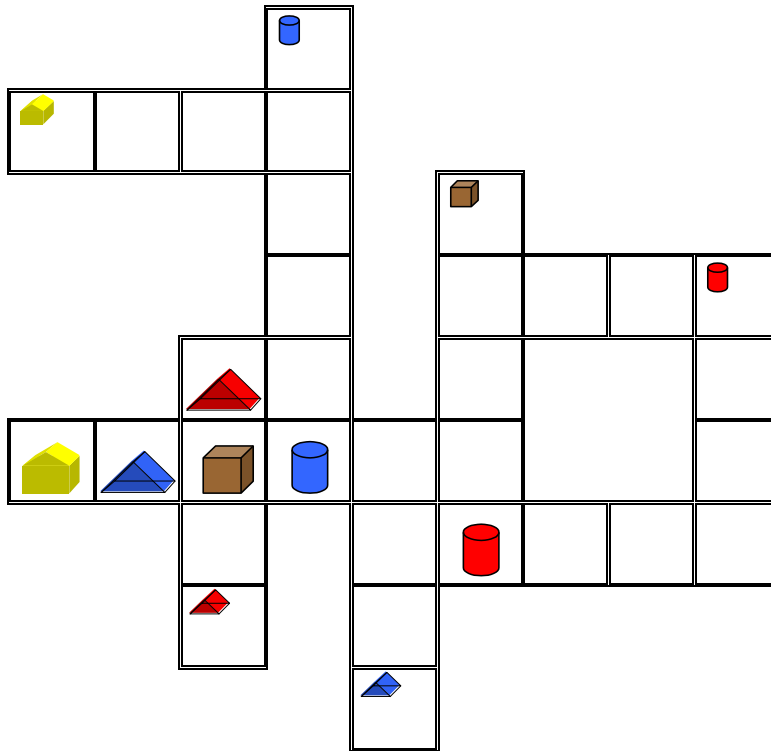
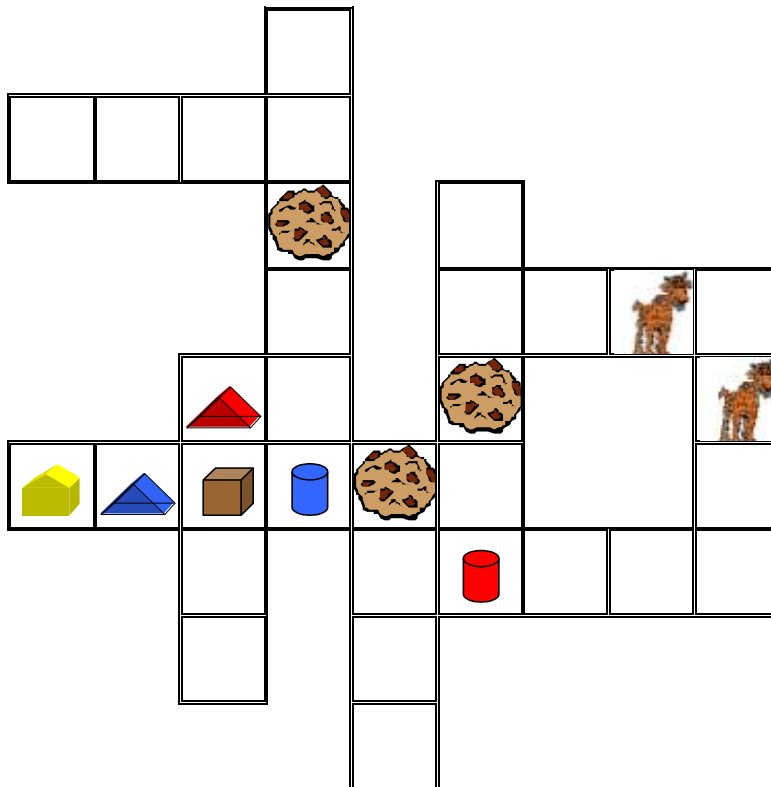


