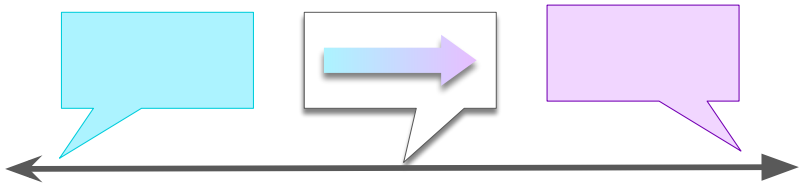
Syntactic Choice Is Shaped by Fine-Grained, Item-Specific Knowledge

Emily Goodwin, Beth Levin, Emily Morgan

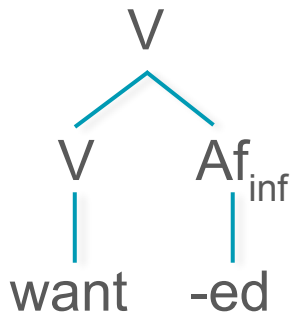
Cogsci 2025



Speakers have productive knowledge

Generally applicable rules or constraints

Combinatorial Syntax + Semantics…



Probabilistic ordering constraints….

🥺

Throw the girl it
Bring him it
Show her it

😄

Throw it to the girl
Bring it to him
Show it to her

Speakers have productive and item-specific knowledge

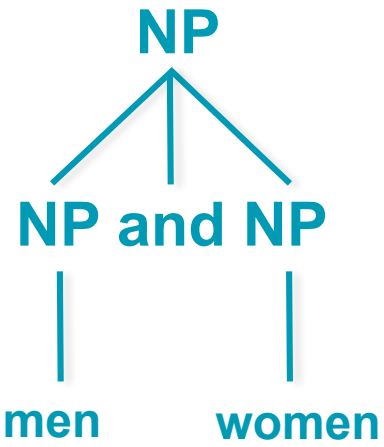
Direct experience with specific words, phrases, or sentences

went

[Went] vs. Go + -ed

Wanted

[Wanted] vs. Want + ed



vs. [men and women]

Speakers have productive and item-specific knowledge

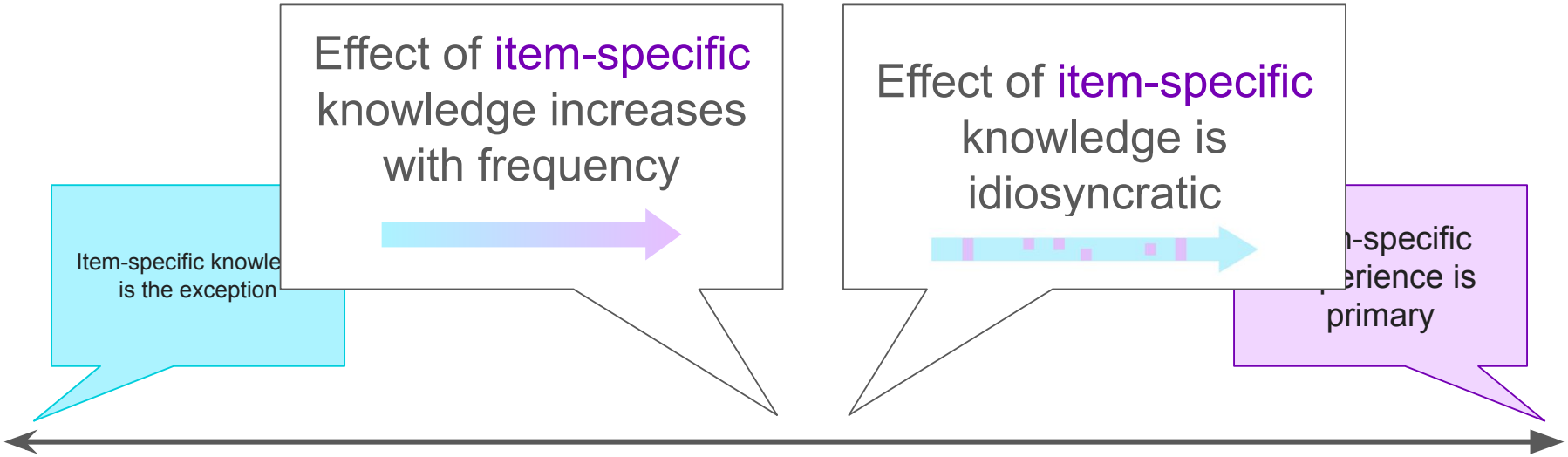
When is each type recruited?

Pinker & Ullman, 2002

Ambridge, 2020; Bybee, 2006; Bybee & McClelland, 2005; Goldberg, 2003; *inter alia*

Speakers have productive and item-specific knowledge

When is each type recruited?



Frequency effects can adjudicate between theories

Initial evidence from binomials

- **Binomial expressions** (“men and women”, “bread and butter”)
- Order preferences rely on productive knowledge and item-specific experience

Shorter noun first
No final stress
…
“Culturally Powerful” nouns first

$$\frac{\#[\text{Men \& women}]}{\#[\text{Men \& women}] + \#[\text{Women \& men}]}$$

Morgan & Levy 2015, 2016, 2024

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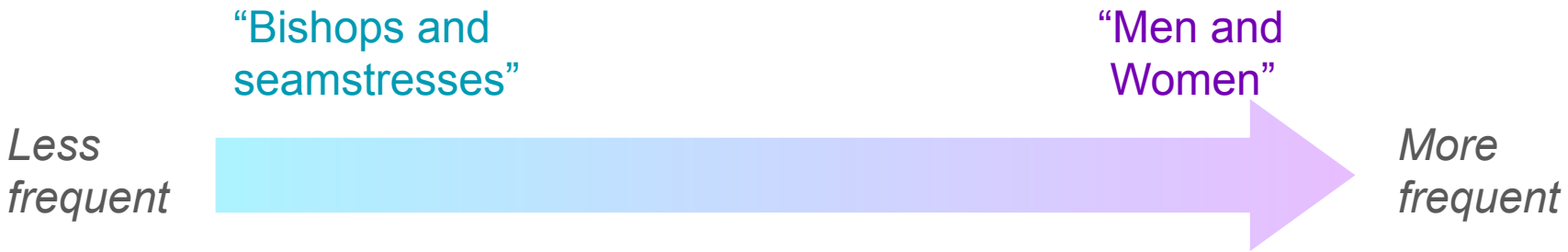

