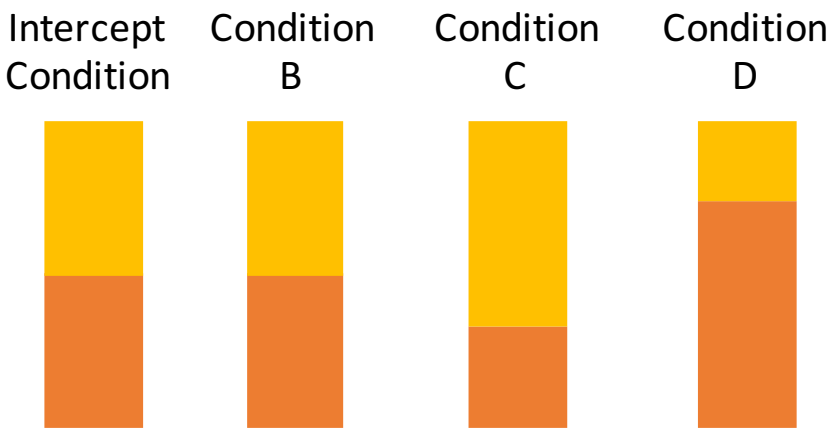
This document was written to explain how the munltinomial model works in general, and was produced before the data was finalised. Readers should refer to the paper for the final numerical results.

Interpretation of multinomial models

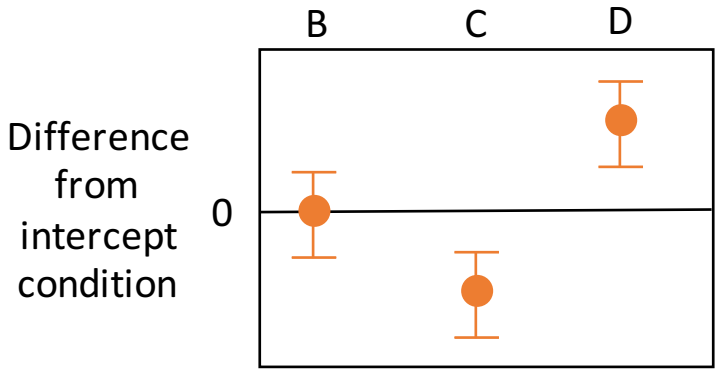
If a variable has two levels, we just need to estimate one number for each condition: how much one of the levels changes.

Here's an imaginary example:

Raw data

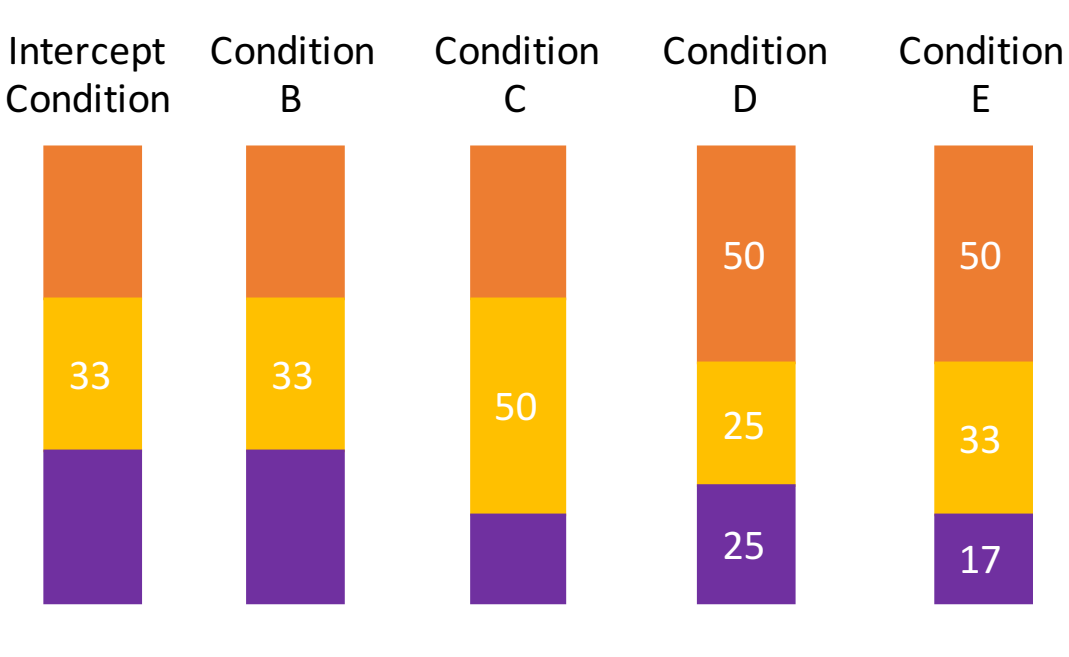


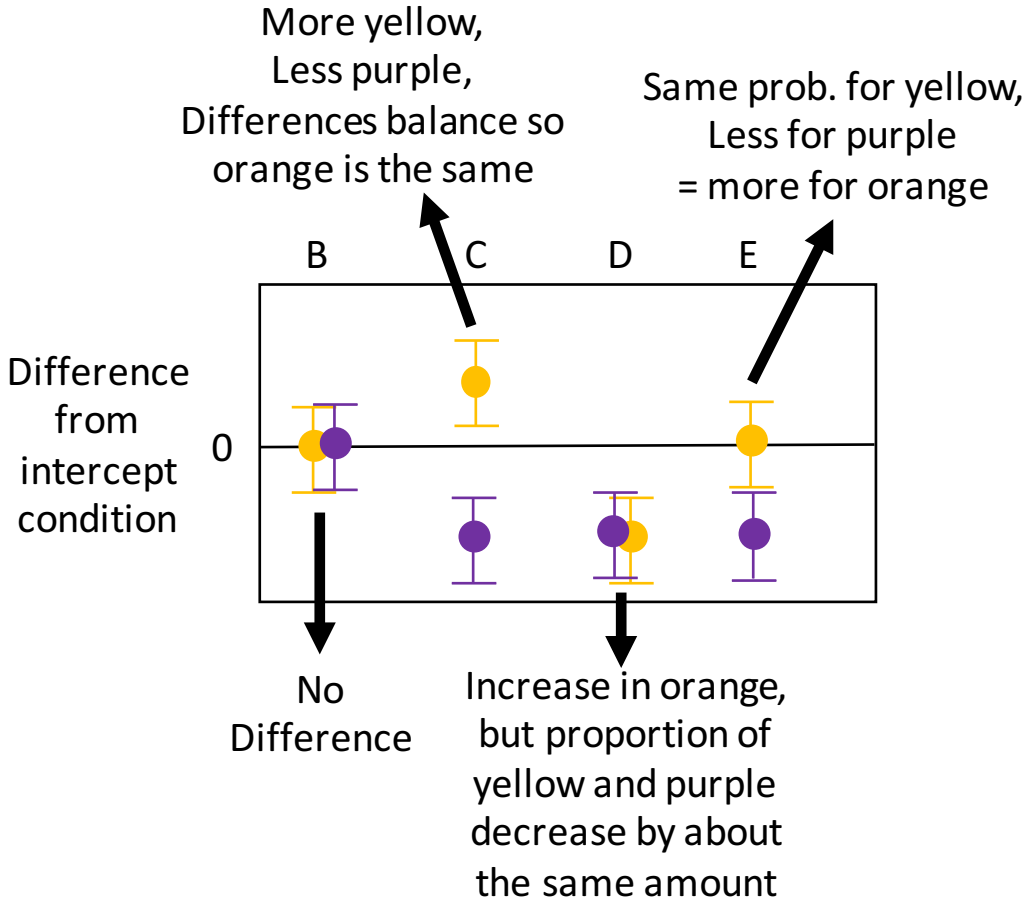
Model estimates



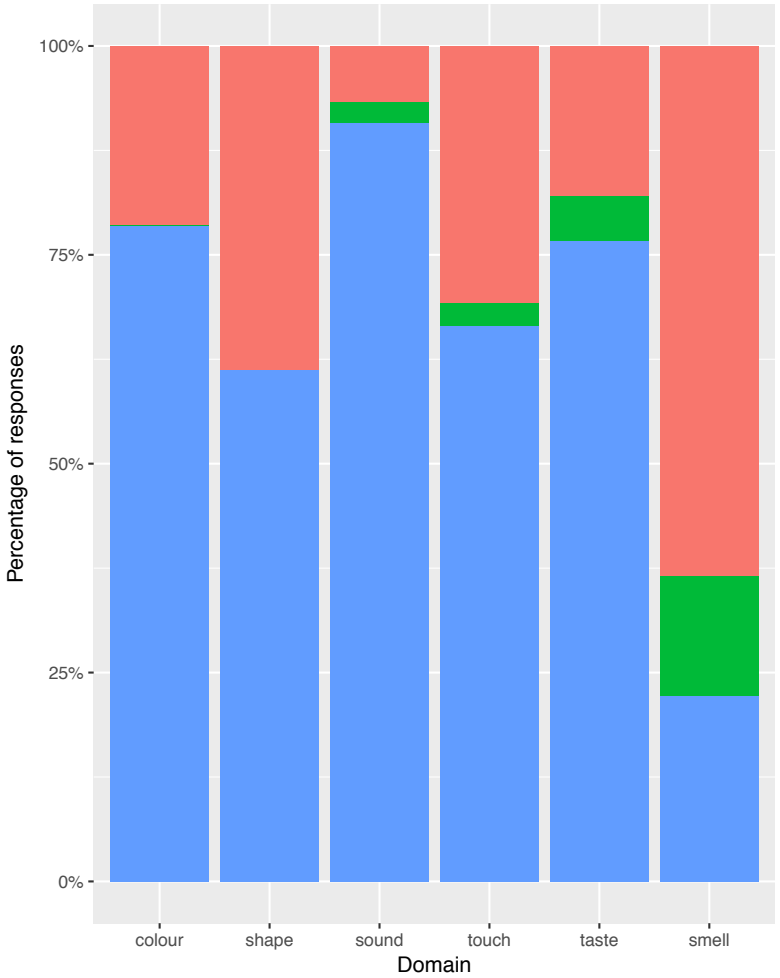
Interpretation of multinomial models

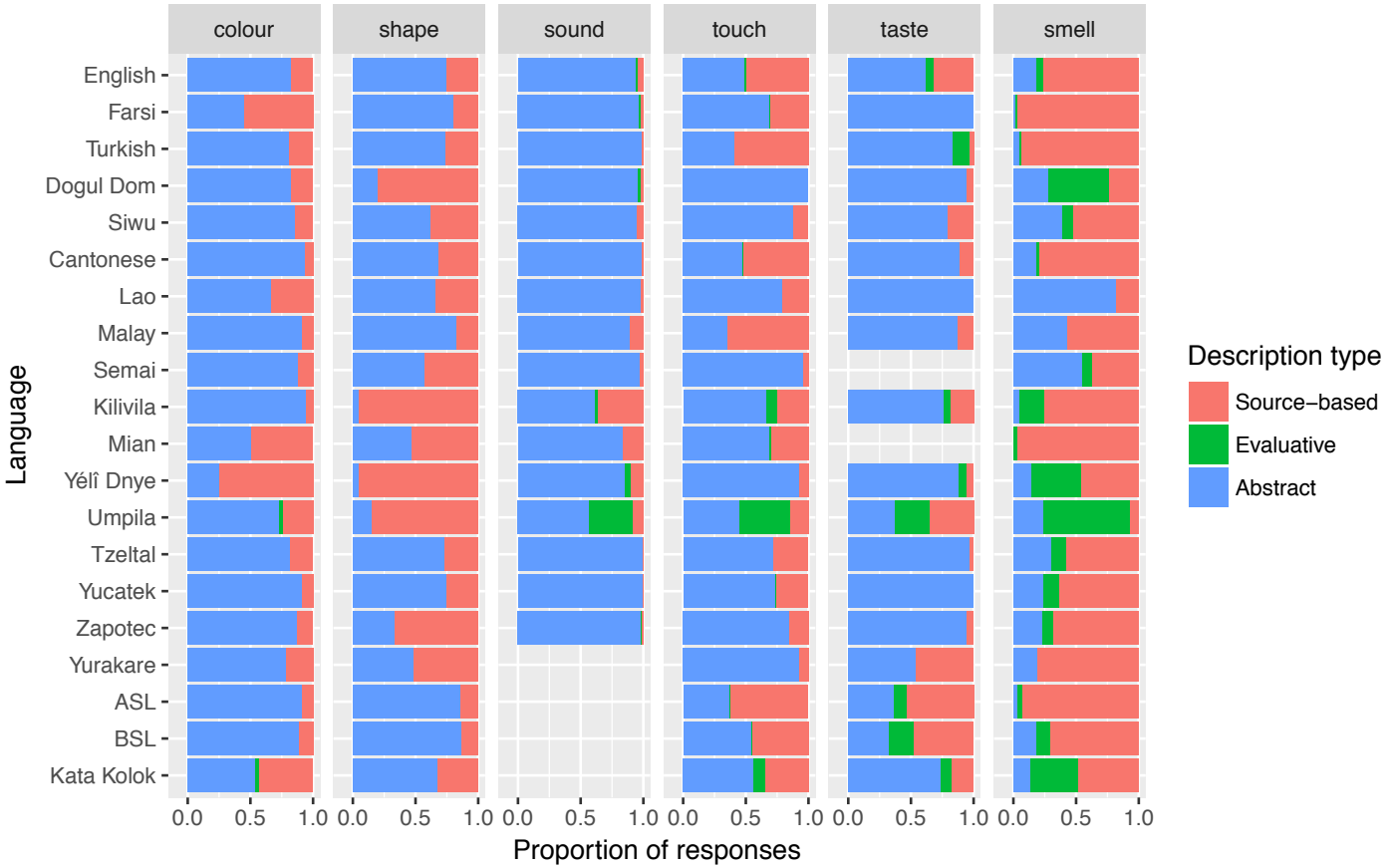
Our variable has 3 levels. One level and one condition is chosen as the intercept.
We need to estimate two numbers: change in intercept level and change in one other level
(the final level is implied logically from the other two)