Appendix A

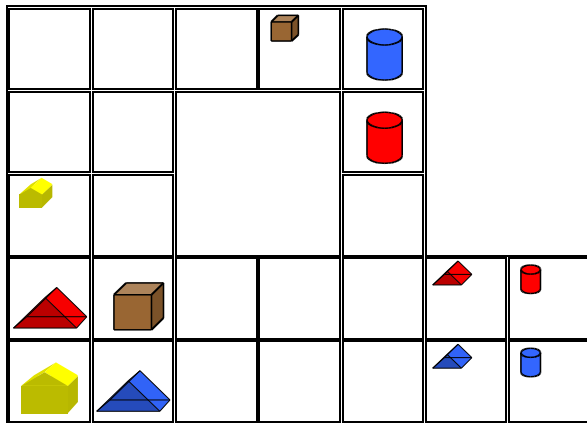
Driver's gameboard A, Experiments 1 and 4. Starting points are shown by the large shapes; goals for objects are shown by the small raised shapes



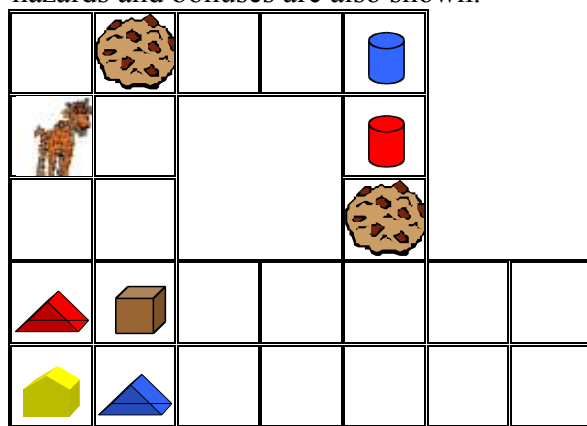
Slider's gameboard A, Experiments 1 and 4. Starting points are shown by the large shapes; hazards and bonuses are also shown.



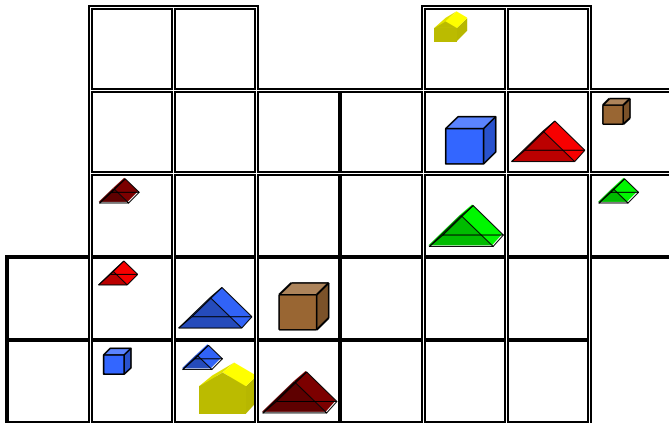
Driver's gameboard B, Experiments 1 and 4. Starting points are shown by the large shapes; goals for objects are shown by the small raised shapes



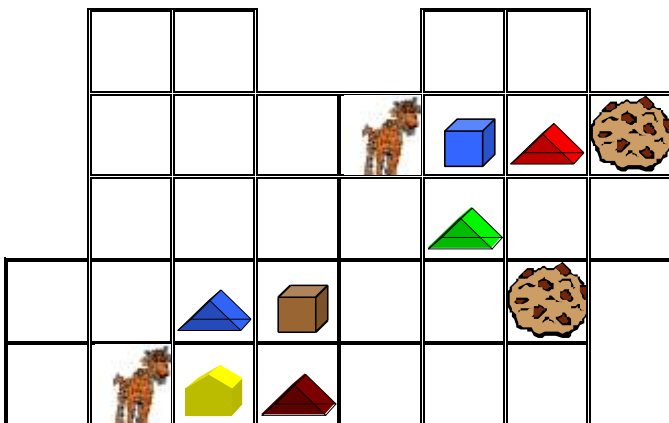
Slider's gameboard B, Experiments 1 and 4. Starting points are shown by the large shapes; hazards and bonuses are also shown.