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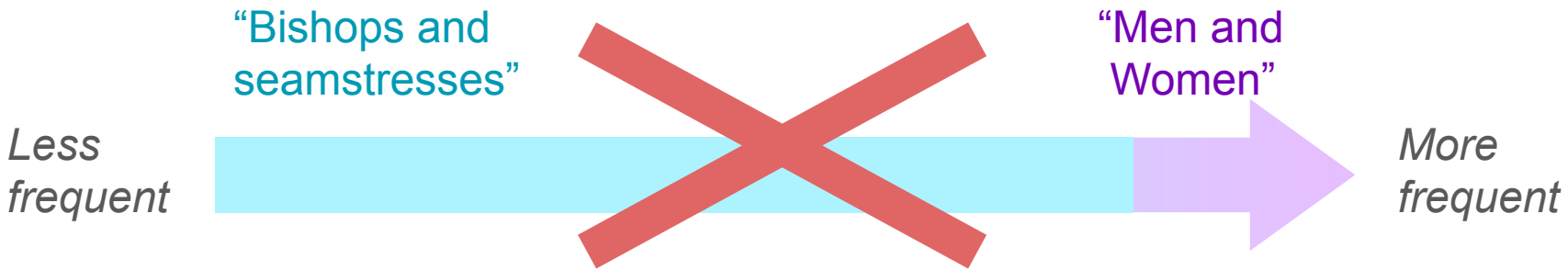
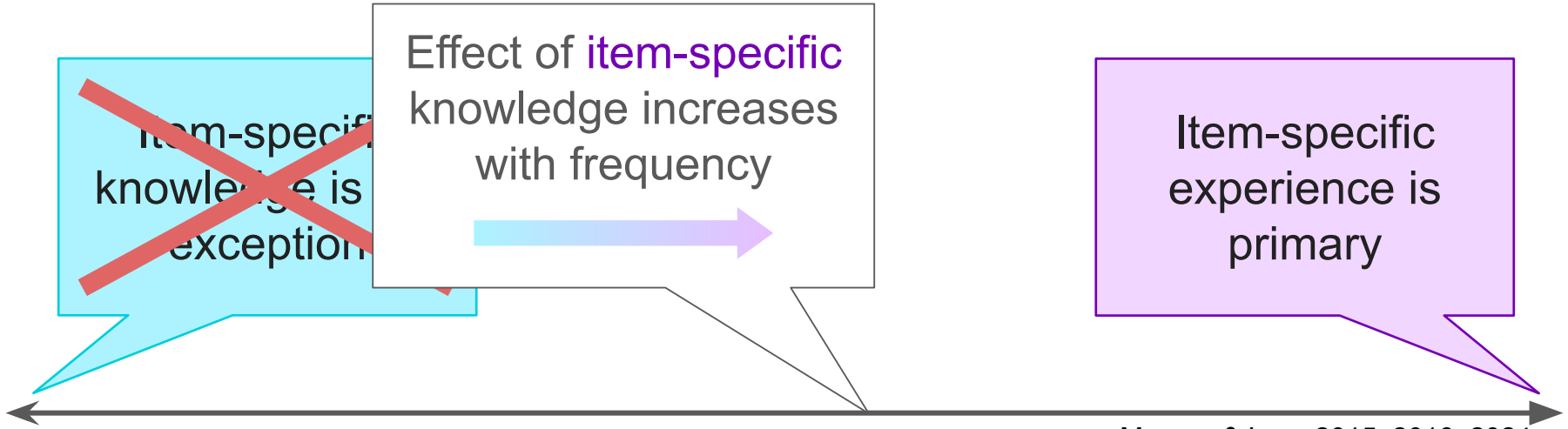


Morgan & Levy 2015, 2016, 2024

Frequency effects can adjudicate between theories

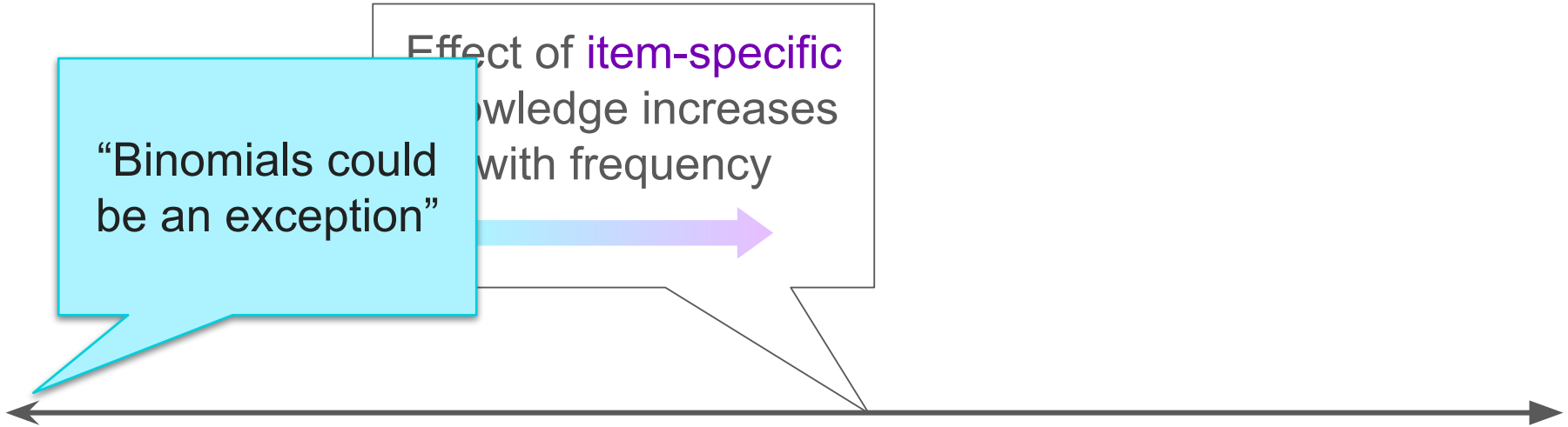
Initial evidence from binomials

- Most items recruit both item-specific and productive knowledge
- Item frequency mediates the tradeoff



Frequency effects can adjudicate between theories

Limitations of binomials



Frequency effects at abstract levels of grammar

Argument ordering with dative verbs

- Like binomials, sentences with dative verbs permit two orders

😄	Throw me the beachball	Throw me it	“Double Object” (DO)
	Throw the beachball **to** me	😄 Throw it to me	“Prepositional” (PP)

Frequency effects at abstract levels of grammar

Argument ordering with dative verbs

- Like binomials, dative verb phrases permit two orders
- Like binomials, speakers have ordering preferences
- Ordering relies on productive knowledge and item-specific experience

Early nouns are: Recently-Mentioned
Animate
Concrete
Shorter
Definite
Pronominal
1st and 2nd person
Plural
\+ Verb Sense, Preceding Structure

Throw
prefers
DO structure

Bresnan et al., 2007

Where does item-specific knowledge come from?

