

LEARNING TO COMPREHEND AND PRODUCE SINGULAR *THEY*

Bethany Gardner
Psychology & Human Development
Vanderbilt University
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bethany.gardner@vanderbilt.edu



osf.io/u7wd5/



[bethanyhgardner/dissertation](https://github.com/bethanyhgardner/dissertation)

Demi Lovato thanks Lizzo for correcting paparazzo who misgendered her: 'I love you'

The "Dancing With The Devil" singer came out as non-binary in May and goes by "they/them" pronouns.

Many people recall that someone uses they/them pronouns and express support, but make errors in their actual language production:

The "Dancing With The Devil" singer came out as non-binary in May, revealing their preferred pronouns are they/them an episode of their podcast, *4D With Demi*.

"Today is a day I'm so happy to share more of my life with you all - I am proud to let you know that I identify as non-binary and will officially be changing my pronouns to they/them moving forward," Lovato said in a video posted to her social media accounts, adding, "I'm doing this for those out there that haven't been able to share who they truly are with their loved ones."



OVERVIEW

Theoretical & Applied Questions

Experiment 1: Associating pronouns with a person

Experiment 2: Effects of a PSA and usage
modeling on written production

Experiment 3: Effects of including pronouns in
introductions and on nametags on spoken
production

Experiment 4: Online processing

When do speakers use pronouns instead of other forms of reference?

Lovato

Demi
Lovato

The Dancing with
the Devil" singer

she

they



Pronouns are used for “in focus” referents

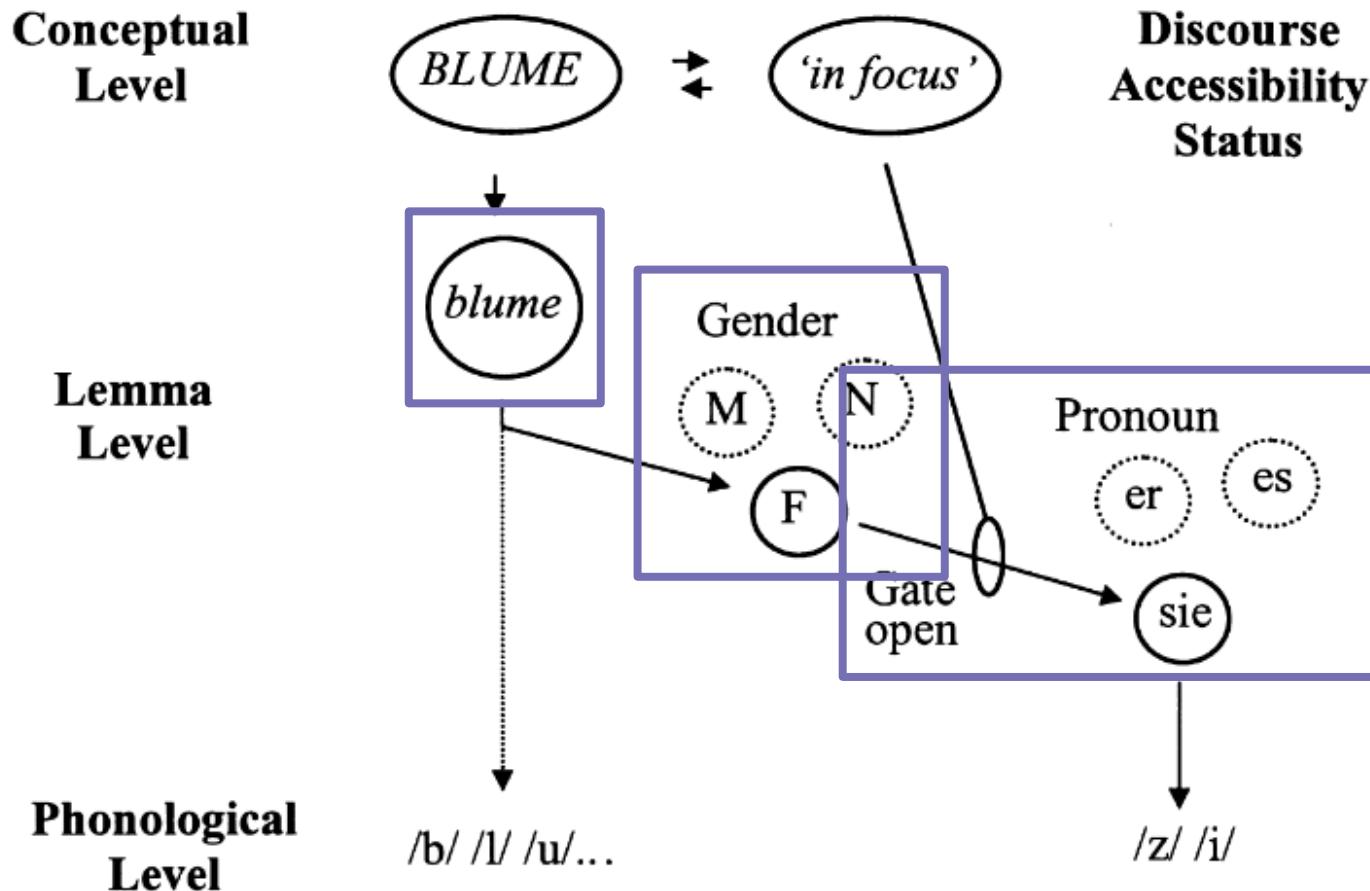
Once speakers decide to use a pronoun, how do they pick which one?