Driver's gameboard C, Experiments 1 and 4. Starting points are shown by the large shapes; goals for objects are shown by the small raised shapes



Slider's gameboard C, Experiments 1 and 4. Starting points are shown by the large shapes; hazards and bonuses are also shown.



## Appendix B

### Driver & Slider Lines for Experiments 1 and 4

#### *For the Driver*

##### **WHEN YOU WANT TO TELL THE SLIDER TO MOVE SOMETHING:**

- D1: I want to change the position of the square with the [*cylinder/triangle/square with the triangle*].
- D2: I want to change the position of the [*cylinder/triangle/square with the triangle*].

##### **TO SPECIFY WHICH COLOR OBJECT TO MOVE:**

- D3: The [*brown/blue/red/green/yellow*] one. When that moves the square it should land in a good spot.
- D4: The [*brown/blue/red/green/yellow*] one. When that moves it should land in a good spot.

##### **TO TELL THEM THEY MOVED CORRECTLY:**

- D5: Good job.
- D6: I am able to confirm the move was the final one.  
The [*cylinder/square/triangle/square with the triangle*] has now reached its goal.
- D7: Congratulations, we have reached the end of the round.

##### **IF THE SLIDER MOVED THE WRONG WAY, OR**

##### **IF YOU CHANGE YOUR MIND ABOUT WHAT YOU WANT DONE:**

- D8: Whoops, go back, there's another direction I want you to go in.
- D9: Whoops, go back, there's another object I want you to move.

#### *For the Slider*

##### **TO ASK WHICH OBJECT YOU SHOULD MOVE:**

- S1: Which [*cylinder/triangle*] do you want to change the position of the square?
- S2: Which [*cylinder/triangle/square*] do you want to change the position of this time?

##### **TO LET THE DRIVER KNOW YOU WILL PASS OVER A FEATURE:**

S3: Good choice. When that moves the [*cylinder/square/triangle/square with the triangle*] will encounter a cookie.

S4: Bad luck. When that moves the [*cylinder/square/triangle/square with the triangle*] will encounter a ravenous goat. (Fortunately, I have a cookie to feed it.)

**TO LET THE DRIVER KNOW WHERE YOU HAVE MOVED AN OBJECT.**

**REMEMBER: IF YOU USE AN OBJECT TO PUSH THE SQUARE, YOU MUST USE S5!**

S5: I am able to confirm the move of the square with the [*cylinder/triangle/square with the triangle*].

It has moved [*1/2/3/4/5...*] space(s) [*up/down/left/right*].

S6: I am able to confirm the move of the [*cylinder/triangle/square with the triangle*].

It has moved [*1/2/3/4/5...*] space(s) [*up/down/left/right*].

**AFTER THE DRIVER TELLS YOU TO MOVE IN ANOTHER DIRECTION/MOVE ANOTHER OBJECT:**

S7: OK, it's back where it was before.

**IF YOU CAN'T DO THE MOVE THE DRIVER WANTED:**

S8: I am unable to complete that move.

## Appendix C

### Driver & Slider Lines for Experiment 3

Lines were identical to those in Appendix B, with the following substitutions (numbering scheme is the same).

#### High-attached condition:

##### *For the Driver*

- D1: I want to change the position of the square with the [*cylinder/rectangle/triangle*].
- D2: I want to change the position of the [*cylinder/triangle/rectangle*].
- D3: The [*tan/blue/red/green/*] one. When that moves the square, it should land in a good spot.
- D4: The [*tan/blue/red/green/*] one. When that moves, it should land in a good spot.
- D6: I am able to confirm the move was the final one.  
The [*cylinder/square/triangle/rectangle*] has now reached its goal.

