table 33: Experiment 2: 6 full feedback: sim ∼ block + (1|gameId)

Term	Est.	95% CrI
Intercept	0.459	[0.422, 0.496]
block	-0.047	[-0.049, -0.044]

Table 34: Experiment 2: 6 thin: sim $\sim$ block + (1|gameId)

Term	Est.	95% CrI
Intercept	0.432	[0.393, 0.471]
block	-0.025	[-0.028, -0.022]

Table 35: Experiment 3: sim $\sim$ block × channel × gameSize + (1|gameId)

Term	Est.	95% CrI
Intercept	0.378	[0.352, 0.404]
block	-0.027	[-0.029, -0.025]
block:channelthin	-0.001	[-0.003, 0.002]
block:channelthin:gameSize6	0.011	[0.008, 0.015]
block:gameSize6	-0.010	[-0.013, -0.008]
channelthin	0.038	[-0.001, 0.082]
channelthin:gameSize6	-0.053	[-0.115, 0]
gameSize6	0.073	[0.035, 0.113]

Convergence to next

We also looked at how similar an utterance was to the next block utterance for the same image in the same group: this can be thought of as the derivative of the to-last comparison. (Although cosine similarities are not actually additive in the same way integrals are).

Table 36: Experiment 1: sim ∼ earlier × condition + (1|tangram) + (1|gameId)

Term	Est.	95% CrI
Intercept	0.591	[0.541, 0.641]
condition	-0.004	[-0.014, 0.006]
earlier	0.063	[0.051, 0.075]
earlier:condition	-0.008	[-0.011, -0.006]

Table 37: Experiment 2: 6 same describer: sim ∼ earlier + (1|tangram) + (1|gameId)

Term	Est.	95% CrI
Intercept	0.660	[0.619, 0.702]
earlier	0.043	[0.037, 0.05]

Table 38: Experiment 2: 6 full feedback: sim ∼ earlier + (1|tangram) + (1|gameId)

Term	Est.	95% CrI
Intercept	0.605	[0.569, 0.643]
earlier	0.015	[0.006, 0.024]

Table 39: Experiment 2: 6 thin: sim ∼ earlier + (1|tangram) + (1|gameId)

Term	Est.	95% CrI
Intercept	0.533	[0.49, 0.578]
earlier	0.010	[0, 0.019]

Table 40: Experiment 3: sim ∼ earlier × channel × gameSize + (1|tangram) + (1|gameId)

Term	Est.	95% CrI
Intercept	0.714	[0.682, 0.746]
channelthin	-0.124	[-0.159, -0.088]
channelthin:gameSize6	0.000	[-0.051, 0.049]
earlier	0.046	[0.041, 0.052]
earlier:channelthin	-0.010	[-0.018, -0.002]
earlier:channelthin:gameSize6	-0.018	[-0.029, -0.007]
earlier:gameSize6	-0.003	[-0.011, 0.004]
gameSize6	-0.034	[-0.069, 0.003]

Divergence from first

We also looked at how similar an utterance was to the first block utterance for the same image. This is not very informative because first round utterances tend to be pretty noisy with lots of hedges and filler words.

Table 41: Experiment 1: sim ∼ later × condition + (1|tangram) + (1|gameId)

Term	Est.	95% CrI
Intercept	0.647	[0.591, 0.705]
condition	-0.010	[-0.022, 0.003]
later	-0.030	[-0.041, -0.019]
later:condition	0.001	[-0.002, 0.004]

Table 42: Experiment 2: 6 same describer: sim ∼ later + (1|tangram) + (1|gameId)

Term	Est.	95% CrI
Intercept	0.680	[0.628, 0.728]
later	-0.042	[-0.049, -0.035]

Table 43: Experiment 2: 6 full feedback: sim ∼ later + (1|tangram) + (1|gameId)

Term	Est.	95% CrI
Intercept	0.644	[0.584, 0.706]
later	-0.044	[-0.052, -0.037]