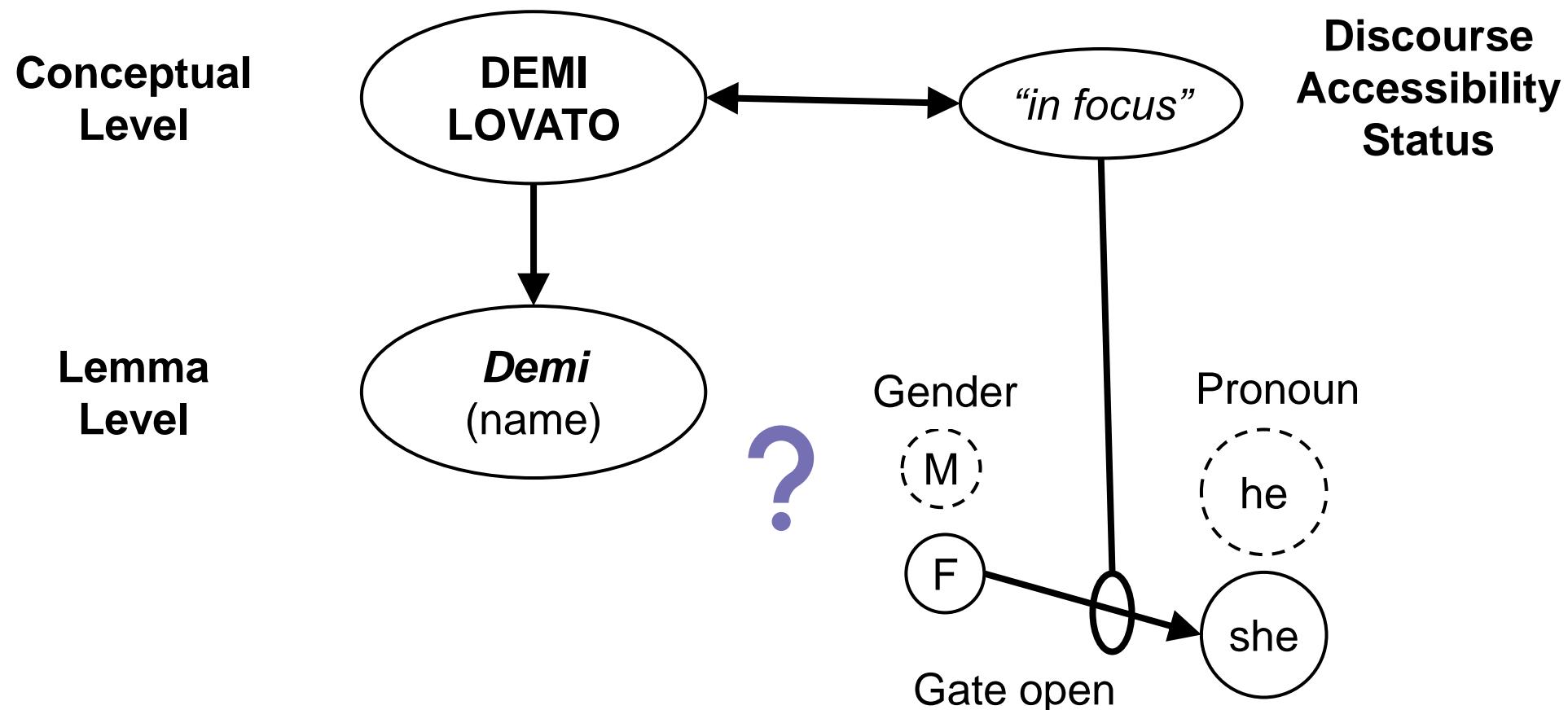
she

they

Selecting pronouns in a grammatical gender language:

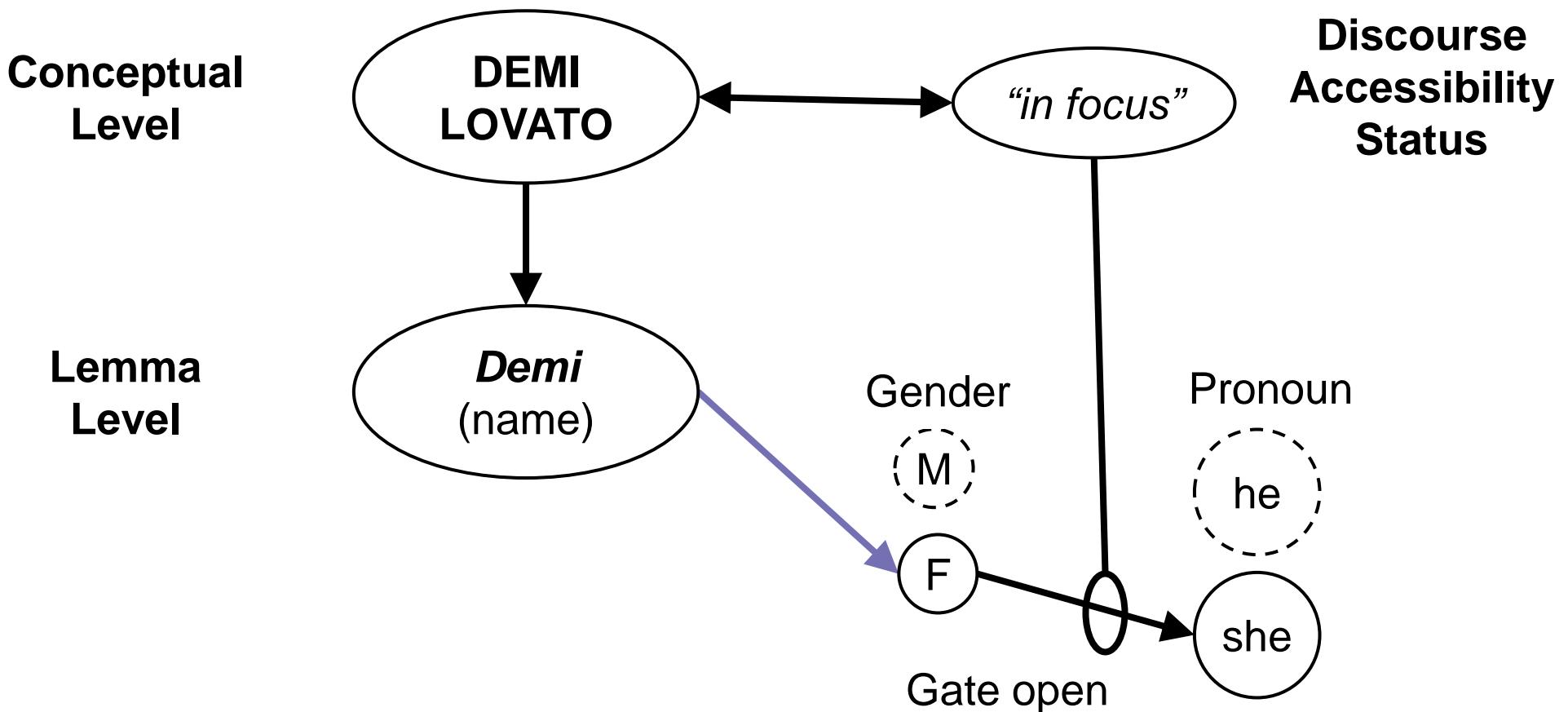


What happens when you move from grammatical gender for nouns (where there is nearly always one correct option) to social gender for people (where speakers have a wider variety of choices)?

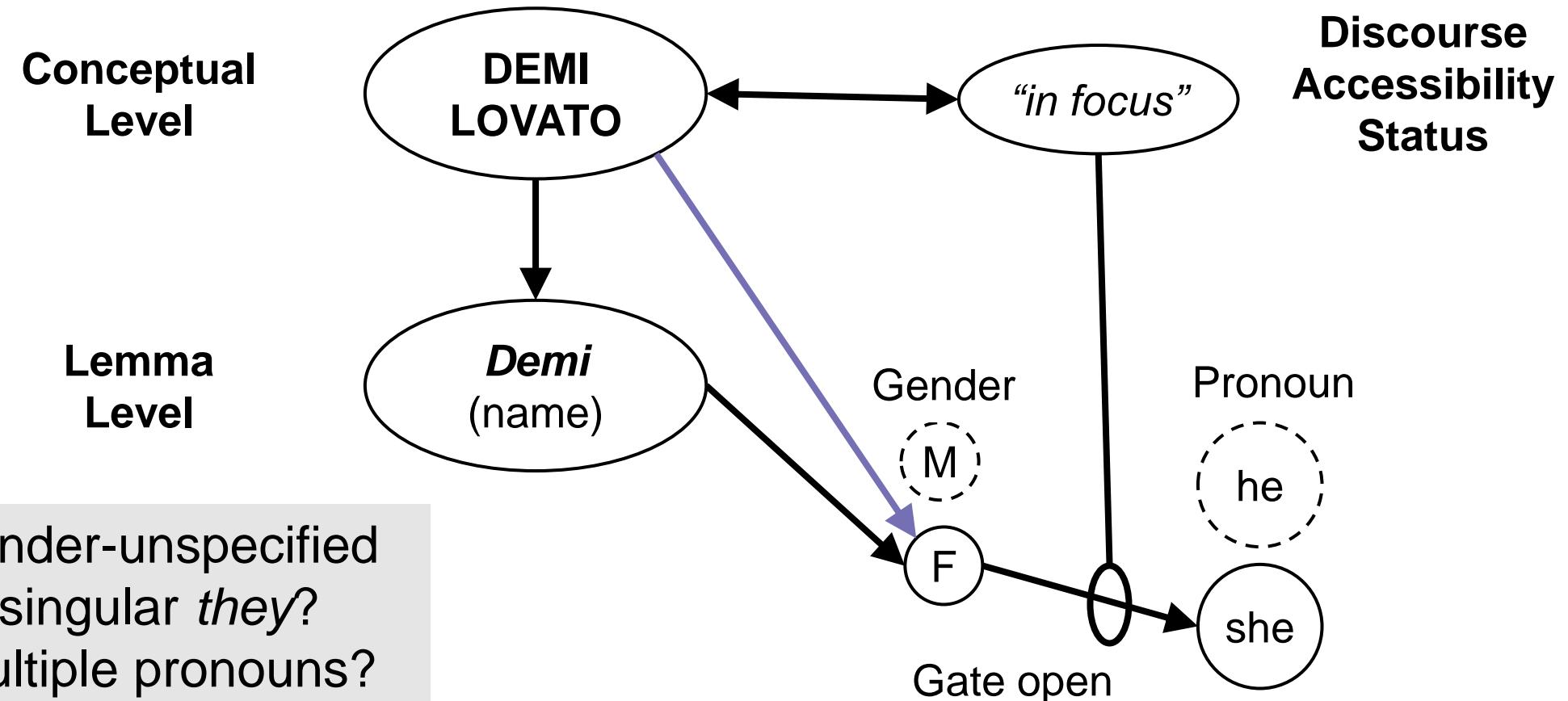


One option is via the name:

gender-neutral names?
they/them pronouns?

