Cross-linguistic pragmatic differences as a function of hyponym ~~complexity~~ viability

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LSA 2020, New Orleans

Outline

Fill in the blank!

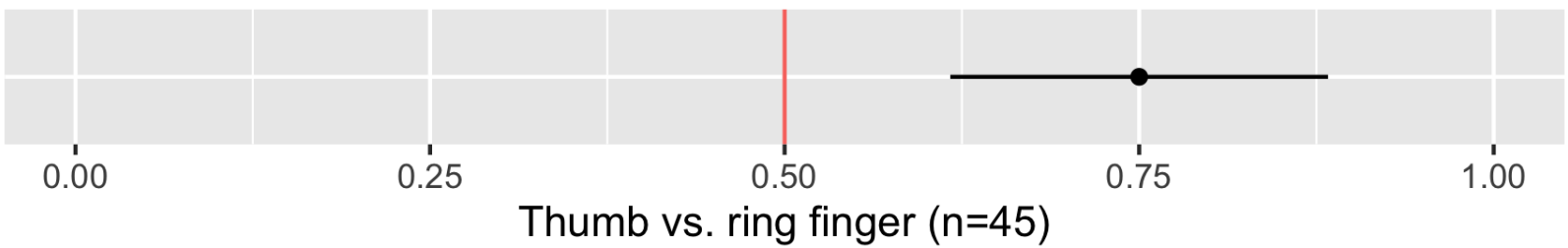
She has a tattoo on her _____.

Fill in the blank!

She has a tattoo on her _____.

Somebody says: "She has a tattoo on her finger."'

Which picture are they talking about?



Quiz: How many fingers do people normally have?

10!

So *thumb* is a hyponym of *finger*.

Narrowing in opposition to a hyponym

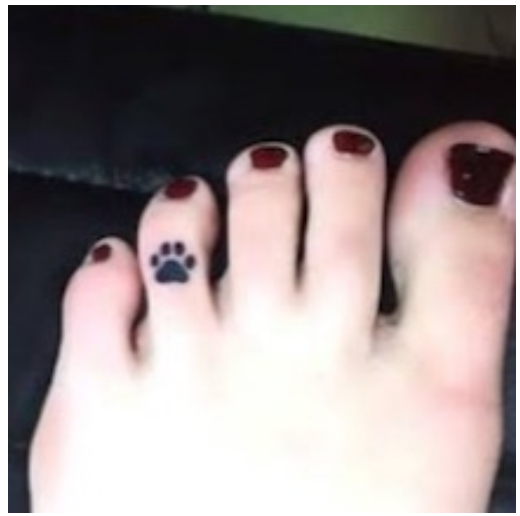
Horn (1984): *finger* narrows in opposition to its hyponym, *thumb*, via Quantity and Manner.

Hearer thinks: If the speaker means 'thumb', she will say *thumb*, which is just as short (Manner), and more informative (Quantity).

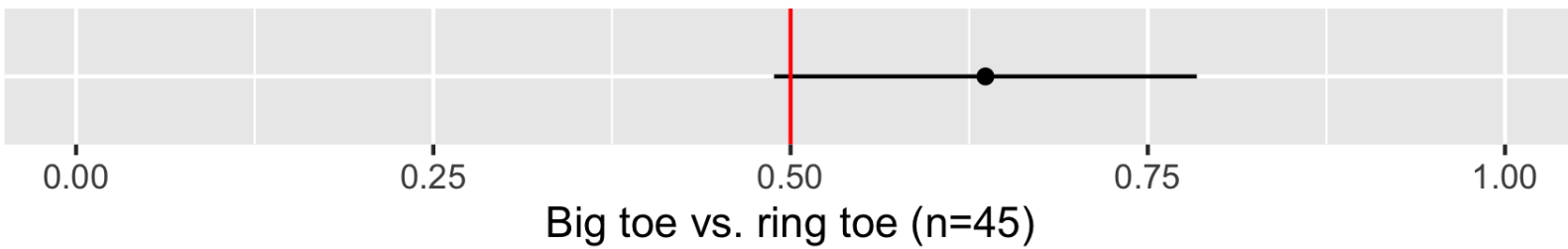
Prediction: Since *big toe* is more complex than *toe*, there should be no narrowing of *toe* in opposition to *big toe*.

(On Manner, see also Kiparsky 1982, Aronoff 1976, Atlas & Levinson 1981, Horn 1972, McCawley 1978, Horn 1984, Horn 1991, Matsumoto 1995, Katzir 2007, Swanson 2010, Blutner 1998, 2000, van Rooy 2003, Jäger 2000, 2012, Frank & Goodman 2012, Goodman & Stuhlmüller 2013, Bergen et al. 2012, Bergen et al. 2016, Rett 2015, i.a.)

Somebody says: "She has a tattoo on her toe."



Which picture are they talking about?



Horn's conjecture

"We would predict that if the colloquial language replaced its *thumb* with the polymorphous *pollex* (the Latin and scientific English term for both 'thumb' and 'big toe'), the asymmetry [between *finger* and *toe*] would instantly vanish."