Raw proportions





Results

Intercept is abstract terms for colours.

Output of the MCMC model

	post.mean	l-95% CI	u-95% CI	eff.samp	pMCMC
traitSAE.E	-6.73	-7.480	-5.95	1160.00	0.00002
traitSAE.S	-1.87	-2.580	-1.16	47400.00	0.00004
domainshape	-7.99	-12.500	-1.96	2.76	0.00280
domainsound	1.79	0.691	2.91	2830.00	0.00228
domaintouch	2.70	1.430	3.99	4410.00	0.00028
domaintaste	2.80	1.310	4.35	4730.00	0.00052
domainsmell	6.70	5.590	7.78	2560.00	0.00002
traitSAE.S:domainshape	9.53	3.920	13.70	2.50	0.00002
traitSAE.S:domainsound	-3.81	-4.190	-3.43	371.00	0.00002
traitSAE.S:domaintouch	-2.23	-2.630	-1.84	381.00	0.00002
traitSAE.S:domaintaste	-3.53	-3.990	-3.09	414.00	0.00002
traitSAE.S:domainsmell	-3.15	-3.480	-2.83	126.00	0.00002

We can plot these estimates and confidence intervals …

Results

Intercept is abstract terms for colours.

Estimate (mean of distribution taken from the posterior)