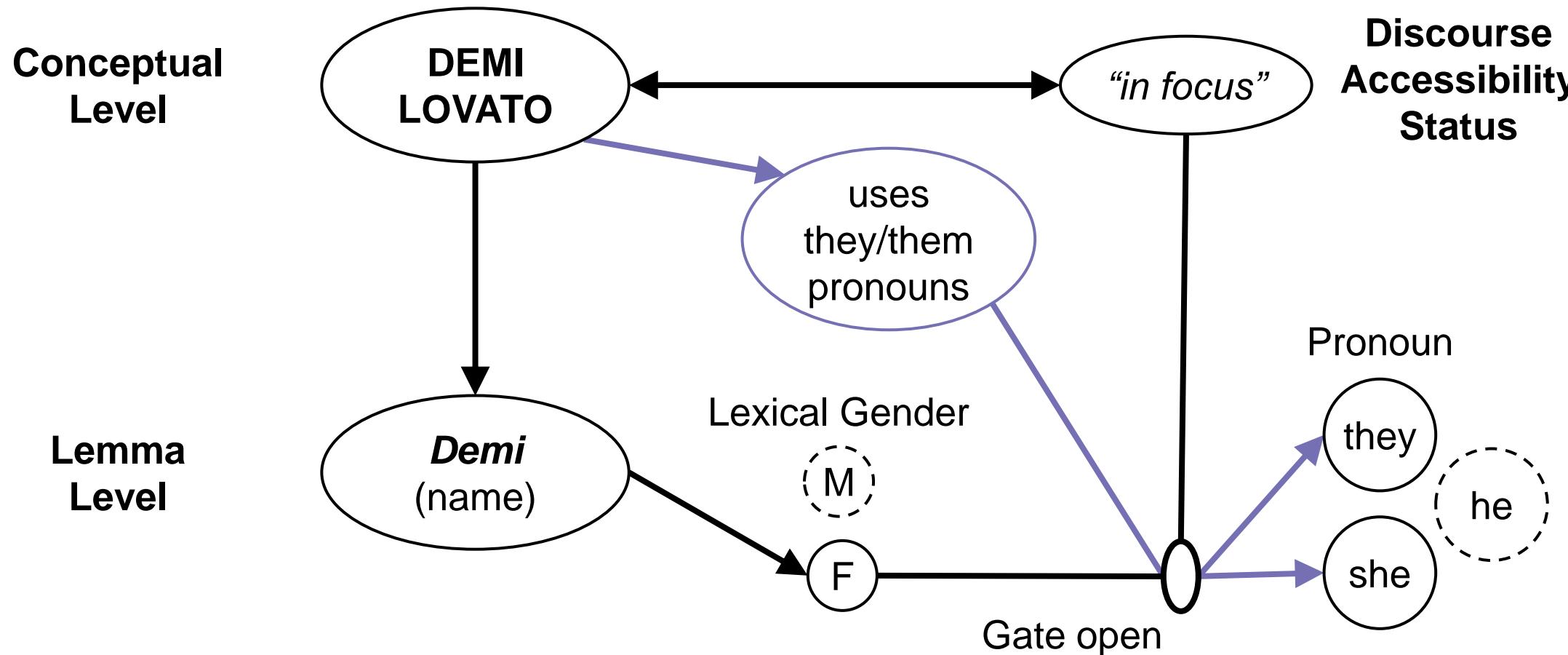


Another option is conceptual information about the person:



Information about a person's stated pronouns and what language other people use to refer to them:

How is this connection learned? How do alternative pronoun choices compete?



Core Ideas:

- Coreference is ambiguous a lot of the time!
- Speakers have strategies for choosing forms of reference that they think will be understood, and listeners have strategies for resolving ambiguity
- Our current language processing models don't account for the full range of people's linguistic behavior

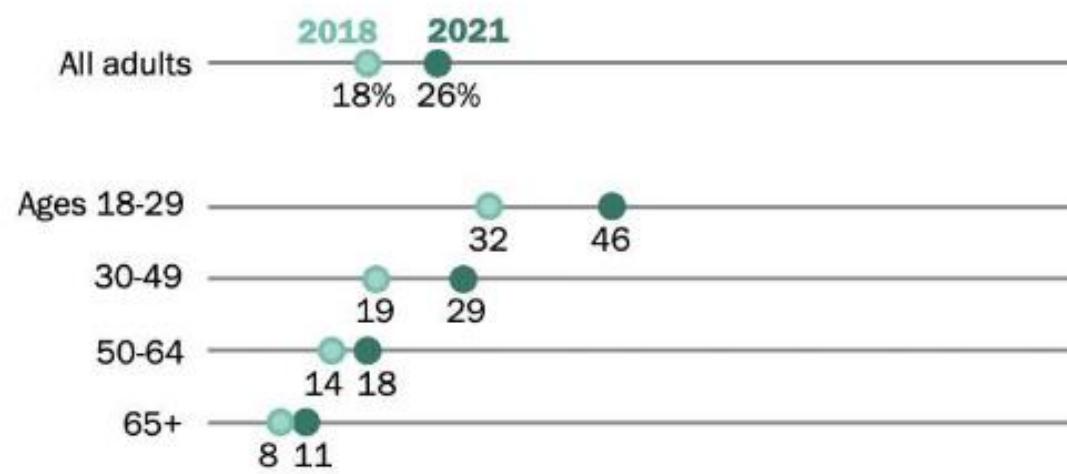
Why is this interesting to linguists and cognitive psychologists?

