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## **SUPPLEMENT: Appendix A: Insignificant experiment (6)**

One more experiment was conducted, yielding an insignificant target effect of pair distance overall, but still showing a tendency in one condition (i.e., means in the expected direction of greater liking for pairs of wide than narrow pair distances when oriented towards the maximum). The SDE was replicated. Following the arguments of Rosenthal (1979), and, more recently, Lakens and Etz (2017), we argue that mixed levels of significance in a series of studies which form a line of research often are more likely to occur than a series of exclusively significant studies, and can provide evidence for the target hypothesis if statistical power is sufficient and Type I error rates are adequately controlled (see Overview section above). We describe this experiment in short terms.

Six sets of six ideographs, from six languages unfamiliar to our student population, were chosen as stimuli. We expected the SDE to replicate and further predicted more positive evaluative judgments for elements from wider pairs, as compared to elements from narrower pairs. The same methodology was used as in Experiment 1 except using two more fictitious languages (6 instead of 4), and using a shorter chain of six ideographs per language (instead of eight). No participant was excluded. For accuracies and response latencies see Table 6.

**Table 6 Experiment 6**, Accuracies and Response latencies by Pair distance.

	Pair 3/4		Pair 2/5		Pair 1/6	
Accuracy	.736	(.357)	.856	(.268)	.895	(.235)
Latency	1409	(571)	1354	(535)	1223	(499)

*Note.* Accuracies are given in proportion of correct responses. Response latencies are given in milliseconds. Standard deviations are presented in brackets.

Using the same type of statistical modelling as in Experiment 1, and with significant SDE's for accuracy and latency, liking was compared between elements as part of trained stimulus pairs of type 1/6 (pair distance = 5,  $M_{16} = 3.53$ ,  $SD = 1.53$ ) and 4/5 (pair distance = 1,  $M_{45} = 3.41$ ,  $SD = 1.44$ ),  $F(1, 40) = 2.00$ ;  $p = .16$ ,  $dz = .10$ . As the interaction between pair distance and orientation was significant,  $F(1, 1664) = 4.91$ ;  $p = .03$ , Bonferroni-Holm corrected simple effects were calculated revealing that the outer-inner difference was significant when stimuli were oriented towards the maximum ( $M_{outer} = 3.69$ ,  $M_{inner} = 3.43$ ;  $t(94.5) = -2.45$ ;  $p < .03$ ), whereas the difference was not significant for stimuli oriented towards the minimum ( $M_{outer} = 3.37$ ,  $M_{inner} = 3.38$ ;  $t(94.5) = .177$ ;  $p = .86$ ). The blending hypothesis was confirmed for outer pairs as stimuli closer to the maximum were preferred to those closer to the minimum ( $p < .001$ ), but not for inner pairs ( $p = .57$ ).

In a separately calculated model, predicting preferences for the stimuli involved in inner and outer pairs by the response times to these same stimuli, and participants as random factor, we found that response times for a stimulus significantly predicted the preference for it,  $F(1, 50.73) = 5.61$ ;  $p = .02$ ,  $\beta = -.14$ . That is, the shorter the response time, the more a stimulus was liked.

## **SUPPLEMENT: Appendix B: Artificial words from Bailey & Hahn (2001)**

Four blocks:

- 1) Binth, Clemp, Dresp, Flesk, Misp, Nulp, Shrept, Shrurst
- 2) Blesk, Clenth, Dolf, Finth, Resp, Slon, Smiss, Zint
- 3) Breltch, Crupt, Druss, Frondge, Gesht, Sesk, Swess, Wust
- 4) Brunth, Crusp, Drup, Freltch, Kwesk, Smist, Swuft, Thrindge

## SUPPLEMENT: Appendix C: Modelling of effects

In order to determine which random effect structure to assume, we used generalized linear mixed models with random effects for *participants* for accuracy data, and linear mixed models with random effects for *participants* for latency and preference data. Non-minimal models were compared with the corresponding minimal model for each experiment (see below). If there was a significant difference in fit, the particular type of random slope as specified in the non-minimal model under comparison was then retained for the final model, afinal, resp., tfinal, resp., pfinal. In a second step, these final models were assembled and run in order to evaluate the respective fixed effect structure from those models (see Jaeger, 2008). This strategy thus considers random intercepts and random slopes for the main effects of the experimental design. The analyses employed the statistical programming language R (R Core Team, 2013), using the package lme4 (Bates, Maechler, Bolker, & Walker, 2015) and afex (Singmann, Bolker, Westfall, & Aust, 2018).

### Experiment 1

Model comparisons were performed in a two-steps procedure: In the first step, we fitted three or four models for each data type (a1, a2, a3 for accuracy data, tm1, tm2, tm3 for latency data, and p1, p2, p3, p4 for preference data). Models of type a and tm had the same fixed effect structure, that is, pair distance and ideograph style, as well as their interaction. Models of type p had, additionally, orientation (towards minimum or maximum of the dimension) as a fixed effect. All models had a random intercept for participants. Models a3, tm3 and p4 had only this intercept, so these models are minimal. Models a1 / tm1 / p1 also had a random slope for pair distance as function of participant. Models a2 and tm2 had a random slope for ideograph style instead, whereas model p2 had a random slope for orientation. Finally, model p3 had a random slope for ideograph style. These models were then compared using the Chi square difference statistic  $\Delta\chi^2$ .

#### Accuracies

Model	<i>df</i>	<i>AIC</i>	<i>BIC</i>	<i>loglik</i>	<i>deviance</i>	$\Delta\chi^2$	$\Delta df$	<i>p</i>
a3	17	1987.8	2085.8	-976.88	1953.8			
a1	26	1960.8	2110.8	-954.37	1908.8	45.014	9	9.17e-07 ***
a2	26	1889.2	2039.3	-918.62	1837.2	116.51	9	< 2.2e-16 ***

afinal = random slopes for pair distance and ideograph style, as a function of participants, are kept.

#### Latencies

Model	<i>df</i>	<i>AIC</i>	<i>BIC</i>	<i>loglik</i>	<i>deviance</i>	$\Delta\chi^2$	$\Delta df$	<i>p</i>
tm3	18	29311	29410	-14637	29275			
tm1	27	29263	29411	-14604	29209	65.624	9	1.091e-10 ***
tm2	27	29284	29432	-14615	29230	44.641	9	1.075e-06 ***

`tfinal` = random slopes for pair distance and ideograph style, as a function of participants, are kept.

### *Preferences*

Model	<i>df</i>	<i>AIC</i>	<i>BIC</i>	<i>loglik</i>	<i>deviance</i>	$\Delta\chi^2$	$\Delta df$	<i>p</i>
p4	18	4486.1	4577.5	-2225.1	4450.1			
p1	20	4487.0	4588.5	-2223.5	4447.0	3.16	2	0.206
p2	27	4480.2	4581.8	-2220.1	4440.2	9.9093	2	0.007051 **
p3	20	4444.9	4581.9	-2195.4	4390.9	59.276	9	1.848e-09***

`pfinal` = random slopes for ideograph style and orientation, as a function of participants, are kept.

## Experiment 2

Model comparisons were performed in a two-steps procedure: In the first step, we fitted three models for accuracy and latency data (a1, a2, a3 for accuracy, tm1, tm2, tm3 for latency), and five models for preference data (p1, p2, p3, p4, p5). Models pertaining to accuracy and latency had pair distance and nonword list, as well as their interaction, as fixed factors. Models pertaining to preference had these, and additionally, orientation (towards minimum or maximum of the dimension) and comparator as fixed factors, along with all possible interactions. All models had a random intercept for participants. Models a3, tm3 and p5 had only this intercept, so these models are minimal. Models a1 / tm1 / p1 also had a random slope for pair distance as function of participant, whereas a2 / tm2 / p2 had a random slope for nonword list. Model p3 had a random slope for orientation, and model p4 had a random slope for comparator. These models were then compared using the Chi square difference statistic  $\Delta\chi^2$ .

### *Accuracies*

Model	<i>df</i>	<i>AIC</i>	<i>BIC</i>	<i>loglik</i>	<i>deviance</i>	$\Delta\chi^2$	$\Delta df$	<i>p</i>
a3	17	2946.7	3046.9	-1456.3	2912.7			
a1	26	2909.1	3062.4	-1428.6	2857.1	55.582	9	9.434e-09 ***
a2	26	2859.3	3012.6	-1403.7	2807.3	105.39	9	< 2.2e-16 ***

`afinal` = random slopes for pair distance and nonword list, as a function of participants, are kept.

### *Latencies*

Model	<i>df</i>	<i>AIC</i>	<i>BIC</i>	<i>loglik</i>	<i>deviance</i>	$\Delta\chi^2$	$\Delta df$	<i>p</i>
tm3	18	29240	29339	-14602	29204			

tm1	27	29221	29370	-14584	29167	36.447	9	3.303e-05	***
tm2	27	29171	29319	-14558	29117	87.192	9	5.948e-15	***

tfinal = random slopes for pair distance and nonword list, as a function of participants, are kept.

### Preferences

Model	<i>df</i>	<i>AIC</i>	<i>BIC</i>	<i>loglik</i>	<i>deviance</i>	$\Delta\chi^2$	$\Delta df$	<i>p</i>	
p5	43	4662.2	4886.0	-2288.1	4576.2	53.605	9	2.244e-08	***
p1	36	4670.6	4858.0	-2299.3	4598.6	31.181	2	1.694e-07	***
p2	43	4662.2	4886.0	-2288.1	4576.2	53.605	9	2.244e-08	***
p3	36	4671.8	4859.1	-2299.9	4599.8	30.004	2	3.053e-07	***
p4	36	4684.1	4871.4	-2306.1	4612.1	17.717	2	0.0001422	***

pfinal = random slopes for pair distance, nonword list, orientation and comparator, as a function of participants, are kept.

## Experiment 3

Model comparisons were performed in a two-steps procedure: In the first step, we fitted three or four models for each data type (a1, a2, a3 for accuracy data, tm1, tm2, tm3 for latency data, and p1, p2, p3, p4 for preference data). Models of type a and tm had the same fixed effect structure, that is, pair distance, ideograph style and number of learning cycles, as well as their interactions. Models of type p had, additionally, orientation (towards minimum or maximum of the dimension) as a fixed effect. All models had a random intercept for participants. Models a3, tm3 and p4 had only this intercept, so these models are minimal. Models a1 / tm1 / p1 also had a random slope for pair distance as function of participant. Models a2 and tm2 had a random slope for ideograph style instead, whereas model p2 had a random slope for orientation. Finally, model p3 had a random slope for ideograph style. These models were then compared using the Chi square difference statistic  $\Delta\chi^2$ .

### Experiment 3a

#### Accuracies

Model	<i>df</i>	<i>AIC</i>	<i>BIC</i>	<i>loglik</i>	<i>deviance</i>	$\Delta\chi^2$	$\Delta df$	<i>p</i>
a3	37	1962.1	2198.8	-944.06	1888.1			
a1	42	1929.7	2198.3	-922.82	1845.7	42.465	5	4.742e-08***

a2	46	1941.1	2235.3	-924.55	1849.1	39.014	9	1.145e-05
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afinal = random slopes for pair distance and ideograph style as a function of participants are kept.

### *Latencies*

Model	<i>df</i>	<i>AIC</i>	<i>BIC</i>	<i>loglik</i>	<i>deviance</i>	$\Delta\chi^2$	$\Delta df$	<i>p</i>
tm3	38	12605	12845	-6264.5	12529			
tm1	43	12541	12813	-6227.4	12455	74.137	5	1.408e-14***
tm2	47	12560	12858	-6233.1	12466	62.751	9	3.942e-10***

tfinal = random slopes for pair distance and ideograph style as a function of participants are kept.

### *Preferences*

Model	<i>df</i>	<i>AIC</i>	<i>BIC</i>	<i>loglik</i>	<i>deviance</i>	$\Delta\chi^2$	$\Delta df$	<i>p</i>
p4	50	5687.3	5952.2	-2793.7	5587.3			
p1	52	5682.0	5957.4	-2789.0	5578.0	9.3361	2	0.009391**
p2	52	5673.3	5948.7	-2784.6	5569.3	18.056	2	0.00012***
p3	59	5751.5	6064.0	-2816.7	633.5	0	9	1

pfinal = random slopes for pair distance and orientation, as a function of participants, are kept.