##### *For the Slider*

#### TO ASK WHICH OBJECT YOU SHOULD MOVE:

- S1: Which [*cylinder/triangle/rectangle*] do you want to change the position of the square?
- S2: Which [*cylinder/triangle/rectangle/square*] do you want to change the position of this time?
- S3: Good choice. When that moves, the [*cylinder/square/triangle/rectangle*] will encounter a cookie.
- S4: Bad luck. When that moves, the [*cylinder/square/triangle/rectangle*] will encounter a ravenous goat. (Fortunately, I have a cookie to feed it.)
- S5: I am able to confirm the move of the square with the [*cylinder/triangle/rectangle*].  
It has moved [*1/2/3/4/5...*] space(s) [*up/down/left/right*].
- S6: I am able to confirm the move of the [*cylinder/triangle/rectangle*].  
It has moved [*1/2/3/4/5...*] space(s) [*up/down/left/right*].

#### Low-attached condition:

##### *For the Driver*

- D1: I want to change the position of the square and the [*cylinder/square with the triangle/triangle*].

- D2: I want to change the position of the [*cylinder/triangle/square with the triangle*].
- D3: The [*tan/blue/red/green/*] one. When that and the square move, they should land in a good spot.
- D4: The [*tan/blue/red/green/*] one. When that moves, it should land in a good spot.
- D6: I am able to confirm the move was the final one.  
The [*cylinder/square/triangle/square with the triangle*] has now reached its goal.

### ***For the Slider***

- S1: Which [*cylinder/triangle/square with the triangle*] do you want to change position along with the square?
- S2: Which [*cylinder/triangle/square with the triangle/square*] do you want to change the position of this time?
- S3: Good choice. When that moves, the [*cylinder/square/triangle/square with the triangle*] will encounter a cookie.
- S4: Bad luck. When that moves, the [*cylinder/square/triangle/square with the triangle*] will encounter a ravenous goat. (Fortunately, I have a cookie to feed it.)
- S5: I am able to confirm the move of the square and the [*cylinder/triangle/square with the triangle*].  
It has moved [*1/2/3/4/5...*] space(s) [*up/down/left/right*].
- S6: I am able to confirm the move of the [*cylinder/triangle/square with the triangle*].  
It has moved [*1/2/3/4/5...*] space(s) [*up/down/left/right*].

Appendix D: Full statistical (*lmer*) models referred to in the text

NB: ‘c’ before a factor name indicates that the factor has been centered to remove collinearity from the model. See text for more details concerning these models. Intercept levels of the factors tested in the model are given below each table.

Table 1 *square*+pause durations, experiment 1

	Estimate	MCMCmean	HPD95lower	HPD95upper	pMCMC
(Intercept)	-2.4894	-2.4890	-2.6360	-2.3474	0.0001
cAttachment	-1.2809	-1.2773	-1.4514	-1.0926	0.0001
cRole	-0.3447	-0.3442	-0.4457	-0.2368	0.0001
cVariety	-0.0484	-0.0493	-0.3305	0.2524	0.7220
cPropseq	-0.2983	-0.2994	-0.4693	-0.1161	0.0016
cAttachment:cRole	-0.0455	-0.0446	-0.2562	0.1762	0.6970
cAttachment:cVariety	-0.1366	-0.1400	-0.4970	0.2198	0.4434
cAttachment:cPropseq	0.0075	0.0114	-0.3488	0.3801	0.9566

Intercept levels: High Attachment, Driver, AmE, first position in sequence.

Table 2 strongest boundary location, ‘equal’ data excluded, experiment 1

	Estimate	Std. Error	z value	Pr(> z )
(Intercept)	-2.4564	0.4507	-5.4500	0.0000
cAttachment	-5.2245	0.5809	-8.9950	< 0.0001
cRole	-0.7329	0.4360	-1.6810	0.0928
cVariety	0.4830	0.8880	0.5440	0.5865
cPropseq	-1.0818	0.7739	-1.3980	0.1621
cAttachment:cRole	1.4683	0.7655	1.9180	0.0551
cAttachment:cVariety	1.0232	1.1310	0.9050	0.3656
cAttachment:cPropseq	-1.2102	1.3440	-0.9000	0.3679

Intercept levels: High Attachment, Driver, AmE, first position in sequence.