Binomials: Direct experience with the entire phrase

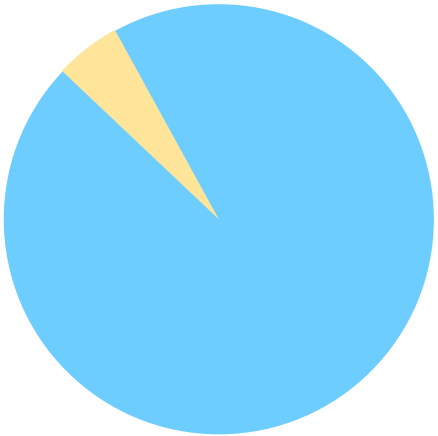
men and women
men and women *men and women*
women and men *men and women*
men and women

$$\frac{\#[\text{Men \& women}]}{\#[\text{Men \& women}] + \#[\text{Women \& men}]}$$

Where does item-specific knowledge come from?

Binomials: Direct experience with the entire phrase

women and men



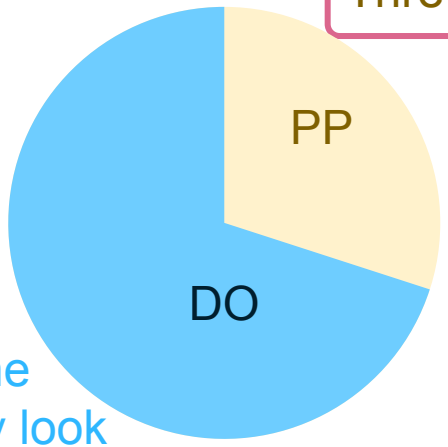
men and women

$$\frac{\#[\text{Men \& women}]}{\#[\text{Men \& women}] + \#[\text{Women \& men}]}$$

Where does item-specific knowledge come from?

Verbs: Direct experience with verb, in any phrase?

Throw more passes to the quarterback
Throw the marker to the student
Threw the ball to the endzone ?



$$\frac{\#\ [\textit{Throw}\ \text{DO Structure}]}{\#\ [\text{Throw, DO}] + \#\ [\text{Throw, PP}]}$$

Throw him a bone
Threw her a dirty look
Throw the students their papers

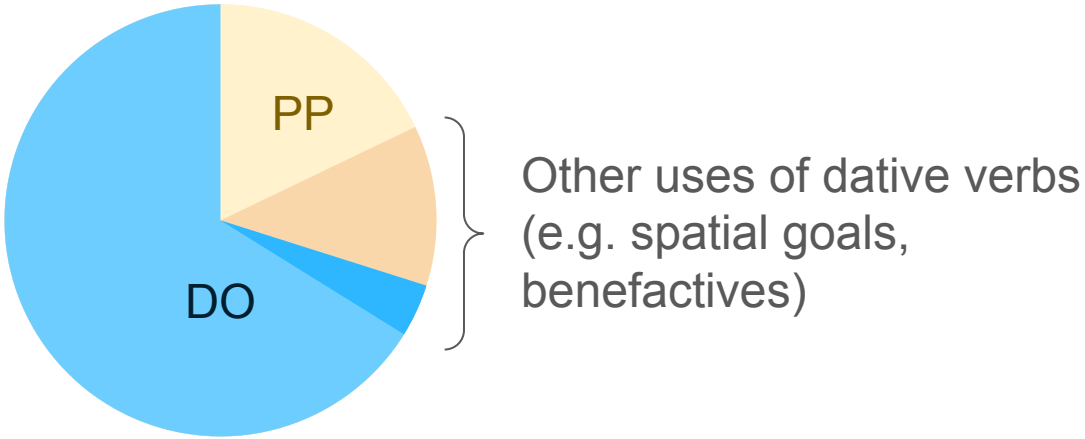
Where does item-specific knowledge come from?

Non-dative uses of dative verbs lack a recipient and do not alternate

	Non-Dative Use (has a spatial goal)	Dative Use (has a recipient)
PP	Throw the ball to the endzone	Throw the ball to the quarterback
DO	* Throw the endzone the ball	Throw the quarterback the ball

Where does item-specific knowledge come from?

Do other uses of dative influence knowledge of dative ordering?



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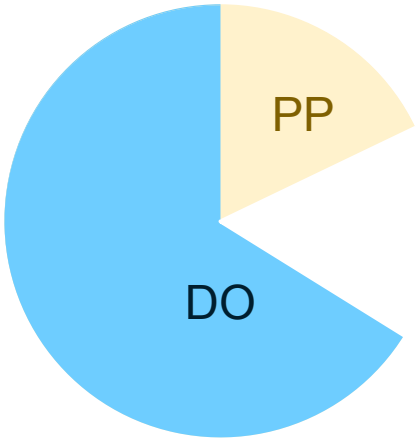

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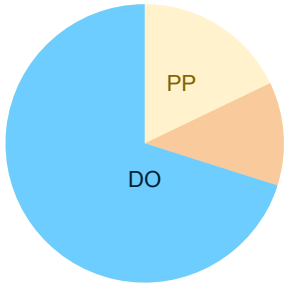
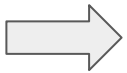
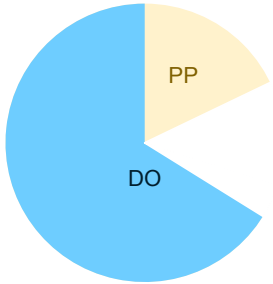
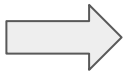




Throw
DO structure: 65%
PP structure: 35%



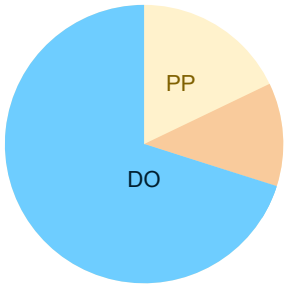


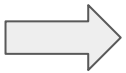
Throw
DO structure: 80%
PP structure: 20%

Where does item-specific knowledge come from?

