

In Short

Modification is governed by pragmatic constraints: adjectives in referential NPs implicate multiple instances of the noun (Sedivy et al. 1999); we probe whether this reasoning extends to depicting/gestural modifiers in two spoken languages (English, Mandarin) and a sign language (ASL)

Background

- Recent interest in how linguistic meaning composes with meaning beyond language (Schlenker 2018; Tieu et al. 2019; Pasternak & Tieu 2022; Storment 2024); we focus here on gestures accompanying language.
- Co-speech gestures are frequently non-restrictive, in contrast to verbal lexical modifiers (Ebert & Ebert 2014; Schlenker 2018; Zlogar & Davidson 2018, Zlogar 2019, Espirova 2019), but we note this could be either due to:
 - Modality:** gestures are manual/visual, speech is oral/auditory
 - Representational format:** gestures are iconic, language is symbolic
 We thus include a sign language, where iconic co-linguistic depictions share a modality with symbolic language.

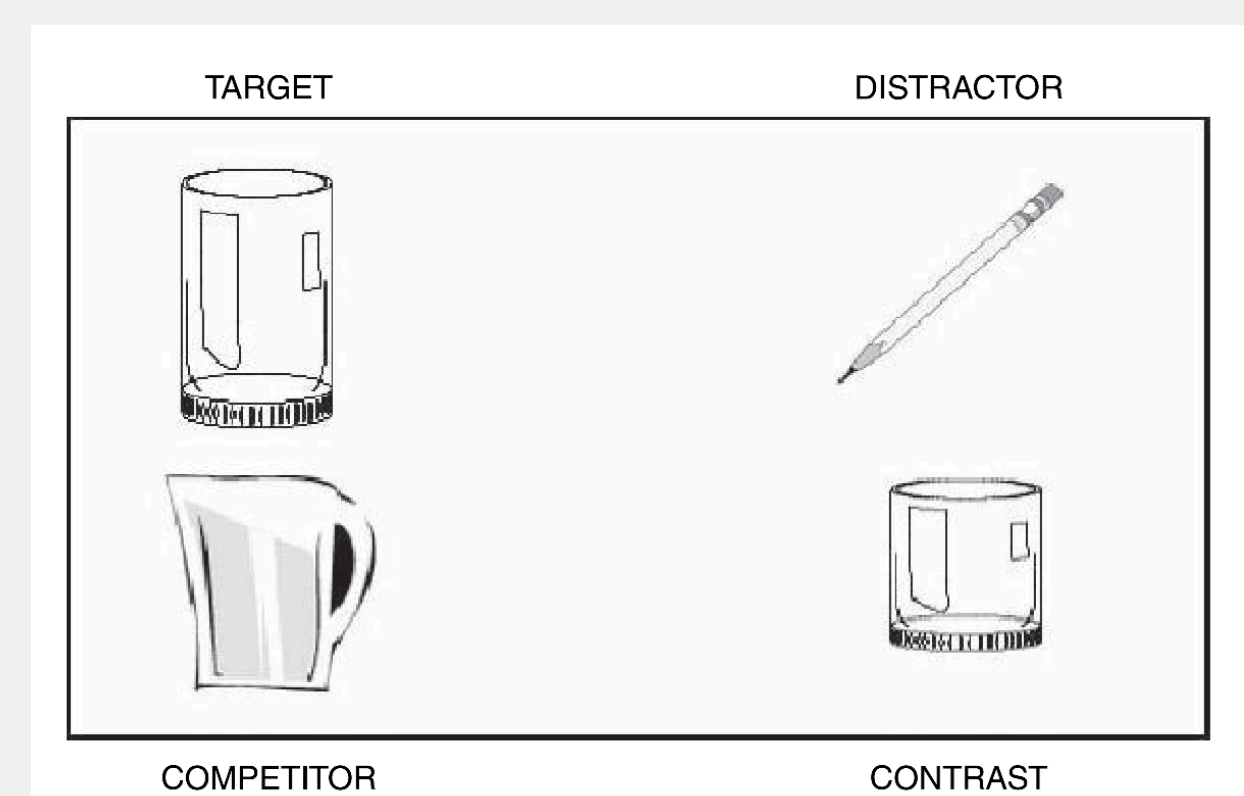


Figure 1. Visual display from Grodner & Sedivy (2011)

- To test whether co-linguistic depictive gestures are restrictive, we use *contrastive inference* (attributing modification, e.g. *tall glass*, to referential informativity) (Sedivy et al. 1999; Grodner & Sedivy 2011; Alsop et al. 2018; Kreiss & Degen 2020), assuming that only when they are restrictive will there be contrastive inference.
- We ask whether co-linguistic depictive gestures in English, Mandarin, and ASL support contrastive inference.

