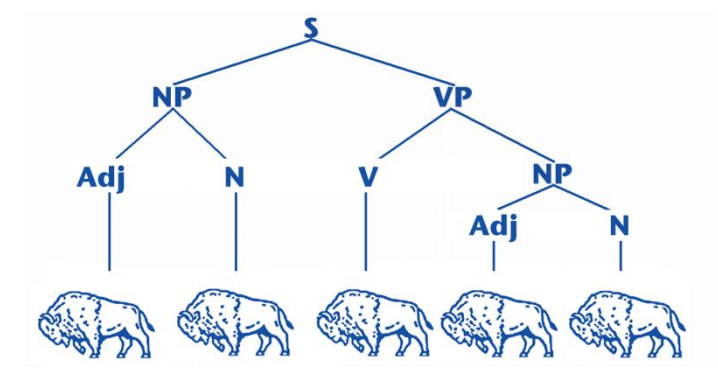


Retrieval of Irregular Polysemes: Evidence from Priming and Eye-Movements

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How are irregular polysemes like *sour* stored in and retrieved from memory?

Homonyms (*bank: money; river*)

- In the absence of a biasing context
 - Only the most frequent (dominant) of a homonym's unrelated meanings is retrieved
- Dominance effect** consistent with separate lexical entries for each meaning (Simpson, 1981)
- In contexts biased toward less frequent (subordinate) meaning
 - Dominant and subordinate meanings compete for retrieval (Duffy et al., 1988; but c.f., Vu et al., 1998) and subordinate meaning takes longer to retrieve (**subordinate bias effect**)

Regular Polysemes (*novel: object; content*)

- Marginally engender longer reading times when a disambiguating context is biased toward a subordinate semantically related sense (Frazier & Rayner, 1990)
- Retrieval is via application of lexical rules (Rabagliati et al., 2011) or an underspecified node (Frisson & Pickering, 1999).

Irregular Polysemes (*sour: lemon; milk*)

- Differ from **homonyms** because senses are semantically related
- Differ from **regular polysemes** because senses cannot be derived from each other by productive rules
- Similar processing for homonyms and irregular polysemes has been observed (Klein & Murphy, 2001; 2002)
- Results of Klein & Murphy (2001, Exp't. 5)

Prime Type	Target	Processing times relative to Neutral Prime
Neutral Prime _____ paper	shredded paper	
Same Sense Prime wrapping paper	shredded paper	Facilitation
Different Sense Prime daily paper	shredded paper	Inhibition

- Klein and Murphy argue that inhibition is only possible if polysemes have separate entries, thus
 - Inhibition, conceived as the cost of switching entries, affects non-selected interpretation of both homonyms and polysemes
 - Polysemes have no shared features or core meaning

Results of previous studies may have been due to materials and baseline problems

- Materials not normed for sense frequency (Duffy et al., 1988) or sense relatedness (Klepousniotou et al., 2008).
- Baseline for inhibition effects (polysemes plus underscore) skewed towards dominant reading.
 - Slower retrieval times supporting inhibition may be due to the contribution of subordinate senses rather than polysemes as a whole.

Dominance Prediction. If irregular polysemes are stored like homonyms, they too should exhibit dominance effects (i.e., faster retrieval of the dominant sense in a non-biasing context).

Switching Cost Prediction. If the non-selected sense of irregular polysemes is inhibited in retrieval, then switching between senses will be equally costly for both polysemes and homonyms. **BUT**, if irregular polysemes share core features, they should incur lower switching costs than homonyms.

