Individual differences and the relationship between attitude predicates and perspective

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2 December 2018 ♦ CAMP 2, University of Southern California

Introduction

(1)   𝕁: Where's Thomas?

    a.   𝕂: He's reading about probability.

    b.   𝕂: That dork is reading about probability.

    c.   𝕂: **My sister said** he's reading about probability.

    d.   𝕂: **My sister said** that dork is reading about probability.

In (1a), Kay asserts something about Thomas's actions.

Ambiguities in perspective-dependent meaning

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In (1b), Kay asserts something about Thomas's actions, meanwhile expressing a not-at-issue opinion, that he's a *dork*.

Potts (2005, 2007)

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In (1b), Kay asserts something about Thomas's actions, meanwhile expressing a not-at-issue opinion, that he's a *dork*. ⇐ epithet

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In (1c), Kay is now reporting her sister's assertion, using *said* (**attitude predicate**).

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    d. 𝕂: **My sister said** <u>that dork</u> is reading about probability.

In (1d), Kay reports her sister's assertion, but it is ambiguous whether Kay or her sister believes that Thomas is a *dork*.

Harris & Potts (2009); Kaiser (2015)

(2) 𝕂: My sister said <u>that dork</u> is reading about probability.

To interpret, we appear to select between multiple possible **judges** of the epithet, at least:

- the person who uttered the sentences containing the epithet, like Kay
- characters within the scenario being described, like Kay's sister

judge	interpretation
Speaker	"Speaker interpretation"
Character	"Shifted interpretation"

How does interpretation allow this apparent relationship between a judge and an epithet? Does it exist within linguistic structure?

Language-internal hypothesis

Language-internal hypothesis: Certain predicates introduce a structural representation of their subjects as speakers, which can be inherited as judges in later structure.

Anand (2007); Schlenker (2007)

Attitude predicates in a language-internal hypothesis

Research on **shifted indexicals** proposes that attitude predicates can contain operators which shift the utterance-context within their scope, optionally overwriting the speaker to the predicate's subject.

(3) Hɛseni   va   kɛ   ɛz dɛwletia.
    Hesen.OBL said that I rich.be-PRES
    'Hesen_i said that he_i is rich.'   (Zazaki)

Typology suggests an hierarchy where speech predicates are prototypical shifters.

(4) **Belief** < **Thought** < **Speech**

Culy (1994); Anand & Nevins (2004); Deal (2017)   5

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(5) **Belief** < **Thought** < **Speech**

Even in languages which do not shift indexicals (e.g. English), a hard-coded hierarchy should still manifest in soft preferences.

Evidence from certain reflexive parses in English supports the dominance of speech predicates.

Bresnan et al. (2001); Sloggett (2017)

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Language-external hypothesis: Semantic interpretation does not assign the emotional content of the epithet to any particular judge. Social and pragmatic reasoning are left to arbitrate.

Harris (2012)

Attitude predicates in a language-external hypothesis

Neural evidence for language-independent resources used to reason about the content of other agents' minds (**Theory of Mind**).

Emotions of agents are extrapolated from narratives, contradiction is costly.

Characters who might be upset are more likely judges, perhaps attitude predicates are a similar pragmatic cue.

Koster-Hale & Saxe (2013)

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Before moving on to experimental evidence, let's consider the ways these hypotheses might account for some more of the descriptive phenomena.

(6) My father screamed at me when he heard the news. He would
     never allow me to marry <u>that bastard</u> Webster.

Language-internal hypothesis?
Possible, allowing for some kind of multi-sentential scope. (cf. quantifier
and modal subordination)

Language-external hypothesis?
Predicted *a priori.*

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(7) My father stormed out of the house when he heard the news. He would never allow me to marry <u>that bastard</u> Webster.

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Possible, but would require operator accommodation.

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Possible depending on other evidence of character emotion.

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Individual differences

Anecdotally, the grammaticality of shifted interpretations differs highly between speakers.

Language-internal: Variation in resolution of ambiguity within language (e.g. discourse anaphora) is typically attributed to differences in linguistic ability and experience.

Language-external: Variation in interpretation and model construction might be the result of personality, etc.

