

Tug of war

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1 Research question

- exploring the probabilistic language of thought hypothesis as a model for human inference in tug of war world
- demonstrate compositionality and productivity of thought

2 Experiment 1: How strong?

Table 1: Games used in Experiment 1. Participants were always asked about the strength of player 1. *Note:* > indicates that team1 won against team2; < indicates that team1 lost against team2.

id	team1	winner	team2
1	1	>	2
1	1	>	2
1	1	>	2
2	1	>	2
2	2	>	3
2	2	>	4
3	1	>	2
3	2	<	3
3	2	<	4
4	1	>	2
4	1	>	3
4	1	>	4
5	1,2	>	3,4
5	1,2	>	5,6
5	1,2	>	7,8
6	1,2	>	5,6
6	1,3	>	5,7
6	1,4	>	5,8
7	1,2	>	5,6
7	2,3	<	5,6
7	2,4	<	5,6
8	1,2	>	5,6
8	2,3	>	5,6
8	2,4	>	5,6
9	1,2	>	5,6
9	1,3	>	7,8
9	1,4	>	9,10
10	1,2	>	3,4
10	1,3	>	2,4
10	1,4	>	2,3
11	1	<	2
11	1	<	2

id	team1	winner	team2
11	1	<	2
12	1	<	2
12	2	<	3
12	2	<	4
13	1	<	2
13	2	>	3
13	2	>	4
14	1	<	2
14	1	<	3
14	1	<	4
15	1,2	<	3,4
15	1,2	<	5,6
15	1,2	<	7,8
16	1,2	<	5,6
16	1,3	<	5,7
16	1,4	<	5,8
17	1,2	<	5,6
17	2,3	>	5,6
17	2,4	>	5,6
18	1,2	<	5,6
18	2,3	<	5,6
18	2,4	<	5,6
19	1,2	<	5,6
19	1,3	<	7,8
19	1,4	<	9,10
20	1,2	<	3,4
20	1,3	<	2,4
20	1,4	<	2,3
21	1,2	>	3
22	1	<	2,3
23	1,2	>	4,5,6
23	2	>	4,5
24	1,4	>	5,2,3
24	1,5	>	2,3,4
25	1,2,3	>	4,5,6
25	2,3	>	4,5,6
26	1,2	<	3
27	1	>	2,3
28	1,2	<	4,5,6

id	team1	winner	team2
28	2	<	4,5
29	1,4	<	5,2,3
29	1,5	<	2,3,4
30	1,2,3	<	4,5,6
30	2,3	<	4,5,6

2.1 Methods

2.1.1 Design

2.1.2 Procedure

Instructions

In this experiment, your task is to judge how strong you think different players are, based on their performance in a tug-of-war tournament.

In each game, a player either competes as part of a team, or individually. For example, in the Tournament shown below, PW and MM competed against JP and AW in Game 1. The crown indicates which team won the game. Here, PW and MM won against JP and AW.

In Game 2, PW lost the game against JP.

Tournament

Game 1

Game 2

Note that a player's strength remains constant throughout a tournament. For example, PW was equally strong in Game 1 and in Game 2. A player neither gets stronger nor weaker between games.

However, each player has a certain chance of being lazy in any given game. If a player decides to be lazy, then that player only pulls with half their strength. For example, it's possible that PW pulled with all his strength in Game 1 but decided to be lazy in Game 2.

A team's strength is determined by the sum of the strengths of its players. The team with the greater overall strength wins the game.

Please press 'Start' to proceed. We will ask you a few test questions to check that you've understood how everything works.

Figure 1: Instructions.

TEST QUESTIONS

Games

Game 1

Please answer the following question about the tournament shown above:

Who won the above game?

Figure 2: Test question.

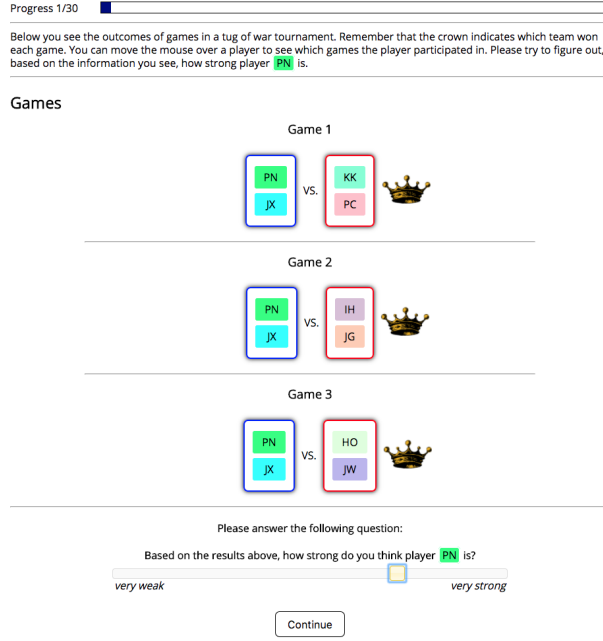


Figure 3: Trial.