Geurts (2011), *Quantity Implicatures*

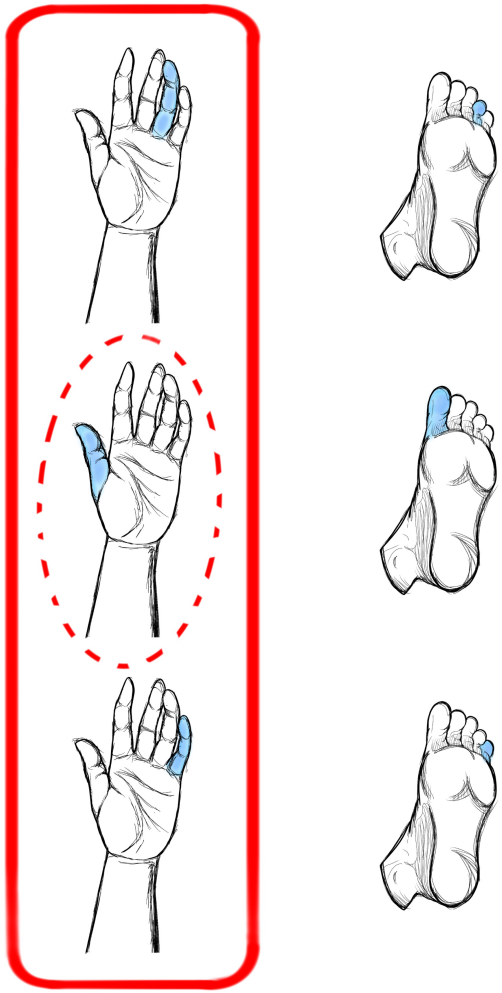
"It is important to note, however, that the adjective 'colloquial' is doing real work in this statement: it is not enough for an alternative word to be in the language; it has to be sufficiently salient, as well: if the word 'thumb' was rarely used, then presumably the asymmetry between would vanish too."

Hey, that gives us an idea!

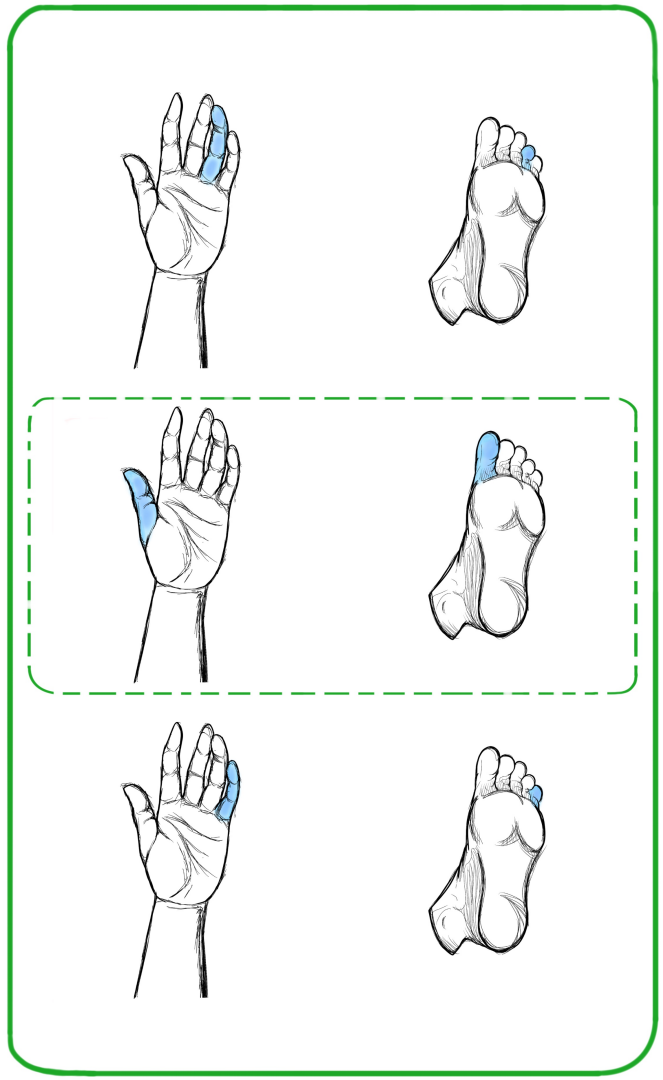
Spanish: *pulgar* ‘thumb’ (rare).

Digits in English and Spanish

English *finger* vs. *thumb*



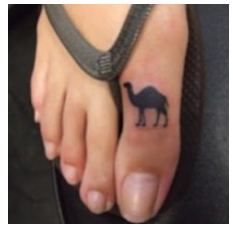
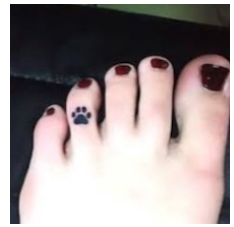
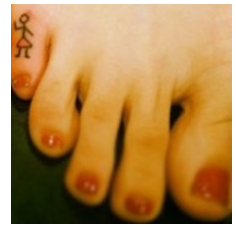
Spanish *dedo* vs. *pulgar*



Outline

Design/Procedure



	Targets	Fillers
Production (fill in the blank)	6 digits	6 other body parts (arm, leg, back)
Comprehension (forced choice)	6 digit-pairs	6 other pairs (mix of easy/hard)

Order, left-right presentation randomized.

Participants (via Prolific)