Nieuwland & Van Berkum (2006); Arnold et al. (2018)

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1. The effects of attitude predicates on shifting fail to confirm predictions of an context-shifting operator account (no evidence for hierarchy)
2. Individual shifting behaviors are related to variables other than language ability and experience

Attitude predicates and shifted interpretations

Experiment: Method

96 native English speakers were recruited through Amazon Mechanical-Turk, and completed:

- 4 training items
- 20 experimental items
- 32 similar fillers

Performance on unambiguous fillers was used to exclude 16 participants who fell below a predefined standard for accuracy, leaving $n = 80$.

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Experimental items had four conditions:

(8) Alex says:

$$\begin{pmatrix} \text{a. Miranda's} & \text{b. Miranda knew that her} \\ \text{c. Miranda thought that her} & \text{d. Miranda said that her} \end{pmatrix}$$

...supervisor gave her a negative performance review.
The dirtbag is only nice to his tennis buddies.

Miranda's supervisor is a "dirtbag" according to who?
{Miranda, Alex}

Mirroring the levels in the shifted-indexical predicate hierarchy:

(a) **No Attitude Predicate**, (b) **Belief**, (c) **Thought**, (d) **Speech**

15

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Proportion "shifted" responses:

Language-internal:
Belief < Thought < Speech
No Pred < Belief, potentially No Pred = 0

Language-external:
Belief = Thought = Speech
No Pred < Belief, No Pred > 0

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Shifted responses increased from **No Pred** to **Belief** **Thought** and **Speech** ($z = 3.22, p = .001$).
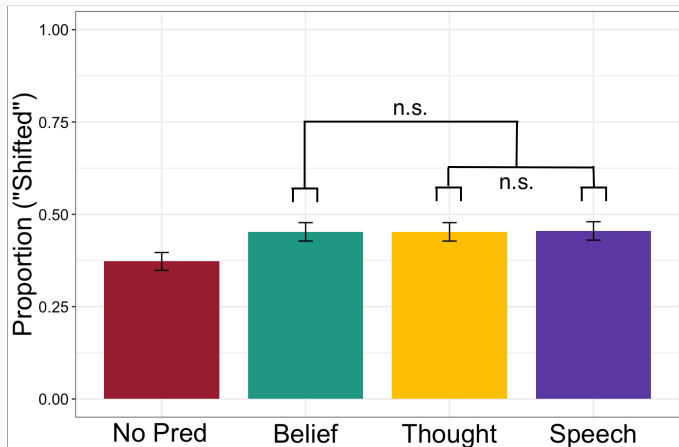
No difference in shifted responses between **Belief** **Thought** and **Speech** .
($p = .939$, $p = .855$)

All predicates cause an equal increase in shifting. The hierarchy expected by the language-internal hypothesis doesn't appear.

Shifting is less likely without an attitude predicate, but still possible.

Individual differences

Differences among participants

Individual performance was highly scattered.
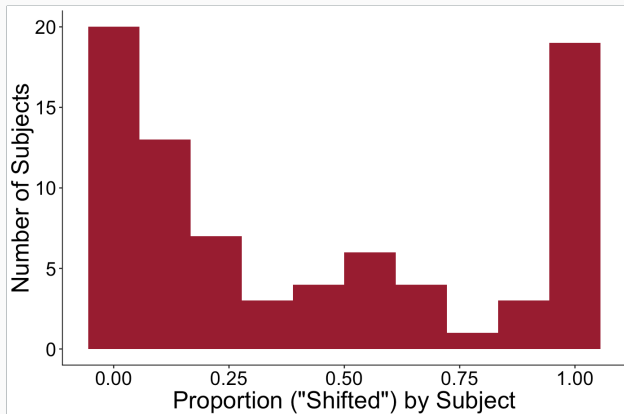
Language-internal hypothesis: differences in linguistic experience.

Language-external hypothesis: broader differences in cognition.

At the exit of the experimental task described above, I collected individual difference measures:

Linguistic experience ~ Author Recognition Task (ART) [1]

Cognitive variation ~ Autism-Spectrum Quotient (AQ) [2]
(Communication and Imagination sub-scores)

_____

[1]Stanovich & West (1989); Acheson et al. (2008); Arnold et al. (2018)
[2]Baron-Cohen et al. (2001)

ART did not predict subject response distributions.