- Right in the middle of a type of language change that doesn't happen very often
- Connecting higher-level social factors to lower-level processing mechanisms

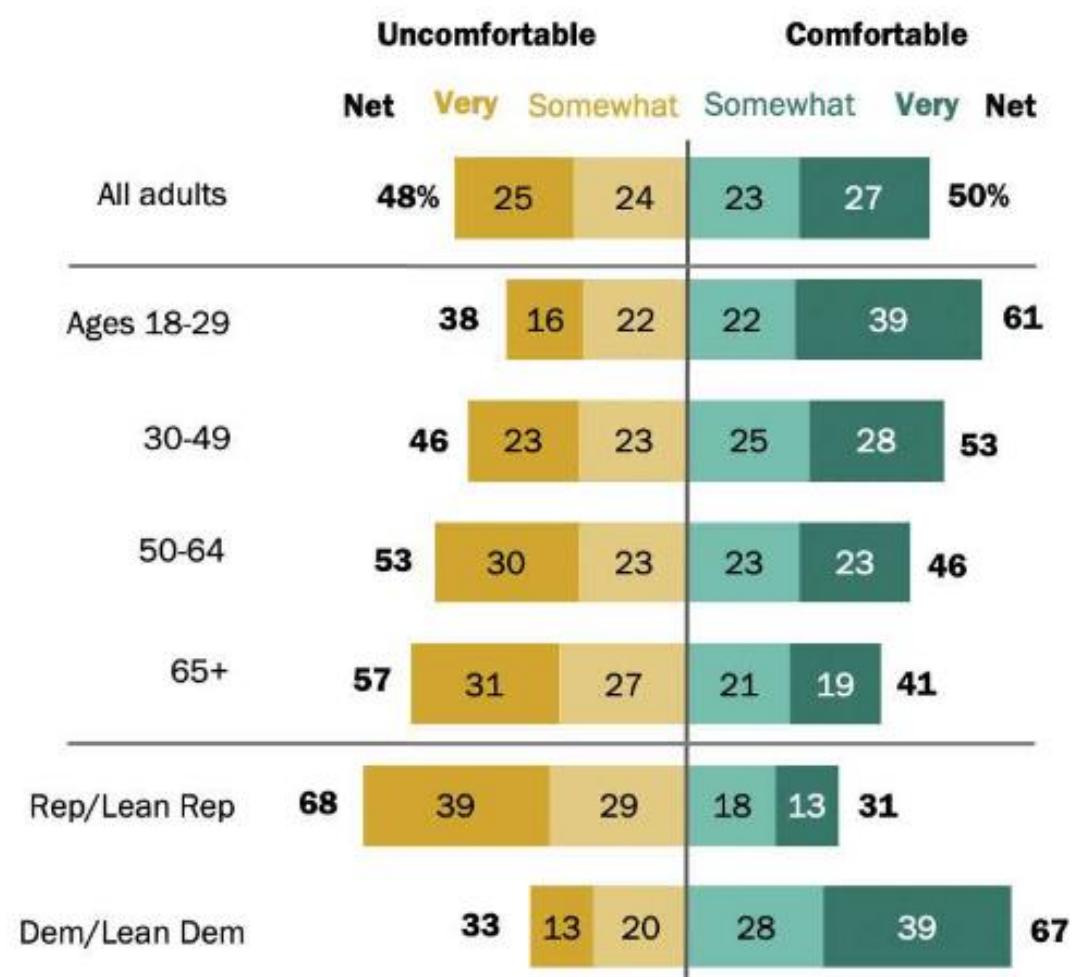
Specific singular *they* is becoming increasingly common and accepted

46% of younger U.S. adults know someone who goes by gender-neutral pronouns, up from 32% in 2018

% of adults who say they personally know someone who prefers that others use gender-neutral pronouns when referring to them



% of adults saying they would feel very or somewhat _____ using a gender-neutral pronoun to refer to someone if they asked them to do so



Why talk about pronouns now?

- Misgendering is:
 - A source of **minority stress** (Chodzen et al., 2019; McLemore, 2018; Testa et al., 2015)
 - A contributor to **poorer mental health** (Galupo et al., 2020; McLemore, 2015, 2018; Mitchell et al., 2021)
 - Often functioning as a **microaggression** (Chang & Chung, 2015; Nadal, 2013; Nadal et al., 2016; Sue et al., 2007)
 - A site for **anti-LGBTQ legislation** (e.g., TN S.B. 0466/H.B. 1269)
- Social support helps mitigate the negative mental health effects of **transphobia** (McLemore, 2015; Testa et al., 2015; The Trevor Project, 2020)
- Reducing misgendering is one concrete things allies can change in their communities



EXPERIMENT 1

Associating pronouns with
a person

- Learning to use singular *they* may require a change in how we select which pronouns to produce
- Semantic/conceptual features of a person or morphosyntactic gender associated with their name → recalling episodic information about a person's stated pronouns
- Difficulty with this learning process may be driving errors

How do people learn to associate pronouns with a person when their pronouns cannot be inferred from their name?