Table 3 strongest boundary location, ‘equal’ grouped with ‘square’, experiment 1

	Estimate	Std. Error	z value	Pr(> z )
(Intercept)	-0.7081	0.2570	-2.7550	0.0059
cAttachment	-3.6374	0.3769	-9.6500	< 0.0001
cRole	-0.6289	0.2319	-2.7120	0.0067
cVariety	-0.1639	0.5110	-0.3210	0.7484
cPropseq	-0.8460	0.3980	-2.1260	0.0335
cAttachment:cRole	0.1927	0.4643	0.4150	0.6782
cAttachment:cVariety	0.2851	0.7467	0.3820	0.7026
cAttachment:cPropseq	-1.2256	0.7997	-1.5330	0.1254

Intercept levels: High Attachment, Driver, AmE, first position in sequence.



Table 4 *square*+pause durations, ambiguity analysis, experiment 1

	Estimate	MCMCmean	HPD95lower	HPD95upper	pMCMC
(Intercept)	-1.5858	-1.5892	-1.8223	-1.3372	0.0001
ambfactorbiased	-0.0804	-0.0805	-0.3384	0.1850	0.5338
ambfactorambig	0.0983	0.1038	-0.1538	0.3609	0.4302

Intercept level: Unambiguous.

Table 5 strongest boundary location, ‘equal’ data excluded, ambiguity analysis, experiment 1

	Estimate	Std. Error	z value	Pr(> z )
(Intercept)	2.9985	1.2097	2.479	0.0132
ambfactorbiased	-0.2106	0.9231	-0.288	0.8195
ambfactorambig	0.9232	0.9850	-0.937	0.3486

Intercept level: Unambiguous.

Table 6 strongest boundary location, ‘equal’ grouped with ‘square’, ambiguity analysis, experiment 1

	Estimate	Std. Error	z value	Pr(> z )
(Intercept)	3.5766	1.1427	3.130	0.0018
ambfactorbiased	-0.6344	0.8433	-0.752	0.4519
ambfactorambig	-0.6832	0.9076	-0.753	0.4516

Intercept level: Unambiguous.

Table 7 *square*+pause durations, gamepiece analysis, experiment 1

	Estimate	MCMCmean	HPD95lower	HPD95upper	pMCMC
(Intercept)	-1.9390	-1.9396	-2.1336	-1.7590	0.0001
attachment.high.tri	0.1833	0.1851	0.0224	0.3498	0.0264
attachment.low.tri	-1.0539	-1.0543	-1.2080	-0.9008	0.0001
cRole	-0.1838	-0.1830	-0.4573	0.1003	0.1986
attachment.high.tri:cRole	-0.1227	-0.1213	-0.4437	0.1989	0.4688
attachment.low.tri:cRole	-0.2105	-0.2098	-0.5281	0.0879	0.1818

Intercept levels: High-attached Cylinder, Driver.

Table 8 strongest boundary location, ‘equal’ data excluded, gamepiece analysis, experiment 1

	Estimate	Std. Error	z value	Pr(> z )
(Intercept)	0.66658	0.50364	1.324	0.1855
attachment.high.tri	0.13745	0.43508	0.316	0.7520
attachment.low.tri	-4.68012	0.51296	-9.124	<0.0001
cRole	-0.16442	0.78023	-0.211	0.8329
attachment.high.tri:cRole	-1.11442	0.88523	-1.259	0.2080
attachment.low.tri:cRole	-0.02036	0.98327	-0.021	0.9832

Intercept levels: High-attached Cylinder, Driver.

Table 9 strongest boundary location, ‘equal’ grouped with ‘square’, gamepiece analysis, experiment 1

	Estimate	Std. Error	z value	Pr(> z )
(Intercept)	1.8435	0.3612	5.104	<0.0001
attachment.high.tri	-0.5652	0.3335	-1.695	0.0902
attachment.low.tri	-3.8897	0.3416	-11.387	<0.0001
cRole	0.3754	0.5817	0.645	0.5187
attachment.high.tri:cRole	-0.9782	0.6654	-1.470	0.1415
attachment.low.tri:cRole	-1.0031	0.6534	-1.535	0.1247

Intercept levels: High-attached Cylinder, Driver.

