

## Supplementary materials Willems, Labruna, D'Esposito, Ivry & Casasanto

### Materials and their characteristics

Displayed are the materials used in the main experiment (A) and in the control experiment (B) and scores for these materials and concreteness (CONC, Coltheart, 1981), number of letters (NLET), Thorndike and Lorge lexical frequency (T-L FREQ; Coltheart, 1981) and Subtlex lexical frequency (Subtlex; Brysbaert & New, 2009). For the nouns in the control experiment also imageability score is provided (IMG; Coltheart, 1981).

#### A) MAIN EXPERIMENT

##### MANUAL

Word	CONC	NLET	T-L freq	Subtlex
to autograph		9	2.639	2.619
to brush	589	5	6.001	2.859
to caress		6	4.317	1.839
to carry	364	5	7.313	3.526
to carve		5	4.407	2.199
to catch		5	6.129	3.840
to chisel	597	6	3.401	1.653
to chop	555	4	4.990	2.841
to clasp	498	5	4.691	1.716
to cleave		6	1.099	1.000
to clench		6	4.489	1.301
to clutch		6	5.118	2.104
to comb		4	4.564	2.490
to cut	430	3	6.849	4.069
to dial	537	4	3.761	2.655
to draw	442	4	6.059	3.314
to engrave		7	3.296	1.176
to erase		5	3.178	2.501
to etch		4	2.708	1.000
to fiddle	582	6	3.219	2.267
to finger		6	6.755	3.272
to flick		5	3.871	2.410
to fling		5	4.043	2.255
to flog		4	1.946	1.176
to fondle		6	2.708	1.398
to gesture	403	7	5.642	2.579
to grab		4	5.308	3.558
to grasp	330	5	5.333	2.367
to grip	490	4	5.730	2.694
to hammer	605	6	4.663	2.803
to handle		6	5.852	3.743
to hit		3	6.040	4.147
to hold	416	4	6.729	4.348
to inscribe		8	3.135	0.954
to jab		3	2.565	2.233

to knead		5	2.303	0.954
to knock		5	5.919	3.518
to manipulate		10	3.091	2.248
to massage		7	3.258	2.752
to paddle		6	3.611	2.281
to paint	577	5	7.005	3.273
to pat	400	3	5.652	2.970
to pet	557	3	5.088	3.012
to pick	502	4	6.894	4.005
to pinch		5	4.454	2.494
to pluck		5	3.761	2.072
to point	464	5	7.228	4.081
to poke		4	4.094	2.474
to pound	515	5	6.534	2.850
to pour	356	4	6.321	2.887
to press		5	6.498	3.487
to pull	360	4	6.842	3.873
to punch	548	5	4.357	3.180
to push		4	6.297	3.556
to reach	368	5	7.284	3.463
to rub		3	5.517	2.897
to salute	471	6	4.331	2.568
to scoop		5	3.664	2.461
to scratch	523	7	4.754	2.983
to scrawl		6	3.584	1.079
to scribble		8	3.045	1.505
to scrub		5	4.691	2.502
to shake		5	5.338	3.306
to shave		5	4.127	2.846
to shove		5	4.700	2.829
to shovel	581	6	3.850	2.543
to sketch	535	6	5.371	2.401
to slap	511	4	4.771	2.803
to slash		5	4.205	2.086
to slice	443	5	5.872	2.638
to smack	451	5	3.807	2.686
to smash	402	5	4.615	2.624
to snap	420	4	5.832	2.948
to snip		4	2.773	2.033
to spar		4	2.708	1.556
to spear	584	5	2.944	2.365
to squeeze		7	4.796	2.886
to stab		4	3.638	2.650
to stir		4	6.242	2.479
to strike		6	5.787	3.366
to stroke	463	6	5.252	2.824
to tap	538	3	4.913	2.876
to throw	400	5	5.802	3.818
to tickle	473	6	3.497	2.389

to topple		6	3.091	1.505
to toss		4	5.505	2.801
to touch	417	5	6.924	3.877
to trace	371	5	5.403	2.995
to tug		3	4.543	2.146
to twist	423	5	5.638	2.808
to wave	492	4	6.170	3.035
to whack	409	5	3.091	2.658
to whip	570	4	5.553	2.827
to whittle		7	2.398	1.322
to write	446	5	6.863	3.811
to yank		4	3.367	2.380

