Ling 245 Project Presentation

Benjamin Sparkes

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Motivation

> *Our approach was to test whether enrichments can be primed across expressions. If different sorts of enrichments can prime each other, there must be an abstract mechanism that is shared between them. By testing which enrichments prime each other and which don't, we can specify what the common mechanism might be.* *(2016, p. 118)*

- ☞ Are there are shared reasoning processes which apply to distinct instances of enrichment via alternatives, or whether each category of enrichment has its on specialised process?
  - ⇝ Bott and Chemla are interested in whether priming can occur at all *given* a prior assumption of enrichment via alternatives.

Thoughts on the Question

The question of whether or not there are shared reasoning processes which apply to distinct instances of enrichment via alternatives, or whether each category of enrichment has its on specialised process has a nice cognitive feel.

> Intuitively there's some positive upshot whichever way the data points.
>
> (i) If there is cross-category enrichment, then there is a need to posit shared reasonig processes.
> (ii) If there is no cross-category enrichment, then one should posit distinct reasoning processes.

However, it is important to note that each of these carries a presupposition that the data can/should/will support one of these resolutions. And, as we shall see, there is no guarantee that the data will be so clean.

Bott and Chemla's Experiments

Bott and Chemla ran three experiments, in which participants are presented with trials consisting of a setence and two picutures, and are asked to select the picture which best reflects the sentence.
Trials are split into *prime* and *response*, and every response trial is preceeded by two prime trials which are used to ensure the participant considers certain alternatives.
For the two pictures in the response trial, one picture is consistent with the semantic content of the sentence, and the other contains the words 'Better Picture?', which the participants were instructed to click if they felt the the other picture did not sufficiently capture the sentence meaning.
This allows us to state the basic linking hypothesis, which is that prior trials will effect how participants evaluate sentences, and that in response trials participants click on 'Better Picture?' if they process the setence pragmatically, and the semantically adequate picture otherwise.

Details of the Experiment

The sentences were constructed using one of two frames:

(i) Some of the symbols are [symbol]
(ii) There are four [symbol]

Bott and Chemla included a third frame:

(iii) There is a [symbol].

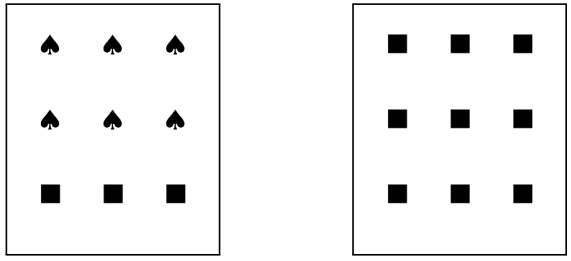
Example

Prime

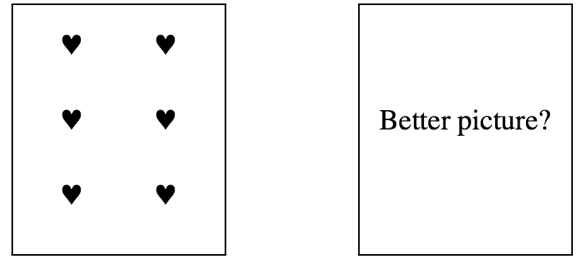
Target

Some of the symbols are squares

Strong

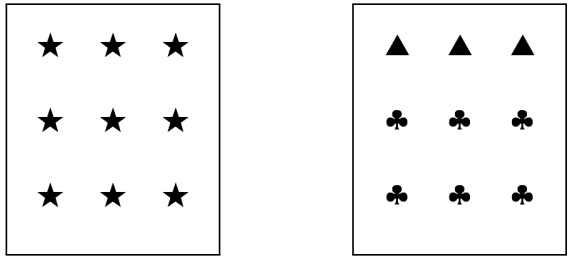


Four of the symbols are hearts



Some of the symbols are stars

Weak



The 'Replication'

We (partially) replicated Experiment 1 of Bott and Chemla. The replication is partial for two reasons:

1) Half the number of participants compared with Bott and Chemla's original experiment (100 and 200 participants, respectively)
2) Only two enrichment categories, as opposed to three in the original.
3) We included keyboard shortcuts
4) Areas where Bott and Chemla weren't super clear on details

The basis for both modifications were straightforward cost considerations.
By uncommenting a few lines of code (and fixing any bugs that this may cause) the full experiment can be run.