Predictions:

- If **not sharing a modality** is the reason why co-speech depictive gestures are non-restrictive
 - ⇒ co-sign gestures could be *restrictive*
 - ⇒ no contrastive inference in English and Mandarin; could have contrastive inference in ASL
- If **not being symbolic** is the reason why co-speech depictive gestures are non-restrictive
 - ⇒ co-linguistic depictive gestures should be uniformly non-restrictive in both spoken and sign languages
 - ⇒ no contrastive inference in English, Mandarin, and ASL

Methods

Methods. For all three languages we used an **offline forced-choice** paradigm adapted from Alsop *et al.* (2018), chosen over visual-world eye-tracking for two modality-driven reasons:

- All stimuli are visual (videos containing gestures) and demand visual attention, which present a confound in the eye-tracking method.
- Offline measures better capture the final interpretive output of a potentially complex pragmatic calculus.

Procedure. Participants completed a Qualtrics-based survey involving a communicative inference task:

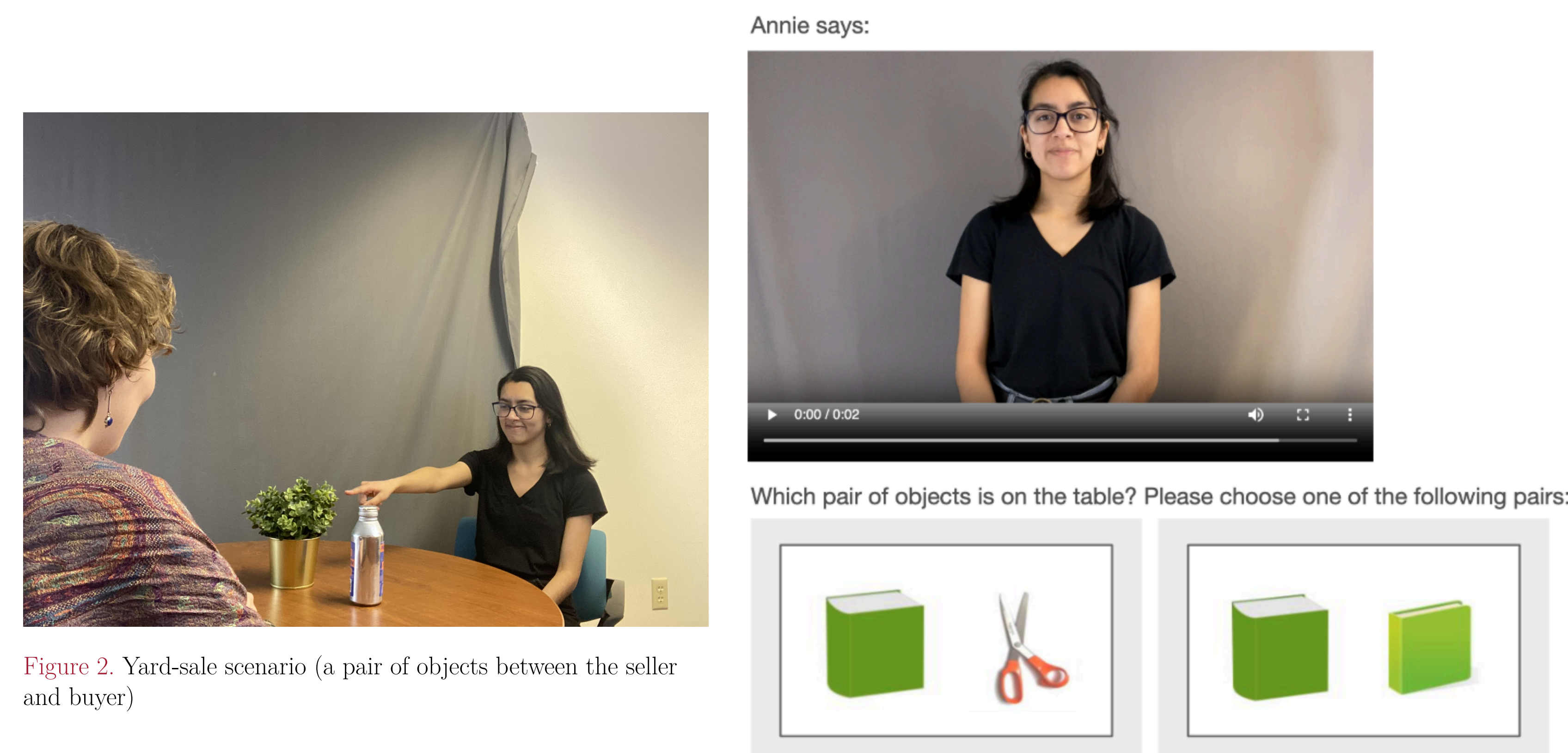


Figure 2. Yard-sale scenario (a pair of objects between the seller and buyer)

Figure 3. Example trial

- Each trial: participants watch a video of a request from the buyer (e.g., “Pass me the [modifier] noun”), and were asked to infer the likely pair of objects on the table, by choosing between a non-contrastive array (left in fig.3) and a contrastive array (right in fig.3).

Critical Manipulation

Design. We manipulated the modification of the noun phrase in the request as the independent variable, in a **within-subject** design. The dependent variable was **array choice** (contrastive vs. non-contrastive array).

- English and Mandarin:** three levels — **unmodified**, **adjective**, **gesture**.