Measure of the independence of the samples from the MCMC

Probability that the estimate is not different from zero

Confidence intervals

E and S are less likely than abstract in general

Estimates for Evaluative descriptions by domain

Estimates for Source-based descriptions by domain

	post.mean	l-95% CI	u-95% CI	eff.samp	pMCMC
traitSAE.E	-6.73	-7.480	-5.95	1160.00	0.00002
traitSAE.S	-1.87	-2.580	-1.16	47400.00	0.00004
domainshape	-7.99	-12.500	-1.96	2.76	0.00280
domainsound	1.79	0.691	2.91	2830.00	0.00228
domaintouch	2.70	1.430	3.99	4410.00	0.00028
domaintaste	2.80	1.310	4.35	4730.00	0.00052
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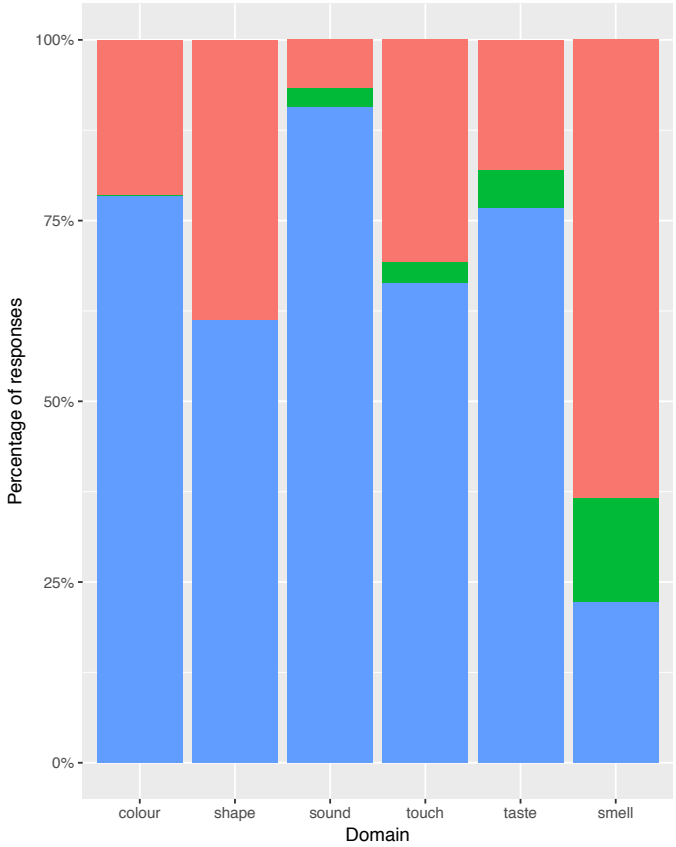
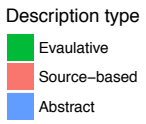
We can plot these estimates and confidence intervals …

Intercept is abstract terms for colours.

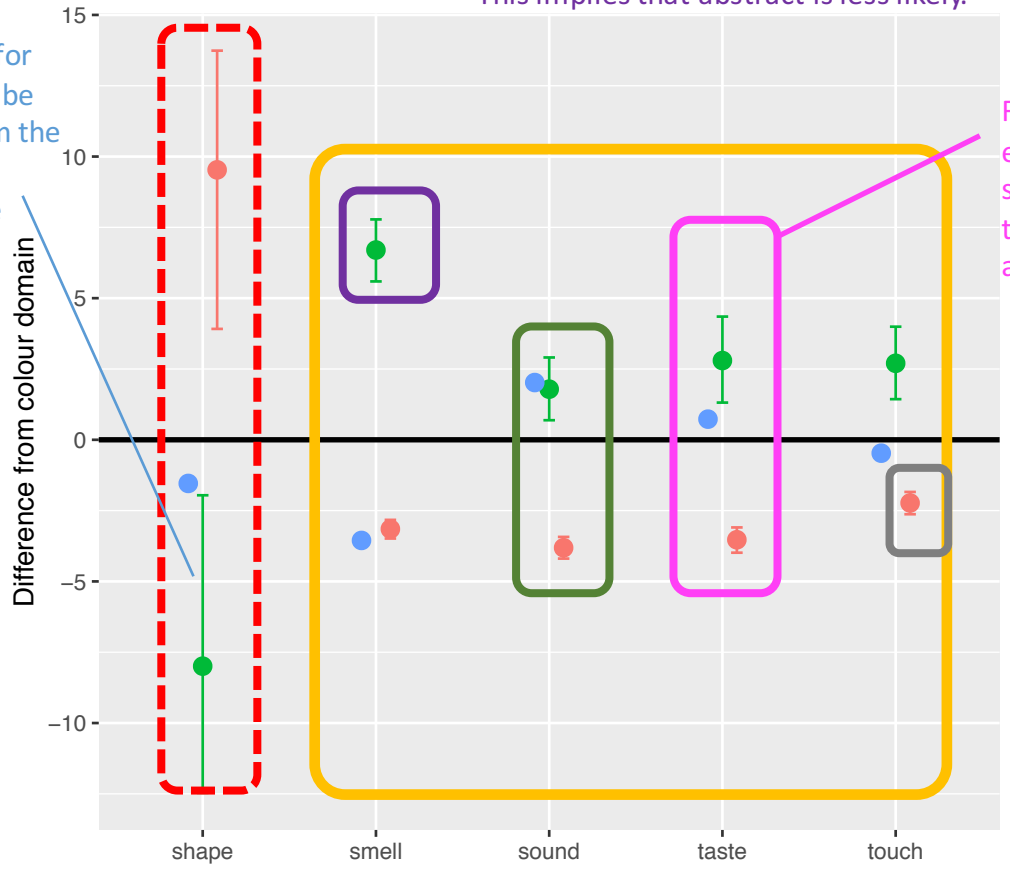


The change for abstract can be inferred from the difference between the other two estimates

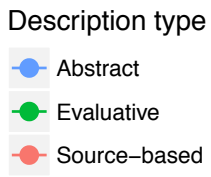


Shape: Source based more likely, Evaluative less likely

For smell: source-based evaluative is much higher, while source-based is roughly the same as for sound, taste and touch.
This implies that abstract is less likely.



