Appendices

Full Model Results

Table 1

GPT-2					GPT-2XL			
	Est.	Err.	2.5	97.5	Est.	Err.	2.5	97.5
Intercept	-0.10	0.10	-0.30	0.10	0.05	0.09	-0.13	0.23
AbsPref	-0.52	0.64	-1.81	0.69	-0.89	0.63	-2.17	0.29
Observed	**4.62**	0.50	3.66	5.59	**5.34**	0.46	4.45	6.25
Freq	-0.04	0.06	-0.15	0.07	-0.01	0.05	-0.11	0.09
AbsPref:Freq	0.10	0.39	-0.66	0.86	-0.17	0.36	-0.87	0.53
Observed:Freq	**0.96**	0.24	0.49	1.43	**1.01**	0.21	0.59	1.43
Llama-2 7B					**Llama-2 13B**			
	Est.	Err.	2.5	97.5	Est.	Err.	2.5	97.5
Intercept	0.22	0.13	-0.03	0.47	0.12	0.08	-0.04	0.27
AbsPref	1.11	0.84	-0.40	2.91	0.32	0.54	-0.72	1.38
Observed	**3.07**	0.64	1.81	4.31	**5.25**	0.40	4.46	6.05
Freq	0.04	0.07	-0.10	0.17	-0.08	0.04	-0.16	0.01
AbsPref:Freq	-0.32	0.47	-1.24	0.59	-0.02	0.32	-0.64	0.60
Observed:Freq	0.23	0.28	-0.33	0.78	**0.72**	0.19	0.34	1.09
Llama-3 8B					**Llama-3 70B**			
	Est.	Err.	2.5	97.5	Est.	Err.	2.5	97.5
Intercept	0.15	0.09	-0.03	0.33	0.04	0.05	-0.06	0.14
AbsPref	0.23	0.59	-0.92	1.42	0.10	0.38	-0.63	0.85
Observed	**5.64**	0.46	4.75	6.54	**5.00**	0.27	4.49	5.52
Freq	-0.07	0.05	-0.17	0.03	-0.05	0.03	-0.11	0.00
AbsPref:Freq	0.07	0.36	-0.63	0.78	-0.11	0.21	-0.52	0.30
Observed:Freq	**0.60**	0.22	0.18	1.03	**0.65**	0.12	0.41	0.89
OLMo 1B					**OLMo 7B**			
	Est.	Err.	2.5	97.5	Est.	Err.	2.5	97.5
Intercept	0.06	0.08	-0.09	0.22	0.04	0.07	-0.10	0.18
AbsPref	0.69	0.54	-0.33	1.79	-0.86	0.51	-1.88	0.11
Observed	**4.36**	0.39	3.58	5.12	**5.37**	0.36	4.67	6.08
Freq	0.06	0.04	-0.02	0.14	0.01	0.04	-0.07	0.08
AbsPref:Freq	-0.12	0.31	-0.73	0.47	0.10	0.28	-0.47	0.64
Observed:Freq	**0.81**	0.19	0.44	1.17	**0.70**	0.17	0.37	1.04

Table 2: Model results for each language model. The Estimate is given in the "Est." column, the standard deviation of the posterior is given in the "Err." column. The columns labeled 2.5 and 97.5 represent the lower and upper confidence interval boundaries. AbsPref is the abstract ordering preferences, Observed is the observed preference in corpus data, and Freq is the overall frequency of the binomial.

Full List of Stimuli

Below is a table of our list of binomials as well as the individual constraint values for each.

Table 3: Full list of binomials as well as their constraints.

