Lexical alternatives and the acquisition of subordinate nouns

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Specificity of word meanings

Word learning is challenging because words don't just label objects - they invoke **specific meanings** that the speaker **intends to convey**.

It's hard to disambiguate word meanings that enter into a **subset-superset relationship** (e.g., 'dog' vs. 'dalmatian') even under referential certainty.

Quine (1960); Clark (1987, 1990); Markman (1984, 1990)

“This is a fep”

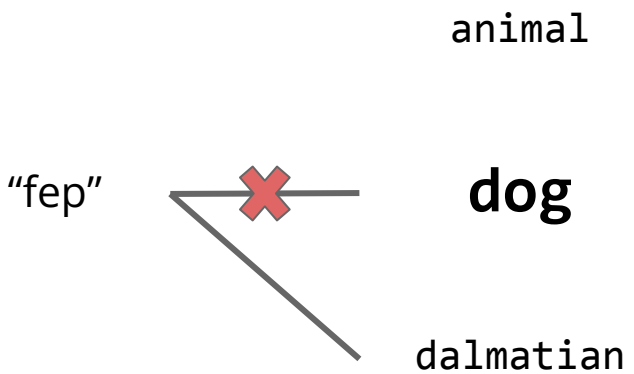
“Basic”-level bias

“basic”

animal > **dog** > dalmatian

“superordinate” “subordinate”

The challenge of subordinate nouns



Linguistic cues to subordination

“Anchoring” to known basic-level category can scaffold subordinate-level distinctions (e.g., “This is a dog. It is a *terrier*”. Callanan 1985; Waxman et al. 1991, 1997)

Conventions in linguistic form can serve as evidence for subordination (e.g., compound vs. single nouns. Clark 1987; Gelman et al. 1989)

Perhaps assumes richness of input & experienced language learner?

Evidence from cross-situational learning

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- **Style of exemplar presentation** (simultaneous presentation of exemplars highlights shared details; Spencer et al. 2011 among others)

Bottom-up perceptual account

Sequential

`DOG-features`

4-legged, has tail and snout, ...

Simultaneous

`DALMATIAN-features`

Spotted, lean, has long tail, ...

Spencer et al. (2011); Jenkins et al. (2015, 2021)

Evidence from cross-situational learning

- **Style of exemplar presentation** (simultaneous presentation of exemplars highlights shared details; Spencer et al. 2011 among others)
- **Sampling of exemplars** (“suspicious coincidence” of subordinate-level exemplars given basic-level meaning; Xu & Tenenbaum 2007 among others)

“Suspicious Coincidence” account

Observed

“dalmatian”

“dalmatian”

“dalmatian”

Un-observed

“dalmatian”

Xu and Tenenbaum (2007); Lewis and Frank (2018)

Evidence from cross-situational learning

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Effect can disappear under other circumstances of task (e.g., learning other categories within/across the basic-level; Wang & Trueswell 2019, 2022)

Subordinate nouns as a pragmatic puzzle

Prior framing: The learner tracks label-referent pairings as fundamental unit of evidence and discovers the “subordinate-ness” of the word.

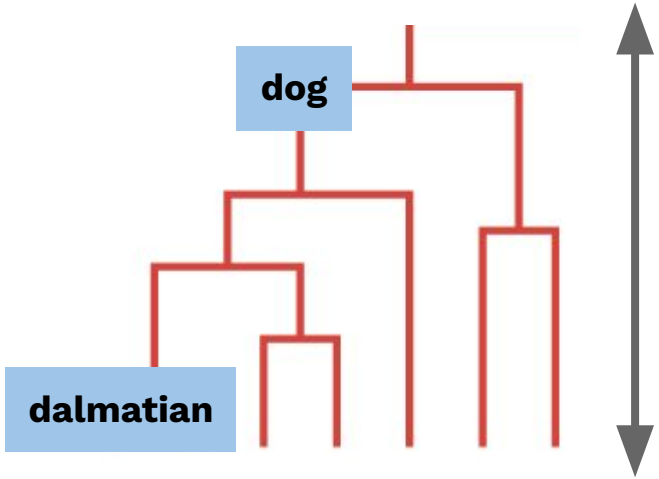
Current study: When do learners **expect to hear** a word with a narrower (subordinate-level) meaning?

