Inanimacy in the Input

How a very infrequent cue can still be very powerful

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Introduction

How do children figure out the structure of sentences in which

the true grammatical relations which hold among the words in a sentence are not expressed directly in its surface structure. (C. Chomsky 1969, p.6)

Learning Problem

(1) a. The climber$_i$ seemed [t_i to be stuck.] (raising verb)
     b. Max$_i$ is easy [(Op) PRO$_{arb}$ to see t_i.] (*tough*-adjective)
     c. The relatives$_i$ arrived t_i at the wedding. (unaccusative)

Learning Problem

(2) a. The climber$_i$ pretended [PRO$_i$ to be stuck.] (control verb)

b. Max$_i$ is eager [PRO$_i$ to see e.] (control adjective)

c. The relatives danced at the wedding. (unergative)

Learning Problem

(3) a. The climber gorped to be stuck.

b. Max is daxy to see.

c. The relatives flimmed at the wedding.

Inanimate Subjects

(4) a.   The rock seemed to be stuck.

     b. # The rock pretended to be stuck.

(5) a.   The house is easy to see.

     b. # The house is eager to see.

(6) a.   The gifts arrived at the wedding.

     b. # The gifts danced at the wedding.

(7)   a. The rock gorped to be stuck.

        b. The house is daxy to see.

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1. Naturalistic input (child-directed speech)
2. Simulated learning tasks (children and adults)

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Inanimate subject $\rightarrow$ infrequent, but. . .
$\qquad\qquad\qquad \rightarrow$ unlikely to be external argument
$\qquad\qquad\qquad \rightarrow$ noncanonical underlying structure

Naturalistic Input

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2. Do they hear inanimate subjects disproportionately with displacing predicates?

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1. Do children hear inanimate subjects in the input?
   (kind of)

2. Do they hear inanimate subjects *disproportionately* with displacing predicates?
   YES!

Raising and Control Verbs and Subject Animacy

Mothers' Use of Animate/Inanimate Subjects with Raising and
Control Verbs

Raising Verbs	Animate Subjects	Inanimate Subjects	% Inanimate Subj.
seem	4	6	
used (to)	45	5	
going (to)	1197	58	
total	1246	69	5.2%
Control Verbs			
want	405	2	
like	210	0	
try	86	0	
love	10	0	
hate	1	0	
total	712	2	0.3%

$\chi^2 = 33.8, df = 1, p \leq 0.001$; (Adapted Mitchener & Becker 2011, pp.175–176)

Tough- and Control Adjectives and Subject Animacy

Mothers' Use of Animate and Inanimate Subjects with
Tough/Control Adjectives

Tough-Adjectives*	Animate Subj.	Inanimate Subj.	% Inanimate Subj.
hard	0	41	
difficult	0	3	
easy	0	4	
total	0	48	100%
Control Adjectives**			
happy	4	0	
afraid	2	0	
glad	4	0	
total	10	0	0%

$\chi^2 = 58.0, df = 1, p = 0.00$

*tough was not used; **anxious, willing and eager were not used.

Unaccusative and Unergative Verbs and Subject Animacy

Mothers' Use of Animate and Inanimate Subjects with
Unaccusatives and Unergatives

Unaccusatives	Animate Subject	Inanimate Subject	% Inanimate Subj.
close	0	6	
come	375	169	
fall	176	139	
open	1	21	
total	552	335	38.8%
Unergatives			
cry	122	5	
dance	60	6	
laugh	25	1	
total	207	12	5.5%

$\chi^2 = 85.0, df = 1, p \leq 0.001$

Unaccusative and Unergative Verbs and Subject Animacy

(8)   a. The sunshine is laughing. (Adam 12)
      b. What kind of egg dances around? (Adam 21)
      c. The teapot's crying? (Nina 18)

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Predicate	Inanimate Subj	Predicate	Inanimate Subj
Raising V	5.2%	Control V	0.3%
Tough-Adj	100%	Control Adj	0%
Unaccusative	37.8%	Unergative	5.5%