### ***Experiment 3b***

#### *Accuracies*

Model	<i>df</i>	<i>AIC</i>	<i>BIC</i>	<i>loglik</i>	<i>deviance</i>	$\Delta\chi^2$	$\Delta df$	<i>p</i>
a3	37	1187.0	1421.5	-556.49	1113.0			
a1	42	1191.7	1457.9	-553.87	1107.7	5.2413	5	0.3871
a2	46	1201.4	1492.9	-554.70	1109.4	3.5791	9	0.9369

afinal = no random slopes as a function of participants are kept.

### *Latencies*

Model	<i>df</i>	<i>AIC</i>	<i>BIC</i>	<i>loglik</i>	<i>deviance</i>	$\Delta\chi^2$	$\Delta df$	<i>p</i>
tm3	38	12521	12761	-6222.5	12445			
tm1	43	12460	12731	-6186.8	12374	71.451	5	5.111e-14***
tm2	47	12477	12773	-6191.4	12383	62.185	9	5.075e-10***

*tfinal* = random slopes for pair distance and ideograph style as a function of participants are kept.

### *Preferences*

Model	<i>df</i>	<i>AIC</i>	<i>BIC</i>	<i>loglik</i>	<i>deviance</i>	$\Delta\chi^2$	$\Delta df$	<i>p</i>
p4	50	5402.3	5664.3	-2651.2	5302.3			
p1	52	5402.2	5674.6	-2649.1	5298.2	4.1457	2	0.1258
p2	52	5406.0	5678.4	-2651.0	5302.0	0.3673	2	0.8322
p3	59	5405.1	5714.1	-2643.5	5287.1	15.286	9	0.08338

*pfinal* = no random slopes as a function of participants are kept.

## Experiment 4

In this experiment, type of comparator (“older”, or “more frequently used”, see Methods section in Experiment 1) did make a difference for accuracies and latencies, but not for preference. Therefore, the reported models for preference do not have comparator as a fixed factor, whereas the remaining models do.

For accuracy and latency models, four models each were fitted (a1, a2, a3, a4 for accuracy, tm1, tm2, tm3, tm4 for latency). These had pair distance, type of ideograph, and comparator, as well as their interactions, as fixed factors. The five models pertaining to preference (p1, p2, p3, p4, p5) had pair distance, type of ideograph, comparator and orientation (towards minimum or maximum of the dimension) as fixed factors, along with all possible interactions. All models had a random intercept for participants. Models a4, tm4 and p5 had only this intercept, so these models are minimal. Models a1 / tm1 / p1 also had a random slope for pair distance as function of participant, whereas a2 / tm2 / p2 had a random slope for type of ideograph. Models a3 / tm3 / p3 had a random slope for comparator, and p4 had a random slope for orientation. These models were then compared using the Chi square difference statistic  $\Delta\chi^2$ .

### *Accuracies*

Model	<i>df</i>	<i>AIC</i>	<i>BIC</i>	<i>loglik</i>	<i>deviance</i>	$\Delta\chi^2$	$\Delta df$	<i>p</i>
a4	33	10947	11194	-5440.7	10881			
a1	42	10525	10839	-5220.6	10441	440.12	9	< 2.2e-16 ***

a2	42	10556	10869	-5235.8	10472	409.76	9	< 2.2e-16 ***
a3	35	10937	11199	-5433.6	10867	14.219	2	0.0008172 ***

afinal = random slopes for pair distance, type of ideograph, and comparator, as a function of participants, are kept.

### *Latencies*

Model	<i>df</i>	<i>AIC</i>	<i>BIC</i>	<i>loglik</i>	<i>deviance</i>	$\Delta\chi^2$	$\Delta df$	<i>p</i>
tm4	10	157867	157939	-78923	157847			
tm1 ***	12	157807	157894	-78892	157783	63.37	2	1.735e-14
tm2	12	157703	157789	-78839	157679	167.98	2	< 2.2e-16 ***
tm3	12	157862	157948	-78919	157838	8.6139	2	0.01347 *

tfinal = random slopes for pair distance, type of ideograph, and comparator, as a function of participants, are kept.

### *Preferences*

Model	<i>df</i>	<i>AIC</i>	<i>BIC</i>	<i>loglik</i>	<i>deviance</i>	$\Delta\chi^2$	$\Delta df$	<i>p</i>
p5	34	25781	26011	-12856	25713			
p1	36	25759	26003	-12844	25687	25.517	2	2.878e-06 ***
p2	43	25626	25917	-12770	25540	172.83	9	< 2.2e-16 ***
p3	36	25727	25971	-12828	25655	57.146	2	3.899e-13 ***
p4	36	25736	25980	-12832	25664	48.858	2	2.458e-11 ***

pfinal = random slopes for pair distance, type of ideograph and orientation, as a function of participants, are kept.

## Experiment 5

Model structure and comparisons were the same as in Experiment 2.

### *Accuracies*

Model	<i>df</i>	<i>AIC</i>	<i>BIC</i>	<i>loglik</i>	<i>deviance</i>	$\Delta\chi^2$	$\Delta df$	<i>p</i>
a3	33	2375.9	2563.5	-1154.9	2309.9			

a1	42	2353.9	2592.7	-1135.0	2269.9	39.931	9	7.822e-06 ***
a2	42	2376.8	2615.6	-1146.4	2292.8	17.057	9	0.04784 *

afinal = random slopes were kept for pair distance and nonword list, as a function of participants.

### *Latencies*

Model	<i>df</i>	<i>AIC</i>	<i>BIC</i>	<i>loglik</i>	<i>deviance</i>	$\Delta\chi^2$	$\Delta df$	<i>p</i>
tm3	34	2828.9	3009.1	-1380.5	2760.9			
tm1	43	2776.9	3004.8	-1345.5	2690.9	69.972	9	1.542e-11 **
tm2	43	2809.6	3037.4	-1361.8	2723.6	37.335	9	2.293e-05 ***

tfinal = random slopes for pair distance and nonword list, as a function of participants, are kept.

### *Preferences*

Model	<i>df</i>	<i>AIC</i>	<i>BIC</i>	<i>loglik</i>	<i>deviance</i>	$\Delta\chi^2$	$\Delta df$	<i>p</i>
p2	10	1896.1	1939.1	-938.05	1876.1			
p0	12	1899.0	1950.6	-937.49	1875.0	1.114	2	0.5729
p1	12	1887.8	1939.3	-931.87	1863.8	12.35	2	0.002081 **

pfinal = random slopes for orientation as a function of participants, are kept.

## Experiment 6

Model comparisons were performed in the same way as in Experiment 1.

### *Accuracies*

Model	<i>df</i>	<i>AIC</i>	<i>BIC</i>	<i>loglik</i>	<i>deviance</i>	$\Delta\chi^2$	$\Delta df$	<i>p</i>
a3	33	1999.6	2190	-966.80	1933.6			
a1	42	1972.7	2215	-944.35	1888.7	44.912	9	9.581e-07
a2	42	1902.2	2144.6	-909.12	1818.2	115.36	9	2.2e-16

afinal = random slopes for pair distance and ideograph style as a function of participants are kept.

### *Latencies*

Model	<i>df</i>	<i>AIC</i>	<i>BIC</i>	<i>loglik</i>	<i>deviance</i>	$\Delta\chi^2$	$\Delta df$	<i>p</i>
tm3	34	29326	29513	-14629	29258			
tm1	43	29280	29516	-14597	29194	64.101	9	2.157e-10***
tm2	43	29298	29534	-14606	29212	46.182	9	5.572e-07***

tfinal = random slopes for pair distance and ideograph style as a function of participants are kept.

### *Preferences*

Model	<i>df</i>	<i>AIC</i>	<i>BIC</i>	<i>loglik</i>	<i>deviance</i>	$\Delta\chi^2$	$\Delta df$	<i>p</i>
p4	26	7170.7	7315.9	-3559.3	7118.7			
p1	28	7170.8	7327.2	-3557.4	7114.8	3.8215	2	0.148
p2	28	7167.9	7324.3	-3556.0	7111.9	6.7188	2	0.03476 *
p3	46	7145.3	7402.2	-3526.7	7053.3	65.324	20	1.036e-06 ***

pfinal = random slopes for ideograph style and orientation, as a function of participants, are kept.

## SUPPLEMENT: Appendix D: Model estimates for effects

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

### Experiment 1

*Accuracies, fixed effects:*

Fixed effects:

	Estimate	Std. Error	z value	Pr(> z )	
(Intercept)	2.63295	0.24644	10.684	< 2e-16	***
dist1	-1.54619	0.21328	-7.250	4.18e-13	***
dist2	0.06476	0.20907	0.310	0.75674	
dist3	0.27689	0.24126	1.148	0.25110	
block1	-0.42041	0.22262	-1.888	0.05896	.
block2	-0.12663	0.27819	-0.455	0.64898	
block3	0.71211	0.36054	1.975	0.04825	*
dist1:block1	0.43260	0.19378	2.232	0.02559	*
dist2:block1	-0.48045	0.20196	-2.379	0.01736	*
dist3:block1	-0.08144	0.22315	-0.365	0.71514	
dist1:block2	0.52009	0.19740	2.635	0.00842	**
dist2:block2	0.39904	0.21683	1.840	0.06572	.
dist3:block2	-0.69873	0.21960	-3.182	0.00146	**
dist1:block3	-0.94003	0.23802	-3.949	7.84e-05	***
dist2:block3	0.34092	0.24957	1.366	0.17193	
dist3:block3	0.57871	0.27421	2.110	0.03482	*
---					

*Accuracies, random effects:*

Groups	Name	Variance	Std.Dev.	Corr
Part.	(Intercept)	1.4824	1.2175	
	dist1	0.9402	0.9696	-0.51
	dist2	0.4969	0.7049	0.58 -0.67
	dist3	0.8783	0.9372	-0.06 -0.26 -0.44
	block1	0.7390	0.8597	-0.36 0.45 -0.55 -0.13
	block2	1.4017	1.1839	0.20 0.13 0.07 -0.56 0.50
	block3	2.4419	1.5627	0.17 -0.03 -0.02 0.25 -0.72 -0.50

*Latencies, fixed effects:*

	Estimate	Std. Error	df	t value	Pr(> t )	
(Intercept)	1526.901	101.301	36.151	15.073	< 2e-16	***
dist1	127.252	35.661	195.908	3.568	0.000452	***
dist2	97.813	50.798	37.385	1.926	0.061794	.
dist3	-46.931	35.234	57.513	-1.332	0.188122	
block1	119.273	48.154	35.456	2.477	0.018163	*
block2	-30.006	45.905	35.810	-0.654	0.517512	
block3	-51.325	44.149	39.533	-1.163	0.251982	
dist1:block1	8.519	59.471	1654.926	0.143	0.886112	
dist2:block1	-48.223	55.526	1666.344	-0.868	0.385262	
dist3:block1	78.582	53.783	1676.294	1.461	0.144181	
dist1:block2	42.059	59.098	1594.652	0.712	0.476769	
dist2:block2	-19.157	55.264	1679.683	-0.347	0.728894	
dist3:block2	-84.788	54.042	1684.890	-1.569	0.116855	
dist1:block3	47.136	60.553	1628.298	0.778	0.436426	
dist2:block3	-93.145	53.616	1698.662	-1.737	0.082521	.
dist3:block3	92.243	52.291	1672.674	1.764	0.077909	.
---						

*Latencies, random effects:*

Groups	Name	Variance	Std.Dev.	Corr
Part.	(Intercept)	367153	605.93	
	dist1	2945	54.27	0.63
	dist2	58037	240.91	0.61 0.41
	dist3	10665	103.27	0.30 -0.06 -0.52
	block1	47968	219.02	0.66 -0.10 0.16 0.63
	block2	40003	200.01	0.14 0.82 -0.04 -0.05 -0.53
	block3	35350	188.02	-0.61 -0.43 0.21 -0.79 -0.63 -0.2
2	Residual	576967	759.58	