- Driven by inferences about the level of **informativity** intended by the speaker in the use of a word.

Informativity and the conceptual hierarchy

Informativity maps onto the **vertical scale** in the conceptual hierarchy

- ‘Dalmatian’ is not only a smaller conceptual category than ‘dog’; also a **more informative description** than ‘dog’ (“generic addressee” informativity).



Hypothesis

An explicit **alternative at the subordinate-level** should make the narrower subordinate-level meanings relevant for the target word.

Target

Alternative

Research questions

2 online experiments with adults:

Experiment 1: Do basic-level generalizations decrease if the target label is accompanied by a **semantic alternative at the subordinate-level**?

Experiment 2: Is the contribution of semantic contrast specifically about the **labelling of the alternative**, or does presenting a merely conceptual (i.e., unlabelled) contrast suffice?

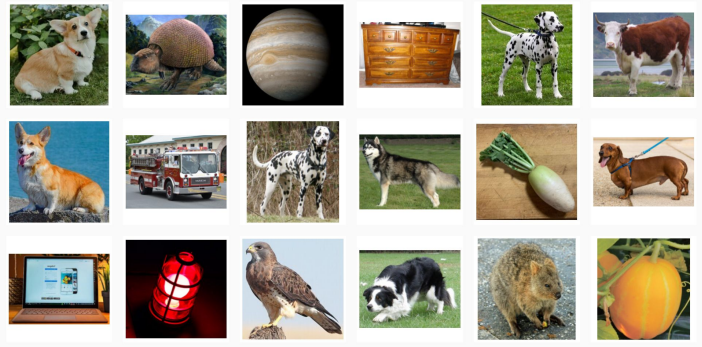
Method: Immediate Generalization Paradigm

Training

"... kapsin ..."

Testing

"... Click on all the kapsins!"



Experiment 1 - Training conditions

No Contrast

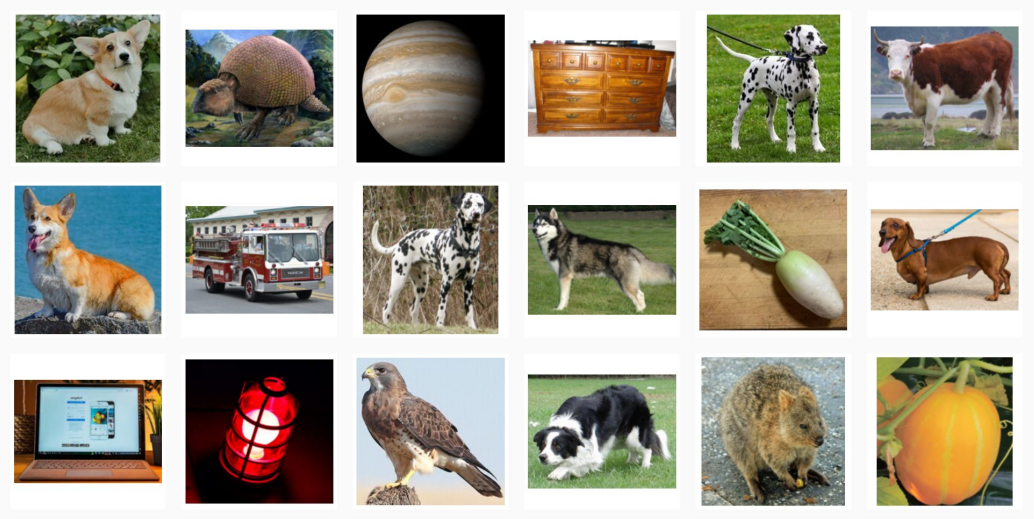
“Look, this is a kapsin.
Do you see the kapsin?”