Do other uses of dative influence knowledge of dative ordering?

- Similar: “Pre-emption vs Entrenchment”





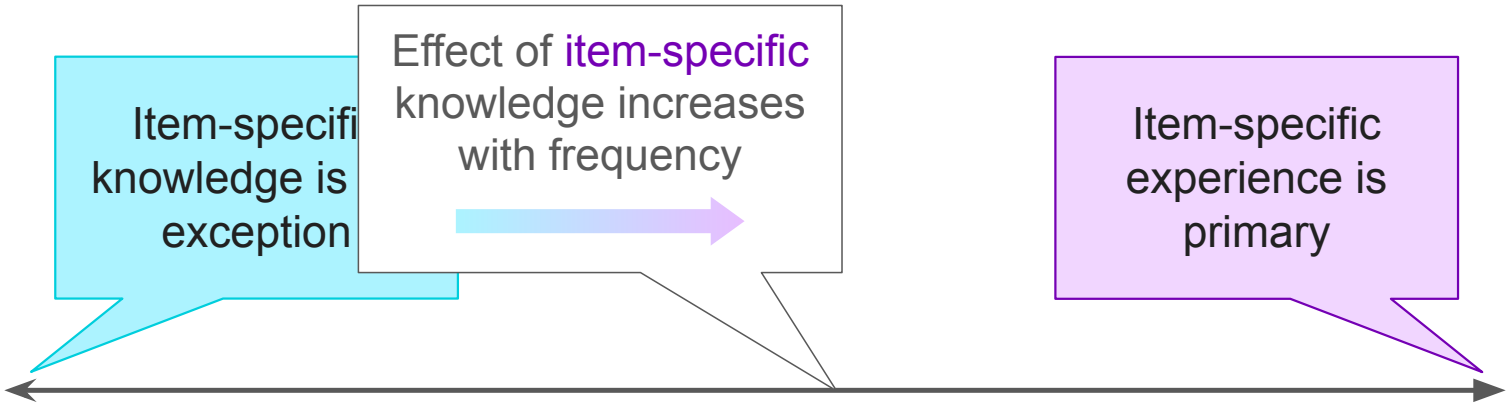
[Throw DO Structure]

[Throw, DO] + # [Throw, PP]

Ambridge et al., 2018; Brooks & Zizak, 2002; Goldberg, 2011 *inter alia*

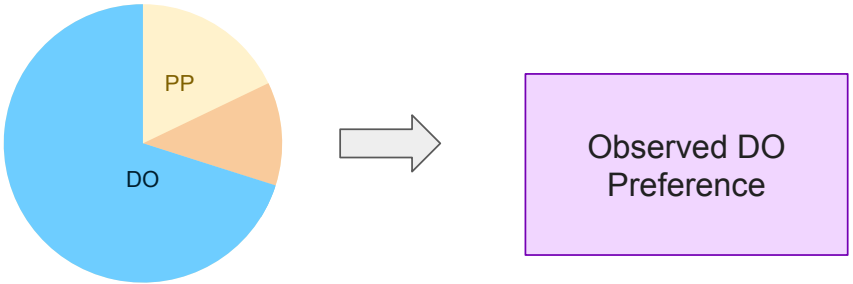
Our study: Preview of Results

- Does item-specific knowledge influence verb-argument ordering preferences, as with binomials?
  - **YES!** gradient influence of item-specific knowledge increasing with item frequency



Our study: Preview of Results

- Does item-specific knowledge influence verb-argument ordering preferences, as with binomials?
  - **YES!** gradient influence of item-specific knowledge increasing with item frequency
- Do other uses of dative verbs influence item-specific knowledge of dative ordering preferences?
  - NO, only dative exposure influences dative ordering preferences



Methods

Corpus is available online:
https://github.com/emilygoodwin/LCOD

(1) Automatically dependency-parse web-text
(2) Extract sentences with dative verbs that have two objects
(3) Sample (non-uniformly, by verb):
    - Super-sampled low-frequency verbs
    - And verbs which are infrequently dative, but frequent over all
(4) Hand-annotate:
    (a) Dative use (Does the event have a recipient?)
    (b) Features relevant to productive knowledge

Corpus Results

- Sampled from 6.15 billion words
- Total dataset:
  - 7,278 dative uses
  - 16,042 non-dative uses

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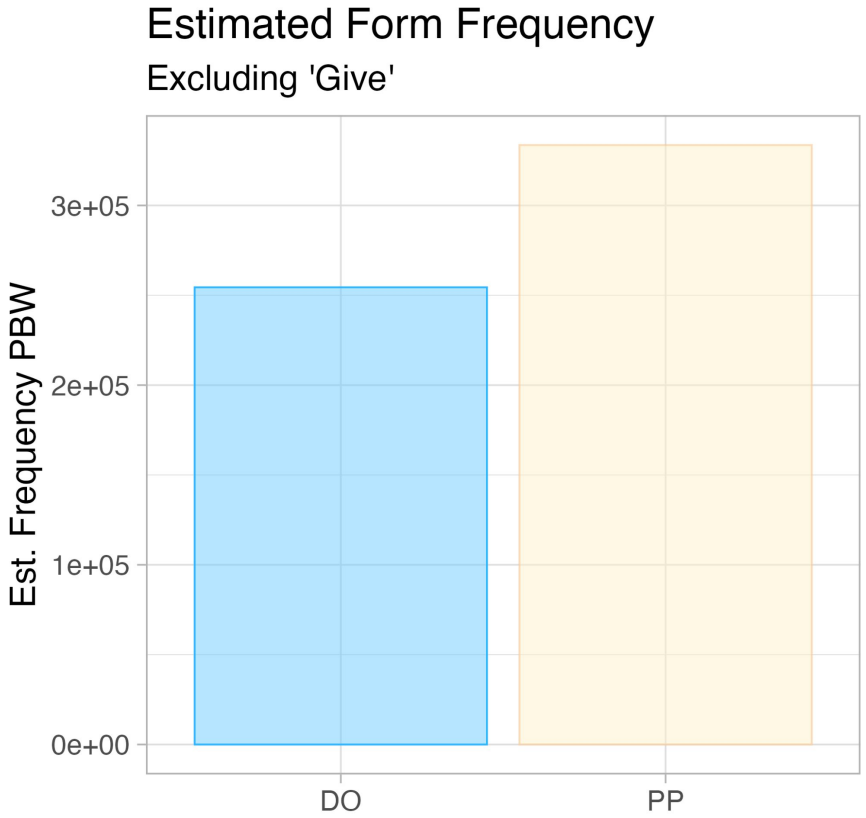
- PPs outnumber DOs
  - Measured over all verbs except “give”
  - Measured over dative and nondative
  - Similar: Yi et al., 2019