*Preferences, fixed effects:*

	Estimate	Std. Error	df	t value	Pr(> t )	
(Intercept)	3.46791	0.12110	36.00065	28.636	<2e-16	***
block1	0.16047	0.13460	36.05218	1.192	0.2410	
block2	0.08615	0.10075	36.08062	0.855	0.3981	
block3	-0.04223	0.10817	37.61538	-0.390	0.6984	
dist1	-0.10135	0.04154	1024.00003	-2.440	0.0149	*
direct1	-0.07095	0.06243	36.69587	-1.136	0.2631	
block1:dist1	-0.13514	0.07195	1024.00003	-1.878	0.0606	.
block2:dist1	0.02703	0.07195	1024.00003	0.376	0.7073	
block3:dist1	-0.03378	0.07195	1024.00003	-0.470	0.6388	
block1:direct1	0.03716	0.07195	1024.00003	0.517	0.6056	
block2:direct1	0.10473	0.07195	1024.00003	1.456	0.1458	
block3:direct1	-0.05743	0.07195	1024.00003	-0.798	0.4249	
dist1:direct1	0.07939	0.04154	1024.00003	1.911	0.0563	.
block1:dist1:direct1	-0.11318	0.07195	1024.00003	-1.573	0.1160	
block2:dist1:direct1	0.13682	0.07195	1024.00003	1.902	0.0575	
block3:dist1:direct1	0.02872	0.07195	1024.00003	0.399	0.6899	

*Preferences, random effects:*

Groups	Name	Variance	Std.Dev.	Corr
Part.	(Intercept)	0.47881	0.6920	
	block1	0.47876	0.6919	-0.39

block2	0.18402	0.4290	0.14	-0.59		
block3	0.24140	0.4913	0.59	-0.87	0.44	
direct1	0.08034	0.2834	0.07	0.05	0.37	0.30
Residual	2.04311	1.4294				

## Experiment 2

Accuracies, fixed effects:

	Estimate	Std. Error	z value	Pr(> z )		
(Intercept)	1.41994	0.18587	7.639	2.18e-14	***	
dist1	-1.11965	0.15919	-7.034	2.01e-12	***	
dist2	-0.09876	0.13295	-0.743	0.4576		
dist3	0.31192	0.14790	2.109	0.0349	*	
list1	0.07208	0.18415	0.391	0.6955		
list2	-0.06987	0.20693	-0.338	0.7356		
list3	0.19113	0.15664	1.220	0.2224		
dist1:list1	0.28611	0.14639	1.954	0.0507	.	
dist2:list1	-0.27098	0.14984	-1.808	0.0705	.	
dist3:list1	-0.22075	0.15741	-1.402	0.1608		
dist1:list2	-0.33527	0.14992	-2.236	0.0253	*	
dist2:list2	0.03662	0.15182	0.241	0.8094		
dist3:list2	0.31638	0.16017	1.975	0.0482	*	
dist1:list3	0.02398	0.14559	0.165	0.8692		
dist2:list3	-0.13247	0.15171	-0.873	0.3825		
dist3:list3	0.16373	0.16196	1.011	0.3120		

Accuracies, random effects:

Groups	Name	Variance	Std.Dev.	Corr		
Part.	(Intercept)	1.2378	1.1126			
	dist1	0.7075	0.8411	-0.75		
	dist2	0.3296	0.5741	-0.22	0.05	
	dist3	0.4014	0.6336	0.64	-0.80	-0.34
	list1	0.9539	0.9767	-0.21	0.26	-0.34
	list2	1.2971	1.1389	0.38	-0.39	0.00
	list3	0.5507	0.7421	-0.14	0.13	0.01
				0.13	-0.10	-0.10

Latencies, fixed effects:

	Estimate	Std. Error	df	t value	Pr(> t )	
(Intercept)	1655.123	104.704	40.972	15.808	<2e-16	***
dist1	35.797	49.607	44.596	0.722	0.4743	
dist2	90.014	38.355	42.852	2.347	0.0236	*
dist3	-26.597	44.625	43.866	-0.596	0.5542	
list1	30.359	52.573	38.581	0.577	0.5670	
list2	-5.873	57.003	40.888	-0.103	0.9184	
list3	70.585	46.777	42.762	1.509	0.1387	
dist1:list1	3.386	59.953	1479.539	0.056	0.9550	
dist2:list1	8.415	55.874	1603.311	0.151	0.8803	
dist3:list1	38.097	53.874	1597.097	0.707	0.4796	
dist1:list2	2.419	65.899	1433.024	0.037	0.9707	
dist2:list2	52.668	57.003	1557.384	0.924	0.3556	
dist3:list2	-28.607	55.194	1606.034	-0.518	0.6043	
dist1:list3	-21.803	59.557	1254.731	-0.366	0.7144	

dist2:list3	11.712	53.614	1593.953	0.218	0.8271
dist3:list3	-50.882	52.804	1606.282	-0.964	0.3354

*Latencies, random effects:*

Groups	Name	Variance	Std.Dev.	Corr					
Part.	(Intercept)	445196	667.2						
	dist1	48848	221.0	-0.23					
	dist2	18918	137.5	-0.07	-0.61				
	dist3	42206	205.4	0.19	-0.59	0.45			
	list1	72124	268.6	0.27	-0.23	0.39	0.15		
	list2	86919	294.8	-0.46	0.19	-0.26	0.23	-0.53	
	list3	50014	223.6	0.65	-0.59	0.01	0.35	-0.21	-0.3
2	Residual	569831	754.9						

*Preferences, fixed effects:*

	Estimate	Std. Error	df	t value	Pr(> t )
(Intercept)	3.548e+00	9.476e-02	4.132e+01	37.442	< 2e-16 **
*					
list1	2.107e-01	6.512e-02	6.912e+02	3.236	0.001272 **
list2	2.732e-02	6.567e-02	7.041e+02	0.416	0.677544
list3	-2.135e-01	6.692e-02	6.385e+02	-3.191	0.001490 **
comp1	9.125e-04	5.359e-02	4.146e+01	0.017	0.986496
dist1	-1.699e-01	6.058e-02	4.158e+01	-2.804	0.007636 **
direct1	-6.555e-02	6.042e-02	4.135e+01	-1.085	0.284193
list1:comp1	5.522e-02	6.999e-02	1.173e+03	0.789	0.430332
list2:comp1	-8.531e-02	7.042e-02	1.171e+03	-1.211	0.225978
list3:comp1	7.596e-02	7.146e-02	1.096e+03	1.063	0.288016
list1:dist1	-1.455e-01	5.863e-02	1.155e+03	-2.482	0.013222 *
list2:dist1	7.205e-02	5.904e-02	1.160e+03	1.220	0.222564
list3:dist1	7.023e-02	6.087e-02	1.167e+03	1.154	0.248838
comp1:dist1	7.830e-02	3.404e-02	1.149e+03	2.300	0.021621 *
list1:direct1	-4.052e-02	5.863e-02	1.155e+03	-0.691	0.489634
list2:direct1	5.633e-02	5.905e-02	1.159e+03	0.954	0.340281
list3:direct1	1.971e-03	6.089e-02	1.167e+03	0.032	0.974183
comp1:direct1	-4.791e-03	3.404e-02	1.149e+03	-0.141	0.888099
dist1:direct1	2.668e-02	3.403e-02	1.148e+03	0.784	0.433160
list1:comp1:dist1	-3.748e-02	6.634e-02	8.591e+02	-0.565	0.572262
list2:comp1:dist1	-2.522e-01	6.657e-02	8.686e+02	-3.789	0.000162 **
*					
list3:comp1:dist1	1.674e-01	6.821e-02	8.856e+02	2.454	0.014300 *
list1:comp1:direct1	-2.696e-03	6.661e-02	8.815e+02	-0.040	0.967722
list2:comp1:direct1	-1.030e-01	6.684e-02	8.908e+02	-1.542	0.123496
list3:comp1:direct1	1.623e-01	6.847e-02	9.074e+02	2.370	0.018006 *
list1:dist1:direct1	7.170e-03	5.847e-02	1.148e+03	0.123	0.902435
list2:dist1:direct1	-3.639e-02	5.879e-02	1.148e+03	-0.619	0.536064
list3:dist1:direct1	3.805e-02	6.042e-02	1.148e+03	0.630	0.528971
comp1:dist1:direct1	2.325e-02	3.403e-02	1.148e+03	0.683	0.494670
list1:comp1:dist1:direct1	1.981e-01	5.847e-02	1.148e+03	3.388	0.000728 **
*					
list2:comp1:dist1:direct1	-1.285e-01	5.879e-02	1.148e+03	-2.186	0.028989 *
list3:comp1:dist1:direct1	-1.416e-01	6.042e-02	1.148e+03	-2.343	0.019300 *

*Preferences, random effects:*

Groups	Name	Variance	Std.Dev.	Corr
Part.	(Intercept)	0.32760	0.5724	
	dist1	0.10490	0.3239	-0.06
	comp1	0.07149	0.2674	-0.32 0.49
	direct1	0.10404	0.3226	-0.03 0.24 0.27
Residual		1.48842	1.2200	

### Experiment 3 a

Accuracies, fixed effects:

	Estimate	Std. Error	z value	Pr(> z )	
(Intercept)	4.293944	0.232165	18.495	< 2e-16	***
step1	-1.054184	0.217272	-4.852	1.22e-06	***
step2	0.183479	0.242895	0.755	0.450019	
block1	-0.049737	0.311540	-0.160	0.873157	
block2	-0.099881	0.286441	-0.349	0.727317	
block3	-0.036297	0.296876	-0.122	0.902689	
repetition1	-0.207722	0.202782	-1.024	0.305666	
repetition2	0.477172	0.216423	2.205	0.027467	*
step1:block1	-0.120893	0.271796	-0.445	0.656470	
step2:block1	0.708900	0.296873	2.388	0.016946	*
step1:block2	-0.038608	0.252778	-0.153	0.878606	
step2:block2	0.181330	0.284875	0.637	0.524435	
step1:block3	0.459219	0.274426	1.673	0.094253	.
step2:block3	-1.069223	0.289957	-3.688	0.000226	***
step1:repetition1	-0.048743	0.241243	-0.202	0.839878	
step2:repetition1	0.187482	0.259863	0.721	0.470622	
step1:repetition2	0.003215	0.257473	0.012	0.990039	
step2:repetition2	-0.136498	0.265301	-0.515	0.606901	
block1:repetition1	0.246787	0.324754	0.760	0.447302	
block2:repetition1	0.090177	0.290361	0.311	0.756128	
block3:repetition1	-0.110958	0.311637	-0.356	0.721803	
block1:repetition2	-0.181326	0.337272	-0.538	0.590835	
block2:repetition2	0.123538	0.317773	0.389	0.697452	
block3:repetition2	0.280613	0.344473	0.815	0.415293	
step1:block1:repetition1	-0.262922	0.286749	-0.917	0.359191	
step2:block1:repetition1	-0.408547	0.339272	-1.204	0.228517	
step1:block2:repetition1	0.416527	0.271286	1.535	0.124690	
step2:block2:repetition1	-0.339780	0.318207	-1.068	0.285613	
step1:block3:repetition1	0.299748	0.296862	1.010	0.312627	
step2:block3:repetition1	-0.904686	0.308758	-2.930	0.003389	**
step1:block1:repetition2	-0.425040	0.313526	-1.356	0.175202	
step2:block1:repetition2	0.497231	0.361240	1.376	0.168680	
step1:block2:repetition2	-0.355756	0.308177	-1.154	0.248340	
step2:block2:repetition2	0.452458	0.368805	1.227	0.219889	
step1:block3:repetition2	0.301906	0.353919	0.853	0.393639	
step2:block3:repetition2	-0.165652	0.351057	-0.472	0.637022	

Accuracies, random effects:

Groups	Name	Variance	Std.Dev.	Corr
Part.	(Intercept)	0.7215	0.8494	
	step1	1.4571	1.2071	-0.50
	step2	1.1119	1.0545	0.29 -0.39
	block1	1.9988	1.4138	0.02 0.04 0.68
	block2	1.4896	1.2205	0.05 -0.09 -0.11 -0.41
	block3	1.7822	1.3350	-0.05 0.12 -0.44 -0.32 -0.46