Contrast

“ … kapsin …”

“… tantol …”

Experiment 1 - Test grid



2 target subordinate

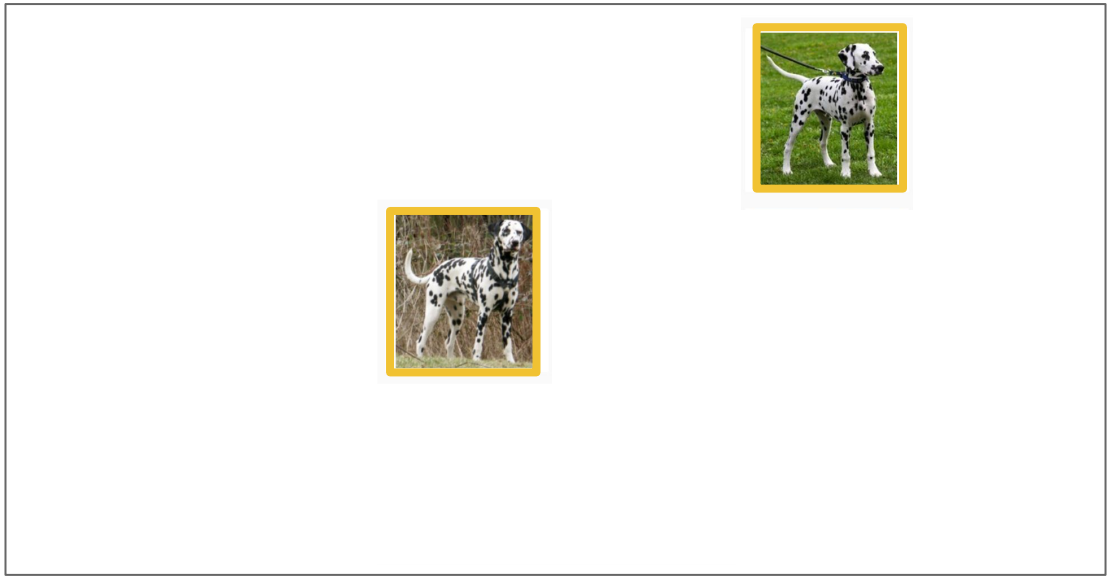
2 alternative subordinate

3 other basic

3 superordinate

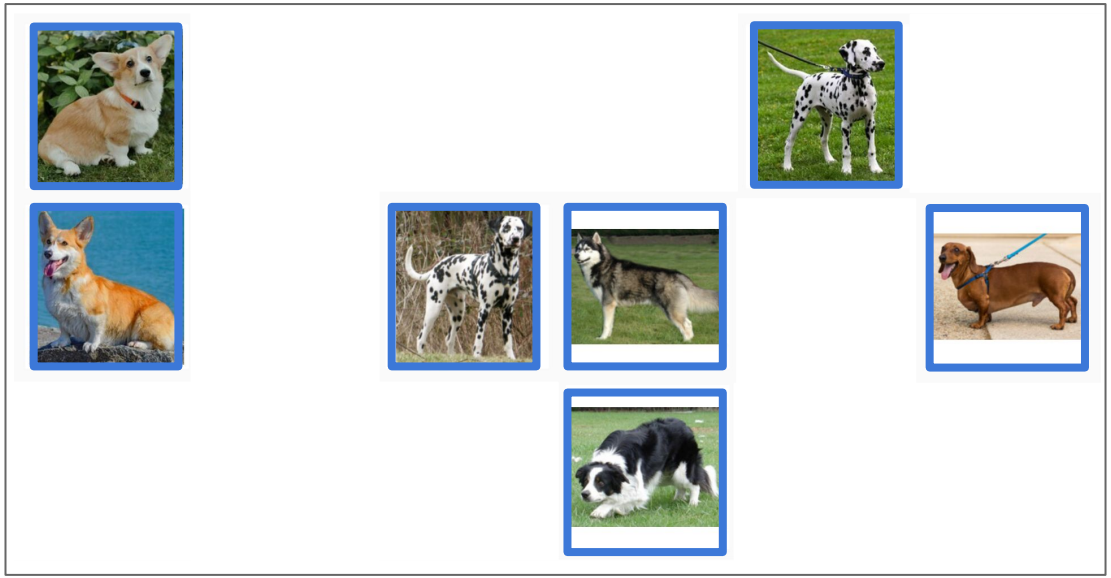
8 other domains

Experiment 1 - Coding



Subordinate-level generalization

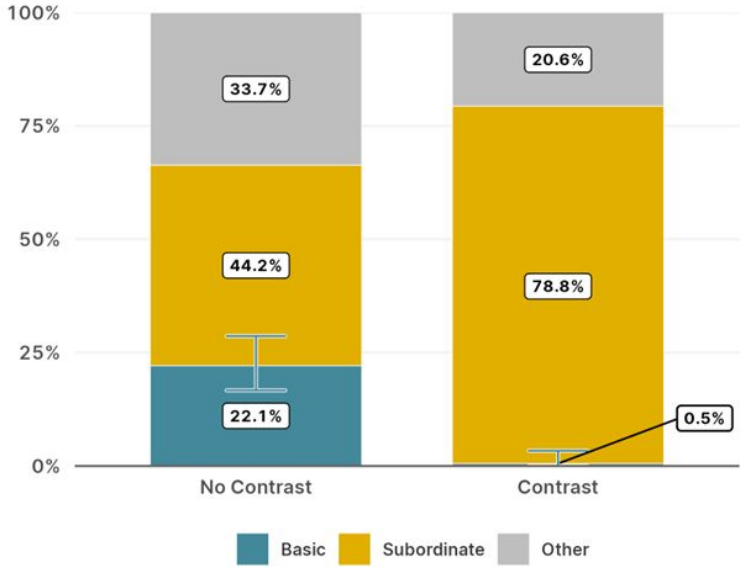