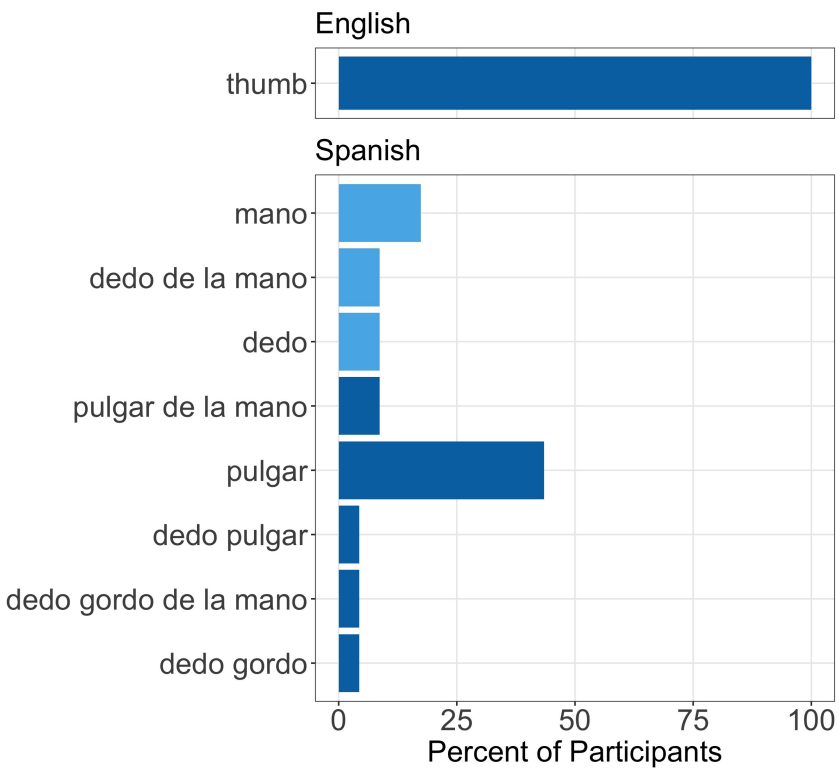
	English speakers	Spanish speakers
Production	24	23
Comprehension*	45	48

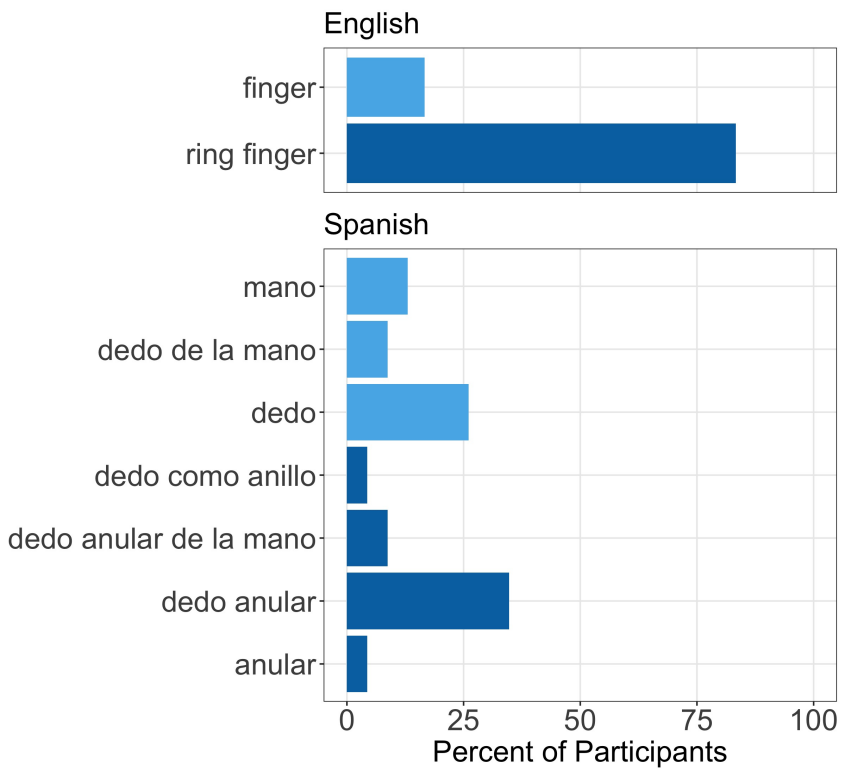
All different groups of participants.

*Only 1 English participant failed attention check

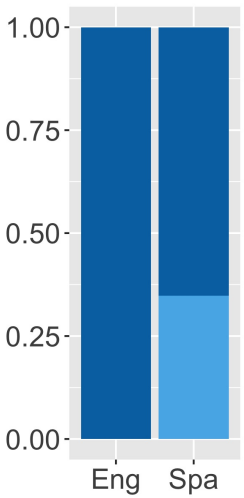
Outline

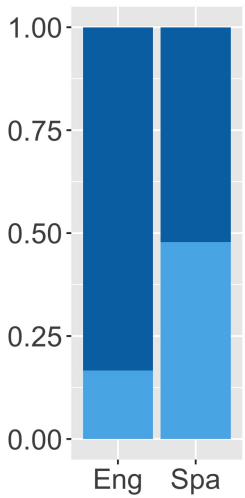
Thumb vs. ring finger (Production)

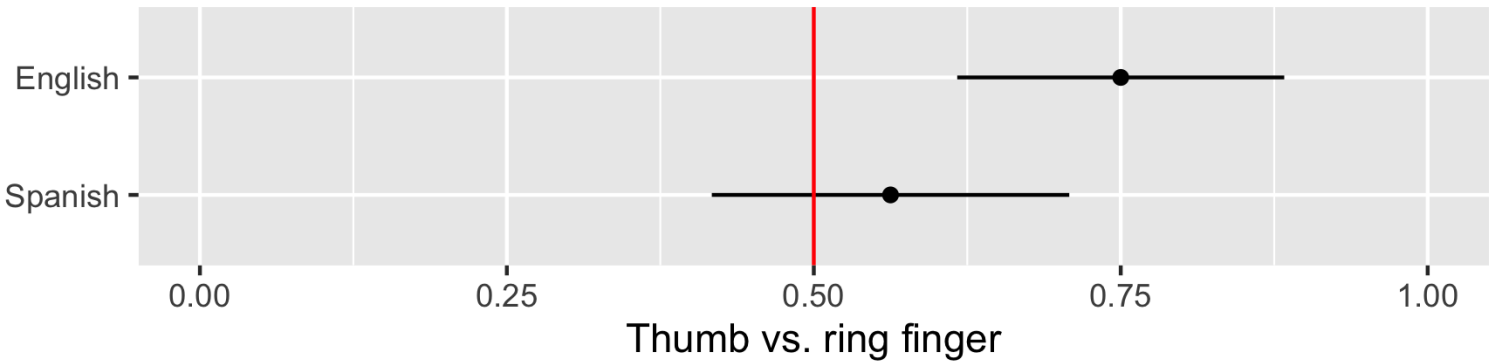




Thumb vs. ring finger







"She has a tattoo on her finger."