*Latencies, fixed effects:*

	Estimate	Std. Error	df	t value	Pr(> t )	
(Intercept)	1.768e+00	4.533e-02	9.477e+01	39.003	< 2e-16	**
*						
step1	3.288e-01	3.461e-02	9.525e+01	9.498	1.91e-15	**
*						
step2	-2.598e-02	2.394e-02	2.736e+02	-1.086	0.278636	
block1	1.636e-01	4.342e-02	9.320e+01	3.768	0.000288	**
*						
block2	-8.638e-02	3.473e-02	9.708e+01	-2.487	0.014586	*
block3	-1.784e-02	3.696e-02	9.784e+01	-0.483	0.630370	
repetition1	4.699e-02	6.421e-02	9.486e+01	0.732	0.466111	
repetition2	4.327e-02	6.473e-02	9.471e+01	0.669	0.505422	
step1:block1	1.010e-01	4.042e-02	3.777e+03	2.499	0.012512	*
step2:block1	-3.636e-02	3.939e-02	3.720e+03	-0.923	0.356077	
step1:block2	6.838e-02	3.969e-02	3.787e+03	1.723	0.085046	.
step2:block2	-1.717e-02	3.886e-02	3.733e+03	-0.442	0.658645	
step1:block3	-5.988e-02	3.935e-02	3.785e+03	-1.522	0.128204	
step2:block3	3.223e-02	3.905e-02	3.737e+03	0.825	0.409298	
step1:repetition1	-5.113e-02	4.914e-02	9.635e+01	-1.040	0.300721	
step2:repetition1	2.381e-03	3.407e-02	2.771e+02	0.070	0.944320	
step1:repetition2	4.345e-02	4.935e-02	9.441e+01	0.880	0.380912	
step2:repetition2	6.676e-04	3.407e-02	2.714e+02	0.020	0.984379	
block1:repetition1	3.648e-02	6.164e-02	9.413e+01	0.592	0.555419	
block2:repetition1	-6.665e-02	4.924e-02	9.743e+01	-1.354	0.178948	
block3:repetition1	6.339e-02	5.245e-02	9.918e+01	1.208	0.229740	
block1:repetition2	-8.127e-02	6.202e-02	9.276e+01	-1.310	0.193299	
block2:repetition2	3.013e-02	4.935e-02	9.684e+01	0.611	0.542911	
block3:repetition2	-4.442e-03	5.266e-02	9.616e+01	-0.084	0.932953	
step1:block1:repetition1	1.254e-01	5.758e-02	3.793e+03	2.178	0.029458	*
step2:block1:repetition1	-4.890e-02	5.589e-02	3.726e+03	-0.875	0.381707	
step1:block2:repetition1	-8.599e-02	5.623e-02	3.789e+03	-1.529	0.126239	
step2:block2:repetition1	8.101e-02	5.517e-02	3.737e+03	1.469	0.142048	
step1:block3:repetition1	-1.748e-02	5.597e-02	3.801e+03	-0.312	0.754834	
step2:block3:repetition1	2.442e-02	5.596e-02	3.761e+03	0.436	0.662512	
step1:block1:repetition2	2.033e-02	5.773e-02	3.771e+03	0.352	0.724744	
step2:block1:repetition2	-1.297e-01	5.613e-02	3.710e+03	-2.310	0.020947	*
step1:block2:repetition2	1.418e-02	5.619e-02	3.789e+03	0.252	0.800702	
step2:block2:repetition2	7.371e-03	5.493e-02	3.724e+03	0.134	0.893258	
step1:block3:repetition2	-4.660e-02	5.574e-02	3.762e+03	-0.836	0.403227	
step2:block3:repetition2	3.420e-02	5.543e-02	3.715e+03	0.617	0.537213	

*Latencies, random effects:*

Groups	Name	Variance	Std.Dev.	Corr
Part.	(Intercept)	0.175381	0.41878	
	step1	0.065564	0.25605	0.73
	step2	0.005807	0.07621	-0.37 -0.54
	block1	0.099725	0.31579	0.24 0.59 -0.92
	block2	0.039238	0.19809	0.14 0.40 0.14 -0.10
	block3	0.056339	0.23736	-0.28 -0.32 0.69 -0.52 -0.38
Residual		1.055531	1.02739	

*Preferences, fixed effects:*

	Estimate	Std. Error	df	t value	Pr(> t )
(Intercept)	4.433e+00	8.027e-02	9.688e+01	55.227	< 2e-16**
*					
step1	-1.506e-01	4.300e-02	9.739e+01	-3.502	0.000699**
*					
dominance1	1.119e-01	4.930e-02	9.819e+01	2.270	0.025392*
block1	-5.124e-02	6.957e-02	1.170e+03	-0.736	0.461605
block2	1.630e-01	6.884e-02	1.173e+03	2.368	0.018040*
block3	-4.668e-02	6.827e-02	1.169e+03	-0.684	0.494257
repetition1	-4.051e-02	1.136e-01	9.674e+01	-0.356	0.722266
repetition2	-8.346e-02	1.148e-01	9.717e+01	-0.727	0.468894
step1:dominance1	-1.989e-02	3.968e-02	1.152e+03	-0.501	0.616271
step1:block1	2.170e-02	6.905e-02	1.184e+03	0.314	0.753309
step1:block2	-1.039e-01	6.827e-02	1.183e+03	-1.522	0.128171
step1:block3	-9.045e-02	6.784e-02	1.175e+03	-1.333	0.182709
dominance1:block1	7.096e-02	6.919e-02	1.181e+03	1.026	0.305331
dominance1:block2	-9.109e-03	6.842e-02	1.182e+03	-0.133	0.894107
dominance1:block3	-4.432e-02	6.795e-02	1.175e+03	-0.652	0.514341
step1:repetition1	6.615e-02	6.090e-02	9.776e+01	1.086	0.280090
step1:repetition2	-4.566e-02	6.156e-02	9.784e+01	-0.742	0.460005
dominance1:repetition1	7.272e-02	6.980e-02	9.842e+01	1.042	0.300029
dominance1:repetition2	-1.793e-02	7.055e-02	9.859e+01	-0.254	0.799940
block1:repetition1	1.572e-01	9.874e-02	1.173e+03	1.592	0.111748
block2:repetition1	-2.454e-01	9.745e-02	1.170e+03	-2.518	0.011929*
block3:repetition1	1.799e-01	9.652e-02	1.167e+03	1.863	0.062662
block1:repetition2	3.208e-02	9.951e-02	1.170e+03	0.322	0.747250
block2:repetition2	8.458e-02	9.812e-02	1.178e+03	0.862	0.388863
block3:repetition2	-8.533e-02	9.789e-02	1.166e+03	-0.872	0.383530
step1:dominance1:block1	-3.971e-03	6.900e-02	1.152e+03	-0.058	0.954115
step1:dominance1:block2	-2.866e-02	6.823e-02	1.152e+03	-0.420	0.674480
step1:dominance1:block3	5.577e-02	6.781e-02	1.152e+03	0.822	0.411014
step1:dominance1:repetition1	-8.729e-02	5.620e-02	1.152e+03	-1.553	0.120662
step1:dominance1:repetition2	2.602e-03	5.682e-02	1.152e+03	0.046	0.963483
step1:block1:repetition1	-1.001e-01	9.786e-02	1.190e+03	-1.023	0.306742
step1:block2:repetition1	-1.715e-01	9.676e-02	1.179e+03	-1.773	0.076556.
step1:block3:repetition1	7.254e-02	9.595e-02	1.175e+03	0.756	0.449833
step1:block1:repetition2	1.106e-01	9.877e-02	1.183e+03	1.119	0.263235
step1:block2:repetition2	6.984e-02	9.714e-02	1.188e+03	0.719	0.472320
step1:block3:repetition2	-5.950e-02	9.735e-02	1.173e+03	-0.611	0.541194
dominance1:block1:repetition1	7.223e-02	9.811e-02	1.186e+03	0.736	0.461745
dominance1:block2:repetition1	-6.068e-03	9.694e-02	1.178e+03	-0.063	0.950100
dominance1:block3:repetition1	-1.155e-01	9.610e-02	1.174e+03	-1.202	0.229701
dominance1:block1:repetition2	-9.808e-03	9.897e-02	1.180e+03	-0.099	0.921073
dominance1:block2:repetition2	2.158e-02	9.739e-02	1.187e+03	0.222	0.824693
dominance1:block3:repetition2	4.453e-02	9.749e-02	1.172e+03	0.457	0.647934
step1:dominance1:block1:repetition1	-4.718e-02	9.779e-02	1.152e+03	-0.482	0.629559
step1:dominance1:block2:repetition1	-2.544e-02	9.671e-02	1.152e+03	-0.263	0.792517
step1:dominance1:block3:repetition1	1.061e-01	9.591e-02	1.152e+03	1.106	0.268823

step1:dominance1:block1:repetition2	2.988e-02	9.871e-02	1.152e+03	0.303	0.762151
step1:dominance1:block2:repetition2	4.595e-02	9.707e-02	1.152e+03	0.473	0.636007
step1:dominance1:block3:repetition2	-8.848e-02	9.731e-02	1.152e+03	-0.909	0.363404

*Preferences, random effects:*

Groups	Name	Variance	Std.Dev.	Corr
Part.	(Intercept)	0.47917	0.6922	
	step1	0.02693	0.1641	-0.86
	dominance1	0.08337	0.2887	0.56
Residual		2.31606	1.5219	

## Experiment 3 b

*Accuracies, fixed effects:*

	Estimate	Std. Error	z value	Pr(> z )	
(Intercept)	3.76413	0.14250	26.415	< 2e-16	***
step1	-0.64180	0.13143	-4.883	1.04e-06	***
step2	0.35060	0.16181	2.167	0.0303	*
block1	-0.10630	0.18215	-0.584	0.5595	
block2	-0.02321	0.17658	-0.131	0.8954	
block3	0.08832	0.19424	0.455	0.6493	
repetition1	-0.23691	0.17294	-1.370	0.1707	
repetition2	0.04720	0.18075	0.261	0.7940	
step1:block1	0.12229	0.22311	0.548	0.5836	
step2:block1	-0.21049	0.26391	-0.798	0.4251	
step1:block2	0.04412	0.21575	0.205	0.8380	
step2:block2	0.18675	0.27165	0.687	0.4918	
step1:block3	-0.14895	0.23370	-0.637	0.5239	
step2:block3	-0.02470	0.28910	-0.085	0.9319	
step1:repetition1	0.21318	0.17978	1.186	0.2357	
step2:repetition1	-0.24143	0.21264	-1.135	0.2562	
step1:repetition2	-0.35072	0.18378	-1.908	0.0563	.
step2:repetition2	0.25008	0.23722	1.054	0.2918	
block1:repetition1	-0.20244	0.23707	-0.854	0.3931	
block2:repetition1	0.23527	0.24343	0.966	0.3338	
block3:repetition1	-0.10573	0.25215	-0.419	0.6750	
block1:repetition2	-0.09793	0.25345	-0.386	0.6992	
block2:repetition2	0.10635	0.25730	0.413	0.6794	
block3:repetition2	0.16030	0.29967	0.535	0.5927	
step1:block1:repetition1	0.44996	0.30411	1.480	0.1390	
step2:block1:repetition1	-0.18595	0.33422	-0.556	0.5780	
step1:block2:repetition1	-0.01007	0.30256	-0.033	0.9734	
step2:block2:repetition1	0.25895	0.37340	0.693	0.4880	
step1:block3:repetition1	0.09061	0.30943	0.293	0.7697	
step2:block3:repetition1	0.15900	0.37140	0.428	0.6686	
step1:block1:repetition2	0.03660	0.30386	0.120	0.9041	
step2:block1:repetition2	0.23535	0.38288	0.615	0.5388	
step1:block2:repetition2	0.18486	0.30857	0.599	0.5491	
step2:block2:repetition2	-0.40567	0.39315	-1.032	0.3022	

step1:block3:repetition2	-0.60487	0.34017	-1.778	0.0754	.
step2:block3:repetition2	0.29719	0.45735	0.650	0.5158	