Only AQ was at all significantly predictive.
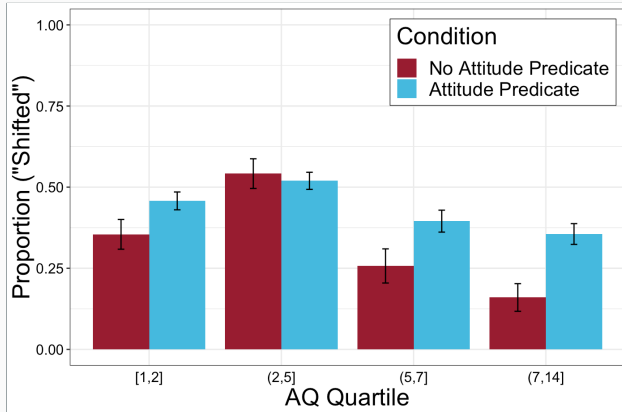
No main effect.
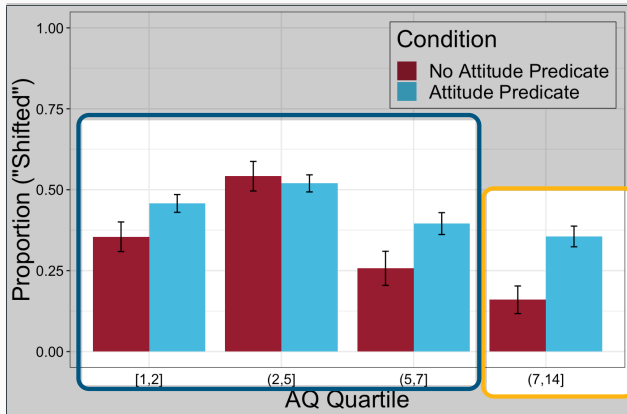
Interaction!
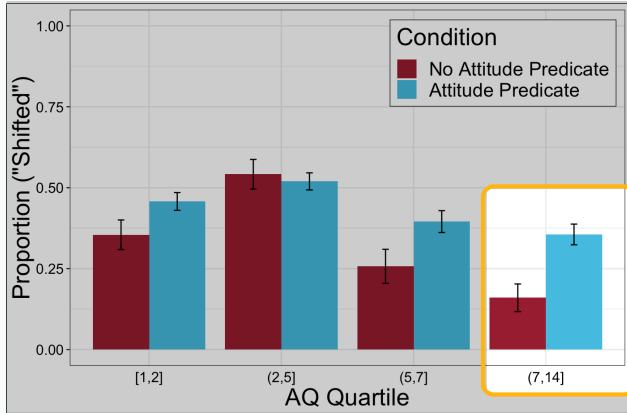
Difference between No Att Pred and the Att Pred conditions increased at highest quartile of AQ ($z = 2.28$, $p = .023$).

High-AQ participants were less willing than others to shift in absence of an attitude predicate.

Differences in linguistic experience did not predict subject variation.

No supporting evidence for language-internal account.

Suggestive evidence for a language-external account potentially tied to social reasoning.

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Conclusions

As promised, I've shown experimental evidence for two novel phenomena in the shifted interpretation of epithets:

1. the effects of attitude predicates on shifting fail to meet predictions of a language-internal context shifting hypothesis
2. individual differences appear not to be mediated by linguistic experience, but by cognitive variation of other stripes (AQ)

I consider this evidence enough to reject accounts of perspectival shift which depend on utterance-context operators.

Attitude predicates are one way of signaling topicality of a character's mental content.

Perspective/judge assignment is semantically unspecified.

Social-pragmatic reasoning may attach emotion to some likely host.

AQ modulates social reasoning, high-AQ may rely more heavily on explicit cues.

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Epithets and similar constructions modify individuals not in their roles as speakers/agents, but experiencers.

Judges are linguistically retrieved and composed anaphorically.

Qualities like subject-hood, experiencer-hood may pragmatically influence selection. Compare Kaiser & Herron Lee (2017) on PPT judges, Hinterwimmer (to appear) on FID.