Experiment 1 - Coding



Basic-level

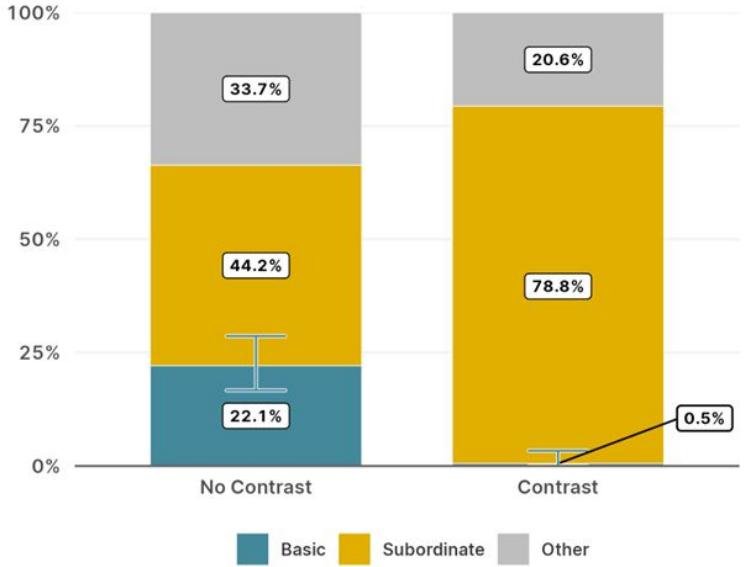
generalization

Experiment 1 - Results



53 participants; 388 responses

Experiment 1 - Results



Significant* decrease in the proportion of **Basic** responses (& increase in **Subordinate** responses) when the semantic alternative is present.