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1. In CDS parents use non-displacing predicates (control, unergatives) with inanimate subjects approx. 0%

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Two word-learning experiments:

adults	novel raising/control verbs
children	novel *tough*/control adjectives

Word-Learning Experiments: Adult Studies

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Table: Novel Verbs and their Meanings (Becker & Estigarribia 2011)

Raising	Defintion	Control	Definition
joop	to look a certain way	rickle	to really dislike being someplace
meb	to probably be a certain way	sart	to make a big effort to be some way
trollick	to be some way most of the time	zid	to really enjoy being someplace

Word-Learning Experiments: Adult Studies

Between-participants manipulations:

1. how many exemplars (1, 3 or 5)
2. explicit definition provided or not
3. sentence "frame" informative for categorization or not

The lifeguard trollicks to have a tan
wants/likes
seems/tends

The lifeguard trollicks to have a tan
wants/likes
seems/tends

The kitchen sink trollicks to be   vs.   Cats zid the sunshine
full of dirty dishes

like/*seem

seems/*likes

Linguistic cues

Frame

Definition

informative   uninformative   definition   no definition
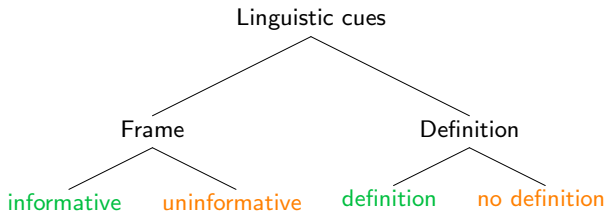
inform. frame + definition	inform. frame + no def.
uninform. frame + definition	*uninform. frame + no def.

Example: **joop**
1. The old man joops to be very tired.
2. The book joops to be very long.
3. It joops to be sunny outside.

(a) There joops to be a computer on the desk. (*there*-construction)
(b) What the fairy joops is to be small. (pseudocleft)

Results: % Correct
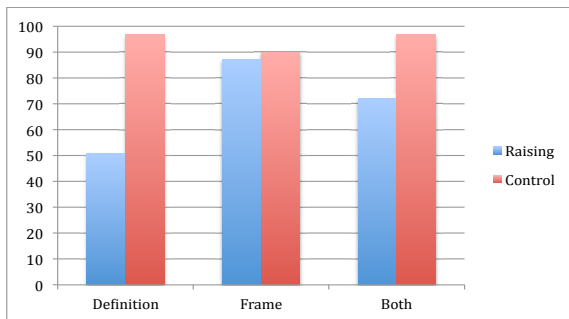
185 adult participants

Word-Learning Experiments: Child Studies

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Becker, Estigarribia & Gylfadottir (2011)

- 40 children ages 4–7 years
- Novel adjective task

(10)   The NP is Adjective to VP
       Adj = easy, eager

Word-Learning Experiments: Child Studies

Table: Novel Adjectives in Child Study

Tough Adj	Contextual Meaning	Control Adj	Contextual Meaning
daxy	easy	greppy	happy/willing
stroppy	easy	narpy	happy/excited

Group 1:

Adjective	Example sentence
daxy	An apple is very daxy to draw
stroppy	The motorcycle is not at all stroppy to hide
greppy	I'm sure Mr. Farmer would be greppy to help
narpy	My teacher was narpy to teach—she gave us fun projects

Group 2:

daxy	The policeman is not daxy to draw (his uniform is complicated)
stroppy	I bet the nurse is stroppy to hide (she's quiet)
greppy	(same as Group 1)
narpy	(same as Group 1)

Methodology: RT in response to Yes/No questions (after Naigles, Fowler & Helm 1995)