Using Continuous Priming to Test Dominance and Switching Cost Predictions in Homonyms and Irregular Polysemes

Materials: 20 homonyms and 20 irregular polysemes

- Relatedness norming:** Can the two meanings appear in similar contexts? Do they share physical or functional properties? Do they taste, smell, sound, or feel similar? Do they behave similarly?
 - senses of polysemes are semantically more related than meanings of homonyms ($p < 0.001$)
- Dominance norming:** Give the first five words or phrases that come to mind.
 - polysemes and homonyms have equally dominant (87%) and subordinate readings ($p > 0.5$)
- word length and frequency of target words were controlled for

Procedure: continuous priming paradigm in which lexical decisions are made to **both** primes and targets

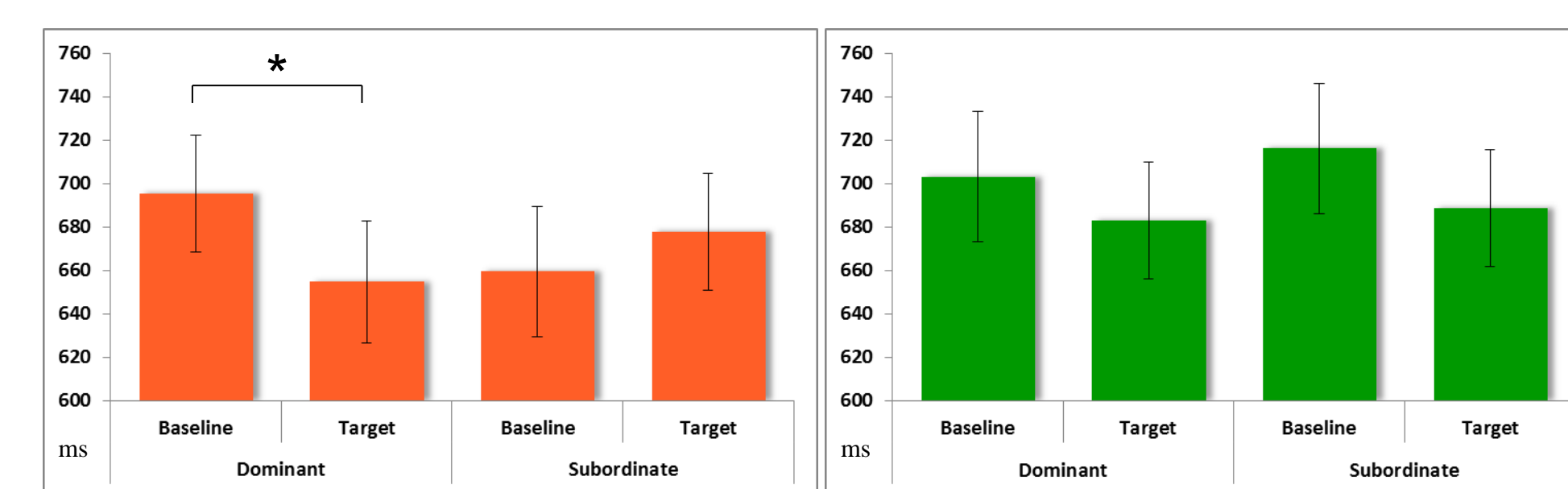
- Experiment 1:** primes are visible, 250 ms SOA
- Experiment 2:** primes displayed for (50ms) and forward and backward masked (#####), 250 ms SOA,
- Participants **not** consciously aware of primes

Ambiguity	Condition	Dominance	Item		
			Context / Baseline	Prime	Target
Homonymy	Inconsistent Context	Dominant	SWIM	BANK	ROB
		Subordinate	ROB	BANK	SWIM
	No Context	Dominant		BANK	ROB
		Subordinate		BANK	SWIM
Polysemy	Inconsistent Context	Dominant	DAIRY	SOUR	LEMON
		Subordinate	LEMON	SOUR	DAIRY
	No Context	Dominant		SOUR	LEMON
		Subordinate		SOUR	DAIRY

- RTs on target in no context and inconsistent context conditions
- For the baseline: RTs on context word in inconsistent context condition e.g. *dairy* context is the baseline for *dairy* target