For taste, the increase in evaluative is roughly the same as the decrease for taste, suggesting that abstract is just as likely

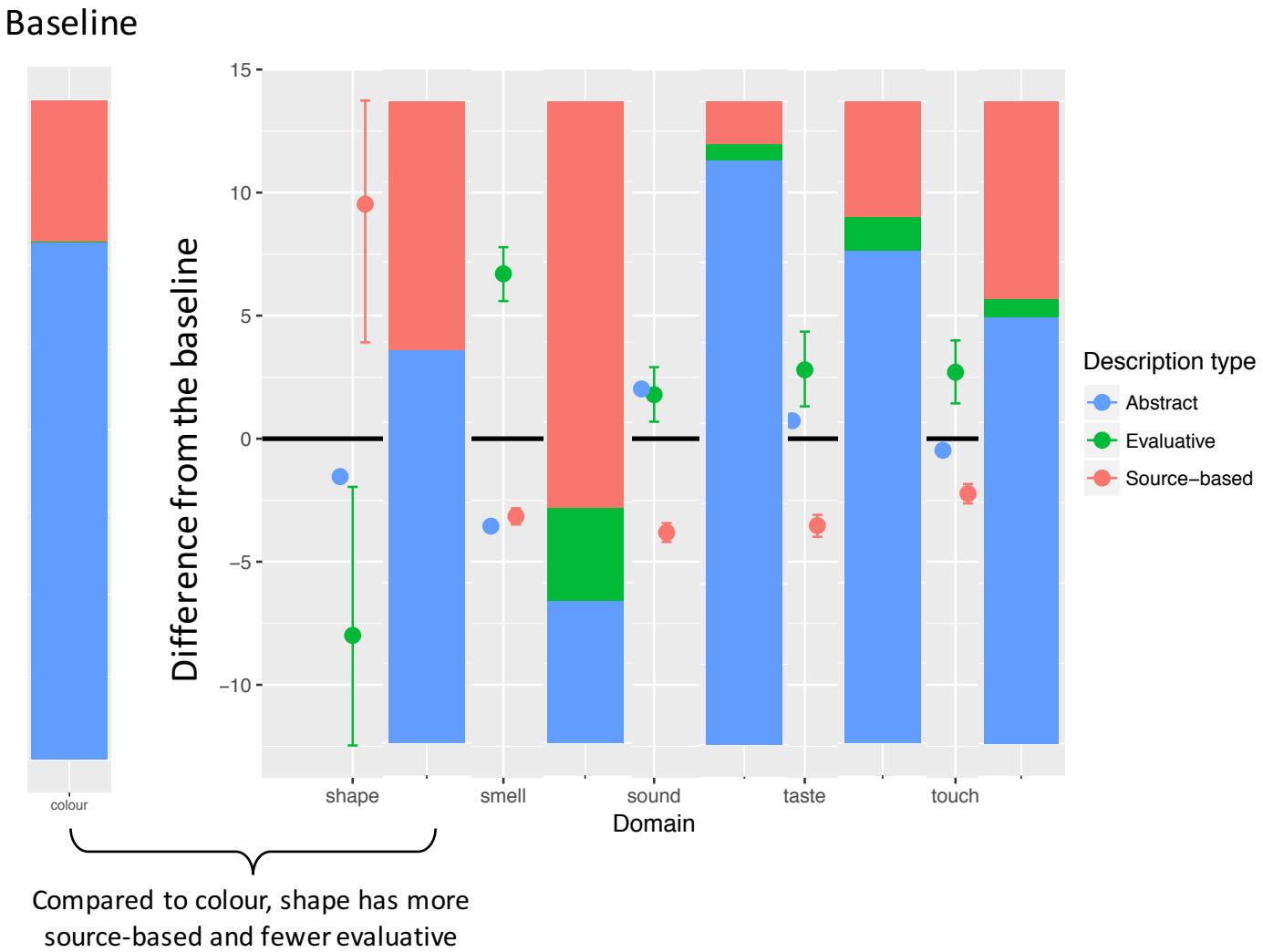


According to the model, source-based is less likely for touch than colour. This is not what the raw proportions look like, so they may be affected by one particular language.