Not clear how to predict the individual difference results. (Implicit prosody?)

Roberts (2015); Barlew (2017)

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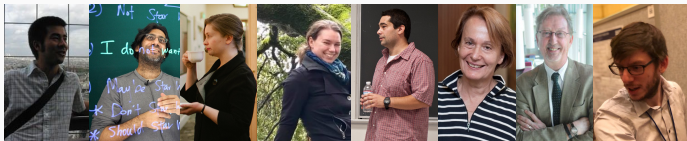
Peter Alrenga, Pranav Anand, Carolyn Anderson, Caroline Andrews, Adrian Brasoveanu, Angelika Kratzer, John Kingston, Alex Goebel

Ivano Caponigro, Elsi Kaiser, Jesse Harris, Christopher Potts, Matt Wagers, Amanda Rysling, Shayne Sloggett

and my incomparable undergraduate advisors, Lyn Frazier and Chuck Clifton.

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Other Example Items

- (Gina's | Gina said that her | Gina knew that her) co-worker ate the last cookie in the break room. The pig never saves enough for anyone else.
- (Trudy's | Trudy said that her | Trudy knew that her) neighbor knocked over her mailbox. The idiot never learned how to back out of a driveway.
- (Steve's | Steve said that his | Steve discovered that his) upstairs neighbor installed a new kitchen sink at 10:00 PM last night. The twerp always finds new ways of making a racket.
- (Sandy's | Sandy said that her | Sandy knew that her) mailman opened a bunch of her mail. The creep has no respect for privacy.

Example Ambiguous Fillers (Experiment Two)

- Alex says:
  Michael accompanied Herbert. (That dirtbag,) He (came | always comes) to work without showering.
  Who (came | always comes) to work without showering?
- Kevin walked over to Aaron. (That dork,) His shoes (were untied | were always untied).
- Mary looked at Elizabeth. (That clown,) She (was eating | always eats) with her mouth open.
- Ethan chatted with Greg. (Poor guy,) He (was standing | always stands) in the corner by himself.

Kaiser (2015)

Experiment Two Results
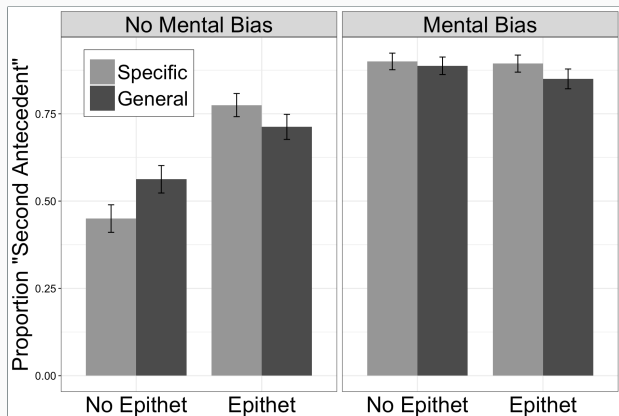
Non-AP mental predicates, epithets, and event generalization are cues to character perspective centers.

Example Unambiguous Fillers

- **Alex says:**

  Troy knows everyone in town. Yesterday the gossip-hound told his sister Roberta about how he played baseball with the Mayor when he was 12. **Who played "baseball" as a kid?** {Troy, Roberta}
- People always tell Joyce that she has awful luck, but she's just clumsy. She ran into her boss Bob the other night and dumped a bowl of soup right into his lap. **Who is clumsy?** {Joyce, Bob}
- When Vincent was younger, he worked in New York City. In 2005, when his granddaughter Lily went to college there, she found the pharmacy where he used to work. **Who went to "college" in New York?** {Lily, Vincent}

Results of Logistic Regression

Response ~ AP + Subject + Subject:AP + Item + Item:AP

	Estimate	Std. Error	Wald Z	p value
(Intercept)	-0.47	0.45	-1.04	.297
NP v. AP	0.28	0.09	3.22	**.001**
KP v. T/SP	0.01	0.07	0.08	.939
TP v. SP	-0.02	0.13	-0.18	.855

Author Recognition Task

- Randomized list of 130 names, 65 actual authors, and 65 not.
- Participants instructed to select every author they recognized.
- Scored as H - F (actual authors selected - incorrectly selected distractors)
- Correct authors updated and normed for early 21st-century college students, e.g. *Kurt Vonnegut.*
- Distractors were taken from contributing editors to a recent issue of *Reading Research Quarterly*, e.g. *Daphne Greenberg.*

Stanovich & West (1989); Acheson et al. (2008)

Sample ART Excerpt

Please select only the real published authors of fiction you recognize in the following list of names.