Characters

1 of 12 names
(6 masc, 6 fem)

1 of 3 pronouns (**he/him**,
she/her, **they/them**)

1 of 3 pets

1 of 12 jobs

Can't predict
pronouns
from name

*This is Emily, who uses
they/them pronouns.
Emily works as a nurse
and has a cat.*



Distractor

~5 minutes
simple math



Memory

Multiple choice:

*What pronouns does
Emily use?*

*What kind of pet
does Emily have?*

What is Emily's job?



Production

Written sentence
completion eliciting
pronoun:

*After Emily got
home from working
as a nurse...*

- N = 102 undergrads
- Logistic mixed effects regression with random effects by participant and by item

1

How is accuracy for they/them pronouns different than accuracy for he/him and she/her pronouns?

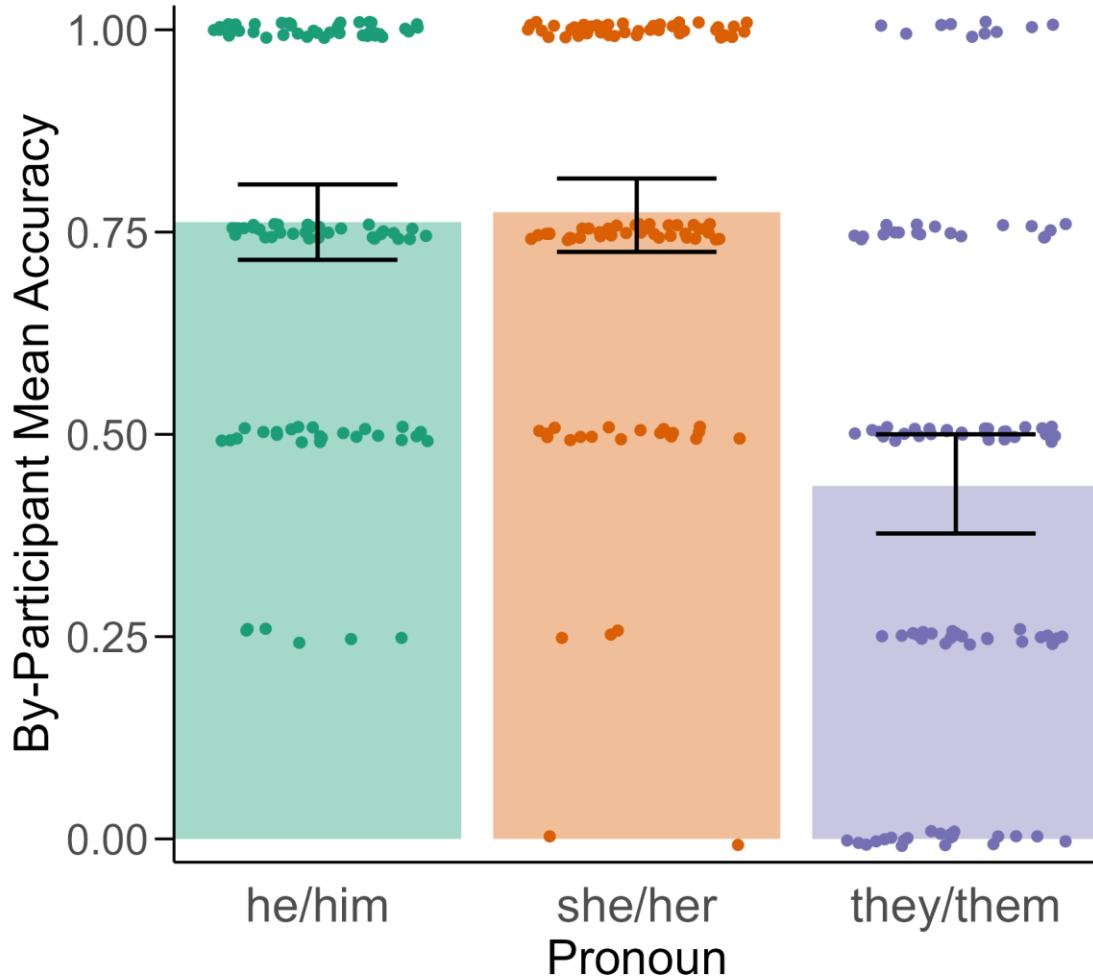
- They/them is less frequent and less familiar
→ **he/him** and **she/her** will be more accurate
- Guess based on names or distribution within experiment
→ **he/him** and **she/her** will be more accurate
- They/them is novel and stands out
→ **they/them** will be more accurate