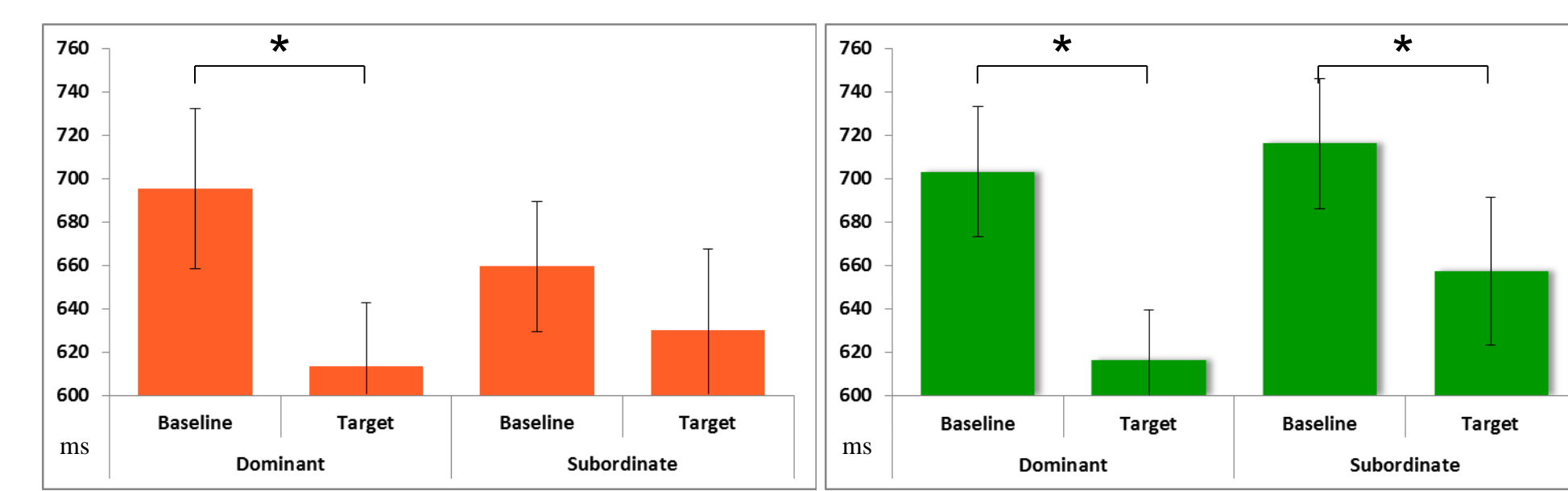
No Context Condition-Visible Primes

- Dominance effects only observed for homonyms
- Irregular polysemes** were not retrieved like **homonyms**



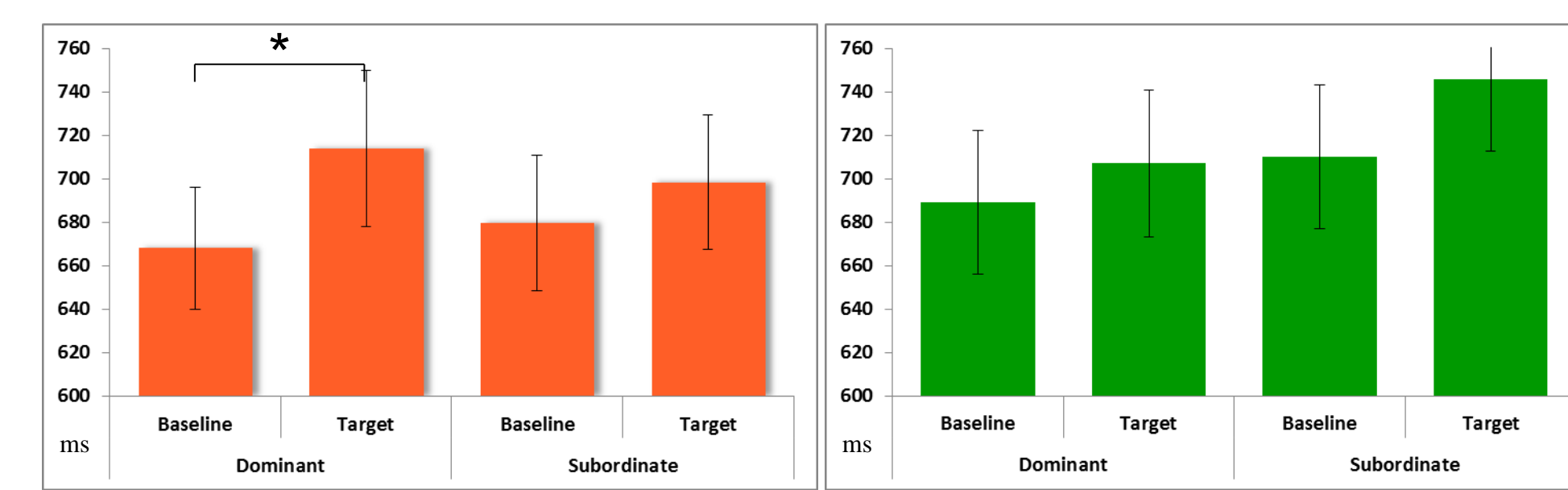
Inconsistent Context Condition—Visible Primes