Word1	Word2	Form	Percept	Culture	Power	Intense	Icon	Freq	Len	Lapse	Final Stress	AbsPref
kiwis	wolverines	0	0	0	-1	-1	0	-0.291	1	-1	-1	0.427
kiwis	narwhals	0	1	0	-1	-1	0	2.715	0	-1	-1	0.515
kiwis	ocelots	0	0	0	-1	0	0	2.737	0	-1	-1	0.458
ibex	kiwis	0	0	0	1	0	0	-1.171	0	1	0	0.497
harpies	kiwis	0	-1	0	1	1	0	-1.948	0	0	0	0.471
axolotls	wolverines	0	-1	0	-1	0	0	-2.689	-1	-1	-1	0.262
axolotls	ibex	0	-1	0	-1	0	0	-1.228	-2	-1	0	0.331
axolotls	harpies	0	1	0	-1	-1	0	-0.450	-2	0	0	0.413
axolotls	keas	0	0	1	-1	0	0	1.052	-3	-1	1	0.591
axolotls	bonobos	0	-1	0	-1	0	0	-0.895	-1	0	0	0.328
axolotls	wombats	0	-1	0	-1	0	0	-0.655	-2	-1	-1	0.266
axolotls	lions	0	-1	-1	-1	-1	0	-5.114	-2	0	0	0.159
ocelots	platypuses	0	1	-1	1	0	0	0.665	1	3	1	0.525
ibex	platypuses	0	1	0	1	0	0	2.232	2	3	1	0.691
harpies	platypuses	0	0	0	1	1	0	1.454	2	2	0	0.585
keas	platypuses	0	0	-1	0	0	0	-0.048	3	3	1	0.459
bonobos	platypuses	0	1	0	1	0	0	1.898	1	2	0	0.612
harpies	wolverines	0	-1	0	0	0	0	-2.239	1	-1	1	0.571
keas	wolverines	0	-1	-1	-1	0	0	-3.741	2	0	0	0.285
bonobos	wolverines	0	0	0	0	0	0	-1.795	0	-1	-1	0.426

Table 3: Full list of binomials as well as their constraints.

Word1	Word2	Form	Percept	Culture	Power	Intense	Icon	Freq	Len	Lapse	Final Stress	AbsPref
capybaras	ibex	0	0	0	0	0	0	-1.659	-2	-1	-1	0.356
capybaras	harpies	0	1	0	-1	-1	0	-0.882	-2	0	0	0.404
capybaras	keas	0	1	1	1	0	0	0.621	-3	-1	-1	0.593
ibex	narwhals	0	1	0	-1	0	0	1.544	0	0	0	0.536
harpies	narwhals	0	-1	0	0	1	0	0.767	0	-1	-1	0.423
keas	narwhals	0	0	-1	-1	0	0	-0.736	1	0	0	0.362
ibex	ocelots	0	0	0	0	0	0	1.566	1	0	0	0.576
keas	ocelots	0	-1	-1	-1	0	0	-0.714	2	0	0	0.340
bonobos	ocelots	0	0	1	0	0	0	1.233	0	-1	-1	0.594
harpies	ibex	0	-1	0	0	1	0	-0.777	0	-1	-1	0.391
ibex	keas	0	1	1	1	0	0	2.280	-1	0	0	0.729
bonobos	ibex	0	0	0	0	0	0	-0.333	-1	-1	-1	0.419
ibex	koalas	0	0	-1	0	0	0	-0.433	1	1	1	0.471
ibex	sloths	0	0	-1	1	0	0	-0.035	-1	0	0	0.427
aardvarks	ibex	0	0	1	0	0	0	-1.945	0	0	0	0.568
harpies	keas	0	-1	1	1	1	0	1.503	-1	-1	-1	0.569
bonobos	harpies	0	1	0	-1	-1	0	0.444	-1	0	0	0.470
harpies	koalas	0	-1	-1	0	1	0	-1.210	1	0	0	0.359
harpies	wombats	0	-1	0	1	1	0	-0.204	0	-1	-1	0.467
aardvarks	harpies	0	1	0	0	-1	0	-1.167	0	1	1	0.579
bonobos	keas	0	1	1	1	0	0	1.947	-2	-1	-1	0.656
keas	koalas	0	-1	-1	-1	0	0	-2.712	2	1	1	0.339
keas	sloths	0	-1	-1	0	0	0	-2.315	0	0	0	0.301

Table 3: Full list of binomials as well as their constraints.