2

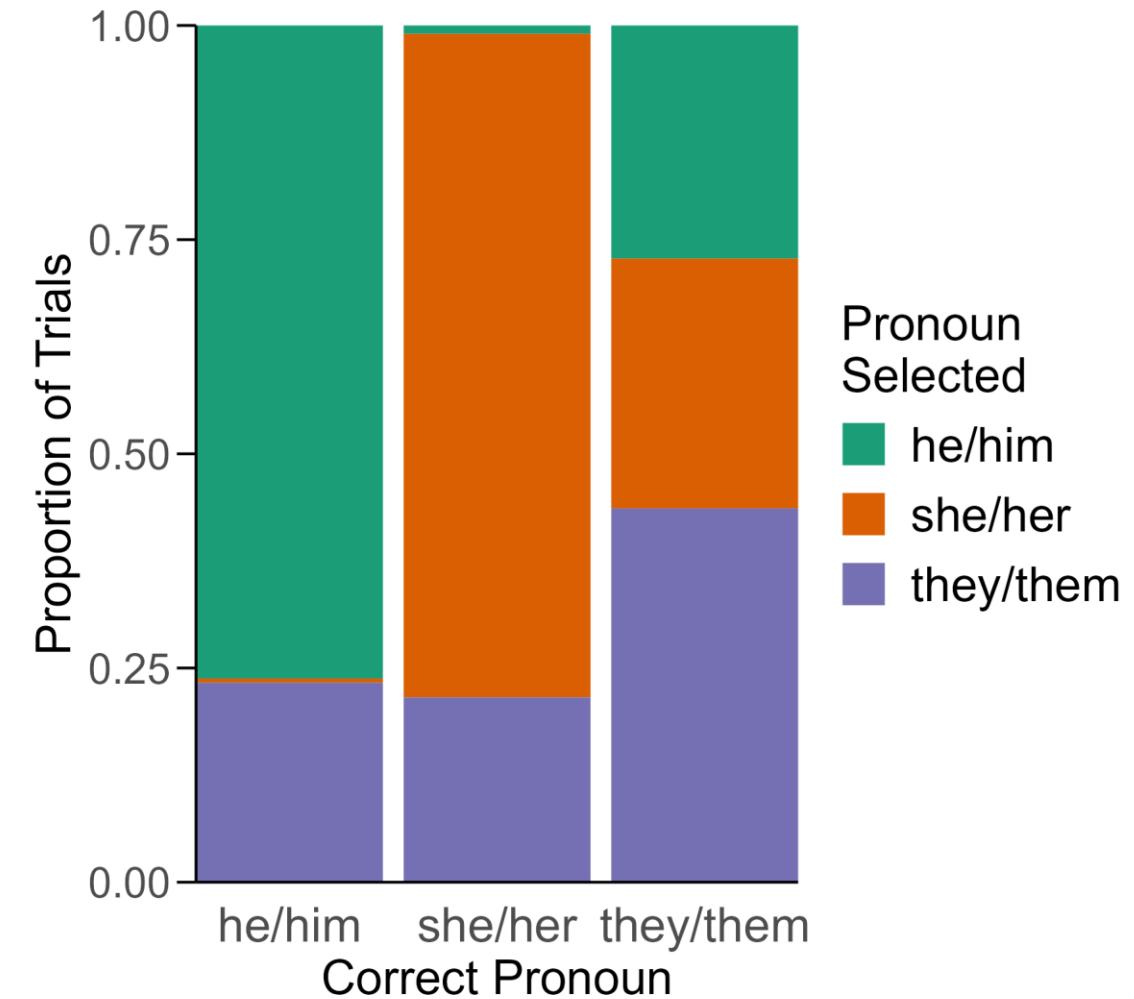
Does memory for pronouns predict production of pronouns?

- Accessing pronoun to produce via name
→ **no**
- Can also access pronoun to produce via episodic memory
→ **yes**