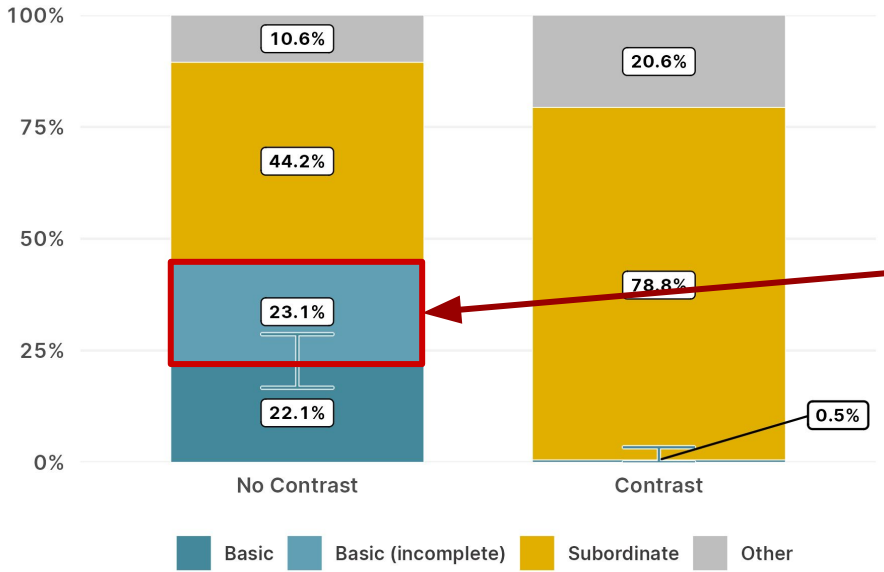
Note:

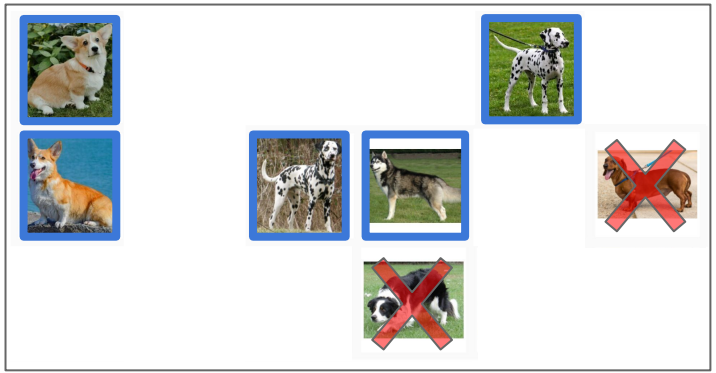
1) Large % of Other responses
2) Low overall % of Basic responses

53 participants; 388 responses

P<0.0001; Chi-squared test of independence

Aside) “Incomplete Basic” responses





Experiment 2 - Learning conditions

Unlabelled Contrast

“ … **kapsin** …”

“And look here!

Do you see this?”

Labelled Contrast

“ … **kapsin** …”

“… **tantol** …”

Experiment 2 - Learning conditions

Unlabelled Contrast

“Look here!

Do you see this?”

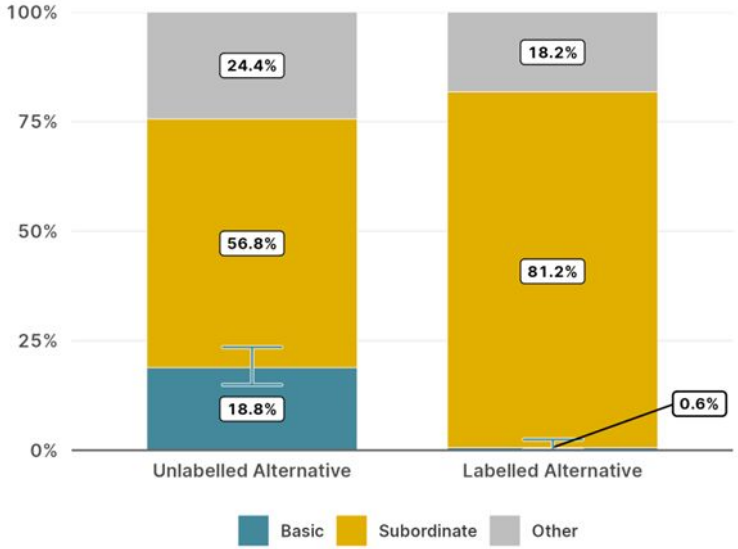
“ … **kapsin** …”

Labelled Contrast

“… **tantol** …”

“ … **kapsin** …”

Experiment 2 - Results



	β (SE)	t	p
(Intercept)	-7.6 (1.7)	-4.5	<0.0001
Label	-2.7 (0.5)	-5.3	<0.0001
Order	2.5 (0.9)	2.9	0.0033

90 participants; 669 responses

Discussion: alternative accounts

Findings are unexpected under accounts where **information outside of referent introduction** is not considered evidence for word meaning.