Predictions confirmed!

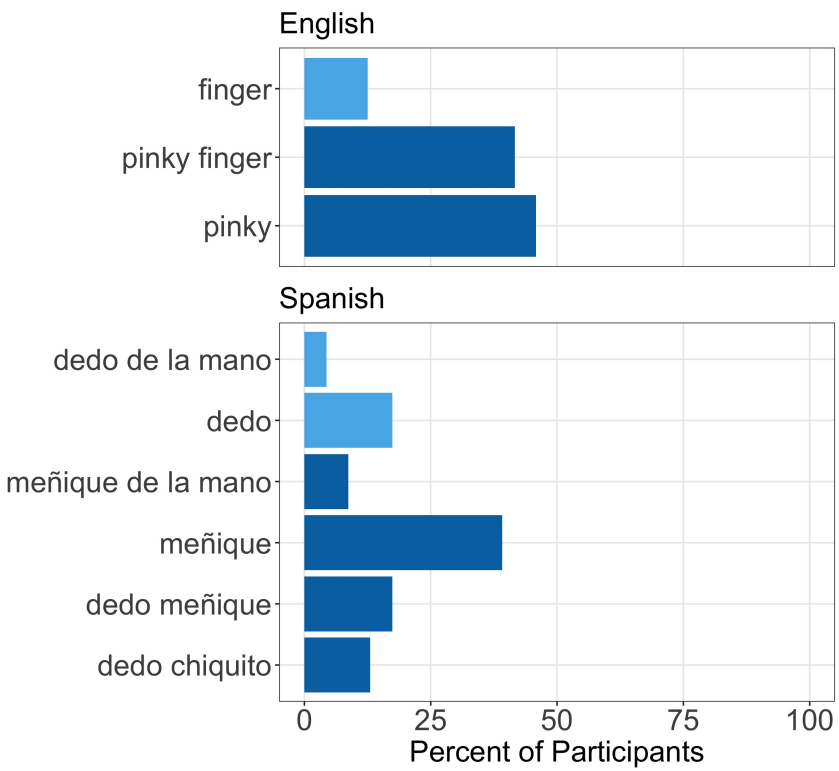
Horn was right: If English had *pollex*, the *finger* ⇒ 'not thumb' implicature would disappear.

Geurts was also right: It matters how colloquial an alternative is.

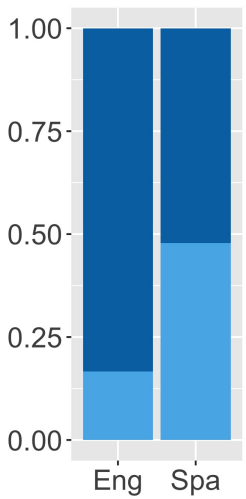
In Spanish, *pulgar* is not used as much, so it does not block *dedo* the way *thumb* blocks *finger*.

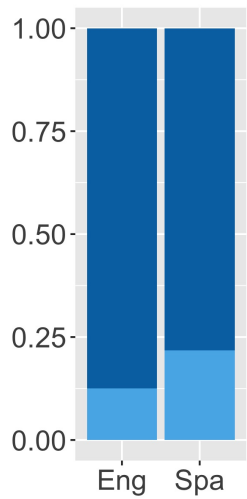
Support: *pinky* doesn't act like *thumb* (in Spanish or English).

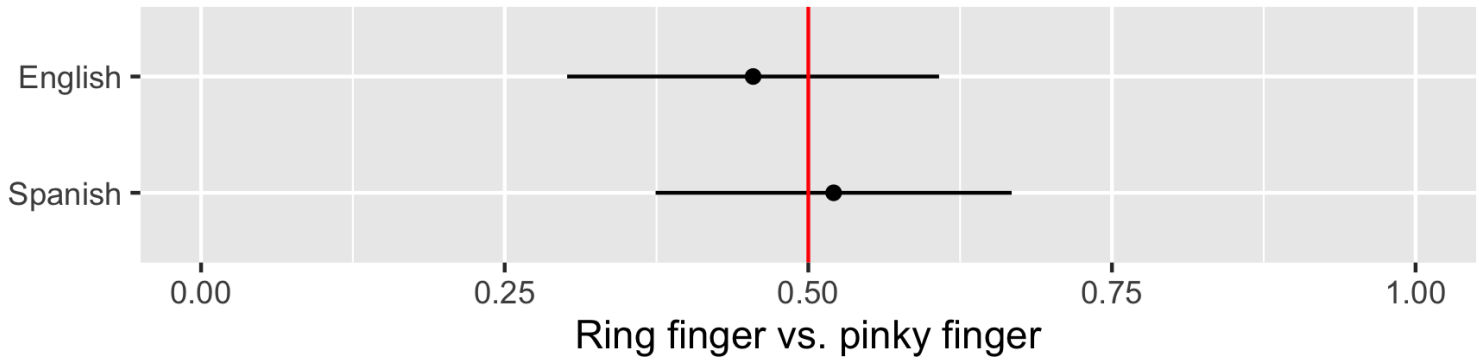
Pinky (Production)



Ring finger vs. Pinky finger







"She has a tattoo on her finger."

The importance of 'viability'

Why doesn't *finger* (or *dedo*) imply 'not pinky'?

After all, *pinky* is just a single word, like thumb. So is *meñique*.

Horn says: "What is crucial is the status of *thumb* (as opposed to *pinky*)... as a viable lexicalized alternative to *finger*."