**NONMANUAL**

<b>Word</b>	<b>CONC</b>	<b>NLET</b>	<b>T-L freq</b>	<b>Subtlex</b>
to				
acknowledge	290	11	4.754	2.496
to admire	296	6	5.549	2.859
to aid	372	3	5.737	2.851
to aim	324	3	4.700	2.880
to amuse	321	5	5.323	2.124
to assent	311	6	3.989	0.602
to assist	342	6	4.522	2.602
to bargain	399	7	4.920	2.787
to bid	364	3	4.466	2.808
to blow	397	4	5.823	3.697
to boast	295	5	4.796	1.732
to bother	267	6	5.659	3.536
to bury	372	4	5.628	3.023
to cheat	329	5	4.625	2.955
to clash	399	5	3.611	1.833
to condemn	314	7	4.489	2.083
to cope	347	4	4.143	2.220
to crush	381	5	5.613	2.933
to cure	352	4	5.389	3.027
to curse	363	5	5.204	2.968
to debate	375	6	4.331	2.676
to decay	370	5	4.248	2.021
to defeat	363	6	5.112	2.763
to deliver	393	7	5.303	3.160
to despise	314	7	4.317	2.362
to earn	349	4	5.628	2.894
to ease	305	4	5.493	2.989
to flow	311	4	5.394	2.846
to flutter	386	7	4.700	1.643
to gain	346	4	5.864	2.845
to gleam	391	5	5.278	1.699
to halt	345	4	5.004	2.760

to hang	397	4	5.844	3.877
to harm	244	4	5.545	3.210
to haul	369	4	4.654	2.558
to hush	396	4	4.500	2.589
to ignore	320	6	5.263	2.978
to import	320	6	4.454	2.045
to incline	376	7	4.898	1.279
to insult	375	6	4.615	2.806
to leap	389	4	5.717	2.531
to lease	371	5	4.277	2.505
to marvel	293	6	4.466	1.996
to measure	366	7	5.215	2.730
to nag	392	3	4.007	2.045
to offend	321	6	4.205	2.425
to pardon	307	6	4.718	3.518
to pat	400	3	5.652	2.970
to peep	388	4	4.060	2.354
to pledge	360	6	4.248	2.545
to plot	379	4	4.852	2.772
to plunge	396	6	5.425	2.057
to praise	354	6	4.754	2.683
to pray	372	4	5.595	3.266
to prime	360	5	4.174	2.970
to punish	344	6	4.025	2.693
to quicken	380	7	3.912	1.146
to recall	319	6	5.690	3.001
to recruit	393	7	3.611	2.274
to refrain	325	7	3.932	2.017
to refresh	362	7	3.738	2.104
to regret	260	6	5.425	3.141
to repair	394	6	4.736	2.653
to restore	275	7	4.852	2.403
to retain	308	6	4.956	2.083
to review	388	6	5.043	2.878
to revolt	400	6	4.357	1.898
to reward	396	6	5.037	2.963
to risk	290	4	5.606	3.398
to scare	380	5	5.328	3.234
to scorn	290	5	4.543	1.771
to scowl	386	5	4.277	1.415
to shock	395	5	5.841	3.167
to slumber	386	7	4.060	2.146
to smother	377	7	4.159	1.778
to sneer	371	5	4.511	1.580
to soar	366	4	3.807	1.892
to span	352	4	3.611	2.004
to spare	313	5	5.521	3.197
to spell	376	5	5.220	3.272
to steal	363	5	5.130	3.435

to stifle	292	6	4.220	1.176
to succeed	304	7	5.576	2.683
to tempt	283	5	4.543	2.111
to tidy	311	4	3.738	2.276
to toil	386	4	4.317	1.708
to torment	288	7	4.111	2.143
to trace	371	5	5.403	2.995
to trick	391	5	5.817	3.382
to trim	388	4	5.247	2.338
to unite	309	5	5.591	2.188
to upset	282	5	5.106	3.580
to vow	329	3	5.081	2.441
to wander	320	6	5.416	2.476
to weigh	363	5	5.069	2.560
to win	364	3	5.710	3.837