Word1	Word2	Form	Percept	Culture	Power	Intense	Icon	Freq	Len	Lapse	Final Stress	AbsPref
keas	wombats	0	-1	-1	-1	0	0	-1.707	1	0	0	0.289
keas	lions	0	-1	-1	-1	-1	0	-6.166	0	1	1	0.217
aardvarks	keas	0	1	1	1	0	0	0.335	-1	0	0	0.695
bonobos	wombats	0	0	0	1	0	0	0.240	-1	-1	-1	0.496
aardvarks	bonobos	0	0	0	0	0	0	-1.611	1	1	1	0.551
ocarinas	vibraphones	0	0	1	0	0	0	0.461	-1	-1	-1	0.540
cymbals	ocarinas	0	0	1	1	0	0	3.485	2	0	0	0.786
clarinets	ocarinas	0	0	1	1	0	0	2.245	0	1	1	0.742
cellos	ocarinas	0	0	1	0	0	0	2.344	2	0	0	0.720
didgeridoos	vibraphones	0	0	0	0	0	0	0.533	-1	0	0	0.479
lutes	marimbas	0	0	0	0	0	0	1.225	2	1	1	0.645
kalimbas	lutes	0	0	0	0	0	0	-2.407	-2	-1	-1	0.342
clarinets	kalimbas	0	0	1	1	0	0	2.827	0	1	1	0.752
kalimbas	trumpets	0	0	-1	-1	0	0	-4.437	-1	0	0	0.234
cellos	kalimbas	0	0	1	1	0	0	2.926	1	0	0	0.751
kalimbas	saxophones	0	0	-1	-1	0	0	-3.124	0	-1	-1	0.252
lutes	saxophones	0	0	-1	-1	0	0	-0.717	2	0	0	0.398
casserole	eagle	0	-1	0	0	-1	0	-1.526	-1	1	1	0.410
kite	linguist	0	-1	1	0	0	0	1.602	1	1	1	0.656
algorithm	perfume	0	-1	-1	0	0	0	1.992	-2	-1	-1	0.280
forest	screwdriver	0	0	0	0	0	0	3.294	1	0	0	0.612
slipper	volcano	0	0	1	-1	-1	0	-1.806	1	0	0	0.540
harmonica	microscope	0	0	0	0	0	0	-1.745	-1	-2	-1	0.437
cookbook	zenith	0	1	1	0	0	0	1.136	0	1	1	0.722
hammock	hydrogen	0	1	-1	0	0	0	-2.060	1	1	0	0.410
neuron	toaster	0	-1	-1	0	0	0	0.383	0	1	0	0.309

Table 3: Full list of binomials as well as their constraints.