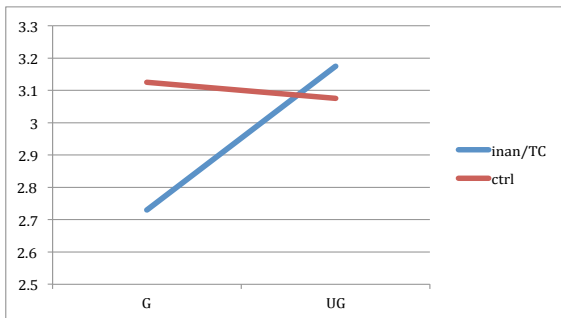- Longer RT for ungrammatical questions
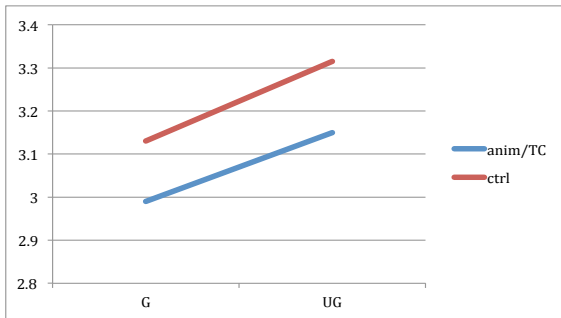- Shorter RT for grammatical questions
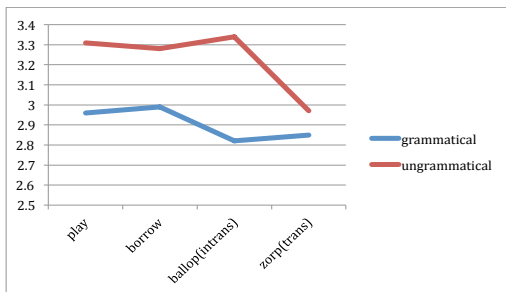
(11) a. Is it Adjective to VP?
          Is it hard to talk to the nurse?
          *Is it afraid to fight the dinosaur?

      b. Is NP Adjective?
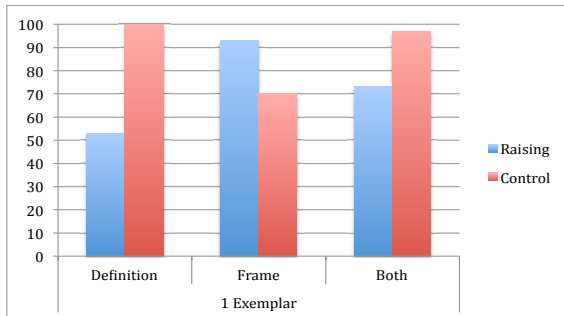   *Is the nurse hard?
          Is the nurse afraid?
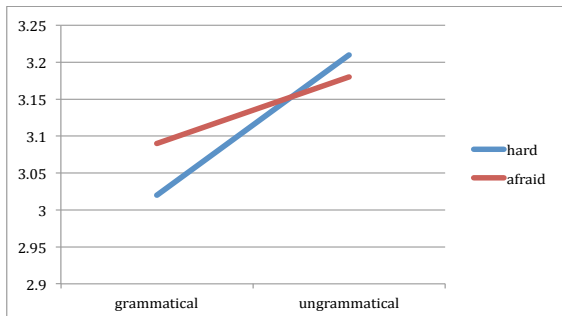
Results: Group 1 (animacy cue)

Results: Group 2 (no animacy cue)

No Age Effects

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- But conventional wisdom: *tough* constructions are hard for children until age 6–10 years
- Why did our kids do better?
- Inanimacy is helpful!