*Accuracies, random effects:*

Groups	Name	Variance	Std.Dev.
Part.	(Intercept)	0.3754	0.6127

*Latencies, fixed effects:*

	Estimate	Std. Error	df	t value	Pr(> t )
(Intercept)	1.761e+00	5.068e-02	9.510e+01	34.745	< 2e-16 **
*					
step1	2.933e-01	3.338e-02	9.926e+01	8.786	4.74e-14 **
*					
step2	3.880e-02	3.340e-02	1.008e+02	1.162	0.24813
block1	8.290e-02	4.321e-02	8.221e+01	1.918	0.05854 .
block2	-9.139e-02	3.356e-02	1.453e+02	-2.723	0.00726 **
block3	5.735e-02	4.067e-02	8.825e+01	1.410	0.16198
repetition1	7.656e-02	7.195e-02	9.625e+01	1.064	0.28994
repetition2	-8.284e-03	7.112e-02	9.504e+01	-0.116	0.90752
step1:block1	2.929e-02	4.130e-02	3.728e+03	0.709	0.47828
step2:block1	-1.451e-02	4.105e-02	3.723e+03	-0.353	0.72375
step1:block2	-4.899e-02	4.056e-02	3.729e+03	-1.208	0.22713
step2:block2	3.688e-02	4.018e-02	3.721e+03	0.918	0.35871
step1:block3	5.096e-02	4.116e-02	3.724e+03	1.238	0.21570
step2:block3	-4.205e-02	4.073e-02	3.718e+03	-1.033	0.30190
step1:repetition1	4.756e-02	4.759e-02	1.013e+02	0.999	0.32002
step2:repetition1	-2.917e-03	4.766e-02	1.032e+02	-0.061	0.95131
step1:repetition2	-2.110e-02	4.687e-02	9.944e+01	-0.450	0.65357
step2:repetition2	-1.508e-02	4.681e-02	1.005e+02	-0.322	0.74797
block1:repetition1	-1.835e-02	6.229e-02	8.296e+01	-0.295	0.76906
block2:repetition1	9.522e-03	4.792e-02	1.474e+02	0.199	0.84275
block3:repetition1	-8.949e-03	5.823e-02	8.901e+01	-0.154	0.87820
block1:repetition2	4.775e-02	6.049e-02	8.182e+01	0.789	0.43214
block2:repetition2	4.752e-03	4.722e-02	1.460e+02	0.101	0.91998
block3:repetition2	-4.795e-03	5.721e-02	8.850e+01	-0.084	0.93339
step1:block1:repetition1					
	1.301e-02	5.940e-02	3.727e+03	0.219	0.82668
step2:block1:repetition1					
	3.202e-02	5.928e-02	3.723e+03	0.540	0.58909
step1:block2:repetition1					
	7.248e-03	5.753e-02	3.720e+03	0.126	0.89976
step2:block2:repetition1					
	-3.509e-02	5.709e-02	3.716e+03	-0.615	0.53886
step1:block3:repetition1					
	-1.139e-01	5.888e-02	3.727e+03	-1.934	0.05323 .
step2:block3:repetition1					
	1.300e-01	5.838e-02	3.721e+03	2.228	0.02597 *
step1:block1:repetition2					
	-1.027e-01	5.795e-02	3.725e+03	-1.772	0.07642 .
step2:block1:repetition2					
	4.196e-02	5.739e-02	3.719e+03	0.731	0.46479
step1:block2:repetition2					
	3.273e-02	5.711e-02	3.726e+03	0.573	0.56655
step2:block2:repetition2					
	1.281e-02	5.653e-02	3.718e+03	0.227	0.82080
step1:block3:repetition2					
	9.991e-02	5.812e-02	3.727e+03	1.719	0.08570 .
step2:block3:repetition2					
	-3.805e-02	5.718e-02	3.719e+03	-0.666	0.50573

*Latencies, random effects:*

Groups	Name	Variance	Std.Dev.	Corr				
ps	(Intercept)	0.22011	0.4692					
	step1	0.05252	0.2292	0.23				
	step2	0.05384	0.2320	0.48	-0.73			
	block1	0.08602	0.2933	0.30	0.12	0.02		
	block2	0.02522	0.1588	-0.66	0.18	-0.65	-0.59	
	block3	0.07018	0.2649	0.18	-0.36	0.42	-0.63	0.33
	Residual	1.11616	1.0565					

*Preferences, fixed effects:*

)	Estimate	Std. Error	df	t value	Pr(> t )
(Intercept)	4.346e+00	8.901e-02	9.355e+01	48.821	< 2e-16 **
*					
step1	-1.455e-01	4.218e-02	1.247e+03	-3.450	0.000579 **
*					
dominance1	2.452e-01	4.218e-02	1.247e+03	5.814	7.72e-09 **
*					
block1	1.053e-01	7.408e-02	1.278e+03	1.422	0.155414
block2	4.895e-02	7.295e-02	1.288e+03	0.671	0.502335
block3	-1.618e-01	7.352e-02	1.270e+03	-2.201	0.027920 *
repetition1	3.738e-02	1.265e-01	9.490e+01	0.296	0.768155
repetition2	1.298e-01	1.248e-01	9.335e+01	1.040	0.301008
step1:dominance1	6.975e-03	4.218e-02	1.247e+03	0.165	0.868684
step1:block1	-6.683e-02	7.302e-02	1.247e+03	-0.915	0.360236
step1:block2	8.835e-02	7.163e-02	1.247e+03	1.233	0.217649
step1:block3	1.456e-02	7.271e-02	1.247e+03	0.200	0.841249
dominance1:block1	-4.091e-02	7.302e-02	1.247e+03	-0.560	0.575364
dominance1:block2	1.261e-01	7.163e-02	1.247e+03	1.760	0.078592 .
dominance1:block3	-7.063e-02	7.271e-02	1.247e+03	-0.971	0.331508
step1:repetition1	4.573e-02	6.035e-02	1.247e+03	0.758	0.448692
step1:repetition2	-8.380e-03	5.910e-02	1.247e+03	-0.142	0.887263
dominance1:repetition1	5.057e-02	6.035e-02	1.247e+03	0.838	0.402162
dominance1:repetition2	-4.414e-03	5.910e-02	1.247e+03	-0.075	0.940469
block1:repetition1	5.802e-02	1.067e-01	1.283e+03	0.544	0.586765
block2:repetition1	-4.804e-02	1.038e-01	1.298e+03	-0.463	0.643589
block3:repetition1	-6.457e-02	1.053e-01	1.273e+03	-0.613	0.539741
block1:repetition2	-1.299e-01	1.036e-01	1.274e+03	-1.254	0.210019
block2:repetition2	9.413e-02	1.028e-01	1.290e+03	0.916	0.359946
block3:repetition2	9.979e-02	1.033e-01	1.272e+03	0.966	0.334390
step1:dominance1:block1	-1.267e-01	7.302e-02	1.247e+03	-1.736	0.082877 .
step1:dominance1:block2	7.183e-03	7.163e-02	1.247e+03	0.100	0.920137
step1:dominance1:block3	-3.158e-02	7.271e-02	1.247e+03	-0.434	0.664124
step1:dominance1:repetition1	1.438e-02	6.035e-02	1.247e+03	0.238	0.811670
step1:dominance1:repetition2	3.704e-03	5.910e-02	1.247e+03	0.063	0.950037
step1:block1:repetition1	-3.709e-02	1.049e-01	1.247e+03	-0.354	0.723667
step1:block2:repetition1	-6.114e-02	1.015e-01	1.247e+03	-0.602	0.547131
step1:block3:repetition1	-5.764e-02	1.040e-01	1.247e+03	-0.554	0.579589
step1:block1:repetition2					

	-6.261e-02	1.023e-01	1.247e+03	-0.612	0.540749
step1:block2:repetition2	3.329e-02	1.008e-01	1.247e+03	0.330	0.741243
step1:block3:repetition2	8.933e-02	1.021e-01	1.247e+03	0.875	0.381787
dominance1:block1:repetition1	-1.253e-01	1.049e-01	1.247e+03	-1.194	0.232571
dominance1:block2:repetition1	1.346e-01	1.015e-01	1.247e+03	1.325	0.185335
dominance1:block3:repetition1	1.320e-01	1.040e-01	1.247e+03	1.269	0.204771
dominance1:block1:repetition2	5.009e-02	1.023e-01	1.247e+03	0.490	0.624539
dominance1:block2:repetition2	-9.272e-02	1.008e-01	1.247e+03	-0.920	0.357814
dominance1:block3:repetition2	-1.535e-01	1.021e-01	1.247e+03	-1.504	0.132940
step1:dominance1:block1:repetition1	1.278e-02	1.049e-01	1.247e+03	0.122	0.903046
step1:dominance1:block2:repetition1	-1.334e-01	1.015e-01	1.247e+03	-1.314	0.189197
step1:dominance1:block3:repetition1	1.531e-01	1.040e-01	1.247e+03	1.472	0.141351
step1:dominance1:block1:repetition2	1.160e-01	1.023e-01	1.247e+03	1.134	0.256962
step1:dominance1:block2:repetition2	6.278e-02	1.008e-01	1.247e+03	0.623	0.533471
step1:dominance1:block3:repetition2	-1.291e-01	1.021e-01	1.247e+03	-1.264	0.206320

*Preferences, random effects:*

Groups	Name	Variance	Std.Dev.
ps	(Intercept)	0.5947	0.7711
	Residual	2.4664	1.5705

## Experiment 4

*Accuracies, fixed effects:*

	Estimate	Std. Error	z value	Pr(> z )	
(Intercept)	2.738357	0.126679	21.616	< 2e-16	***
dist1	-1.676532	0.117178	-14.308	< 2e-16	***
dist2	-0.575291	0.104866	-5.486	4.11e-08	***
dist3	0.688374	0.130369	5.280	1.29e-07	***
block1	-0.120501	0.105867	-1.138	0.255024	
block2	0.174799	0.119452	1.463	0.143375	
block3	-0.148505	0.108950	-1.363	0.172863	
Compare1	0.196517	0.041218	4.768	1.86e-06	***
dist1:block1	-0.052340	0.086257	-0.607	0.543987	
dist2:block1	0.104023	0.091302	1.139	0.254563	
dist3:block1	-0.059105	0.102959	-0.574	0.565924	
dist1:block2	0.219526	0.090350	2.430	0.015110	*
dist2:block2	-0.152376	0.093637	-1.627	0.103672	
dist3:block2	0.033039	0.107743	0.307	0.759111	
dist1:block3	0.008815	0.084956	0.104	0.917360	
dist2:block3	0.332591	0.092140	3.610	0.000307	***
dist3:block3	-0.033598	0.101350	-0.332	0.740263	
dist1:Compare1	-0.014371	0.047949	-0.300	0.764397	
dist2:Compare1	-0.026147	0.050682	-0.516	0.605924	
dist3:Compare1	0.001264	0.057844	0.022	0.982564	
block1:Compare1	0.094837	0.054673	1.735	0.082806	.

block2:Compare1	-0.016744	0.056661	-0.296	0.767604
block3:Compare1	-0.007113	0.054015	-0.132	0.895228
dist1:block1:Compare1	-0.168497	0.076914	-2.191	0.028472 *
dist2:block1:Compare1	0.079146	0.084008	0.942	0.346130
dist3:block1:Compare1	0.203442	0.095025	2.141	0.032279 *
dist1:block2:Compare1	0.062463	0.079591	0.785	0.432572
dist2:block2:Compare1	-0.029946	0.084904	-0.353	0.724308
dist3:block2:Compare1	-0.082454	0.097988	-0.841	0.400082
dist1:block3:Compare1	0.045831	0.075069	0.611	0.541522
dist2:block3:Compare1	0.032531	0.084117	0.387	0.698956
dist3:block3:Compare1	-0.134246	0.093100	-1.442	0.149314

Accuracies, random effects:

Groups	Name	Variance	Std.Dev.	Corr	
Pt.	(Intercept)	2.08512	1.4440		
	dist1	1.58626	1.2595	-0.68	
dist2		0.87429	0.9350	-0.40	0.07
	dist3	0.86547	0.9303	0.60	-0.58
block1		1.07921	1.0388	-0.02	0.18
block2		1.42849	1.1952	-0.06	0.15
block3		1.22305	1.1059	-0.09	-0.16
Compare1		0.05911	0.2431	-0.35	0.37
				0.04	-0.23
				0.04	-0.30
				0.2	

2

Latencies, fixed effects:

	Estimate	Std. Error	df	t value	Pr(> t )	
(Intercept)	1623.2319	34.3905	200.8205	47.200	< 2e-16	***
dist1	155.1745	17.1855	184.4779	9.029	2.28e-16	***
dist2	49.7165	13.7309	283.0102	3.621	0.000348	***
dist3	-48.3644	13.6357	202.0599	-3.547	0.000485	***
block1	147.6690	24.6739	203.2047	5.985	9.66e-09	***
block2	-59.9040	22.5666	194.8752	-2.655	0.008598	**
block3	-33.1447	22.6775	200.1547	-1.462	0.145426	
Compare1	41.3594	7.5705	285.0324	5.463	1.02e-07	***
dist1:block1	-54.1733	24.5066	7826.5775	-2.211	0.027095	*
dist2:block1	22.2221	21.9141	8695.2696	1.014	0.310585	
dist3:block1	31.9609	21.1019	8829.6987	1.515	0.129909	
dist1:block2	12.8960	23.0882	8197.2518	0.559	0.576482	
dist2:block2	-1.5667	21.4467	8712.5131	-0.073	0.941766	
dist3:block2	-34.6069	20.6377	8802.6013	-1.677	0.093602	.
dist1:block3	9.7803	23.7505	8105.2846	0.412	0.680501	
dist2:block3	-17.3616	21.4687	8679.7807	-0.809	0.418714	
dist3:block3	32.6975	20.9948	8813.1499	1.557	0.119410	
dist1:Compare1	26.6225	13.4749	8774.8542	1.976	0.048220	*
dist2:Compare1	-17.2145	12.4066	8689.5938	-1.388	0.165318	
dist3:Compare1	-11.1901	12.0196	8735.8057	-0.931	0.351883	
block1:Compare1	-1.2902	12.6005	8773.1877	-0.102	0.918447	
block2:Compare1	6.0386	12.2342	8777.9951	0.494	0.621614	
block3:Compare1	0.8958	12.3604	8752.7495	0.072	0.942225	
dist1:block1:Compare1	25.9076	23.9166	8716.8247	1.083	0.278729	
dist2:block1:Compare1	14.1993	21.7434	8622.8533	0.653	0.513749	
dist3:block1:Compare1	-44.9762	21.0010	8712.3093	-2.142	0.032251	*
dist1:block2:Compare1	-18.3138	22.8068	8649.9671	-0.803	0.421998	
dist2:block2:Compare1	-15.1899	21.3421	8661.0752	-0.712	0.476648	
dist3:block2:Compare1	10.1411	20.6244	8705.4171	0.492	0.622940	
dist1:block3:Compare1	-3.9886	23.2618	8702.4837	-0.171	0.863860	

dist2:block3:Compare1	-5.9614	21.2677	8648.7817	-0.280	0.779252
dist3:block3:Compare1	3.9877	20.9031	8713.0925	0.191	0.848711

*Latencies, random effects:*

Groups	Name	Variance	Std.Dev.	Corr
Pt.	(Intercept)	229149	478.69	
	dist1	21412	146.33	0.42
	dist2	6473	80.46	0.30 0.48
	dist3	8143	90.24	-0.37 -0.38 -0.52
	block1	89567	299.28	0.18 0.08 -0.40 0.19
	block2	71791	267.94	-0.01 -0.14 0.56 -0.48 -0.36
block3		72021	268.37	-0.20 0.04 -0.01 0.13 -0.61 -0.14
Compare1		1230	35.07	0.57 -0.02 0.28 -0.16 0.05 -0.24 -0.1
6	Residual	476470	690.27	

*Preferences, fixed effects:*

	Estimate	Std. Error	df	t value	Pr(> t )	
(Intercept)	4.204e+00	5.307e-02	2.067e+02	79.222	< 2e-16 **	
*						
block1	-9.384e-02	5.312e-02	1.883e+02	-1.766	0.0789 .	
block2	-7.371e-02	5.134e-02	1.876e+02	-1.436	0.1528	
block3	1.200e-01	5.133e-02	1.717e+02	2.338	0.0205 *	
comp1	4.365e-02	2.959e-02	4.369e+02	1.475	0.1409	
distance1	6.641e-02	2.691e-02	2.085e+02	2.468	0.0144 *	
direct1	1.717e-01	2.901e-02	2.086e+02	5.918	1.32e-08 **	
*						
block1:comp1	-5.449e-02	5.833e-02	3.169e+02	-0.934	0.3509	
block2:comp1	-2.879e-02	5.630e-02	3.241e+02	-0.511	0.6094	
block3:comp1	4.486e-02	5.801e-02	3.145e+02	0.773	0.4399	
block1:distance1	-8.386e-02	3.412e-02	5.306e+03	-2.458	0.0140 *	
block2:distance1	2.922e-02	3.461e-02	5.316e+03	0.844	0.3985	
block3:distance1	-5.739e-03	3.518e-02	5.352e+03	-0.163	0.8704	
comp1:distance1	1.522e-02	1.987e-02	5.260e+03	0.766	0.4436	
block1:direct1	-8.193e-02	3.413e-02	5.303e+03	-2.400	0.0164 *	
block2:direct1	2.611e-02	3.462e-02	5.311e+03	0.754	0.4508	
block3:direct1	1.865e-02	3.520e-02	5.346e+03	0.530	0.5962	
comp1:direct1	-1.431e-02	1.987e-02	5.259e+03	-0.720	0.4714	
distance1:direct1	-1.290e-01	1.986e-02	5.257e+03	-6.493	9.20e-11 **	
*						
block1:comp1:distance1	1.996e-02	3.693e-02	2.799e+03	0.540	0.5889	
block2:comp1:distance1	-6.607e-02	3.748e-02	2.826e+03	-1.763	0.0780 .	
block3:comp1:distance1	-1.823e-02	3.799e-02	2.899e+03	-0.480	0.6313	
block1:comp1:direct1	6.210e-02	3.751e-02	3.199e+03	1.656	0.0979 .	
block2:comp1:direct1	2.491e-02	3.802e-02	3.181e+03	0.655	0.5124 .	
block3:comp1:direct1	-6.545e-02	3.850e-02	3.239e+03	-1.700	0.0892 .	
block1:distance1:direct1		3.313e-02	3.406e-02	5.257e+03	0.973	0.3307
block2:distance1:direct1		-2.192e-02	3.454e-02	5.257e+03	-0.635	0.5256
block3:distance1:direct1		2.443e-03	3.505e-02	5.257e+03	0.070	0.9444
comp1:distance1:direct1	1.627e-02	1.986e-02	5.257e+03	0.819	0.4127	
block1:comp1:distance1:direct1		-2.516e-02	3.406e-02	5.257e+03	-0.739	0.4601
block2:comp1:distance1:direct1		5.499e-04	3.454e-02	5.257e+03	0.016	0.9873
block3:comp1:distance1:direct1		2.575e-02	3.505e-02	5.257e+03	0.735	0.4626

*Preferences, random effects:*

Groups	Name	Variance	Std.Dev.	Corr
Part.	(Intercept)	0.48628	0.69734	
	block1	0.32097	0.56654	0.01
	block2	0.27688	0.52619	-0.09 -0.43
	block3	0.25227	0.50227	0.03 -0.28 -0.37
	comp1	0.00643	0.08019	-0.34 -0.39 0.43 0.18
	distance1	0.06635	0.25758	-0.08 0.18 -0.22 -0.22 0.49
	direct1	0.09001	0.30001	-0.10 0.08 0.22 0.05 0.51 0.05
Residual		2.46474	1.56995	

## Experiment 5

*Accuracies, fixed effects:*

Estimate	Std. Error	z value	Pr(> z )			
(Intercept)	-1.43315	0.21033	-6.814	9.51e-12	***	
sequence1	0.09906	0.20622	0.480	0.63096		
block1	-0.11903	0.17426	-0.683	0.49459		
block2	-0.14985	0.17340	-0.864	0.38749		
block3	-0.04971	0.18085	-0.275	0.78343		
dist1	0.58823	0.14843	3.963	7.40e-05	***	
dist2	0.11770	0.14625	0.805	0.42093		
dist3	-0.03995	0.13746	-0.291	0.77134		
sequence1:block1	-0.06606	0.16614	-0.398	0.69089		
sequence1:block2	0.03957	0.16166	0.245	0.80662		
sequence1:block3	-0.01296	0.17272	-0.075	0.94018		
sequence1:dist1	-0.09478	0.14296	-0.663	0.50735		
sequence1:dist2	0.22024	0.13467	1.635	0.10196		
sequence1:dist3	-0.20581	0.12489	-1.648	0.09938	.	
block1:dist1	-0.01875	0.16057	-0.117	0.90707		
block2:dist1	0.23369	0.16271	1.436	0.15095		
block3:dist1	-0.20817	0.16485	-1.263	0.20666		
block1:dist2	-0.06583	0.16732	-0.393	0.69399		
block2:dist2	-0.46049	0.17428	-2.642	0.00824	**	
block3:dist2	0.32324	0.16807	1.923	0.05445	.	
block1:dist3	-0.10378	0.17154	-0.605	0.54519		
block2:dist3	0.39386	0.16621	2.370	0.01780	*	
block3:dist3	0.01053	0.16921	0.062	0.95039		
sequence1:block1:dist1	-0.20521	0.15711	-1.306	0.19150		
sequence1:block2:dist1	-0.09865	0.15961	-0.618	0.53652		
sequence1:block3:dist1	0.52306	0.16119	3.245	0.00117	**	
sequence1:block1:dist2	0.20116	0.16463	1.222	0.22177		
sequence1:block2:dist2	0.46238	0.17288	2.675	0.00748	**	
sequence1:block3:dist2	-0.70057	0.16512	-4.243	2.21e-05	***	
sequence1:block1:dist3	-0.01892	0.16867	-0.112	0.91068		
sequence1:block2:dist3	-0.27270	0.16451	-1.658	0.09738	.	
sequence1:block3:dist3	-0.01453	0.16565	-0.088	0.93012		
---						
Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1						

*Accuracies, random effects:*

Groups	Name	Variance	Std.Dev.	Corr
participant	(Intercept)	1.2929	1.1370	
	block1	0.5815	0.7625	-0.41
	block2	0.4755	0.6896	0.60 -0.46

block3	0.6245	0.7902	-0.25	-0.51	-0.42		
dist1	0.3793	0.6159	-0.59	-0.06	-0.31	0.46	
dist2	0.2547	0.5047	0.43	-0.29	0.96	-0.46	-0.23
dist3	0.1956	0.4423	-0.27	0.72	-0.85	0.06	0.01

0.79

Number of obs: 2176, groups: participant, 34

*Latencies, fixed effects:*

	Estimate	Std. Error	df	t value	Pr(> t )	*
(Intercept)	1.236e+00	8.303e-02	3.203e+01	14.886	6.05e-16	*
**						
sequence1	-1.985e-01	8.303e-02	3.203e+01	-2.391	0.022873	*
block1	-3.683e-02	4.046e-02	3.306e+01	-0.910	0.369166	
block2	-1.007e-01	3.557e-02	3.809e+01	-2.832	0.007356	*
*						
block3	1.714e-01	4.232e-02	3.172e+01	4.050	0.000308	*
**						
dist1	8.515e-02	3.730e-02	3.288e+01	2.283	0.029031	*
dist2	6.622e-02	3.008e-02	5.661e+01	2.201	0.031810	*
dist3	-6.638e-02	3.127e-02	3.504e+01	-2.123	0.040934	*
sequence1:block1	-3.145e-02	4.046e-02	3.306e+01	-0.777	0.442432	
sequence1:block2	-1.220e-02	3.557e-02	3.809e+01	-0.343	0.733444	
sequence1:block3	-5.162e-02	4.232e-02	3.172e+01	-1.220	0.231583	
sequence1:dist1	7.959e-02	3.730e-02	3.288e+01	2.134	0.040416	*
sequence1:dist2	-7.501e-02	3.008e-02	5.661e+01	-2.493	0.015601	*
sequence1:dist3	-2.336e-02	3.127e-02	3.504e+01	-0.747	0.460114	
block1:dist1	-2.542e-02	4.807e-02	1.331e+03	-0.529	0.597002	
block2:dist1	-3.546e-02	4.617e-02	1.340e+03	-0.768	0.442558	
block3:dist1	1.663e-02	4.568e-02	1.270e+03	0.364	0.715922	
block1:dist2	-2.828e-02	4.507e-02	1.312e+03	-0.627	0.530466	
block2:dist2	-9.487e-02	4.490e-02	1.320e+03	-2.113	0.034773	*
block3:dist2	6.840e-02	4.521e-02	1.321e+03	1.513	0.130521	
block1:dist3	7.153e-03	4.275e-02	1.324e+03	0.167	0.867130	
block2:dist3	8.567e-02	4.364e-02	1.335e+03	1.963	0.049818	*
block3:dist3	1.615e-02	4.315e-02	1.325e+03	0.374	0.708181	
sequence1:block1:dist1	-6.197e-03	4.807e-02	1.331e+03	-0.129	0.897438	
sequence1:block2:dist1	1.799e-03	4.617e-02	1.340e+03	0.039	0.968925	
sequence1:block3:dist1	5.597e-02	4.568e-02	1.270e+03	1.225	0.220752	
sequence1:block1:dist2	8.724e-02	4.507e-02	1.312e+03	1.936	0.053105	.
sequence1:block2:dist2	7.130e-02	4.490e-02	1.320e+03	1.588	0.112500	
sequence1:block3:dist2	-8.834e-02	4.521e-02	1.321e+03	-1.954	0.050906	.
sequence1:block1:dist3	-1.406e-02	4.275e-02	1.324e+03	-0.329	0.742287	
sequence1:block2:dist3	-3.490e-02	4.364e-02	1.335e+03	-0.800	0.423911	
sequence1:block3:dist3	-1.473e-02	4.315e-02	1.325e+03	-0.341	0.732842	
---						
Signif. codes:	0 ‘***’	0.001 ‘**’	0.01 ‘*’	0.05 ‘.’	0.1 ‘ ’	1