Table 10 categorization accuracy, experiment 2

	Estimate	Std. Error	z value	Pr(> z )
(Intercept)	1.3483	0.2885	4.674	0.0000
attachmentlow	-1.0646	0.3700	-2.878	0.0040
propseq	-0.0814	0.1966	-0.414	0.6788
VarietyNZE	0.1093	0.3915	0.279	0.7802
ambfactorbiased	-0.0645	0.1460	-0.442	0.6587
ambfactorambiguous	0.1529	0.1324	1.154	0.2483
attachmentlow:propseq	1.0064	0.2536	3.969	0.0001
attachmentlow:VarietyNZE	0.4775	0.5082	0.940	0.3474
attachmentlow:ambfactorbiased	-0.0239	0.2277	-0.105	0.9164
attachmentlow:ambfactorambiguous	-0.6934	0.2574	-2.694	0.0071

Intercept levels: High Attachment, First position in sequence, AmE, unambiguous.

Table 11 categorization accuracy, strongest boundary location analysis, experiment 2

	Estimate	Std. Error	z value	Pr(> z )
(Intercept)	1.80897	0.11207	16.142	<0.0001
SBLequal	-0.46300	0.13329	-3.474	0.0005
SBLconflicting	-1.90891	0.13685	-13.948	<0.0001
attachmentlow	-0.54136	0.09359	-5.784	<0.0001
SBLequal:attachmentlow	-0.95140	0.16934	-5.618	<0.0001
SBLcounter:attachmentlow	0.24006	0.25514	0.941	0.3468

Intercept levels: Predicted SBL, High Attachment.

Table 12 *square*+pause durations, experiment 3

	Estimate	MCMCmean	HPD95lower	HPD95upper	pMCMC
(Intercept)	-2.4625	-2.4642	-2.6333	-2.3002	0.0001
cAttachment	-0.6822	-0.6798	-1.0100	-0.3515	0.0004
cRole	-0.3099	-0.3100	-0.4925	-0.1358	0.0008
cAttachment:cRole	-0.0399	-0.0409	-0.4078	0.3225	0.8308

Intercept levels: High Attachment, Driver.

Table 13 *square*+pause durations, experiments 1 & 3

	Estimate	MCMCmean	HPD95lower	HPD95upper	pMCMC
(Intercept)	-2.5020	-2.5022	-2.6053	-2.3982	0.0001
cExperiment	0.0251	0.0233	-0.2038	0.2479	0.8424
cAttachment	-1.1340	-1.1313	-1.2836	-0.9847	0.0001
cRole	-0.3375	-0.3388	-0.4259	-0.2495	0.0001
cExperiment:cAttachment	0.5870	0.5915	0.1625	1.0068	0.0048
cExperiment:cRole	0.0346	0.0347	-0.1815	0.2359	0.7496
cAttachment:cRole	-0.0583	-0.0592	-0.2335	0.1239	0.5104
cExperiment:cAttachment:cRole	0.0251	0.0241	-0.3992	0.4382	0.9078

Intercept levels: Experiment 1, High Attachment, Driver.

Table 14 strongest boundary location, 'equal' data excluded, experiment 3

	Estimate	Std. Error	z value	Pr(> z )
(Intercept)	-2.264	0.812	-2.789	0.0053
cAttachment	-5.006	1.557	-3.215	0.0013

Intercept level: High Attachment.

Table 15 strongest boundary location, 'equal' grouped with 'square', experiment 3

	Estimate	Std. Error	z value	Pr(> z )
(Intercept)	-1.2408	0.6236	-1.9900	0.0466
Attachmentlow	-5.0387	1.2155	-4.1450	0.0000

Intercept level: High Attachment.

Table 16 strongest boundary location, 'equal' data excluded, experiments 1 & 3

	Estimate	Std. Error	z value	Pr(> z )
(Intercept)	2.5868	0.8315	3.111	0.0019
Experimentexpt3	-1.8238	1.6461	-1.108	0.2679
attachmentlow	-8.7500	1.3436	-6.512	<0.0001
Experimentexpt3:attachmentlow	2.1834	2.8767	0.759	0.4479

Intercept levels: Experiment 1, High Attachment.