<b>AVERAGE</b>	<b>CONC</b>	<b>NLET</b>	<b>T-L freq</b>	<b>Subtlex</b>
MANUAL	475.7333333	5.0625	4.729	2.640
NONMANUAL	348.9375	5.270833333	4.861	2.550
<b>T</b>	12.12768607	1.100928648	0.823	0.869
<b>p-value</b>	1.93228E-25	0.272320496	0.411	0.386

## B) CONTROL EXPERIMENT

### Concrete

<b>Word</b>	<b>CONC</b>	<b>IMG</b>	<b>NLET</b>	<b>T-L Freq</b>	<b>Subtlex</b>
the air	518	450	3.000	2.986	3.851
the aisle	509	528	5.000	1.857	2.579
the arch	512	557	4.000	1.886	2.274
the audience	515	555	8.000	2.505	3.112
the avenue	539	564	6.000	2.505	2.935
the bank	573	560	4.000	2.922	3.637
the bar	565	596	3.000	2.505	3.642
the barn	614	589	4.000	2.246	2.841
the battle	564	597	6.000	2.487	3.333
the bay	580	570	3.000	2.276	3.092
the beam	502	539	4.000	2.104	2.648
the bedroom	615	629	7.000	2.583	3.272
the blade	584	568	5.000	1.924	2.822
the blood	613	620	5.000	2.702	3.977
the bloom	520	524	5.000	2.248	2.449
the blossom	559	618	7.000	2.230	2.265
the brain	556	572	5.000	2.603	3.594
the branch	583	548	6.000	2.405	2.711
the breeze	500	560	6.000	1.982	2.613
the bubble	563	604	6.000	1.954	2.611
the bush	585	549	4.000	2.204	2.857

the cabin	596	582	5.000	2.666	3.001
the camp	571	588	4.000	2.776	3.417
the canal	598	588	5.000	1.875	2.513
the carriage	576	529	8.000	2.045	2.581
the ceiling	606	557	7.000	2.248	2.629
the cell	542	590	4.000	2.477	3.443
the cellar	572	572	6.000	2.146	2.679
the cement	646	578	6.000	1.892	2.369
the channel	527	508	7.000	1.968	3.095
the circle	515	591	6.000	2.589	3.040
the circus	535	586	6.000	2.041	2.940
the cloud	554	595	5.000	2.565	2.777
the coast	562	588	5.000	2.446	3.134
the colony	511	481	6.000	1.964	2.480
the column	520	491	6.000	2.233	2.747
the coral	572	561	5.000	2.201	2.083
the court	509	552	5.000	2.846	3.711
the dawn	501	586	4.000	2.377	3.114
the deck	566	539	4.000	2.519	3.084
the dirt	564	547	4.000	2.134	3.117
the disease	504	487	7.000	2.512	3.125
the dock	570	559	4.000	1.987	2.696
the doorway	578	548	7.000	2.401	2.215
the dot	530	556	3.000	2.248	2.529
the dust	550	549	4.000	2.491	3.085
the earth	580	580	5.000	2.651	3.705
the estate	541	474	6.000	2.292	3.032
the farm	565	560	4.000	2.917	3.185
the fat	540	574	3.000	2.709	3.608
the feast	542	610	5.000	1.826	2.534
the fleet	520	510	5.000	1.839	2.732
the flood	553	598	5.000	2.512	2.464
the flora	557	472	5.000	1.869	2.057
the fog	556	606	3.000	2.029	2.683
the forest	609	633	6.000	2.320	2.984
the fort	580	559	4.000	1.940	2.896
the frost	608	595	5.000	1.978	2.389
the gallery	569	566	7.000	2.064	2.637
the gas	554	532	3.000	2.517	3.539
the grove	538	470	5.000	1.820	2.294
the harvest	535	562	7.000	2.079	2.290
the hill	588	607	4.000	2.525	3.282
the lobby	532	462	5.000	1.863	2.811
the meadow	594	622	6.000	1.845	2.064
the moisture	545	513	8.000	1.820	1.792
the moon	581	585	4.000	2.455	3.406
the mountain	616	629	8.000	2.459	3.256
the ocean	593	623	5.000	2.068	3.189
the parade	523	578	6.000	2.000	2.818