- Irregular polysemes** not retrieved like **homonyms**
- No switching costs (inhibition) for **irregular polysemes**
 - Facilitation regardless of whether interpretation switched from dominant to subordinate or subordinate to dominant



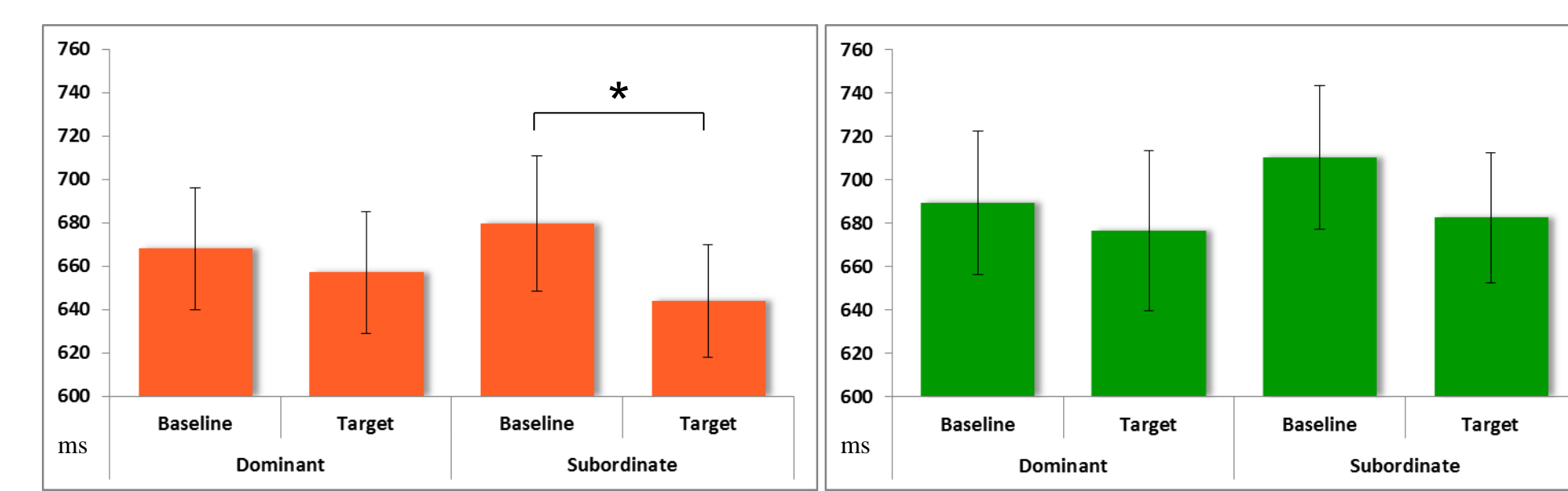
No Context Condition—Invisible (Masked) Primes