Results: Group 1 vs. Group 2
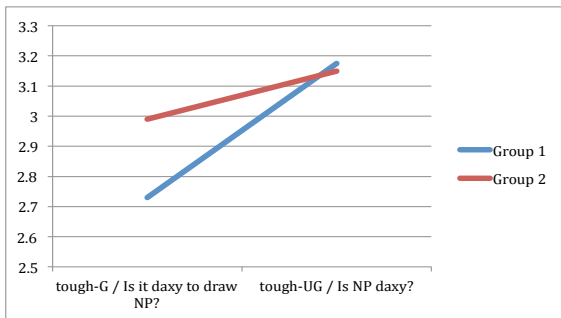
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Summary

- Inanimate subjects indicate a displaced subject
- In CDS inanimate subjects are rare but occur disproportionately with displacing predicates
- Adults and children use inanimate subjects to categorize novel predicates as displacing predicates

1. Why is animacy a good cue to (noncanonical) sentence structure?
2. Where do the (displacing/nondisplacing) predicate categories come from?

Why is Animacy a Good Cue?

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- features (face vs. no face)
  - prefer drawings of faces vs. non-faces
  - prefer faces w/ normal configuration over scrambled configuration
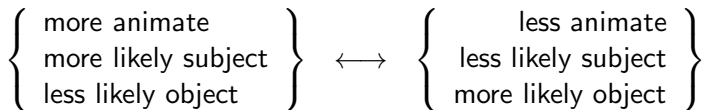
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  - prefer faces w/ normal configuration over scrambled
    configuration
- self-propelled motion (7 months)

Why is Animacy a Good Cue?

Crosslinguistically. . .

$$
\left\{
\begin{array}{c}
\text{more animate} \\
\text{more likely subject} \\
\text{less likely object}
\end{array}
\right\}
\longleftrightarrow
\left\{
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\end{array}
\right\}
$$

Animacy Hierarchy	$\sim$	Thematic Hierarchy
Human		Agent
Non-human Animate		Goal/Source
Inanimate		Theme

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- inanimate subjects used disproportionately with displacing predicates
- but proportions not uniform across types of predicates

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$\Rightarrow$ Subject inanimacy is useful for categorizing predicates into known categories but not useful for creating categories

Acknowledgements

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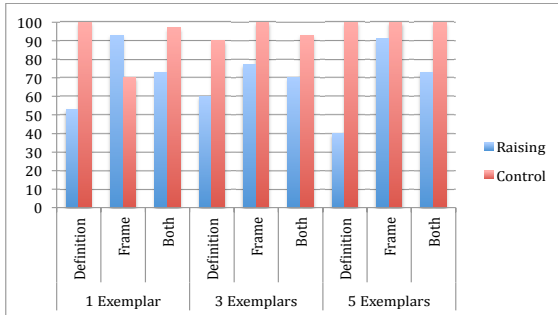
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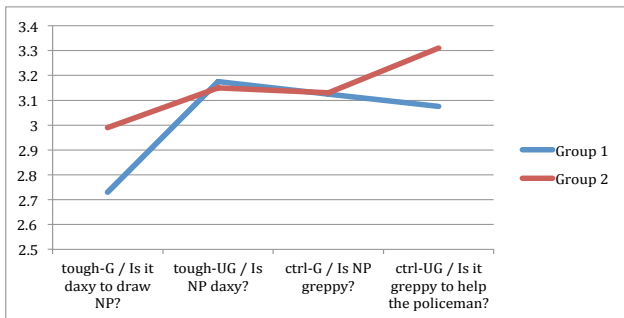
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But. . .

- they are not found in all languages, while inanimate NPs are
- they are very rare in input to children (13% for raising verbs (Hirsch & Wexler 2007))
- they are not necessarily an unequivocal cue since there can be "ambiguous" displacing/nondisplacing predicates (*begin*, Perlmutter 1970)

What about Passives?

Passives also have derived subjects and allow those subjects to be inanimate. . .

   (12)   The cookie was eat-en (by the girl).

   (13)   The girl ate the cookie.

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What about Passives?

But. . .

- passives are morphosyntactically different from their active counterparts
- the only candidate for a parallel nondisplacing counterpart is adjectival passives which also allow inanimate subjects
- the core lexical meaning of *eat* is not different between the two voices (cf. *easy* vs. *eager*)
- Lempert (1989): children trained on *animate patients* produce more passives than children trained on *inanimate patients* (latter produce more actives)