2.2 Results (N = 39)

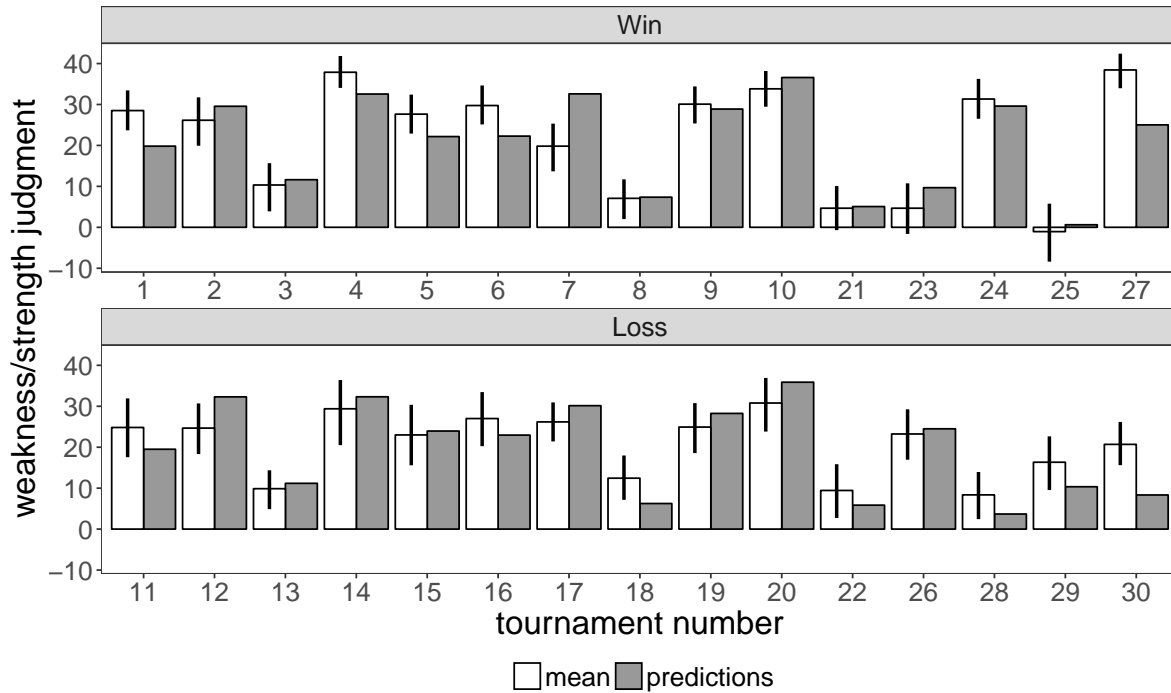


Figure 4: Mean weakness/strength judgments across the 30 tournaments with model predictions. *Note:* Error bars indicate 95% confidence intervals.

3 Experiment 2: How hard did the person try?

3.1 Methods

3.1.1 Design

Table 2: Games used in Experiment 2. Participants were asked how likely it was that the player indicated by the ? tried hard in this game. *Note:* > indicates that team1 won against team2; < indicates that team1 lost against team2.

id	game
1	1? > 2
2	1? < 2
3	1? > 2
3	1 > 2
3	1 > 2
4	1 > 2?
4	1 > 2
4	1 > 2
5	1? 2 > 3
6	1 2 > 3?
7	1? 2 < 3
8	1 2 < 3?
9	1? < 2
9	1 > 2
9	1 > 2
10	1 < 2?
10	1 > 2
10	1 > 2
11	1 < 2
11	1? > 2
11	1 > 2
12	1 < 2
12	1 > 2?
12	1 > 2
13	1? 2 < 3
13	2 > 3
14	1 2? < 3
14	2 > 3
15	1 2 < 3
15	2 > 3?
16	1? < 2

id	game
16	$2 > 3$
16	$2 > 4$
17	$\mathbf{1?} < 2$
17	$2 < 3$
17	$2 < 4$
18	$\mathbf{1?} > 2$
18	$1 > 2$
19	$1 > \mathbf{2?}$
19	$1 > 2$
20	$\mathbf{1?} > 2$
20	$1 < 2$
21	$\mathbf{1?} > 2$
21	$1 > 3$
21	$1 > 4$
22	$1 > \mathbf{2?}$
22	$1 > 3$
22	$1 > 4$
23	$\mathbf{1?} \ 2 > 3 \ 4$
24	$\mathbf{1?} \ 2 > 3 \ 4$
24	$3 > 4$
25	$\mathbf{1?} \ 2 < 3$
25	$2 < 3$
26	$1 \ \mathbf{2?} < 3$
26	$2 < 3$
27	$\mathbf{1?} \ 2 \ 3 > 4 \ 5$
28	$\mathbf{1?} \ 2 \ 3 < 4 \ 5$
29	$1 \ 2 \ 3 > \mathbf{4?} \ 5$
30	$1 \ 2 \ 3 < \mathbf{4?} \ 5$
31	$\mathbf{1?} \ 2 > 3 \ 4$
31	$1 \ 2 < 3 \ 4$
32	$\mathbf{1?} \ 2 \ 3 > 4$
33	$\mathbf{1?} \ 2 \ 3 < 4$