- The semantic alternative does not contribute to the perceptual or distributional profile of the target label itself.

Consistent with hypothesis testing models tracking conjectures (e.g., Trueswell et al. 2013; Stevens et al. 2017), and Bayesian models reasoning over cues beyond the choice of labelled exemplar (e.g., Frank & Goodman 2012; 2014)

Discussion: pragmatic connections

Young children (~5 y.o.) interpret “some” in only the logical sense:

“Some giraffes have long necks”

- **Logical**: ✓ There exists giraffes with long necks.
- **Pragmatic**: ? Not just some but *all* do!

Conceptual difficulty? Processing difficulty?

Noveck 2001

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- **Logical**: ✓ There exists giraffes with long necks.
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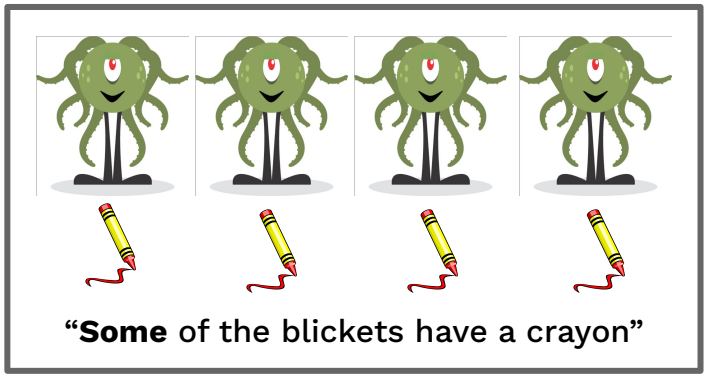
- Also been claimed for subordinate nouns! (Ross & Murphy, 1996; Sloutsky et al., 2007)

Noveck 2001

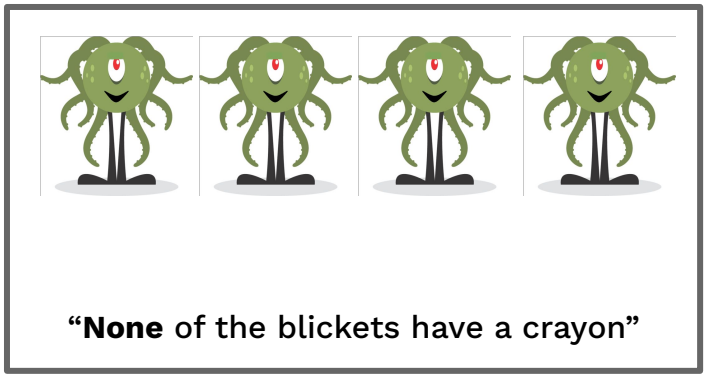
Discussion: pragmatic connections

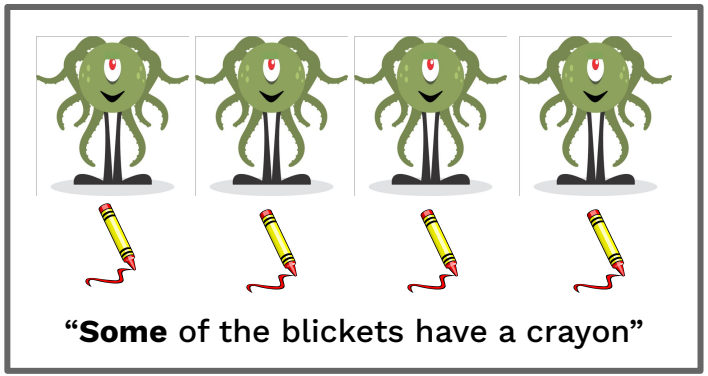


✔

Skordos & Papafragou (2016)

Discussion: pragmatic connections





?