- ASL:** two levels — **unmodified**, **modified** (size-and-shape depictive classifiers, aka SASS).
- ASL has lexical adjectives but we focus on SASS since these provide a critical dissociation: they hold a dedicated syntactic and prosodic position (like adjectives) but depict specific sizes and shapes (like gestures).

	unmodified	adjective	gesture
English	“Pass me the book”	“Pass me the thick book”	“Pass me the [THICK] _g book”
Mandarin	“Digei wo zhe ben shu” (Pass me this Cl. book)	“Digei wo zhe ben houde shu” (Pass me this Cl. thick book)	“Digei wo zhe ben [HOUDE] _g shu” (Pass me this Cl. [THICK] _g book)
ASL			
	BOOK	BOOK CL.C-“thick”	IX 2-GIVEo-1

Stimuli.

- 15 critical items for English and Mandarin; 16 for ASL. The **adjective** condition uses scalar or dimensional adjectives (e.g., *small*, *square*); the **gesture** condition uses corresponding depictive gestures (normed for acceptability).
- Latin Square** design (each item seen once): English 19 (15 critical + 4 catch), Mandarin 18 (15 + 3 catch), ASL 20 (16 + 4 catch) fully randomized trials.
- A demonstrative determiner is used in the Mandarin stimuli, since Mandarin lacks a definite determiner and bare nouns are compatible with indefinite interpretations.

Participants. 74 native English speakers; 65 native Mandarin speakers; 20 native ASL signers (self-reported)

Results

- Data analyzed with **mixed-effects logistic regression** (logit link) with random intercepts for participants and items, and treatment coding (**unmodified** = reference level).
- Robust **main effect of modification** in all three languages, for both **gesture** and **adjective**. (***: $p < 0.001$.)

	English	Mandarin	ASL
gesture	$\beta = 1.37^{***}$	$\beta = 2.89^{***}$	modified
adjective	$\beta = 4.42^{***}$	$\beta = 4.13^{***}$	$\beta = 1.92^{***}$