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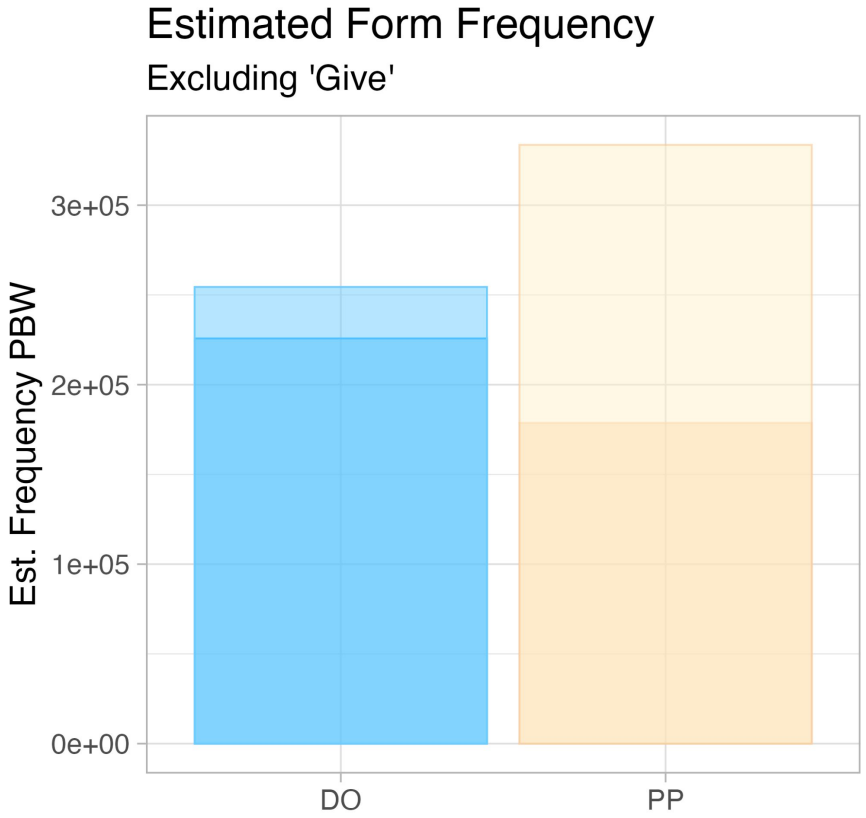
- DOs outnumber PPs
  - Measured over all verbs except “give”
  - Including only datives



Modelling item-specific and productive knowledge

Does the effect of item-specific knowledge increase with verb frequency?

Methods:

- Fit regression model with both productive and item-specific knowledge

Structure (DO/ PP Form) ~ productive constraints + verb-specific intercept

Modelling item-specific and productive knowledge

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Structure (DO/ PP Form) ~ pronoun Recipient + length Difference + … + (1 | verb)

Modelling item-specific and productive knowledge

Does the effect of item-specific knowledge increase with verb frequency?

Methods:

- Fit regression model with both productive and item-specific knowledge
- Test the model against corpus data using only fixed effects

Structure (DO/ PP Form) ~ pronoun Recipient + length Difference + … + ~~(1 | verb)~~

Modelling item-specific and productive knowledge

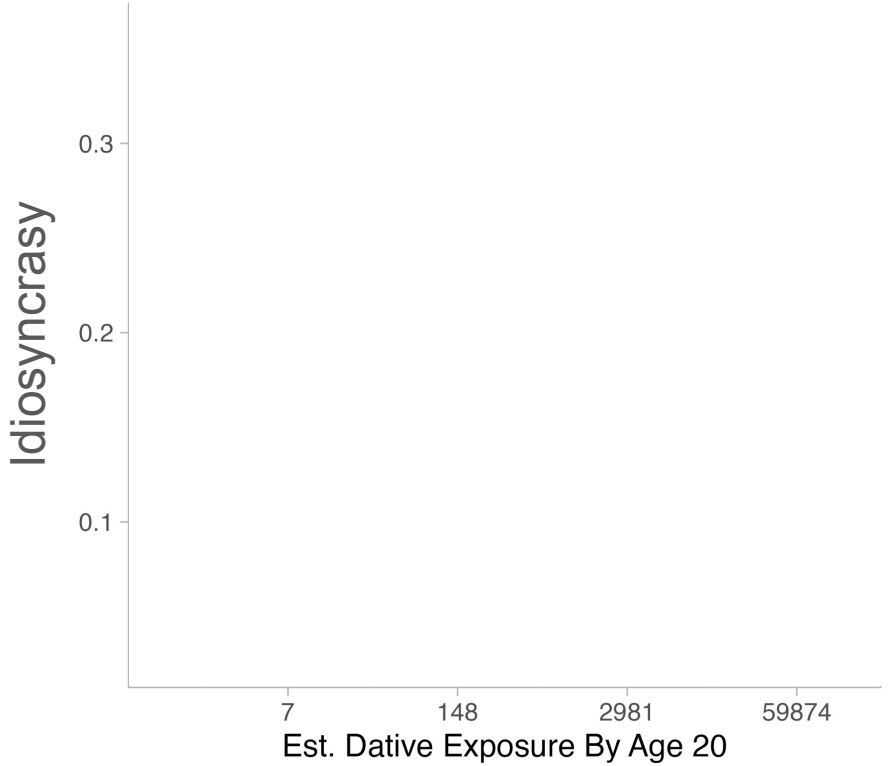
Does the effect of item-specific knowledge increase with verb frequency?