You should not guess, as there will be a penalty for all incorrect answers.

- ☒ Tanya Susan Wright
- ☑ Salman Rushdie
- ☒ Patricia Alexander
- ☒ Barbara A. Bradley
- ☑ Maya Angelou
- ☑ T. C. Boyle
- ☑ Tom Clancy
- ☒ Joshua F. Lawrence
- ☒ Kim Lawless
- ☑ Ray Bradbury
- ☒ James P. Gee
- ☒ Jennifer Cromley
- ☒ William Cornell
- ☒ Thomas P. Crumpler
- ☑ Steven King
- ☒ Dennis S. Davis
- ☒ Janet S. Gaffney
- ☑ George Orwell

ART Scores
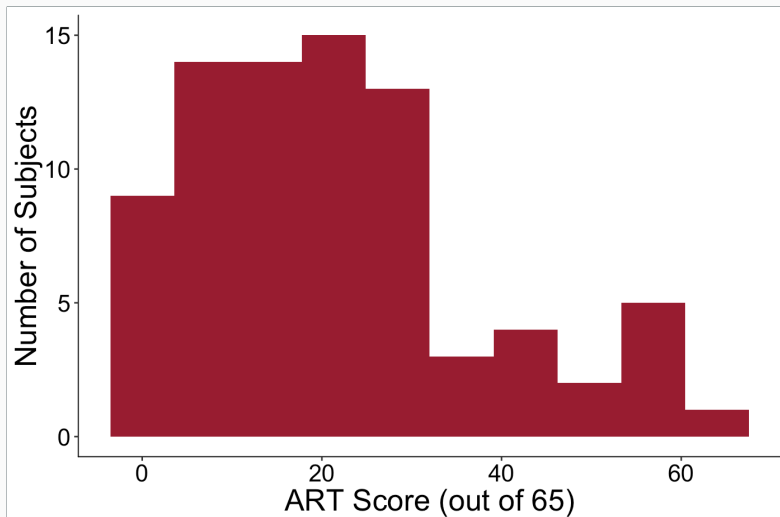
BFI Openness Survey

- 10 statements, participants asked to score their agreement on 5-point Likert from "definitely agree" to "definitely disagree".
- "I am someone who is original, and comes up with good ideas."
- "I am someone with an active imagination."
- "I am someone who prefers work that is routine." (reverse)

John & Srivastava (1999)

Openness Scores
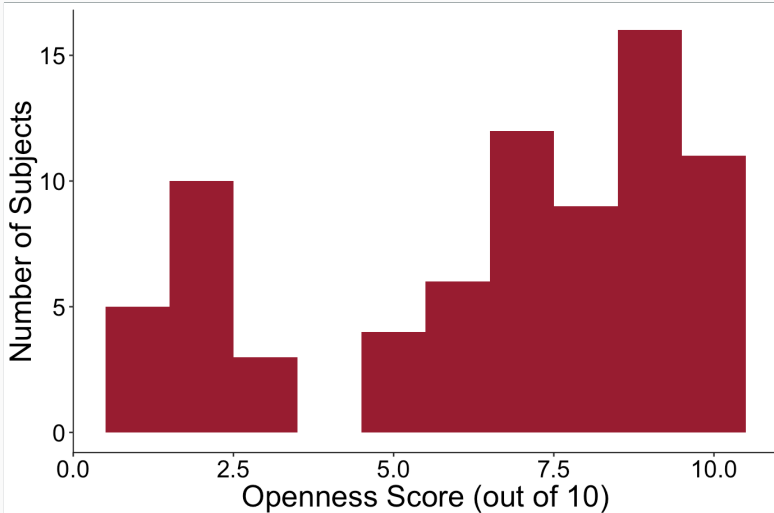
Autism-Spectrum Quotient Survey