Skordos & Papafragou (2016)

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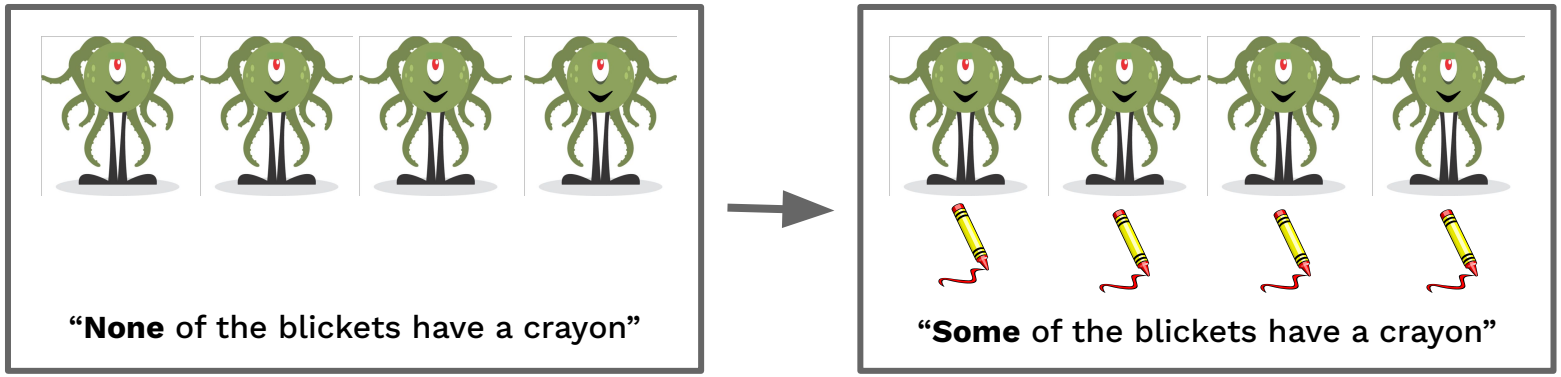

Establishing the **relevant alternatives** constrains search for word meaning

Skordos & Papafragou (2016)

Conclusion

Learners use **linguistically marked** (vs. merely conceptual) contrast to infer the degree of informativity expressed in the use of a novel label.

- Semantic alternatives facilitate subordinate-level conjectures (Expt. 1)
- Alternatives must be labelled, not simply present (Expt. 2)

Informativity helps highlight the subordinate-level meaning as the **relevant alternative** to the **basic-level meaning**.

- Future plans: children participants, other communicative acts, etc.

Appendix A: Magnitude of the Basic-level bias

Study	Age	%*Basic (%Sub)* response	basic-level matches	Learned exemplar present at test
Ours (expt. 1)	adults	22% *(44%)*	5 (of 18)	Absent
X & T 2007a	adults	76% *(20%)*	2 (of 12~24)	Present
	4 y.o.	31% *(54%)*, 40% *(56%)*		
S,P,S,&S 2011	adults	30%~50% *(?%)*		
J,S,S,&S 2015	3-4 y.o.	26% *(?%)*, 25% *(?%)*		
L & F 2018	adults	50~65% *(?%)*		
W & T 2022	adults	64% *(35%)*		Absent

Appendix B: Distribution of “Other” responses

		% of total	Distribution of “Other” responses
Expt. 1	***No Contrast***	30%	Incomplete basic (23%), Incomplete subordinate (5%), ...
	Contrast	19%	Mutually exclusive (13%), Incomplete subordinate (3%), ...
Expt. 2	***Labelled Alternative***	18%	Mutually exclusive (10%), Incomplete subordinate (3%) ...
	Unlabelled Alternative	24%	Incomplete basic (10%), Incomplete superordinate (7%), ...

Appendix C: “Experiment 3”