***Give**:*

- Frequent dative use
- Observed preference **far** from what is predicted by productive knowledge (indicates more item-specific)

***Chuck**:*

- Infrequent dative use
- Observed preferences mostly predicted by productive knowledge



Modelling item-specific and productive knowledge

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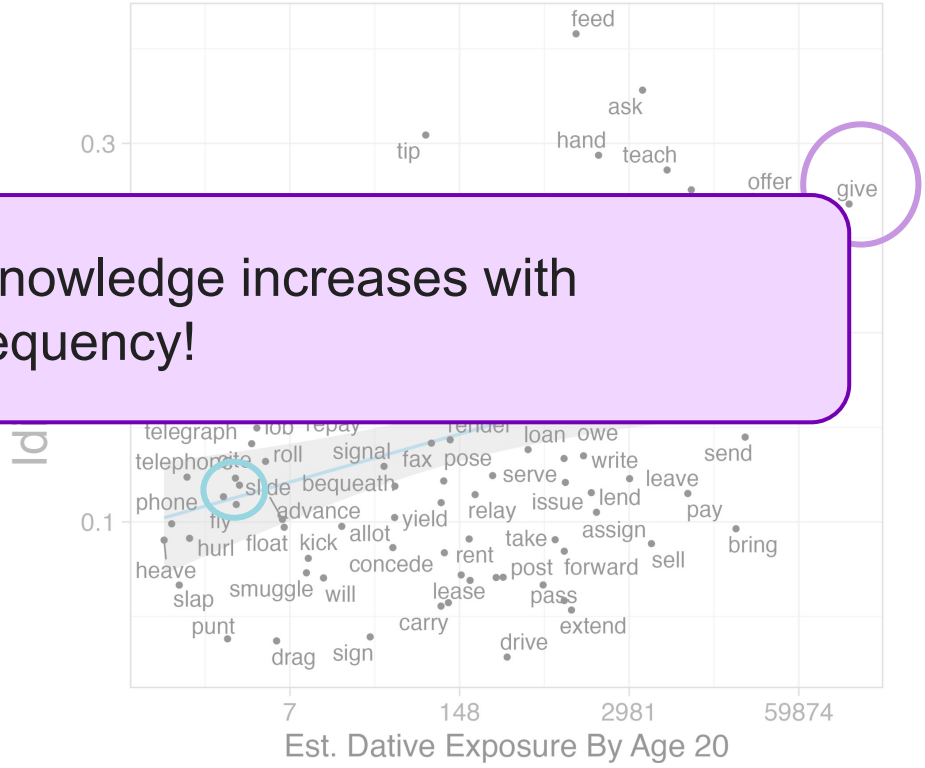
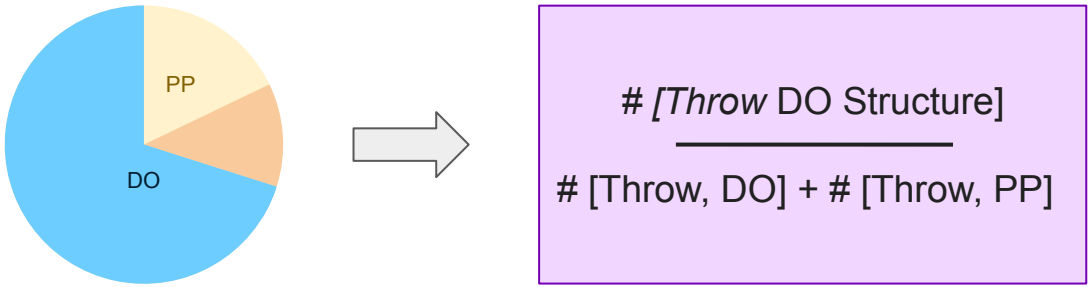
Effect of verb-specific knowledge increases with verb frequency!



What experience contributes to item-specific knowledge?

Do non-dative uses of a verb influence its dative ordering preferences?



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Methods:

- Extract the verb-specific random intercept
- Predict intercept from dative experience and non-dative experience

Structure (DO/ PP Form) ~ pronoun Recipient + length Difference + … + (1 | verb)

Verb-specific Intercept ~ Dative Experience + Non-Dative Experience

What experience contributes to item-specific knowledge?

Do non-dative uses of a verb influence its dative ordering preferences?

Methods:

- Extract the verb-specific random intercept
- Predict intercept from dative experience and non-dative experience
  - “Dative experience” = Proportion of dative forms in DO (in corpus)

Verb-specific Intercept ~ DO/PP Preference (Dative Uses) + DO/PP Preference (Non-dative Uses)

What experience contributes to item-specific knowledge?

Do non-dative uses of a verb influence its dative ordering preferences?

Verb-specific Intercept ~ DO/PP Preference (**Dative** Uses) + DO/PP Preference (Non-dative Uses)

	β	S.E.	P
Dative Use DO Preference	6.01	0.47	<.001
Non-Dative Use DO Preference	0.63	0.53	=0.242

What experience contributes to item-specific knowledge?

Do non-dative uses of a verb influence its dative ordering preferences?

No evidence that verb-specific dative ordering preferences draw on non-dative uses!

	β	S.E.	P
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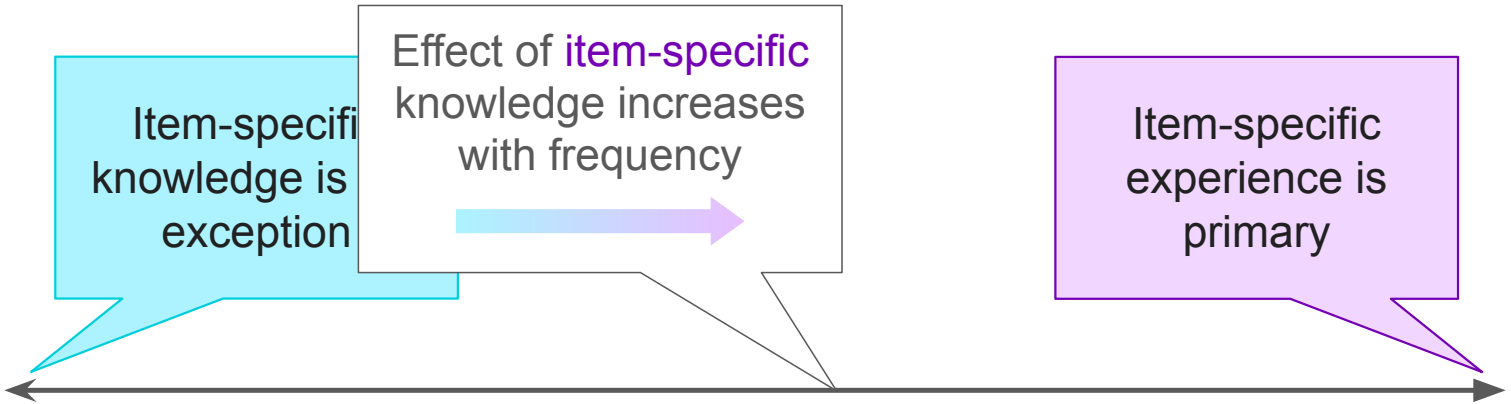
Conclusions