- 20 statements, participants asked to score their agreement on 4-point Likert from "definitely agree" to "definitely disagree".
- 10 each from Communication and Imagination
- Communication:
    - "Other people frequently tell me that what I've said is impolite, even though I think it is polite."
    - "I find it easy to "read between the lines" when someone is talking to me." (reverse)
- Imagination:
    - "When I'm reading a story, I can easily imagine what the characters might look like.' (reverse)
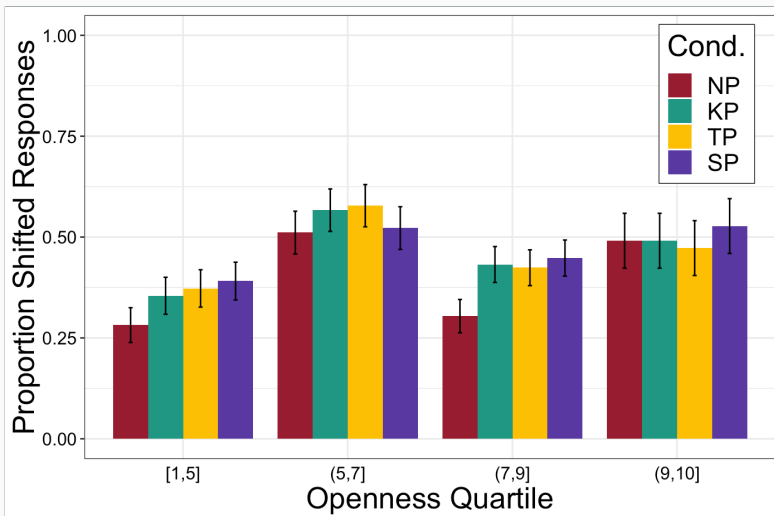   - "When I'm reading a story, I find it difficult to work out the characters' intentions."

AQ Scores
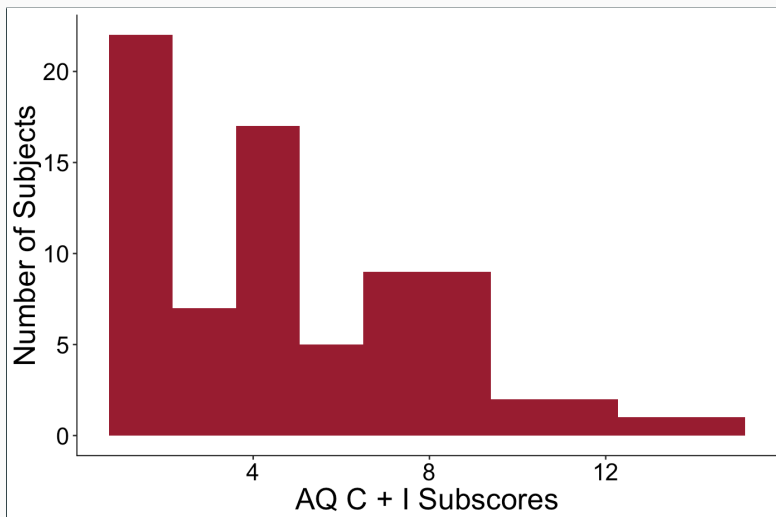
ART Quartiles
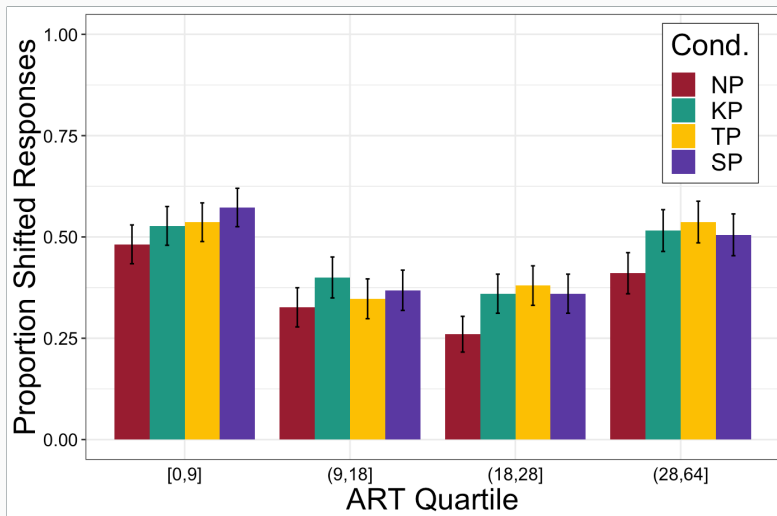
Openness Quartiles