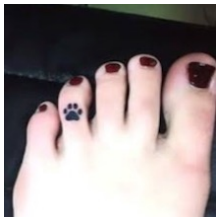
Two complex alternatives

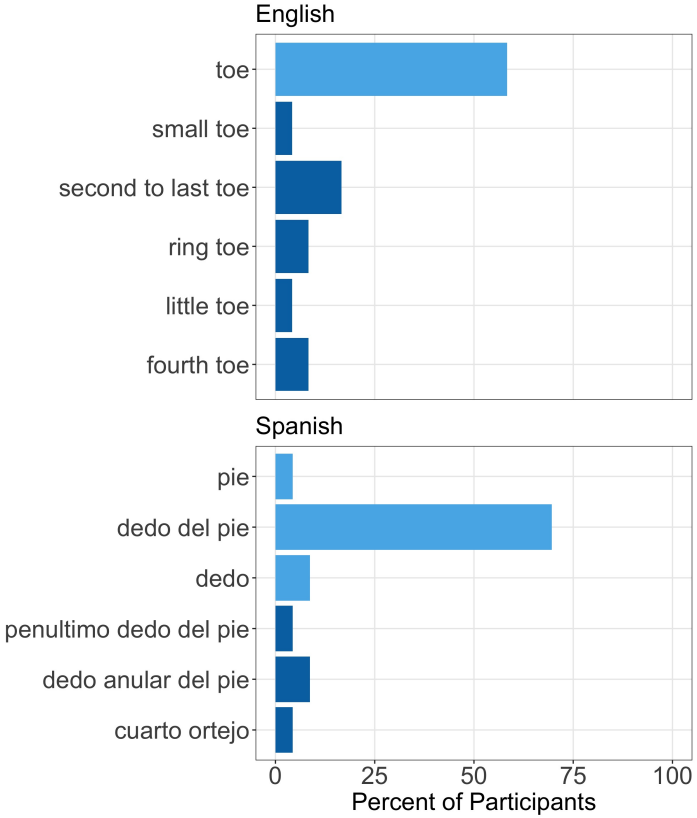
Furthermore, it's not clear that 'viability' is only relevant for *lexicalized* alternatives.

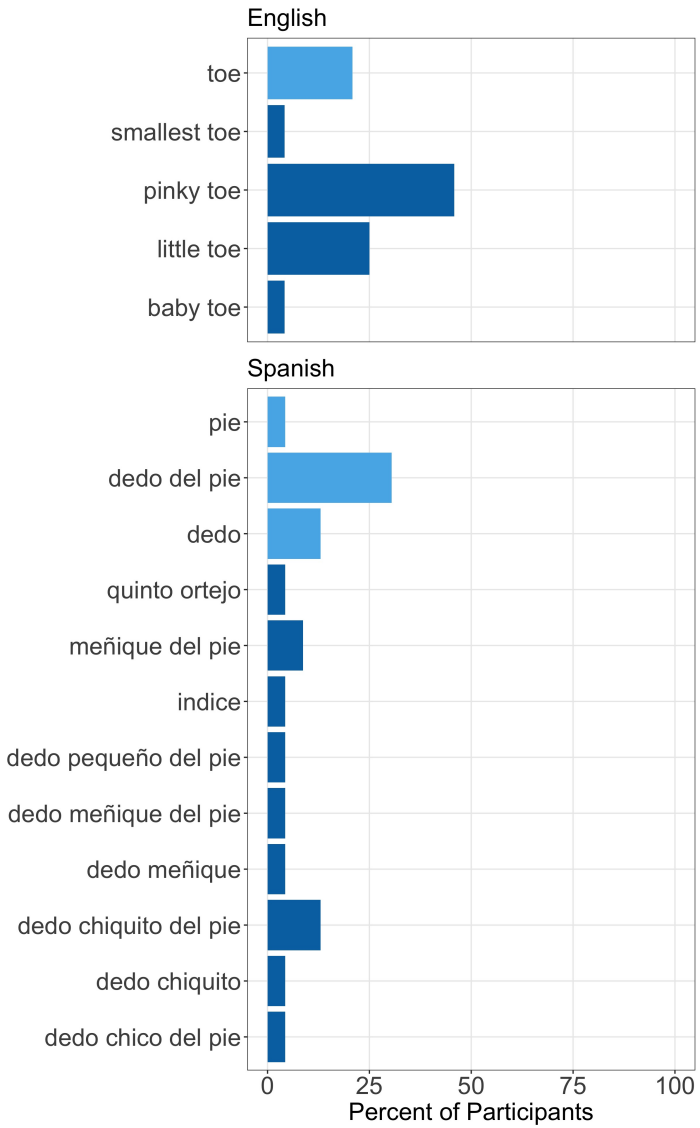
When we have two complex alternatives, and one is more 'viable' than another, we see an implicature here as well.

Example: *pinky toe* vs. *ring toe*.