Smell, sound, taste, touch: Evaluative much more likely, Source-based less likely

For sound, source-based decreases more than evaluative increases, suggesting that abstract increases.

Intercept is abstract terms for colours.



Note: This run done before clean-up of shape typos

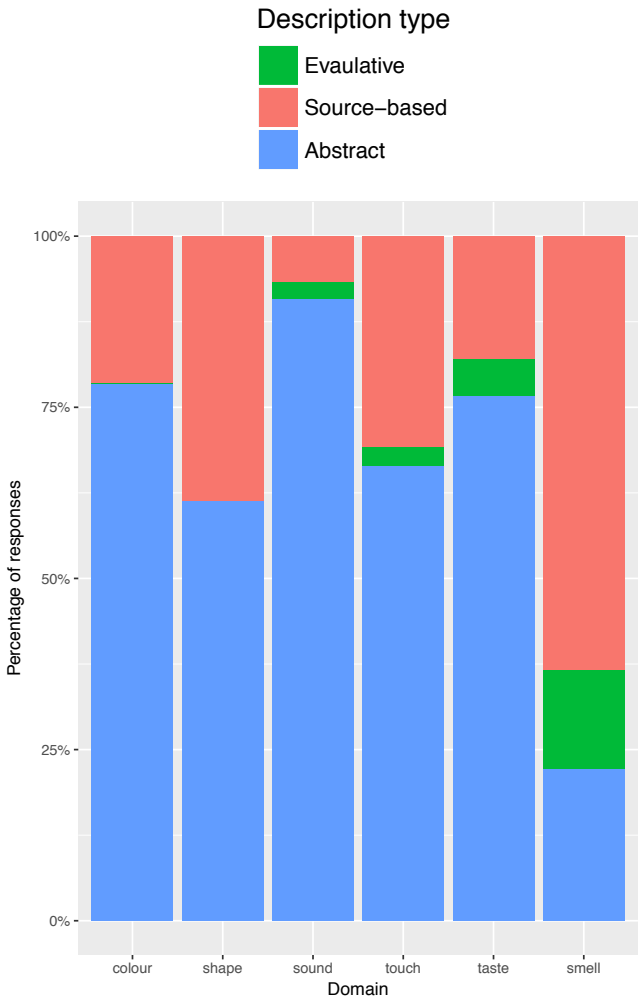
Results (intercept is source-based)

Abstract terms more likely than source based,
Evaluative less likely than source based

Abstract responses for taste not different to abstract responses for colour

	post.mean	l-95% CI	u-95% CI	eff.samp	pMCMC
traitSAE.A	1.730	1.330	2.140	88900.0	0.00001
traitSAE.E	-4.580	-5.090	-4.060	641.0	0.00001
domainsound	2.020	1.620	2.430	18900.0	0.00001
domaintaste	0.258	-0.435	0.961	58100.0	0.46500
domaintouch	-0.718	-1.210	-0.209	75100.0	0.00470
domainshape	-1.000	-1.370	-0.633	66300.0	0.00001
domainsmell	-3.050	-3.510	-2.590	69700.0	0.00001
traitSAE.E:domainsound	2.300	1.910	2.670	457.0	0.00001
traitSAE.E:domaintaste	3.280	2.860	3.680	746.0	0.00001
traitSAE.E:domaintouch	2.780	2.390	3.160	610.0	0.00001
traitSAE.E:domainshape	-4.050	-7.230	-1.260	14.9	0.00001
traitSAE.E:domainsmell	5.840	5.480	6.170	303.0	0.00001

Intercept is source-based terms for colours.



Smell has more evaluative terms and fewer abstract terms than colour.

For these domains, evaluative is more likely than for colour

Overlap is not very meaningful: the proportional increase for abstract and evaluative descriptions is roughly the same for sound (= fewer source-based)

Proportion of abstract responses not different for taste and colour. Taste has more evaluative, which means that it must have fewer source-based

For shape, evaluative and abstract are less likely, which means that source-based is more likely

Abstract less likely for shape, smell and touch than for colour