Table 17 strongest boundary location, 'equal' grouped with 'square', experiments 1 & 3

	Estimate	Std. Error	z value	Pr(> z )
(Intercept)	2.7361	0.6752	4.0520	0.0001
Experimentexpt3	-0.8087	1.3414	-0.6030	0.5470
attachmentlow	-4.8368	0.6553	-7.3800	<0.0001
Experimentexpt3:attachmentlow	-0.3781	1.5738	-0.2400	0.8100

Intercept levels: Experiment 1, High Attachment.

Table 18 durations, experiment 4

	Estimate	MCMCmean	HPD95lower	HPD95upper	pMCMC
(Intercept)	-1.6059	-1.6062	-1.8598	-1.3304	0.0001
closurelate	-1.6981	-1.7002	-2.0100	-1.4125	0.0001
VarietyNZE	0.0015	-0.0040	-0.3910	0.3994	0.9704
regionsquare	-0.7204	-0.7220	-1.0140	-0.4244	0.0001
closurelate:VarietyNZE	-0.1848	-0.1831	-0.6593	0.2617	0.4388
closurelate:regionsquare	1.6052	1.6054	1.1826	2.0214	0.0001
VarietyNZE:regionsquare	0.2287	0.2283	-0.2149	0.6894	0.3224
closurelate:VarietyNZE:regionsquare	-0.0627	-0.0627	-0.7115	0.5496	0.8348

Intercept levels: Early Closure, AmE, 'moves' region.

Table 19 categorization accuracy, experiment 5

	Estimate	Std. Error	z value	Pr(> z )
(Intercept)	1.8346	0.2247	8.1630	<0.0001
completioncrossed	-0.6571	0.0936	-7.0220	<0.0001
closurelate	-0.1781	0.1934	-0.9200	0.3573
SBLequal	-0.7203	0.1482	-4.8600	<0.0001
SBLconflicting	-0.3780	0.2353	-1.6070	0.1081
VarietyNZE	0.0002	0.2657	0.0010	0.9995
completionuncrossed:closurelate	0.4051	0.1302	3.1120	0.0019
closurelateSBLequal	0.0401	0.2007	0.2000	0.8417
closurelate:SBLconflicting	-1.1602	0.2811	-4.127	<0.0001

Intercept levels: Original Completion, Early Closure, AmE, Predicted SBL.

Table 20 strongest boundary location, 'equal' data excluded, experiments 1 & 4

	Estimate	Std. Error	z value	Pr(> z )
(Intercept)	2.5720	0.2311	11.131	<0.0001
cType	-1.9332	0.6375	-3.033	0.0024
cVariety	-0.2773	0.4672	-0.594	0.5528
cType:cVariety	-0.5269	1.3117	-0.402	0.6879

Intercept levels: Closure, AmE.

Table 21 strongest boundary location, 'equal' grouped with 'square', experiments 1 & 4

	Estimate	Std. Error	z value	Pr(> z )
(Intercept)	2.7471	0.2216	12.399	<0.0001
cType	-1.7979	0.6325	-2.843	0.0045
cVariety	-0.3262	0.4475	-0.729	0.4661
cType:cVariety	-0.6776	1.3055	-0.519	0.6037

Intercept levels: Closure, AmE.

Table 22 categorization accuracy, experiments 2 & 5

	Estimate	Std. Error	z value	Pr(> z )
(Intercept)	1.1701	0.1122	10.4280	<0.0001
cType	-0.0539	0.1486	-0.3630	0.7170
cVariety	0.1539	0.2231	0.6900	0.4900
cType:cVariety	0.5174	0.2965	1.7450	0.0810

Intercept levels: Closure, AmE.

Table 23 categorization accuracy, experiments 2 & 5, excluding crossed tokens from experiment 5

	Estimate	Std. Error	z value	Pr(> z )
(Intercept)	1.2723	0.1153	11.0320	<0.0001
cType	-0.2559	0.1480	-1.7300	0.0837
cVariety	0.0259	0.2293	0.1130	0.9099
cType:cVariety	0.7634	0.2953	2.5860	0.0097

Intercept levels: Closure, AmE.