- Item-specific information recruited gradiently, increasing with verb frequency
  - Item-specific knowledge contributes to planning and processing across multiple levels of linguistic structure
  - Not reserved for idioms or a small set of exceptions



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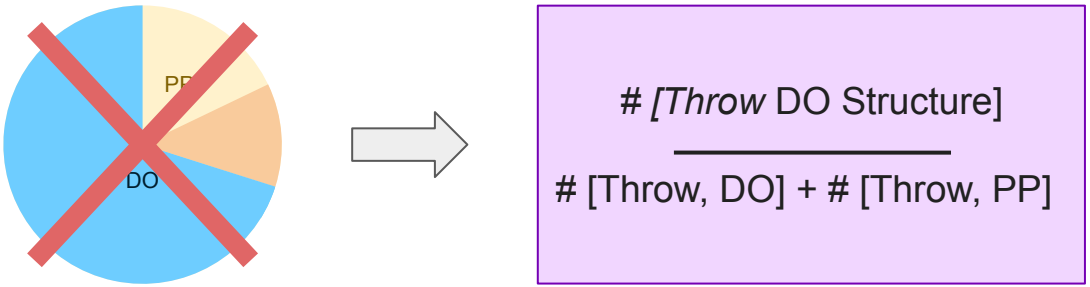

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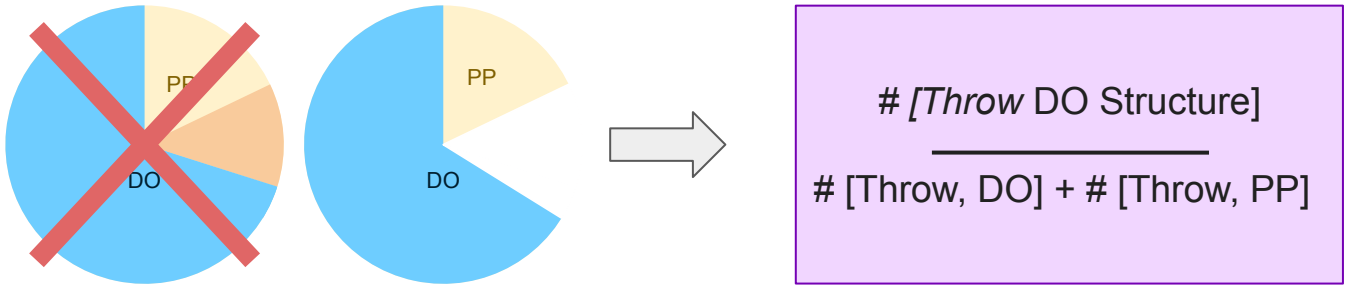

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- For dative verbs' argument ordering, item-specific experience includes dative uses: not other uses of the same verb
  - Exemplars include a dative vs non-dative distinction
  - Or a recipient vs no recipient distinction
- Future: Corroboration with experimental data (forced-choice preference tasks)
  - But see manuscript for proof-of-concept with a smaller existing dataset (Hawkins et al., 2020)

Thank you!

Beth Levin

Emily Morgan

Thank you to our annotators:
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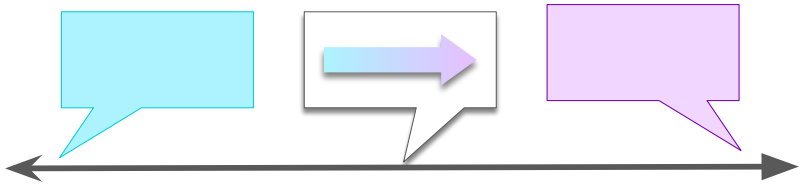