Word1	Word2	Form	Percept	Culture	Power	Intense	Icon	Freq	Len	Lapse	Final Stress	AbsPref
marshmallow	telescope	0	0	0	0	0	0	-1.166	0	-1	-1	0.439
casserole	optics	0	1	0	0	0	0	-0.665	-1	1	1	0.557
encyclopedia	comet	0	1	0	-1	0	0	0.947	-4	-1	0	0.420
nimbus	waffle	0	-1	-1	0	0	0	-1.680	0	0	0	0.312
photon	pumpkin	0	-1	-1	0	0	0	-0.793	0	1	1	0.367
lantern	syntax	0	1	1	0	0	0	-0.941	0	-1	-1	0.609
echo	vineyard	0	-1	0	0	0	0	1.884	0	0	0	0.484
nebula	snowman	0	-1	-1	0	0	0	0.182	-1	-2	-1	0.320
botany	teapot	0	-1	-1	0	0	0	0.438	-1	-2	-1	0.325
chisel	kaleidoscope	0	0	0	1	0	0	0.139	2	-1	-1	0.606
lava	teacup	0	-1	-1	1	0	0	1.969	0	-1	-1	0.405
entropy	orchard	0	-1	-1	0	0	0	0.370	-1	-1	0	0.361
axolotl	vineyard	0	1	0	0	0	0	-3.510	-2	0	0	0.417
clockwork	meadow	0	-1	0	0	0	0	-0.987	0	1	1	0.464
algebra	telescope	0	-1	0	0	0	0	8.751	0	-2	-1	0.634
arcade	topaz	0	0	0	0	0	0	2.276	0	0	0	0.554
asteroid	compass	0	-1	0	1	0	0	-0.862	-1	0	0	0.452
bicycle	nebula	0	1	1	0	0	0	1.991	0	0	0	0.703
bungalow	entropy	0	1	0	0	0	0	-1.198	0	2	1	0.535
carnation	gnome	0	0	0	0	0	0	-1.769	-2	-1	-1	0.354
cinnamon	harmonica	0	0	1	0	0	0	2.300	1	0	0	0.688
coral	syntax	0	1	1	0	0	0	-0.020	0	-1	-1	0.627
dandelion	pendulum	0	0	0	0	0	0	-0.533	-1	1	0	0.409
delirium	telescope	0	-1	-1	0	1	0	-1.442	-1	-2	-1	0.294
anchors	sandstorms	0	1	0	0	-1	0	3.416	0	-1	-1	0.593

Table 3: Full list of binomials as well as their constraints.

Word1	Word2	Form	Percept	Culture	Power	Intense	Icon	Freq	Len	Lapse	Final Stress	AbsPref
scissors	volcanoes	0	0	1	-1	0	0	0.577	1	0	0	0.594
equations	lanterns	0	-1	0	0	0	0	2.297	-1	0	0	0.454
satellites	tulips	0	-1	0	0	0	0	1.493	-1	1	1	0.479
compasses	hedgehogs	0	-1	0	0	0	0	-0.612	-1	-2	-1	0.400
comets	neckties	0	-1	0	1	0	0	2.294	0	-1	-1	0.516
castles	headphones	0	0	-1	1	0	0	-1.098	0	-1	-1	0.402
paperclips	pyramids	0	0	1	-1	0	0	-2.884	0	0	0	0.483
constellations	kettles	0	-1	0	0	0	0	0.938	-2	0	0	0.389
kaleidoscopes	whales	0	-1	-1	-1	0	0	-4.654	-3	0	0	0.147
meadows	pianos	0	-1	-1	0	0	0	1.147	1	0	0	0.403
magnets	zebras	0	-1	1	0	0	0	1.821	0	0	0	0.586
parrots	submarines	0	1	0	-1	0	0	-0.346	1	-1	-1	0.492
crayons	jungles	0	1	1	0	0	0	0.286	0	0	0	0.671
harbor	teapot	0	-1	0	0	0	0	2.561	0	-1	-1	0.457
notebook	quicksand	0	0	1	-1	0	0	3.309	0	0	0	0.614
glacier	lantern	0	-1	0	0	0	0	0.285	0	0	0	0.450
microscope	puddle	0	0	0	0	0	0	1.361	-1	1	1	0.538
compass	swan	0	-1	0	0	0	0	0.199	-1	-1	-1	0.371
bonsai	cathedral	0	1	0	-1	0	0	-2.004	1	1	1	0.540
honeycomb	violin	0	0	-1	0	0	0	-1.398	0	0	0	0.374
sailboat	stadium	0	0	0	0	0	0	-3.213	1	2	1	0.468
acorns	skyscrapers	0	1	0	0	0	0	-0.399	1	1	1	0.635
bell	trellis	0	0	1	0	0	0	3.327	1	1	1	0.740
inkwell	kite	0	0	-1	0	0	0	-3.215	-1	0	0	0.305
foxglove	trombone	0	0	-1	0	0	0	-1.888	0	1	1	0.403
carousel	quill	0	0	1	0	0	0	0.942	-2	0	0	0.554

Table 3: Full list of binomials as well as their constraints.