Table 44: Experiment 2: 6 thin: sim ∼ later + (1|tangram) + (1|gameId)

Term	Est.	95% CrI
Intercept	0.537	[0.49, 0.584]
later	-0.014	[-0.023, -0.004]

Table 45: Experiment 3: sim ∼ later × channel × gameSize + (1|tangram) + (1|gameId)

Term	Est.	95% CrI
Intercept	0.721	[0.681, 0.76]
channelthin	-0.076	[-0.123, -0.026]
channelthin:gameSize6	-0.062	[-0.127, 0.001]
gameSize6	-0.017	[-0.062, 0.03]
later	-0.034	[-0.039, -0.028]
later:channelthin	0.011	[0.003, 0.019]
later:channelthin:gameSize6	0.021	[0.01, 0.032]
later:gameSize6	-0.011	[-0.019, -0.004]

Exploratory Mega-analytic models

For the mega-analytic models:

- thin and emoji conditions are coded as thin; everything else is thick
- group size is coded as intent to treat
- the intercept condition is 2 player, thick, first block
- "thinner" is thin condition instead
- "larger" is per addiitonal player
- "block" is per later block

Table 46: Mega-analytic on accuracy: correct.num ∼ block × thinner × larger + (1|gameId)

Term	Est.	95% CrI
Intercept	1.83	[1.6, 2.07]
block	0.46	[0.4, 0.52]
block:larger	-0.07	[-0.09, -0.05]
block:thinner	-0.12	[-0.21, -0.02]
block:thinner:larger	0.01	[-0.02, 0.04]
larger	-0.07	[-0.15, 0]
thinner	-0.50	[-0.89, -0.08]
thinner:larger	-0.02	[-0.14, 0.11]

Table 47: Mega-analytic of reduction: words ∼ block × thinner × larger + (block|gameId)

Term	Est.	95% CrI
Intercept	17.38	[15.59, 19.21]
block	-2.80	[-3.24, -2.36]
block:larger	-0.36	[-0.51, -0.2]
block:thinner	0.79	[0.04, 1.52]
block:thinner:larger	0.26	[0, 0.51]
larger	2.12	[1.5, 2.75]
thinner	-1.59	[-4.61, 1.55]
thinner:larger	-0.90	[-1.92, 0.11]

Table 48: Mega-analytic on divergence between groups: sim ∼ block × thinner × larger

Term	Est.	95% CrI
Intercept	0.428	[0.426, 0.431]
block	-0.026	[-0.026, -0.025]
block:larger	-0.002	[-0.002, -0.002]
block:thinner	0.005	[0.004, 0.007]
block:thinner:larger	0.004	[0.004, 0.005]
larger	0.012	[0.011, 0.013]
thinner	-0.003	[-0.007, 0.001]
thinner:larger	-0.007	[-0.008, -0.006]

Table 49: Mega-analytic on convergence to last: sim ∼ earlier × larger × thinner

Term	Est.	95% CrI
Intercept	0.546	[0.534, 0.558]
earlier	0.072	[0.067, 0.077]
earlier:larger	0.000	[-0.002, 0.002]
earlier:larger:thinner	-0.007	[-0.01, -0.004]
earlier:thinner	-0.016	[-0.025, -0.008]
larger	-0.016	[-0.021, -0.012]
larger:thinner	0.009	[0.002, 0.016]
thinner	0.001	[-0.021, 0.021]

Log reduction

Reduction models re-run using log-words as DV; these are the same as reduction models except for this change.