3.2 Results

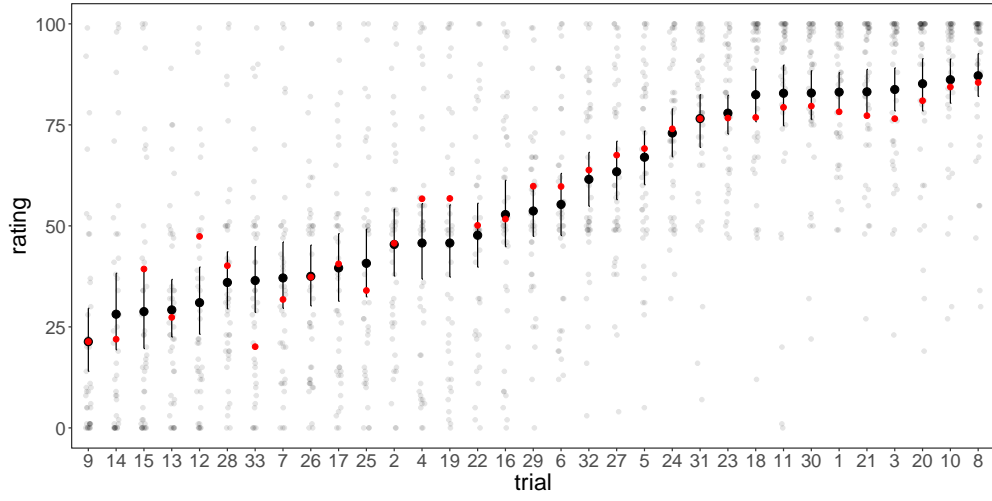


Figure 5: Results.

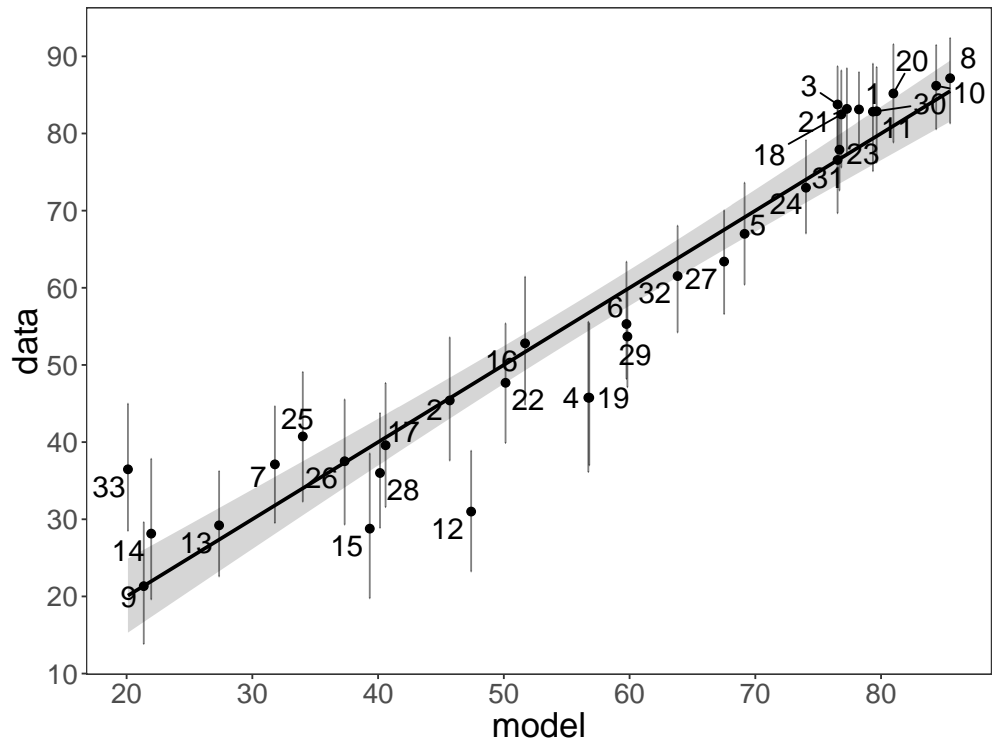


Figure 6: Scatter plot.