`https://github.com/bsparkes/bottchemla2016`
`https://bsparkes.github.io/bottchemla2016/experiment/html/bottchemla2016.html`

Predictions

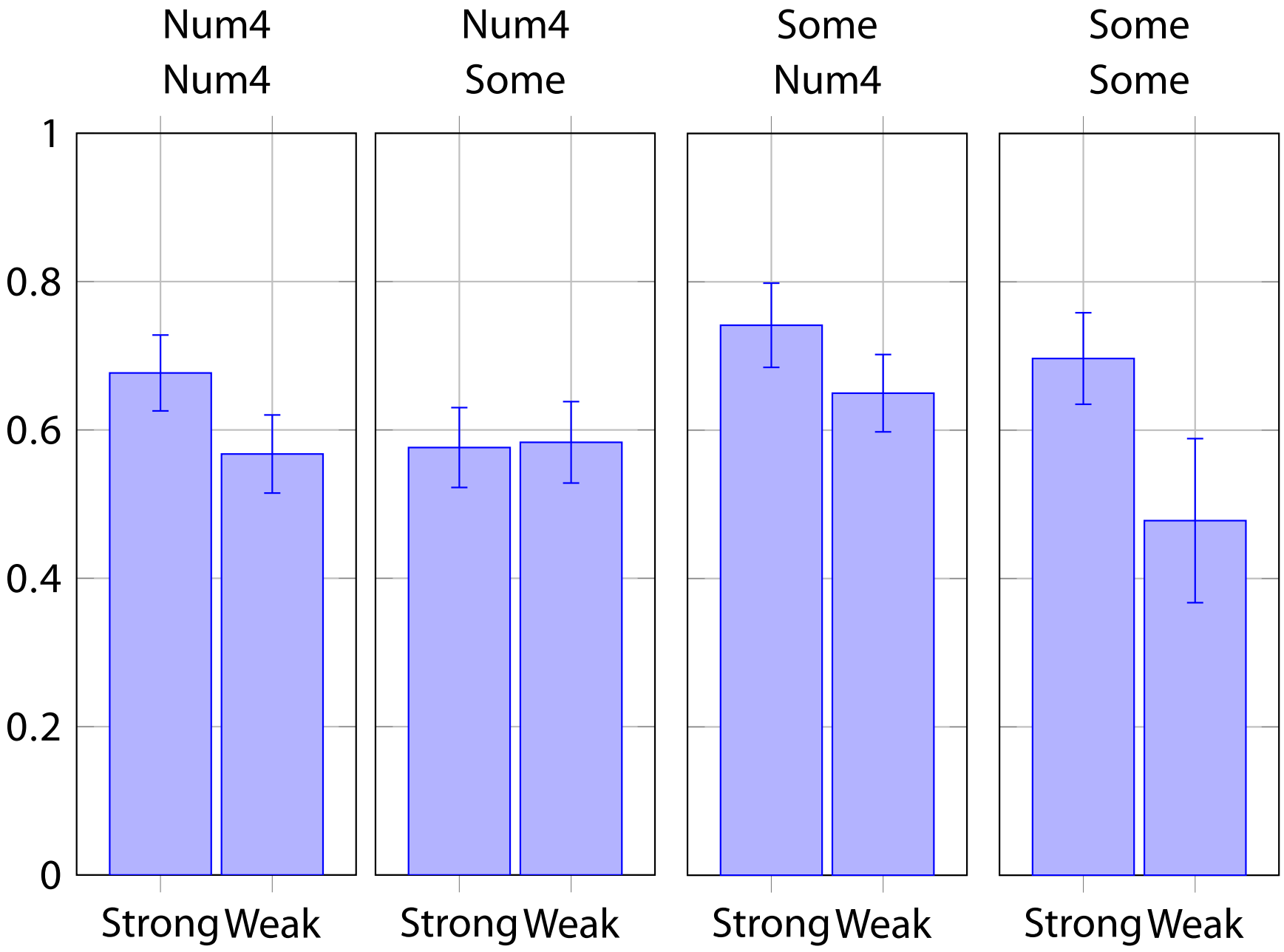
Bott and Chemla did not make predictions regarding the results of the experiment.
As noted, their core interest was in how the question about EVAs should be resolved.
However, they do note that '[i]f enrichment can be primed at all, we would expect within-category priming' and that '[i]f the *numbers*, *some* and *ad hoc* EVAs share enrichment mechanisms we would expect them to prime each other, so that a strong some prime, for example, leads to a greater proportion of strong number responses.' (2016, p. 122)
And, from the results of Bott and Chemla's experiment, one should expect to see a significant effect of priming, both within and between categories.

Results

1. Replication of priming effects in general,
2. failure to replicate between-category priming effect,
3. replication of within-category priming effect,
4. replication of no significant effects when splitting the data in half,
5. replication of no significant effect in between-category priming with respect to the prime and target categories.

☞ Less support for shared reasoning processes between distinct instances of enrichment via alternatives.

A Bar Plot


Num4
Num4
Num4
Some
Num4
Some
Some
Some
1
0.8
0.6
0.4
0.2
0
Strong
Weak
Strong
Weak
Strong
Weak
Strong
Weak

Results from Bott and Chemla (2016, p. 125)