Regression with Survey Data

Response ~ AP + ART + ART:AP + O + O:AP + AQ + AQ:AP + Subject + Item	Estimate	Std. Error	Wald Z	p value
(Intercept)	-0.85	0.53	-1.6	.109
NP v. AP (APa)	0.35	0.08	4.21	< **.001**
KP v. T/SP (APb)	0.06	0.09	0.69	.491
TP v. SP (APc)	0.18	0.16	1.17	.243
ART.Q1 v. ART.Q2 (ARTa)	-0.62	0.60	-1.03	.302
ART.Q1/2 v. ART.Q3 (ARTb)	-0.69	0.39	-1.79	.074
ART.Q1/2/3 v. ART.Q4 (ARTc)	0.42	0.29	1.42	.156
O.Q1 v. O.Q2 (Oa)	0.82	0.62	1.32	.187
O.Q1/2 v. O.Q3 (Ob)	-0.26	0.35	-0.76	.451
O.Q1/2/3 v. O.Q4 (Oc)	-0.35	0.38	-0.91	.363
AQ.Q1 v. AQ.Q2 (AQa)	0.63	0.58	1.08	.279
AQ.Q1/2 v. AQ.Q3 (AQb)	-0.36	0.40	-0.90	.366
AQ.Q1/2/3 v. AQ.Q4 (AQc)	-0.23	0.31	-0.74	.460

# Companion Task (by courtesy of Carolyn Anderson)

This multi-block study also contained a block of items designed by Carolyn Anderson to test the acceptability of shifted interpretations of English indexical *tomorrow* in the scope of SPs.

Anderson's studies have also demonstrated a high degree of individual differences. We might wonder whether the same factors influence these differences across both tasks. This would be explicitly predicted if the same mechanism (context-shifting operators in APs) were responsible for both phenomena.

Anderson (To appear)

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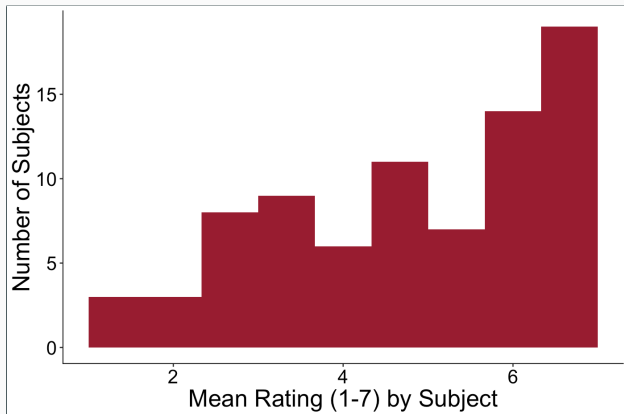
Anderson's task - Sample item

4 practice, 5 critical items, 15 in other conditions, 9 fillers.
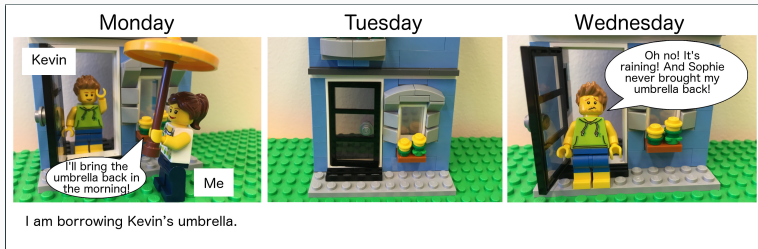
(9) **Please rate this sentence as a caption for the last panel:**
Kevin is upset because I said that I would bring his umbrella back tomorrow.
(Very unnatural)   1   2   3   4   5   6   7   (Very natural)

Anderson replicated her earlier findings that SPs do increase acceptability of shifted *tomorrow*.