Table 50: Experiment 1 log reduction: logwords ∼ block × numPlayers + (block|tangram) + (1|playerId) + (1|tangram:gameId) + (block|gameId)

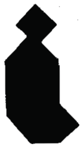
Term	Est.	95% CrI
Intercept	2.75	[2.48, 3.01]
block	-0.38	[-0.47, -0.29]
block:numPlayers	0.01	[-0.01, 0.03]
numPlayers	0.07	[0.02, 0.12]

Table 51: Experiment 3 log reduction: logwords ∼ block × channel × gameSize + (block × channel × gameSize|tangram) + (1|tangram:gameId) + (block|gameId)

Term	Est.	95% CrI
Intercept	2.50	[2.32, 2.69]
block	-0.27	[-0.32, -0.22]
block:channelthin	0.06	[0, 0.14]
block:channelthin:gameSize6	0.03	[-0.06, 0.13]
block:gameSize6	-0.02	[-0.09, 0.04]
channelthin	0.06	[-0.17, 0.29]
channelthin:gameSize6	-0.13	[-0.44, 0.18]
gameSize6	0.45	[0.23, 0.67]

Table 2: Additional examples from 6-player thin games for the same image across repetitions. Describers are indicated with an asterisk.

6-person thin game	
Rep 1: 2/5 correct	
J*	Looks like a skinnier candle but with a shadow at the bottom
K	🤔
H	✅
J*	The top square looks like the flame
J*	It has a triangle leading to that flame
I	❌
Rep 2: 3/5 correct	
K	🤔
I*	the simplest image in the whole, no much issues
J	🤔
L	🤔
I*	1 square as the head
L	🤔
J	🤔
H	🤔
K	🤔
I*	candle with more missing chunks
Rep 3: 1/5 correct	
L*	looks like a candle with more chunks missing
J	🤔
I	🤔
L*	The bottom part faces the right and forms a triangle
L*	The top is a square
I	✅
J	❌
Rep 4: 3/5 correct	
H*	Candle one with shadow
H*	The straight one not the one with bits missing
L	🤔
I	😂
L	🤔
H*	Lower case j but the bottom swings to the right
I	✅ ✅ ✅ ✅
Rep 5: 0/5 correct	
K*	Candle with chunks missing on the right
I	✅ ✅ ✅
Rep 6: 4/5 correct	
G*	candle shape with a chunk of the bottom left missing and added to the bottom right instead
K	🤔 🤔
H	✅
I	✅



6-person thin game	
Rep 1: 2/5 correct	
A*	Square on top
A*	At the bottom of the base part of it sticks out to the right
A*	The base has 8 faces (8 sides of the shape)
C	✅
A*	The square balances on a triangular point of the base
A*	It is a thick base shape, the bottom curves right
D	✅
Rep 2: 5/5 correct	
B*	tombstone and its shadow with a rotated square on top
D	✅
F	✅
C	🤔
Rep 3: 5/5 correct	
D*	tombstone casting a shadow (sorry i've pinched that from before)
C	🤔
B	😂
E	🤔
C	🤔
E	🤔
E	🤔
D*	square on top sitting on top of a triangle which is on top of a square, with 5 side shape at the bottom
Rep 4: 4/5 correct	
C*	looks mummified
C*	person with no limbs
D	✅
B	🤔
C*	square atop, chunky with triangle bottom right
Rep 5: 5/5 correct	
F*	Gravestone casting shadow. Square on top
D	✅
Rep 6: 5/5 correct	
E*	tombstone
D	✅

Table 3: The number of games in each experiment and condition. Complete games finished all 6 blocks; partial games ended early due to disconnections, but contributed at least one complete block of data. 6* indicates that some games started with fewer than 6 players or continued with fewer than 6 players after participants disconnected.

Experiment	Players	Complete	Partial	Total Participants
1: baseline	2	15	4	38
1: baseline	3	18	2	60
1: baseline	4	19	2	84
1: baseline	5	17	3	100
1: baseline	6	12	6	108
2: same describer	6	15	3	108
2: full feedback	6	13	4	102
2: thin	6	10	6	96
3: thin	2	35	3	76
3: thin	6*	44	0	235
3: thick	2	39	3	84
3: thick	6*	38	2	222