the port	531	546	4.000	2.179	2.870
the prairie	575	569	7.000	1.973	2.155
the prison	570	593	6.000	2.412	3.527
the railroad	579	596	8.000	2.565	2.802
the rain	600	618	4.000	2.571	3.397
the ridge	547	543	5.000	2.045	2.558
the road	583	609	4.000	2.961	3.757
the sea	596	606	3.000	2.775	3.485
the shore	574	624	5.000	2.380	3.006
the sky	542	618	3.000	2.540	3.359
the smoke	541	615	5.000	2.736	3.523
the song	514	578	4.000	2.595	3.679
the square	516	610	6.000	2.758	3.210
the stable	562	537	6.000	2.045	2.828
the star	574	623	4.000	2.722	3.618
the station	572	554	7.000	2.787	3.606
the storm	527	587	5.000	2.592	3.197
the sun	617	639	3.000	2.780	3.551
the sunset	525	633	6.000	1.857	2.721
the thunder	547	554	7.000	2.140	2.832
the tide	516	530	4.000	2.093	2.574
the tribe	504	515	5.000	1.863	2.512
the troop	509	498	5.000	2.155	2.471
the valley	575	600	6.000	2.461	3.106
the village	576	578	7.000	2.590	3.234
the wind	552	535	4.000	2.818	3.481

**NonConcrete**

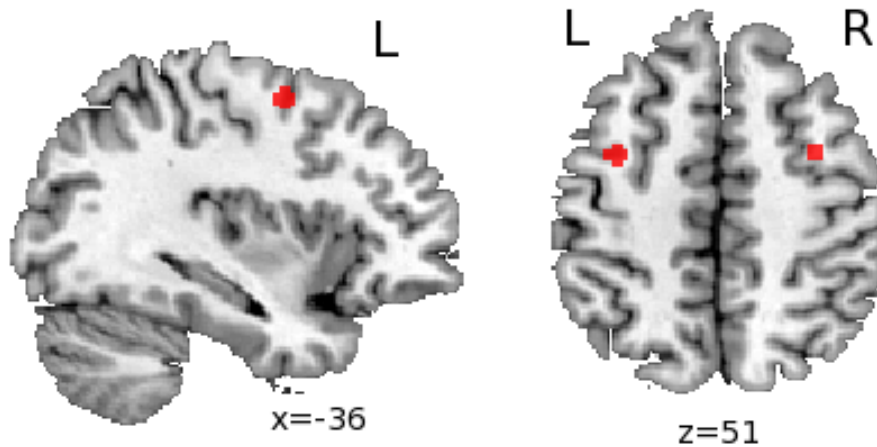
<b>Word</b>	<b>CONC</b>	<b>IMG</b>	<b>NLET</b>	<b>T-L Freq</b>	<b>Subtlex</b>
the addition	339	347	8.000	2.389	2.597
the advice	291	352	6.000	2.545	3.389
the aim	324	383	3.000	2.041	2.880
the amount	335	316	6.000	2.821	3.101
the area	384	394	4.000	2.332	3.582
the aspect	217	233	6.000	1.964	2.294
the belief	270	328	6.000	2.326	2.589
the bid	364	394	3.000	1.940	2.808
the blame	293	356	5.000	2.580	3.477
the budget	366	394	6.000	2.185	2.710
the cause	287	282	5.000	2.973	4.199
the claim	331	321	5.000	2.561	3.112
the crisis	319	375	6.000	2.064	2.929
the culture	351	339	7.000	2.009	2.852
the cure	352	397	4.000	2.340	3.027
the custom	323	364	6.000	2.338	2.500
the deal	342	383	4.000	2.898	4.125
the despair	279	388	7.000	2.196	2.476
the dread	267	378	5.000	2.258	2.107
the duty	322	346	4.000	2.750	3.415