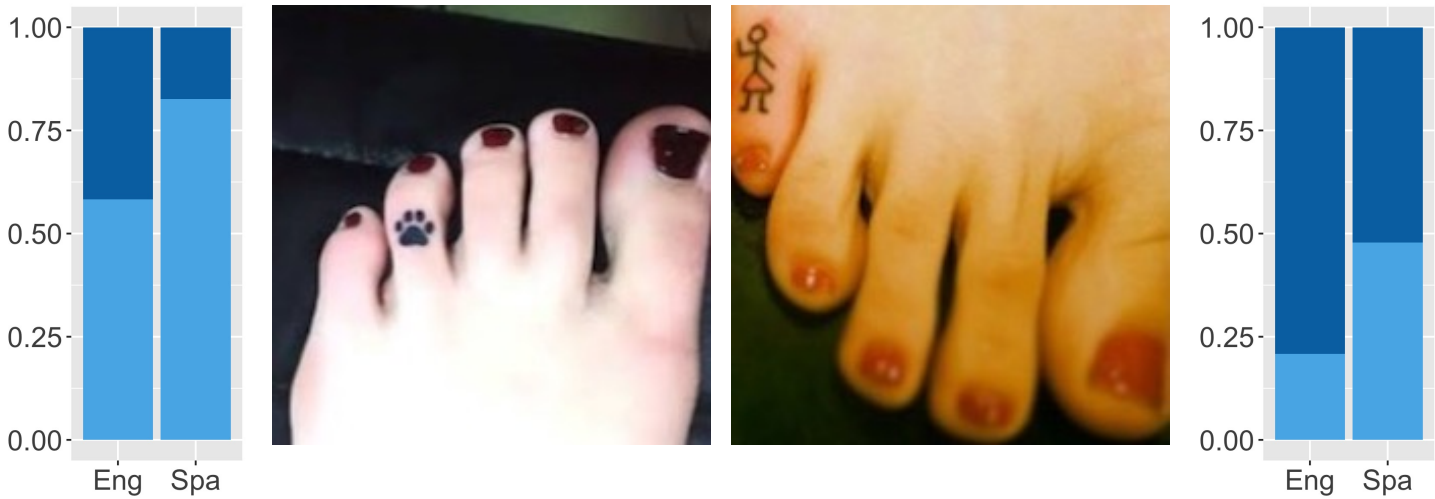
Ring toe vs. Pinky toe (Production)

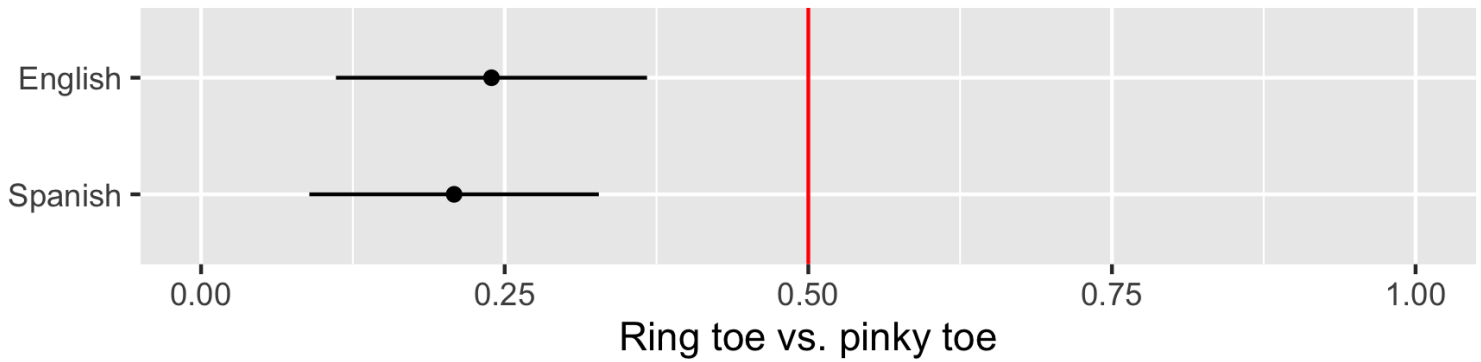






Ring toe vs. Pinky toe





"She has a tattoo on her toe."

Results: Summary

Taken together, our results support a Bayesian view of pragmatics, where listeners reason based on speaker production probabilities.

Outline

Bayesian Pragmatics (e.g. Frank & Goodman 2012)

The listener chooses an interpretation s of an utterance u based on the speaker's probability of producing u while intending to communicate s (and the prior probability of s):

$$L(s \mid u) \propto S(u \mid s) \cdot P(s)$$

A Bayesian listener with perfect knowledge of how speakers behave matches our comprehension data extremely well.

Let us consider two models of the speaker S:

- Complexity-based (penalizing longer utterances)
- Production-based (perfect knowledge of speaker behavior)

Complexity-based speaker model

Given state s (a digit), the **speaker** chooses an utterance u based on accuracy and cost:

$$S(u \mid s) \propto \exp(\alpha \cdot L_0(s \mid u) - \beta \cdot \text{length}(u))$$

where:

- α is the 'rationality parameter' $(\alpha = 1)$
- $L_0(s \mid u)$ is the probability that a 'literal listener' will choose state s given utterance u
- β is the cost coefficient $(\beta = 2)$
- length $=$ length in words

A **literal listener** assigns equal probability to every state compatible with the literal meaning, modulo the prior:

$$L_0(s \mid u) \propto [\![u]\!](s) \cdot P(s)$$

Literal meanings (English)

Six underlying states (digits); we hand-specified literal meanings for each utterance as a set of states.

utterance	thumb	ring finger	pinky finger	big toe	ring toe	pinky toe
big toe				■		
toe				■	■	■
fourth toe					■	
little toe					■	■
ring toe					■	
second to last toe					■	
small toe					■	■
baby toe						■
pinky toe						■
smallest toe						■
thumb	■					
finger	■	■	■			
ring finger		■				
pinky			■			
pinky finger			■			

Literal meanings (Spanish)

utterance	thumb	ring finger	pinky finger	big toe	ring toe	pinky toe
dedo	■	■	■	■	■	■
dedo de la mano	■	■	■			
mano	■	■	■			
dedo gordo	■			■		
dedo pulgar	■			■		
pulgar	■			■		
dedo gordo de la mano	■					
pulgar de la mano	■					
anular		■			■	
dedo anular		■			■	
dedo como anillo		■			■	
dedo anular de la mano		■				
dedo chiquito			■			■
dedo menique			■			■
menique			■			■
menique de la mano			■			
dedo del pie				■	■	■
pie				■	■	■
dedo gordo del pie				■		
pulgar del pie				■		
cuarto ortejo					■	
dedo anular del pie					■	
penultimo dedo del pie					■	
indice						■
dedo chico del pie						■
dedo chiquito del pie						■
dedo menique del pie						■
dedo pequeno del pie						■
menique del pie						■
quinto ortejo						■