*Latencies, random effects:*

Groups	Name	Variance	Std.Dev.	Corr
participant	(Intercept)	0.226699	0.47613	
	block1	0.032744	0.18095	0.53
	block2	0.020816	0.14428	-0.11 0.30
	block3	0.038559	0.19636	-0.62 -0.77 0.26
	dist1	0.021910	0.14802	0.74 0.43 -0.63 -0.73
	dist2	0.007316	0.08554	-0.02 0.08 0.80 0.53 -0.46
	dist3	0.011915	0.10915	0.52 0.36 0.36 -0.45 0.01 -
0.05				
Residual		0.307287	0.55433	

Number of obs: 1479, groups: participant, 34

*Preferences, fixed effects:*

Estimate	Std. Error	df	t value	Pr(> t )
----------	------------	----	---------	----------

(Intercept)	3.96875	0.17712	31.99999	22.407	< 2e-16	**
*						
sequence1	-0.06801	0.17712	31.99999	-0.384	0.70352	
ring1	-0.11949	0.05245	472.00000	-2.278	0.02317	*
direct1	0.17096	0.07829	32.00000	2.184	0.03643	*
sequence1:ring1	-0.02390	0.05245	472.00000	-0.456	0.64889	
sequence1:direct1	0.11213	0.07829	32.00000	1.432	0.16176	
ring1:direct1	-0.16728	0.05245	472.00000	-3.189	0.00152	**
sequence1:ring1:direct1	-0.03493	0.05245	472.00000	-0.666	0.50581	
---						
Signif. codes:	0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1					

*Preferences, random effects:*

Groups	Name	Variance	Std.Dev.	Corr
participant	(Intercept)	0.9731	0.9865	
	direct1	0.1149	0.3389	0.27
Residual		1.4966	1.2234	
Number of obs:	544, groups:	participant,	34	

## Experiment 6

*Accuracies, fixed effects:*

	Estimate	Std. Error	z value	Pr(> z )
(Intercept)	2.99156	0.30937	9.670	< 2e-16 ***
distance1	-1.20215	0.22586	-5.323	1.02e-07 ***
distance2	0.08249	0.17300	0.477	0.633479
style1	0.31220	0.29425	1.061	0.288694
style2	0.71060	0.36372	1.954	0.050736 .
style3	-0.20029	0.26121	-0.767	0.443203
style4	-0.20822	0.26347	-0.790	0.429357
style5	0.19881	0.29647	0.671	0.502474
distance1:style1	-0.33691	0.20015	-1.683	0.092324 .
distance2:style1	0.46250	0.22148	2.088	0.036778 *
distance1:style2	-0.55078	0.22905	-2.405	0.016187 *
distance2:style2	0.87994	0.25794	3.411	0.000646 ***
distance1:style3	-0.14627	0.19475	-0.751	0.452626
distance2:style3	-0.31365	0.19624	-1.598	0.109980
distance1:style4	0.34705	0.19268	1.801	0.071680 .
distance2:style4	-0.32652	0.19549	-1.670	0.094863 .
distance1:style5	0.62844	0.20292	3.097	0.001955 **
distance2:style5	-0.62379	0.19797	-3.151	0.001628 **
---				

*Accuracies, random effects:*

Groups	Name	Variance	Std.Dev.	Corr
Part.	(Intercept)	3.1283	1.7687	
	distance1	1.3472	1.1607	-0.41
	distance2	0.3581	0.5984	-0.18 -0.47
	style1	1.1869	1.0894	0.09 -0.67 0.24
	style2	2.1844	1.4780	0.30 0.24 -0.23 -0.21
	style3	1.0906	1.0443	-0.05 0.00 0.18 -0.17 -0.24
	style4	1.1040	1.0507	-0.24 0.49 -0.51 -0.25 -0.11 -0.47
	style5	1.3481	1.1611	0.18 -0.29 0.22 -0.46 0.09 0.13 -0.37

*Latencies, fixed effects:*

	Estimate	Std. Error	t value
(Intercept)	1304.82	57.78	22.583
distance1	78.70	22.98	3.424
distance2	24.95	15.28	1.634
style1	-28.70	41.90	-0.685
style2	-51.27	36.89	-1.390
style3	124.55	39.98	3.116
style4	-51.19	30.39	-1.684
style5	2.12	45.93	0.046
distance1:style1	46.72	31.62	1.478
distance2:style1	-15.57	29.87	-0.521
distance1:style2	-21.61	32.48	-0.665
distance2:style2	-40.13	29.94	-1.340
distance1:style3	-16.87	33.82	-0.499
distance2:style3	62.86	31.91	1.970
distance1:style4	-10.82	31.67	-0.342
distance2:style4	37.50	29.93	1.253
distance1:style5	-46.14	31.14	-1.482
distance2:style5	13.69	30.71	0.446

*Latencies, random effects:*

Groups	Name	Variance	Std.Dev.	Corr
Part.	(Intercept)	132676	364.25	
	distance1	12736	112.86	0.24
distance2	1794	42.35	0.17	-0.12
style1	52967	230.15	0.10	-0.52 0.59
style2	35207	187.64	-0.16	-0.13 -0.80 -0.16
style3	44198	210.23	0.30	0.22 0.24 -0.09 -0.54
style4	18699	136.74	-0.39	-0.16 -0.46 -0.23 0.18 -0.43
style5	66464	257.81	0.45	0.36 0.14 -0.31 -0.26 -0.11 0.01
Residual		206724	454.67	

*Preferences, fixed effects:*

	Estimate	Std. Error	t value
(Intercept)	3.471545	0.137056	25.329
style1	-0.008130	0.094285	-0.086
style2	-0.291667	0.087335	-3.340
style3	0.110772	0.104710	1.058
style4	0.202236	0.101447	1.994
style5	-0.114837	0.097273	-1.181
dist1	-0.092480	0.030736	-3.009
direct1	-0.058943	0.041716	-1.413
style1:dist1	-0.005081	0.068728	-0.074
style2:dist1	0.065041	0.068728	0.946
style3:dist1	0.022358	0.068728	0.325
style4:dist1	-0.130081	0.068728	-1.893
style5:dist1	0.022358	0.068728	0.325
style1:direct1	-0.008130	0.068728	-0.118
style2:direct1	0.147358	0.068728	2.144
style3:direct1	-0.035569	0.068728	-0.518
style4:direct1	-0.035569	0.068728	-0.518
style5:direct1	0.001016	0.068728	0.015
dist1:direct1	0.068089	0.030736	2.215
style1:dist1:direct1	-0.122967	0.068728	-1.789
style2:dist1:direct1	-0.150407	0.068728	-2.188
style3:dist1:direct1	0.038618	0.068728	0.562
style4:dist1:direct1	0.002033	0.068728	0.030
style5:dist1:direct1	0.166667	0.068728	2.425

*Preferences, random effects:*

Groups	Name	Variance	Std.Dev.	Corr								
Part.	(Intercept)	0.73143	0.8552									
	direct1	0.03262	0.1806	-0.21								
	style1	0.17081	0.4133	0.30	0.05							
	style2	0.11906	0.3450	-0.04	-0.01	-0.32						
	style3	0.25586	0.5058	-0.03	0.75	0.14	0.24					
	style4	0.22828	0.4778	-0.18	-0.23	-0.44	-0.55	-0.60				
	style5	0.19427	0.4408	0.22	-0.31	-0.61	0.21	-0.18	0.0			
1	Residual	1.85921	1.3635									

## **SUPPLEMENT: Appendix E: General approach to data analysis and results concerning the SDE effect as found in all experiments.**

### **Overview of data analysis**

For accuracy, latency, and preference data, we estimated linear mixed models (or generalized linear mixed models with logistic link function) with *participants* as random factors, to determine the best-fitting random structure. The final model with appropriate

random effects was used to evaluate fixed effects (Jaeger, 2008; Judd, Westfall, & Kenny, 2012, see Appendix C). Appendix D contains estimates for fixed and random effects. Effect sizes are reported as Cohen's  $dz$ . Independent variables used orthogonal sum-to-zero contrasts (deviation or effects coding) where the last factor level of each variable is mapped onto all contrast variables with -1 and all other factor levels are mapped onto exactly one contrast variable with +1. Because by default, lmer-models do not use this coding, we explicitly set the contrasts for these types of models via `afex::set_sum_contrasts()`.

Latencies (correct responses) are trimmed according to the Tukey criterion (outlier trials being values larger (smaller) than the upper (lower) quartile plus (minus) 1.5 times the interquartile range in an individual's distribution of latencies (see Clark-Carter, 2004, Chapter 9). If nothing else reported, type of comparator had no effect, therefore models without this factor are described.

## **Experiment 1:**

### ***1. Accuracy***

The overall error level was 16.5%, across participants. The final model contained fixed effects for pair distance (pair 4/5, pair 3/6, pair 2/7, and pair 1/8), ideograph style (Chinese, Georgian, Konkani, Tigrinya), and their interaction. Pair distance was significant,  $\chi^2(3) = 46.03; p < .001$ , with more correct responses at wider pair distances ( $M_{45} = .67; M_{36} = .82; M_{27} = .86; M_{18} = .93$ , SDE-effect replicated), see Table 1. Responses to pair type 1/8 were more correct than to type 3/6 ( $z = -3.24; p = .003$ ) and to type 4/5 ( $z = -7.20; p < .001$ ), responses to pair type 2/7 were more correct than to type 4/5 ( $z = -5.18; p < .001$ ), and responses to pair type 3/6 were more correct than to type 4/5 ( $z = -4.65; p < .001$ ).

The interaction was also significant,  $\chi^2(9) = 35.23; p < .001$ . Bonferroni-Holm corrected contrasts showed the pair distance effect significant for each of the four ideograph styles alone ( $p < .01$ ), but less pronounced in the Georgian style than in other styles.

## **2. Response latencies**

The final model had the same fixed effect structure as above (see Appendix C). Only pair distance was significant,  $F(3,33.15) = 6.19; p = .002$ , showing quicker responding in trials of wider than narrower pairs, (SDE-effect,  $M_{45} = 1715 \text{ ms}$ ;  $M_{36} = 1620 \text{ ms}$ ;  $M_{27} = 1512 \text{ ms}$ ;  $M_{18} = 1371 \text{ ms}$ ), see Table 1. Responses to pair type 1/8 were faster than to type 3/6 ( $t(35.9) = 3.02; p = .02$ ), and to type 4/5 ( $t(35.2) = 4.34; p < .001$ ). Responses to pair type 2/7 were faster than to type 4/5 ( $t(34.5) = 2.97; p = .02$ ).