Word1	Word2	Form	Percept	Culture	Power	Intense	Icon	Freq	Len	Lapse	Final Stress	AbsPref
lighthouse	onion	0	-1	-1	0	0	0	-1.153	0	1	1	0.359
cactus	chessboard	0	0	0	0	1	0	2.084	0	-1	-1	0.513
gallery	raindrop	0	0	0	0	0	0	5.058	-1	-2	-1	0.582
cricket	plow	0	1	0	-1	0	0	2.370	-1	-1	-1	0.474
gingerbread	fresco	0	0	1	0	0	0	0.345	-1	1	1	0.619
cello	sunflower	0	0	0	0	0	0	-0.417	1	0	0	0.535
archway	quilt	0	0	0	0	0	0	-2.775	-1	0	0	0.409
compass	haystack	0	0	0	0	0	0	2.338	0	-1	-1	0.514
beacon	millipede	0	-1	0	0	1	0	4.030	1	-1	-1	0.531
parchment	windmill	0	0	0	0	0	0	0.990	0	-1	-1	0.485
candlestick	meadow	0	1	0	0	0	0	-1.463	-1	1	1	0.540

Individual Constraints at Each Checkpoint

Below is a table of the fixed-effects for each individual constraint at each checkpoint.

Table 4: Model results examining the effect of each individual constraint on LogOdds(AandB).

Parameter	num_tokens	Estimate	Est.Error	Q2.5	Q97.5
Intercept	0B	0.223	0.159	-0.087	0.539
Culture	0B	0.149	0.244	-0.327	0.623
Power	0B	0.286	0.249	-0.207	0.777
Freq	0B	-0.070	0.082	-0.232	0.091
Len	0B	0.030	0.127	-0.220	0.278
Intercept	2B	-0.027	0.256	-0.529	0.478
Culture	2B	-0.399	0.390	-1.161	0.361
Power	2B	0.531	0.404	-0.250	1.334
Freq	2B	0.258	0.135	-0.008	0.524
Len	2B	0.492	0.212	0.076	0.909
Intercept	41B	0.179	0.229	-0.268	0.628
Culture	41B	-0.377	0.347	-1.065	0.305
Power	41B	1.290	0.373	0.568	2.037
Freq	41B	-0.035	0.121	-0.274	0.202
Len	41B	0.807	0.188	0.438	1.179
Intercept	209B	0.176	0.182	-0.186	0.537
Culture	209B	0.290	0.283	-0.268	0.847
Power	209B	0.760	0.289	0.194	1.327
Freq	209B	-0.056	0.096	-0.244	0.132
Len	209B	-0.063	0.150	-0.358	0.234
Intercept	419B	-0.458	0.183	-0.816	-0.099
Culture	419B	-0.125	0.282	-0.679	0.437
Power	419B	0.508	0.289	-0.056	1.073
Freq	419B	0.240	0.096	0.053	0.431
Len	419B	-0.298	0.150	-0.591	-0.005
Intercept	838B	-0.022	0.184	-0.381	0.335
Culture	838B	-0.111	0.284	-0.661	0.446
Power	838B	0.865	0.297	0.283	1.456
Freq	838B	0.127	0.099	-0.068	0.319
Len	838B	0.247	0.154	-0.055	0.552
Intercept	1677B	-0.181	0.176	-0.527	0.159
Culture	1677B	0.861	0.273	0.326	1.394
Power	1677B	0.562	0.275	0.031	1.108
Freq	1677B	0.052	0.091	-0.125	0.230
Len	1677B	-0.431	0.142	-0.708	-0.156