the ease	305	327	4.000	2.386	2.989
the effect	295	280	6.000	2.875	3.086
the envy	265	375	4.000	1.892	2.688
the factor	328	269	6.000	1.996	2.568
the fate	255	343	4.000	2.378	3.138
the fear	326	394	4.000	2.852	3.547
the folly	304	326	5.000	1.857	1.869
the gain	346	307	4.000	2.547	2.845
the glory	304	389	5.000	2.270	3.040
the grade	338	397	5.000	2.253	3.174
the guess	247	330	5.000	2.970	4.365
the guilt	299	381	5.000	1.863	2.881
the harm	244	362	4.000	2.408	3.210
the hint	312	343	4.000	2.241	2.671
the honesty	278	386	7.000	2.083	2.566
the ideal	253	331	5.000	2.598	2.573
the illusion	249	396	8.000	1.869	2.624
the import	320	361	6.000	1.934	2.045
the impulse	271	396	7.000	2.267	2.430
the issue	338	315	5.000	2.650	3.241
the justice	307	379	7.000	2.258	3.281
the lack	311	302	4.000	2.617	2.957
the length	365	395	6.000	2.516	2.554
the liberty	302	392	7.000	2.182	2.929
the lie	357	385	3.000	2.785	3.788
the luck	275	399	4.000	2.494	3.894
the manner	297	342	6.000	2.853	2.769
the memory	284	391	6.000	2.745	3.394
the mercy	239	373	5.000	2.170	3.111
the merit	308	380	5.000	1.929	2.238
the method	303	304	6.000	2.792	2.604
the minor	353	376	5.000	1.919	2.816
the mood	234	394	4.000	2.288	3.240
the moral	220	341	5.000	2.435	2.838
the motive	255	275	6.000	2.076	2.829
the occasion	346	305	8.000	2.627	2.926
the origin	319	306	6.000	1.792	2.356
the patience	266	363	8.000	2.143	2.894
the pause	306	347	5.000	2.690	2.439
the phase	360	319	5.000	1.959	2.799
the phrase	321	342	6.000	2.292	2.667
the pity	303	391	4.000	2.420	3.079
the portion	384	399	7.000	2.097	2.344
the proof	328	339	5.000	2.149	3.244
the purpose	280	280	7.000	2.774	3.253
the rate	308	311	4.000	2.589	3.104
the regret	260	359	6.000	2.356	3.141
the remark	368	321	6.000	2.738	2.350
the remedy	368	370	6.000	1.903	2.072



the result	318	324	6.000	2.953	3.003
the role	335	385	4.000	2.053	2.968
the safety	323	397	6.000	2.446	3.217
the save	314	365	4.000	2.941	3.918
the scheme	328	319	6.000	2.486	2.568
the scorn	290	364	5.000	1.973	1.771
the second	344	371	6.000	2.967	4.162
the series	373	398	6.000	2.467	3.012
the session	372	394	7.000	2.041	2.831
the skill	346	366	5.000	2.017	2.606
the soul	289	366	4.000	2.772	3.594
the system	356	340	6.000	2.741	3.669
the tale	352	363	4.000	2.336	2.787
the term	374	387	4.000	2.645	2.949
the theme	336	395	5.000	1.806	2.851
the theory	287	317	6.000	2.342	3.164
the topic	366	364	5.000	1.820	2.433
the trace	371	384	5.000	2.346	2.995
the treaty	361	321	6.000	1.857	2.378
the trend	328	373	5.000	1.875	2.025
the truth	261	374	5.000	2.844	3.991
the type	376	395	4.000	2.897	3.490
the unit	389	334	4.000	2.217	3.266
the value	260	289	5.000	2.584	3.040
the virtue	243	351	6.000	2.100	2.420
the welfare	309	362	7.000	2.041	2.604
the wisdom	275	381	6.000	2.143	2.752

<b>AVERAGE</b>	<b>CONC</b>	<b>IMG</b>	<b>NLET</b>	<b>T-L Freq</b>	<b>Subtlex</b>
CONCRETE	557.156	567.010	5.167	2.318	2.952
NONCONCRETE	312.875	354.552	5.344	2.354	2.938
<b>T</b>	45.143	36.848	0.972	0.746	0.193
<b>p-value</b>	0.000	0.000	0.333	0.457	0.847



**Supplementary Fig. S1.** Stimulation sites overlaid on a brain normalized to MNI space. Stimulation sites were based upon coordinates from a previous fMRI study with a similar design (Willems, Hagoort, & Casasanto, 2010).

## References

- Brysbaert, M., & New, B. (2009). Moving beyond Kucera and Francis: a critical evaluation of current word frequency norms and the introduction of a new and improved word frequency measure for American English. *Behavior Research Methods*, *41*(4), 977-990.
- Coltheart, M. (1981). The MRC Psycholinguistic Database. *Quarterly Journal of Experimental Psychology*, *33A*, 497-505.
- Willems, R. M., Hagoort, P., & Casasanto, D. (2010). Body-specific representations of action verbs: Neural evidence from right- and left-handers. *Psychological Science*, *21*(1), 67-74.