## **Experiment 2:**

### **1. Accuracy**

The overall error level was 28.9%. The final model contained fixed effects for pair distance (pairs 4/5, 3/6, 2/7, 1/8), list (4 non-word-lists), and the interaction. A significant pair distance effect,  $\chi^2(3) = 41.59; p < .001$ , indicated more correct responses with wider pair distances (SDE,  $M_{45} = .55$ ;  $M_{36} = .72$ ;  $M_{27} = .75$ ;  $M_{18} = .82$ ), Table 2. Responses to pair type 1/8 were more correct than to types 4/5 ( $z = -7.36; p < .001$ ), 3/6 ( $z = -3.91; p < .001$ ), and 2/7 ( $z = -2.57; p = .02$ ); responses to pair type 2/7 were more correct than type 4/5 ( $z = -5.30; p < .001$ ), responses to pair type 3/6 were more correct than responses to type 4/5 ( $z = -4.88; p < .001$ ). The significant interaction,  $\chi^2(9) = 17.11; p < .05$ , showed a significant SDE in each word list separately (Bonferroni-Holm corrected contrasts,  $p < .001$  level), although less pronounced with lists 1 and 3.

### **2. SDE-Effect: Response latencies**

The final model had the same fixed effect structure as above (see Appendix C). Only pair distance was significant,  $F(3,45.65) = 3.20; p = .03$ , showing quicker responding with wider than narrower pairs (SDE,  $M_{45} = 1735 \text{ ms}$ ;  $M_{36} = 1800 \text{ ms}$ ;  $M_{27} = 1649 \text{ ms}$ ;  $M_{18} = 1591 \text{ ms}$ ), see Table 2. Responses to pair type 1/8 were faster than to type 3/6 ( $t(40.3) = 2.77; p < .05$ ), no other post hoc comparison was significant. This, together with the accuracy results, shows that participants presumably generated spatial representation amongst the eight stimuli, thereby determining the difficulty levels between wide and narrow pairs along the comparator dimension.

### **Experiment 3:**

The Tukey criterion was applied for data trimming on a blockwise basis, such that across participants, blocks with extremely high average error rates would be excluded (average percentage correct per block smaller than the lower quartile minus 1.5 times the interquartile range in the sample's distribution of block averages, see Clark-Carter, 2004, Chapter 9).

#### ***1. SDE-Effect: Accuracy***

**Experiment 3a (spatial learning cues).** Out of 408 blocks, 39 blocks were excluded, leaving 369 blocks left for analysis. The overall error level after exclusion was 6.39%. The final model used for analysis contained fixed effects for pair distance (pair 3/4, pair 2/5, and pair 1/6), ideograph style (Chinese, Georgian, Konkani, and Tigrinya), number of learning cycles (3, 5, and 8), and the three-way interaction of these factors. There was a significant fixed factor effect for pair distance,  $\chi^2(2) = 23.98; p < .001$ , indicating that responses were more correct with wider pair distances ( $M_{34} = .89$ ;  $M_{25} = .94$ ;  $M_{16} = .96$ ), thus replicating the SDE, see Table 3. In particular, responses to pair type 1/6 were more correct than responses to pair type 3/4 ( $z = -4.22; p < .001$ ) and responses to pair type 2/5 were more correct than

responses to pair type 3/4 ( $z = -3.48; p < .001$ ), but responses to pair type 1/6 were not significantly more correct than responses to pair type 2/5 ( $z = -1.39; p = .34$ ).

The interaction between pair distance and ideograph style was also significant,  $\chi^2(6) = 18.81; p = .004$ , indicating that the pair distance effect was more pronounced in the Chinese ideograph block as compared to the other three styles. We also found a significant triple-interaction between pair distance, ideograph style, and number of learning cycles,  $\chi^2(12) = 40.06; p < .001$ , which was not interpreted.

**Experiment 3b (temporal learning cues).** Out of 404 blocks, 56 blocks were excluded, leaving 348 blocks left for analysis. The overall error level after exclusion was 3.16%. The final model used for analysis was of the same structure as the previous one for Experiment 8a. There was a significant fixed factor effect for pair distance,  $\chi^2(2) = 23.94; p < .001$ , indicating that responses were more correct with wider pair distances ( $M_{34} = .95; M_{25} = .98; M_{16} = .98$ ), thus replicating the SDE, see Table 3. In particular, responses to pair type 1/6 were more correct than responses to pair type 3/4 ( $z = -3.79; p < .001$ ) and responses to pair type 2/5 were more correct than responses to pair type 3/4 ( $z = -4.02; p < .001$ ), but responses to pair type 1/6 were not significantly more correct than responses to pair type 2/5 ( $z = .20; p = .97$ ). No further significant effects were observed.

## 2. SDE-Effect: Response latencies

**Experiment 3a (spatial learning cues).** The final model used for analysis had the same fixed effect structure as the one reported for accuracy (for its random effect structure see Appendix C). In this model, pair distance had a significant effect,  $F(2,92.78) = 50.96; p < .001$ , replicating the SDE by showing quicker responding in trials of wider than narrower pair distance, ( $M_{34} = 2160 \text{ ms}; M_{25} = 1748 \text{ ms}; M_{16} = 1469 \text{ ms}$ ), see Table 3. In particular, responses to pair type 1/6 were faster than responses to pair type 3/4 ( $t\text{-ratio} = 10.14 (df = 95.5); p < .001$ ), responses to pair type 1/6 were faster than responses to pair type 2/5 ( $t\text{-ratio}$

$= 6.19$  ( $df = 93.0$ );  $p < .001$ ), and responses to pair type 2/5 were faster than responses to pair type 3/4 ( $t\text{-ratio} = 7.05$  ( $df = 94.2$ ));  $p < .001$ ).

Ideograph style also had a significant main effect,  $F(3,88.48) = 5.58$ ;  $p < .001$ , indicating that responses to Chinese ideographs were slowest as compared to the other three ideograph styles,  $ps < .04$ , with no other post hoc differences being significant. There was also a significant interaction of pair distance and ideograph style,  $F(6,3709.17) = 2.50$ ;  $p = .02$ , with the SDE appearing more pronounced in Chinese and Georgian scripts as compared to Konkani and Tigrinya,  $ps < .05$ . No further effects were significant.

**Experiment 3b (temporal learning cues).** A similar model as above was fitted and statistically evaluated (for its random effect structure see Appendix C). In this model, pair distance had a significant effect,  $F(2,92.19) = 72.58$ ;  $p < .001$ , replicating the SDE by showing quicker responding in trials of wider than narrower pair distance, ( $M_{34} = 2077$  ms;  $M_{25} = 1808$  ms;  $M_{16} = 1437$  ms), see Table 3. In particular, responses to pair type 1/6 were faster than responses to pair type 3/4 ( $t\text{-ratio} = 11.75$  ( $df = 92.9$ ));  $p < .001$ ), responses to pair type 1/6 were faster than responses to pair type 2/5 ( $t\text{-ratio} = 6.96$  ( $df = 93.3$ ));  $p < .001$ ), and responses to pair type 2/5 were faster than responses to pair type 3/4 ( $t\text{-ratio} = 4.23$  ( $df = 93.5$ ));  $p < .001$ ). Ideograph style also had a significant main effect,  $F(3,83.58) = 3.99$ ;  $p < .01$ , indicating that responses to Chinese ideographs were slower than those to Georgian,  $p = .04$ , as well as responses to Konkani ideographs being slower than those to Georgian,  $p = .04$ . No further effects were significant.

## **Experiment 4:**

### ***SDE-Effect: Accuracy***

The overall error level was 18%. The final model contained fixed effects for pair distance (pair 3/4, pair 2/5, and pair 1/6), ideograph style (Chinese, Georgian, Konkani, and

Tigrinya), type of comparator, and their interaction. A significant effect for pair distance,  $\chi^2(3) = 199.67; p < .001$ , indicated more correct responses with wider pair distances (SDE,  $M_{45} = .67; M_{36} = .80; M_{27} = .87; M_{18} = .92$ ), see Table 4. Responses to pair type 1/8 were more correct than to type 4/5 ( $z = -12.66; p < .001$ ), responses to pair type 1/8 were more correct than responses to pair type 3/6 ( $z = -8.80; p < .001$ ), responses to type 1/8 were more correct than to type 2/7 ( $z = -3.55; p < .001$ ), responses to type 2/7 were more correct than to type 4/5 ( $z = -11.66; p < .001$ ), responses to type 2/7 were more correct than to type 3/6 ( $z = -6.59; p < .001$ ), and responses to type 3/6 were more correct than to type 4/5 ( $z = -8.04; p < .001$ ).

The interaction showed,  $\chi^2(9) = 30.57; p = .0004$ , that the SDE was less pronounced for Georgian letters than for other types ( $ps < .01$ ). Type of comparator was significant,  $\chi^2(1) = 21.29; p < .001$ , with accuracies higher for comparator “*old*” ( $M = .84$ ) than for “*more frequently used*” ( $M = .79, z = 4.76; p < .001$ ).

#### **SDE-Effect: Response latencies**

The final model had the same fixed effect structure as above (Appendix C). Pair distance had a significant effect,  $F(3,229.18) = 37.72; p < .001$ , showing quicker responding in trials of wider than narrower pair distance, (SDE,  $M_{45} = 1790\ ms; M_{36} = 1694\ ms; M_{27} = 1601\ ms; M_{18} = 1491\ ms$ ), see Table 4. In particular, responses to pair type 1/8 were faster than to type 4/5 ( $z = 10.28; p < .001$ ), to type 3/6 ( $z = 8.13; p < .001$ ), and to type 2/7 ( $z = 4.64; p < .001$ ). Responses to pair type 2/7 were faster than to type 4/5 ( $z = 7.95; p < .001$ ) and to type 3/6 ( $z = 4.37; p < .001$ ), and responses to pair type 3/6 were faster than responses to type 4/5 ( $z = 4.44; p < .001$ ).

Type of ideograph,  $F(3,218.32) = 13.29; p < .001$ , showed that, as post-hoc tests revealed ( $ps < .001$ ), participants needed on average longer to respond to Chinese ideographs ( $M = 1819\ ms$ ) as compared to Georgian ( $M = 1595\ ms$ ), Konkani ( $M = 1626\ ms$ ) or Tigrinya

ideographs ( $M = 1501$  ms). Lastly, type of comparator was significant,  $F(1,226.18) = 29.75$ ;  $p < .001$  with slower responding to “*older than*” items ( $M = 1673$  ms) than to “*more frequently used*” items ( $M = 1592$  ms;  $z = 5.46$ ;  $p < .001$ ).

## **Experiment 5:**

### ***SDE-Effect: Accuracy***

The overall error level was 27%. The final model contained fixed effects for pair distance (pairs 4/5, 3/6, 2/7, 1/8), list (4 non-word-lists), and the interaction. A significant pair distance effect,  $\chi^2(3) = 18.11$ ;  $p < .001$ , indicated more correct responses with wider pair distances (SDE,  $M_{45} = .65$ ;  $M_{36} = .69$ ;  $M_{27} = .75$ ;  $M_{18} = .81$ ), see Table 5. Responses to pair type 1/8 were more correct than to types 4/5 ( $z = 4.32$ ;  $p < .001$ ), 3/6 ( $z = 3.00$ ;  $p < .01$ ), and 2/7 ( $z = 2.44$ ;  $p = .04$ ); responses to pair type 2/7 were more correct than type 4/5 ( $z = 2.96$ ;  $p < .01$ ).

### ***SDE-Effect: Response latencies***

The final model had the same fixed effect structure as above (see Appendix C). Pair distance was significant,  $F(3,38.23) = 5.63$ ;  $p = .003$ , showing a tendency to quicker responding with wider than narrower pairs (SDE,  $M_{45} = 1305$  ms;  $M_{36} = 1329$  ms;  $M_{27} = 1157$  ms;  $M_{18} = 1187$  ms), see Table 5. Responses to pair type 1/8 were faster than to types 4/5 ( $z = 4.32$ ;  $p < .001$ ), 3/6 ( $z = 3.00$ ;  $p < .01$ ) and 2/7 ( $z = 2.44$ ;  $p < .04$ ), as well as faster to type 2/7 than type 4/5 ( $z = 2.96$ ;  $p < .01$ ). This, together with the accuracy results, shows that participants presumably generated spatial representation amongst the eight stimuli, thereby determining the difficulty levels between wide and narrow pairs along the comparator dimension.

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