Complexity-based model: Summary

The **pragmatic listener** chooses an interpretation based on the speaker:

$$L(s \mid u) \propto S(u \mid s) \cdot P(s)$$

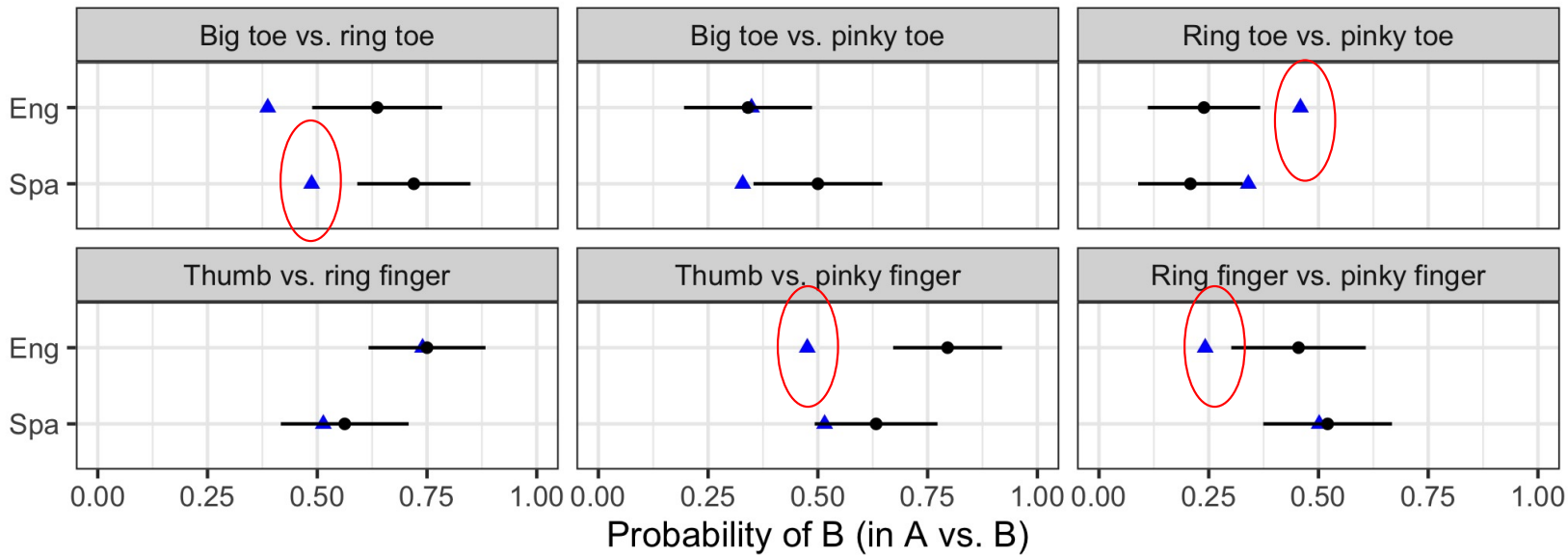
The **speaker** chooses an utterance based on accuracy and cost:

$$S(u \mid s) \propto \exp(\alpha \cdot L_0(s \mid u) - \beta \cdot \text{length}(u))$$

A **literal listener** chooses a true interpretation at random:

$$L_0(s \mid u) \propto [\![u]\!](s) \cdot P(s)$$

Complexity-based model results



Signpost

We are considering two models of the speaker:

- Complexity-based
- Production-based

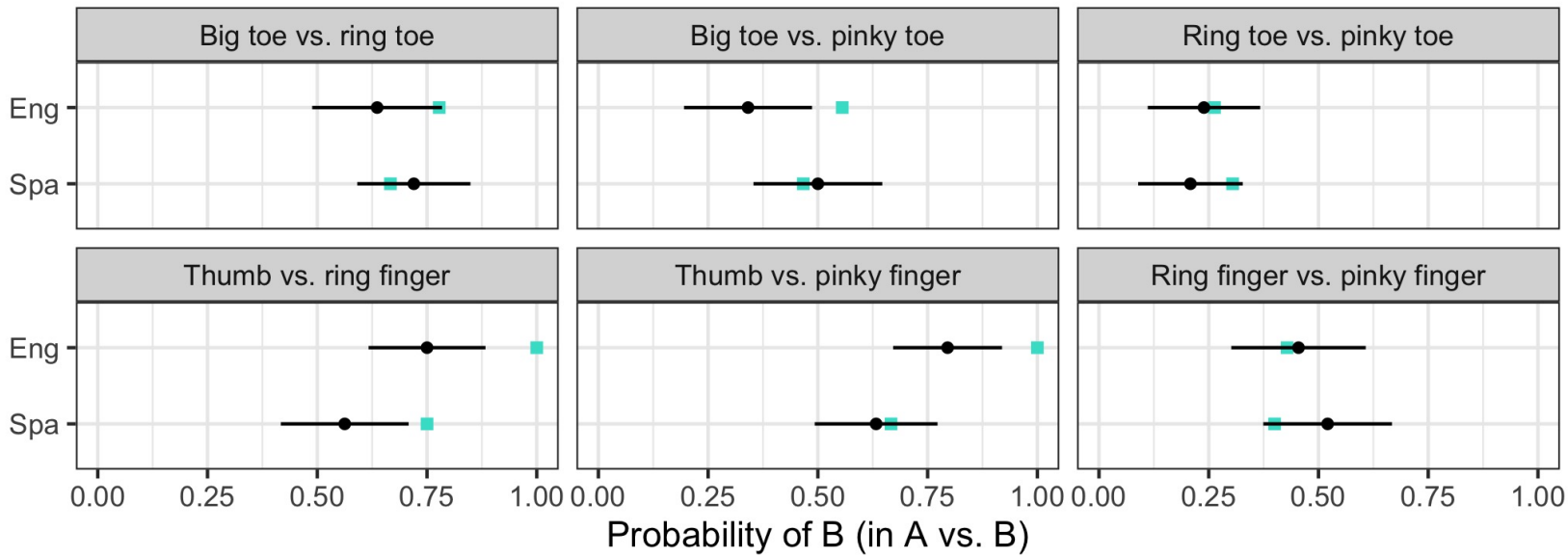
Production-based speaker model

The speaker chooses an utterance based on empirically observed frequencies in our production data:

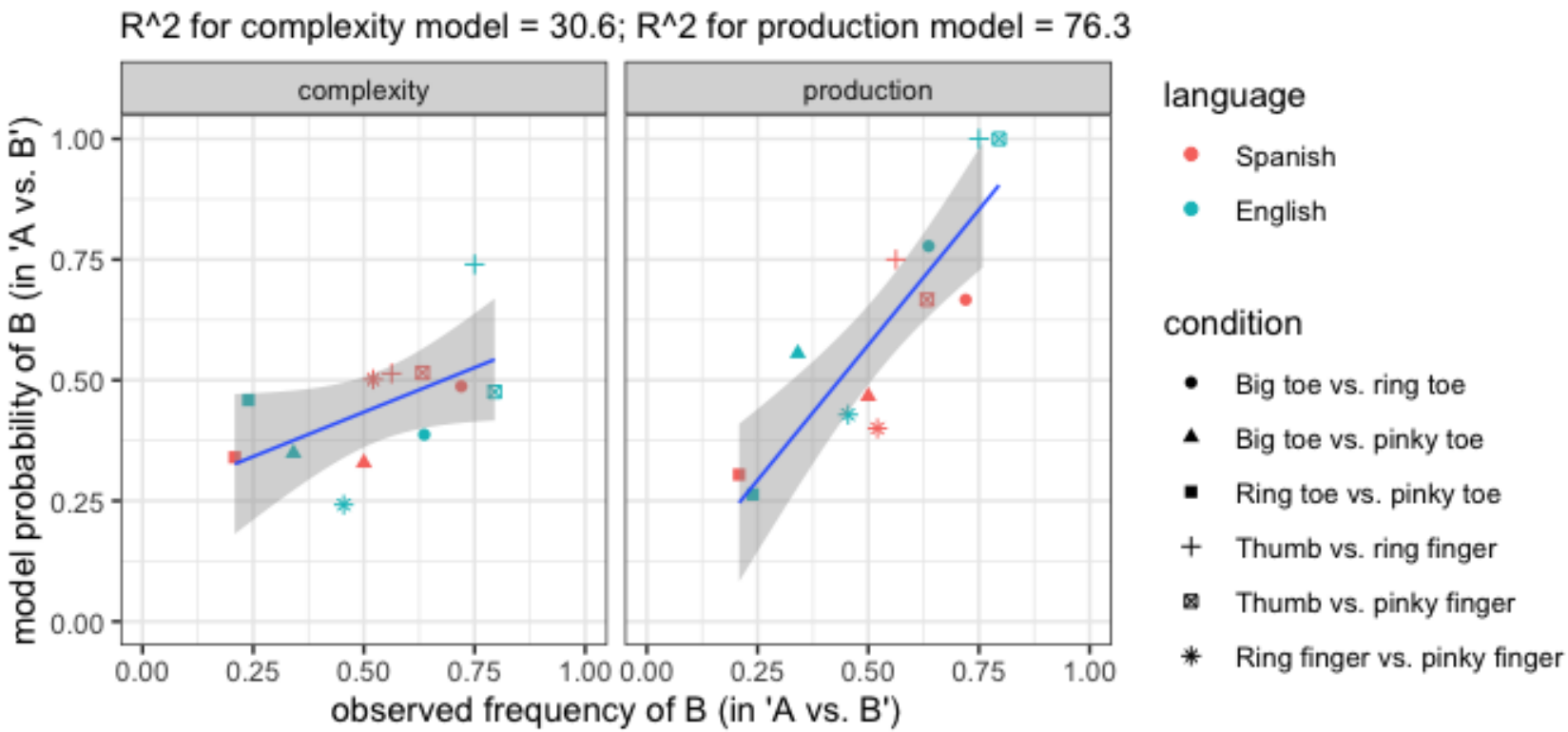
$$S(u \mid s) \propto F(u \mid s)$$

where $F(u \mid s)$ is the frequency with which utterance u was used in our production experiments to describe state s.

Production-based model results



Model comparison



Outline

Two main conclusions

- The implicatures that an expression gives rise to are affected by the viability of its alternatives. Alternatives are differently viable in different languages; hence cross-linguistic pragmatic differences.
- Viability is tied to production probability, and complexity is not all there is to it. In other words: listeners are Bayesian, with good models of speaker production probability.

Questions to explore further

- Why do speakers do what they do?
  (Ngram frequency not helpful as far as we can see...)
- How should complexity be measured?
- What is the significance of dispersion (many alternatives)?
- Does bilingalism affect alternatives?
- Where else might we find cross-linguistic pragmatic differences that arise due to viability of alternatives?
  - Collins (2016) on definiteness in Tagalog
  - Chemla (2007) (no *both* in French, yet $^{?}$*all his arms*)
  - ...
  - You and Your Collaborator (2021)?

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