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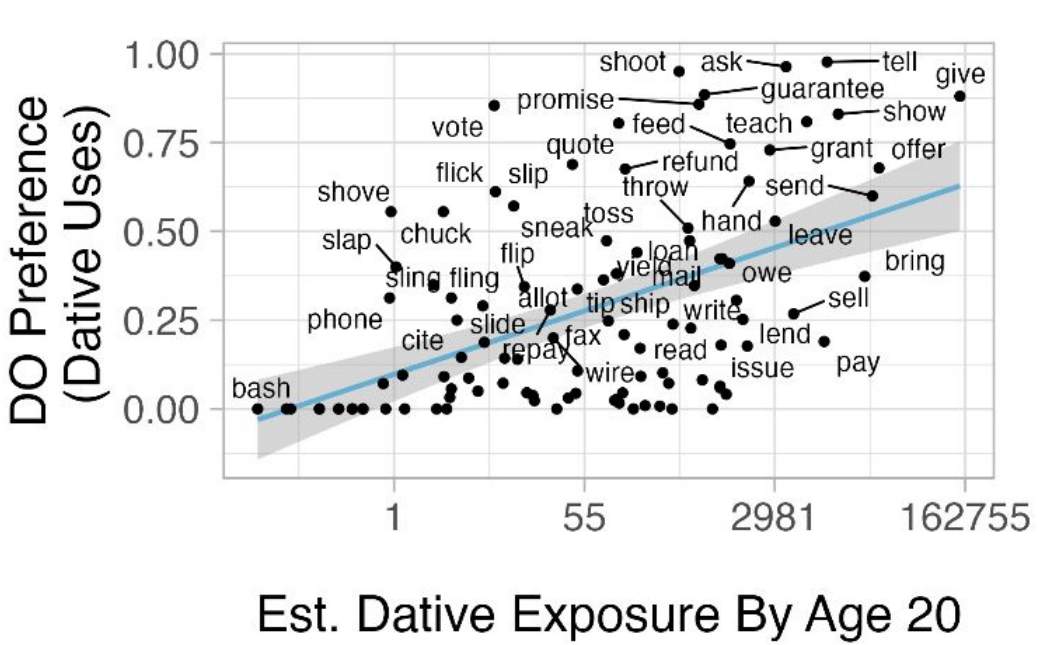
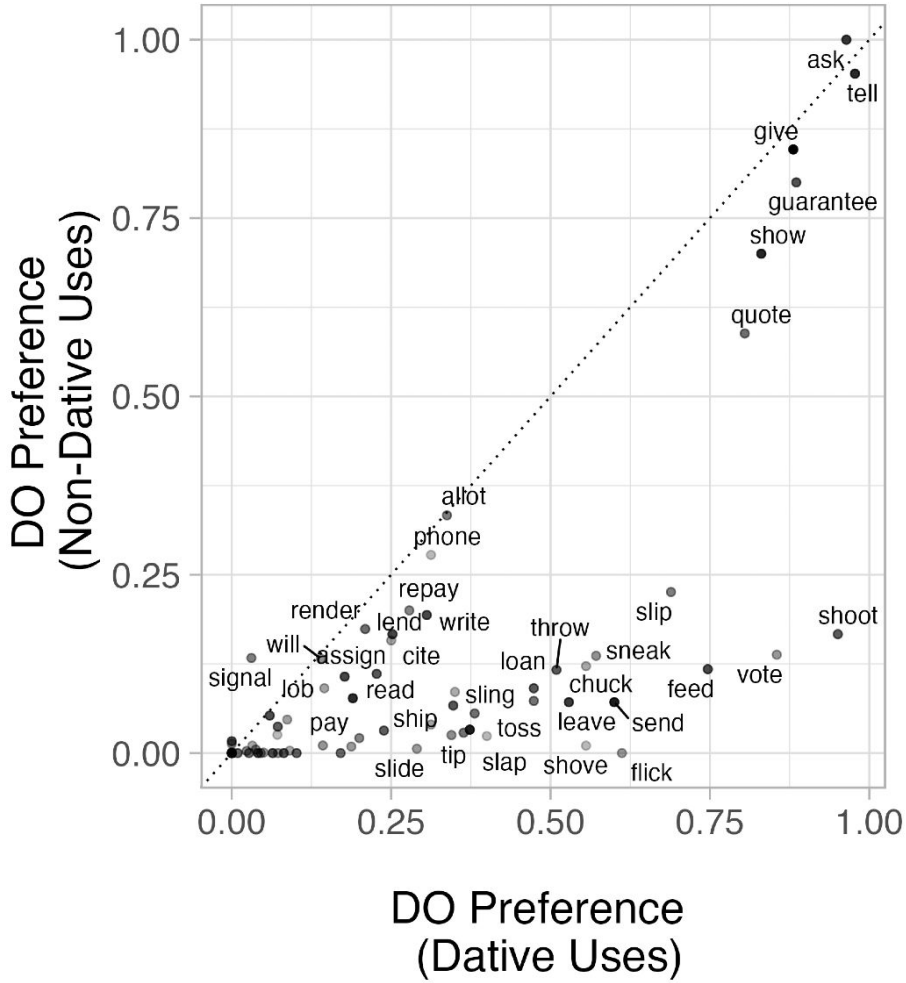
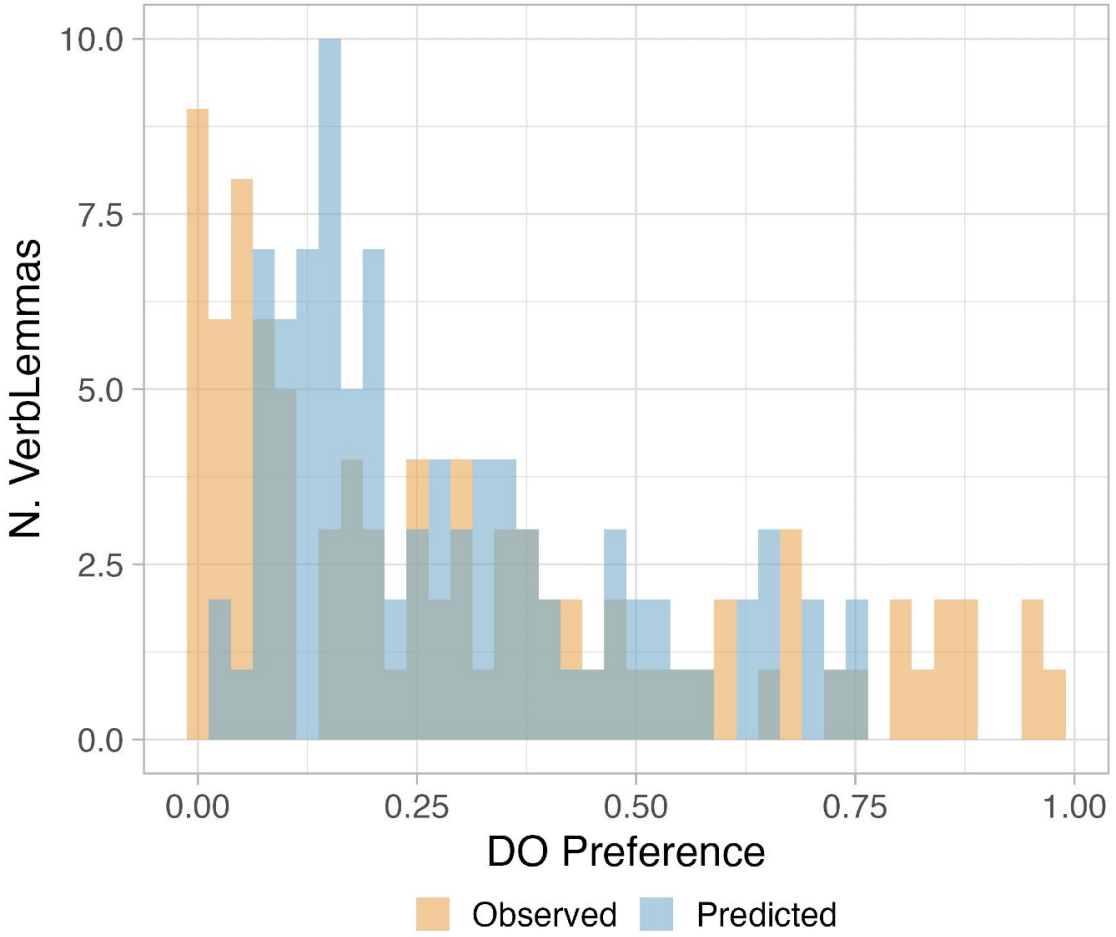
More frequent verbs prefer the DO



Distribution of Verbs' Preference for DO



Distribution of Verbs' Preference for DO



Productive Constraints' Effect Sizes