Cross-linguistic Contrastive Inference Comparison

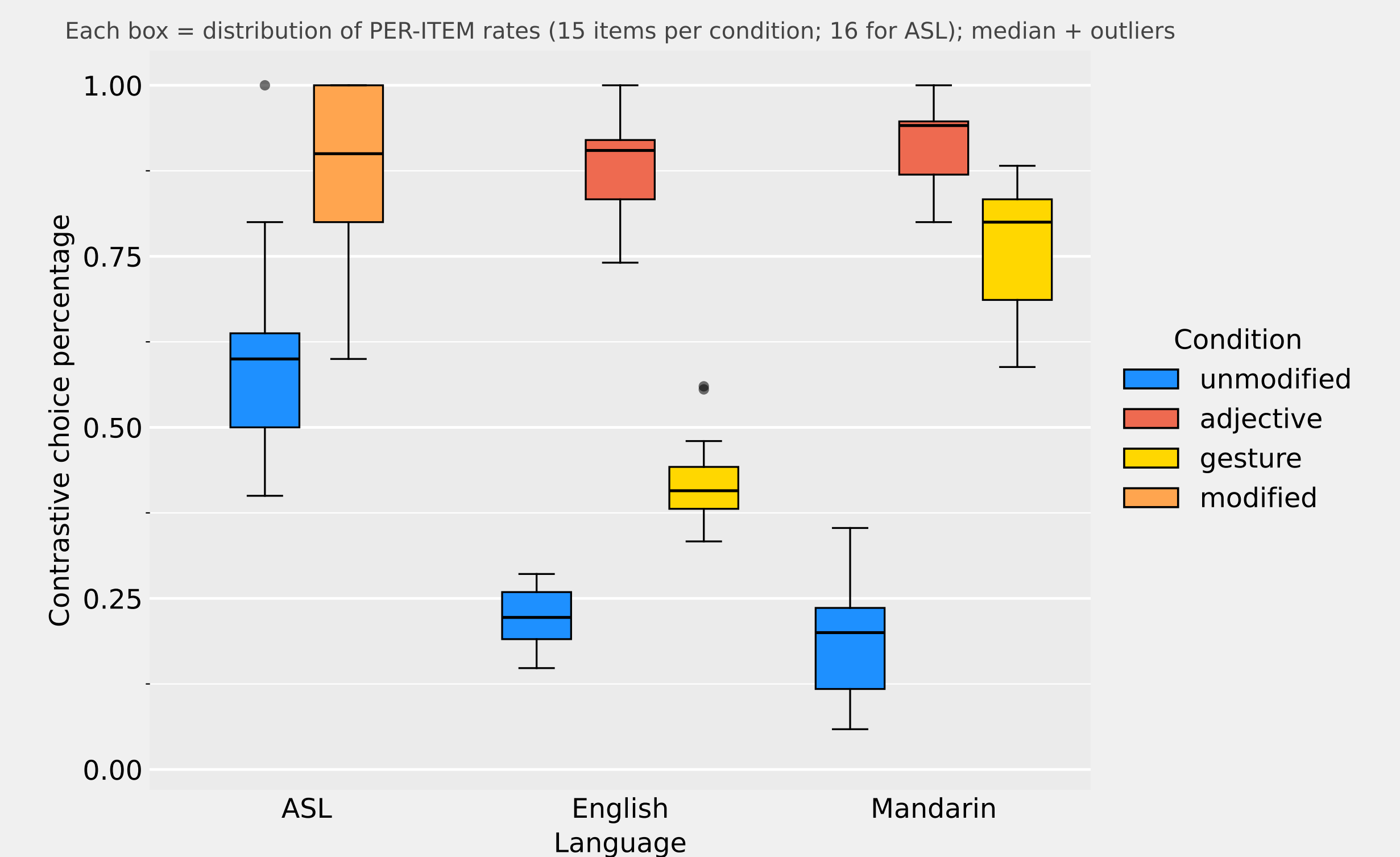


Figure 4. Cross-linguistic Contrastive Inference Comparison

Core Findings

- Contrastive inference was observed in the **modified** condition of **ASL**
- Contrastive inference was also observed robustly in the **gesture** condition of **Mandarin**
 - ⇒ depictive co-linguistic gestures **could** elicit contrastive inference in both sign and spoken languages
 - ⇒ **not directly compatible with either hypothesis!**

Discussion

- Why high contrastive inference in the **gesture** condition in Mandarin? Might be related to the use of demonstrative determiner “zhe”:
 - Anti-uniqueness presupposition? Incompatible with the low rate of contrastive choice in the **unmodified** condition
 - Dimension-shifter of gestural content from non-at-issue to at-issue (Ebert et al. 2020)? Compatible with our data
- Why high contrastive inference in the **unmodified** condition in ASL? We speculate that ASL bare nouns may be more rigidly referential due to iconicity, similar to *that N* rather than *the N* or *a N*

Conclusion

- Our findings suggest the often observed non-restrictiveness of depictive cospeech gestures are explained neither by a simple modality difference or by a simple difference in representational format, but require a more nuanced story involving morphosyntactic structures and pragmatics.