		β	S.E.	Z	p-value
Overview	Prime $*$ WithBet $+$ (1 $+$ Prime $*$ WithBet $\mid$ subject)				
	(Intercept)	−0.594	0.198	−2.991	.003
	Prime	0.563	0.034	16.342	<.001
	WithBet	0.126	0.029	4.284	<.001
	Prime:WithBet	−0.430	0.033	−13.177	<.001
Within simple	Prime	0.993	0.059	16.950	<.001
Between Simple	Prime	0.133	0.033	4.082	<.001
Within detail	Prime $*$ WithCat $+$ (1 $+$ Prime $*$ WithCat $\mid$ subject)				
	(Intercept)	−2.088	0.255	−8.185	<.001
	Prime	1.239	0.109	11.374	<.001
	WithCatNUM4	2.068	0.195	10.588	<.001
	WithCatSOME	1.823	0.157	11.598	<.001
	Prime:WithCatNUM4	0.174	0.166	1.046	.269
	Prime:WithCatSOME	−0.138	0.137	−1.007	.314
Between detail	Prime $*$ BetCat $+$ (1 $+$ Prime $*$ BetCat $\mid$ subject)				
	(Intercept)	−0.691	0.204	−3.384	<.001
	Prime	0.145	0.058	0.058	.012
	BetCatSOMEADH	−0.054	0.089	−0.611	.540
	BetCatSOMENUM4	0.889	0.112	7.915	<.001
	Prime:BetCatSOMEADH	−0.069	0.079	−0.873	.383
	Prime:BetCatSOMENUM4	0.078	0.088	0.888	.374

Results from the replication

		β	S.E.	Z	p-value
Overview	Prime $*$ WithBet $+$ (1 $+$ Prime $*$ WithBet $\mid$ subject)				
	(Intercept)	0.962	0.346	2.778	<.010
	Prime	0.310	0.074	4.196	<.001
	WithBet	−0.006	0.067	−0.089	.929
	Prime:WithBet	0.294	0.071	4.135	<.001
Between Simple	Prime	0.016	0.089	0.181	.857
Within Simple	Prime	0.603	0.114	5.277	<.001
Within Detail	Prime $*$ WithCat $+$ (1 $+$ Prime $*$ WithCat $\mid$ subject)				
	(Intercept)	1.361	0.460	2.960	<.010
	Prime	0.759	0.206	3.678	<.001
	WithCat	−0.784	0.432	−1.816	.069
	Prime:WithCat	−0.164	0.265	−0.618	.536
Between detail	Prime $*$ BetCat $+$ (1 $+$ Prime $*$ BetCat $\mid$ subject)				
	(Intercept)	0.899	0.506	1.777	.076
	Prime	−0.086	0.160	−0.541	.589
	BetCat	0.861	0.451	1.910	.056
	Prime:BetCat	0.362	0.282	1.281	.200

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Additional details follow …

Details for the bar plots

Prime		Response	From the replication				From Bott and Chelma	
Type	Category	Category	mean %	Raw mean	Raw S.D.	Raw S.E.	mean %	Raw S.E.
Strong	Num4	Num4	0.6767956	2.634409	1.653619	0.1714723	0.615	0.018
Weak	Num4	Num4	0.5675553	2.184783	1.683334	0.1745536	0.339	0.018
Strong	Num4	Some	0.5762712	2.193548	1.702032	0.1764925	0.553	0.019
Weak	Num4	Some	0.5833029	2.239130	1.750162	0.1814834	0.484	0.019
Strong	Some	Num4	0.7414502	2.511364	1.597371	0.1656396	0.544	0.020
Weak	Some	Num4	0.6498584	2.466667	1.643510	0.1704240	0.474	0.019
Strong	Some	Some	0.6966165	2.329545	1.713514	0.1776831	0.604	0.019
Weak	Some	Some	0.4703510	1.978261	1.728737	0.1792617	0.340	0.018

Relevant cell mean and S.E. from Bott and Chemla included (see Table A1 (2016, pp. 138–139)).

Analysis of priming effect for between category trials

		β	S.E.	Z	p-value
	Prime + (1 + Prime | Subject)				
some → *number4*	Prime	−0.080	0.162	−0.492	0.623
number4 → *some*	Prime	0.354	0.238	1.488	0.137

Analysis of the experiment by halves

		β	S.E.	Z	p-value
Within by half	Prime $*$ WithCat $*$ Half $+$ (1 $+$ Prime $*$ WithCat $*$ Half $\mid$ Subject)				
	(Intercept)	−0.221	0.378	−0.584	.559
	Prime	0.141	0.320	0.442	.658
	WithCat	1.068	0.481	2.222	<.050
	Half	0.850	0.371	2.294	<.050
	Prime:WithCat	0.770	0.542	1.423	.155
	Prime:Half	0.172	0.243	0.706	.480
	WithCat:Half	−0.671	0.334	−2.011	<.050
	Prime:Withcat:Half	−0.534	0.379	−1.407	.159
Half 1 only	(Intercept)	0.675	0.3157	2.139	<.050
	Prime	0.314	0.1154	2.719	<.010
	WithCat	0.377	0.1801	2.092	<.050
	Prime:WithCat	0.217	0.1975	1.098	.272
Half 2 only	(Intercept)	1.518	0.6091	2.493	<.050
	Prime	0.519	0.2572	2.016	<.050
	WithCat	−0.203	0.299	−0.680	.497
	Prime:WithCat	−0.392	0.361	−1.086	.277

Half = experiment half factor (2 levels: first half, second half). First half and *number*4 as bases.