- Dominance effects, as reflected by response inhibition, only seen in homonyms
- Irregular polysemes** again not retrieved like **homonyms**



Inconsistent Context Condition—Invisible Primes

- Priming only for subordinate meaning of **homonyms**



Summary and Conclusions for Priming Results

- Visible Primes**
 - Irregular polysemes are retrieved differently from homonyms whether or not an inconsistent context word is present
 - Lack of priming in the absence of context and easier switching between senses suggest shared meaning feature activation
- Invisible Primes**
 - Again, irregular polysemes do not pattern with homonyms
 - Inconsistent prime results consistent with self-inhibition of responses for masked priming (Eimer & Schlaghecken, 1998)

Are homonyms and irregular polysemes processed differently in context?

Duffy et al. (1988) found that a homonym's dominant meaning competes with a context-biased subordinate meaning.

- homonyms** are read more slowly than controls after subordinate contexts
- subordinate contexts are read more slowly following a **homonym**

Frazier and Rayner (1990) and Frisson and Pickering (1999) showed little or no conflict between regular polyseme senses, consistent with filling out an underspecified representation.

- regular polysemes** were read marginally slower than controls after subordinate contexts
- subordinate contexts showed no slow down following a **regular polyseme**

Context prediction. If **irregular polysemes** are processed like **homonyms**, subordinate contexts should be read more slowly after an **irregular polyseme** than after a matched control.

Ambiguous word prediction. If **irregular polysemes** are processed like **regular polysemes**, they should take longer to read than a control following subordinate contexts.

✓ **BUT**, if shared features (core meaning) of **irregular polysemes** are initially retrieved, no reading difficulties are expected.

Materials: 20 **homonym** and 20 **irregular polyseme** items; $N = 48$ (4 lists)

- contexts supported the ambiguous word's subordinate meaning
- unambiguous controls (in parens below) matched for length and frequency
- ambiguous and control sentences normed for equal plausibility

Context After the ambiguous word:

Fortunately his **hand** (mind) was strong enough for winning rummy against his best friends.

Everybody paid close attention to the **horns** (bones) during the visit because the dinosaur was very exotic.

Difference Scores shown below: AMBIG. CONDITION - CONTROL † $p < 0.06$

	AMBIG. WORD	SPILLOVER ...	DISAMBIG. CONTEXT
	his hand	was strong	rummy against his
GAZE DUR.	4.51	34.44 *	3.74
TOTAL TIME	-11.09	36.01 *	11.98
	the horns	during	the dinosaur was very
GAZE DUR.	4.84	9.49	5.77
TOTAL TIME	36.06	10.59	57.71 **

- Irregular polysemes** read more slowly than controls in spillover
- Homonyms** read longer on later subordinate contexts

Context Before the ambiguous word:

For winning rummy against his best friends fortunately his **hand** (mind) was strong enough.

Because the dinosaur was very exotic everybody paid close attention to the **horns** (bones) during the visit.

	DISAMBIG. CONTEXT	... AMBIG. WORD	SPILLOVER
	rummy against his	his hand	was strong
GAZE DUR.	-39.80	5.33	-0.29
TOTAL TIME	53.48	-11.97	16.06
	the dinosaur was very	the horns	during
GAZE DUR.	-40.87	13.66 †	53.62 **
TOTAL TIME	0.42	39.06 *	83.63 ***

- No slow down for **irregular polysemes**
- Homonyms** read more slowly after subordinate context

Irregular polysemes are processed differently than homonyms and regular polysemes in both word recognition and reading.

➔ **Unlike homonyms**, irregular polysemes share a core meaning that does not require the processor to fully commit to either sense, and facilitates switching between interpretations.

➔ **Unlike what happens with regular polysemes**, subordinate contexts do not elicit extended reading times of subsequent irregular polysemes because no lexical rule is applied.

➔ **Integration of core meaning of irregular polysemes in sentence contexts comes with a short-term cost.**

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