Anderson's task - Subject correlations
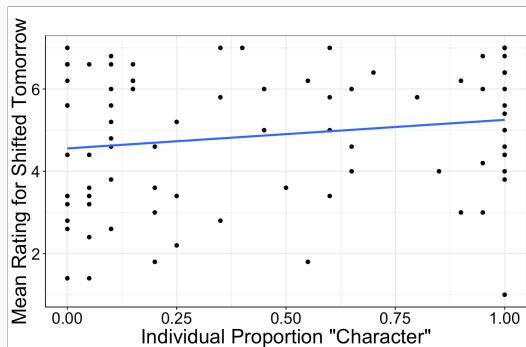
No strong correlation observed between tasks
($r = 0.17$, $t = 1.47$, $p = .144$).

Also note that no individual difference measures were significantly predictive of subjects' mean ratings.

No evidence for a relationship between shifted indexicals and epithets.

⇓

There may be multiple types of perspective in language.

No evidence for a relationship between shifted indexicals and epithets.

$$\Downarrow$$

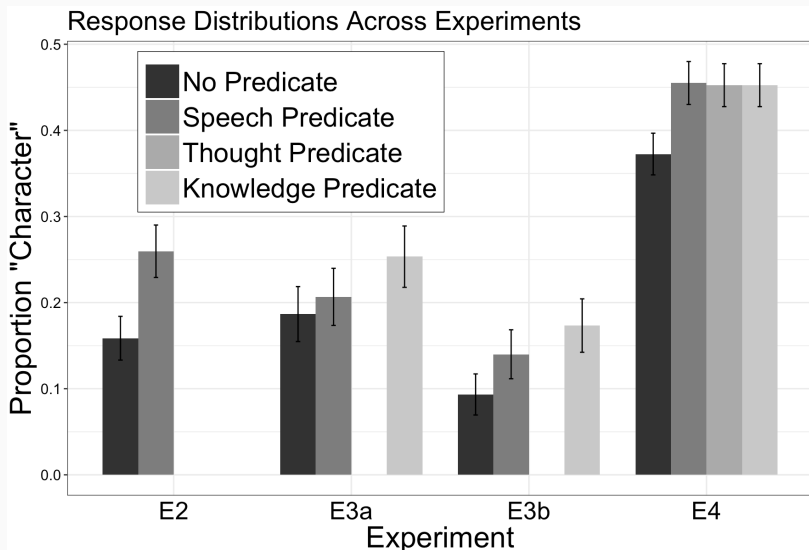There may be multiple types of perspective in language.

Going forward

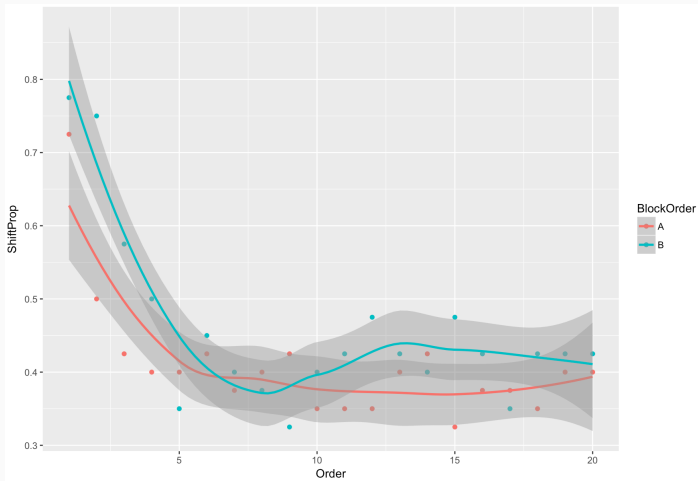In future work, I hope to continue arbitrating between possible accounts of perspective.

Specific plans include:

- Collecting visual world evidence for the time-course of judge integration (or lack thereof)
- Comparison of AP influence on other perspectival items
- Replication and extension of individual difference relationships

Response Distributions Across Experiments

Order

Response Time

Response Times by Condition and Response