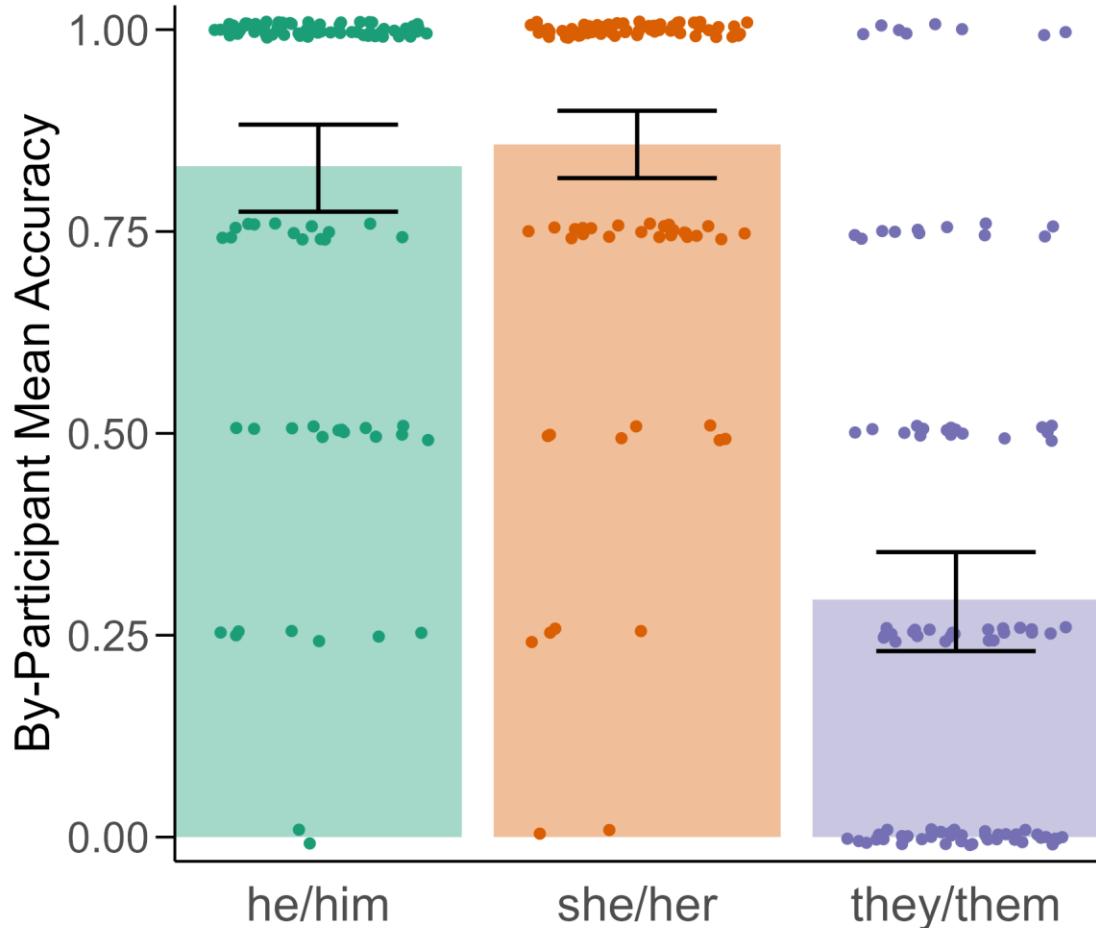
Memory Accuracy



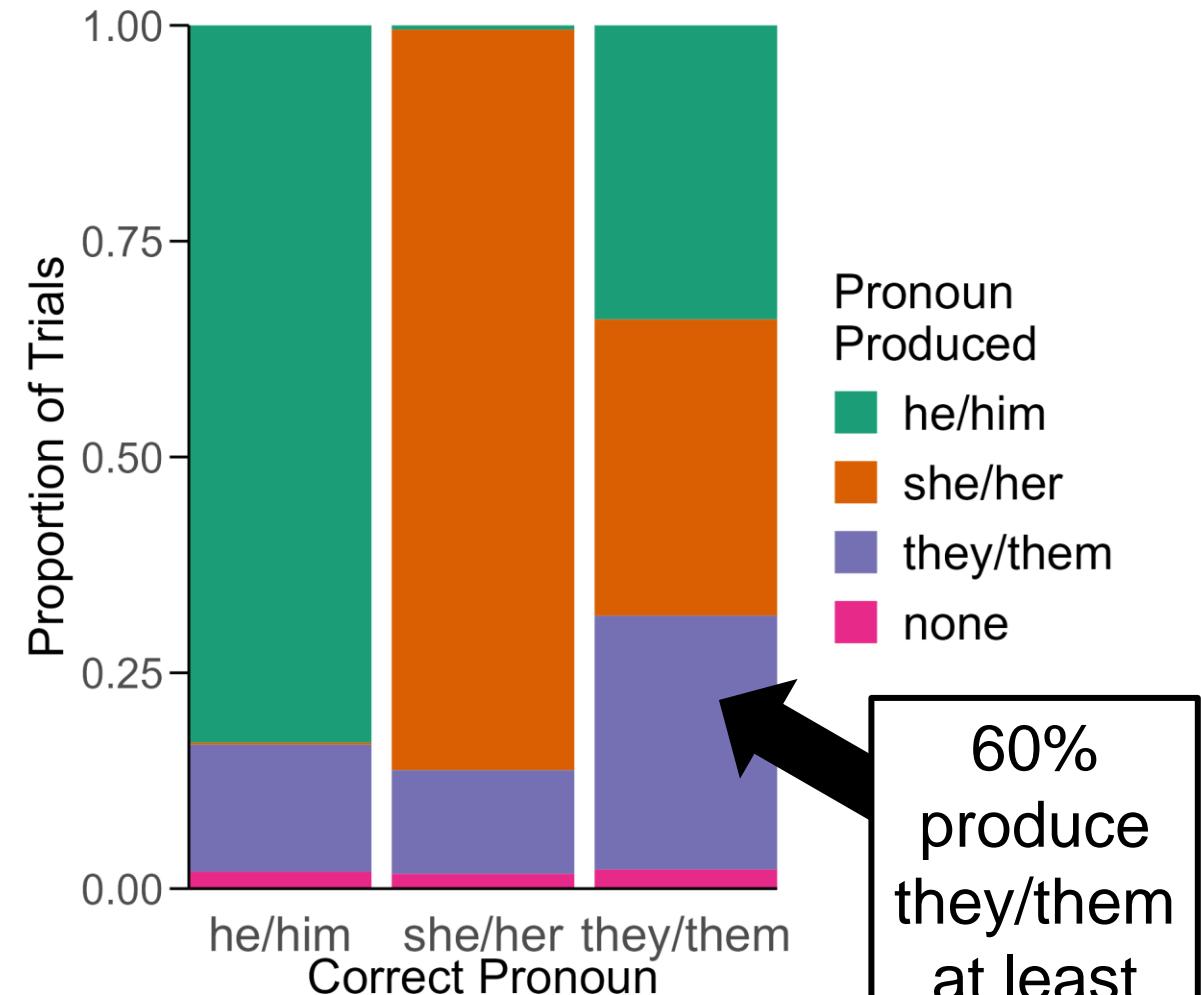
Memory Distribution



Production Accuracy



Production Distribution

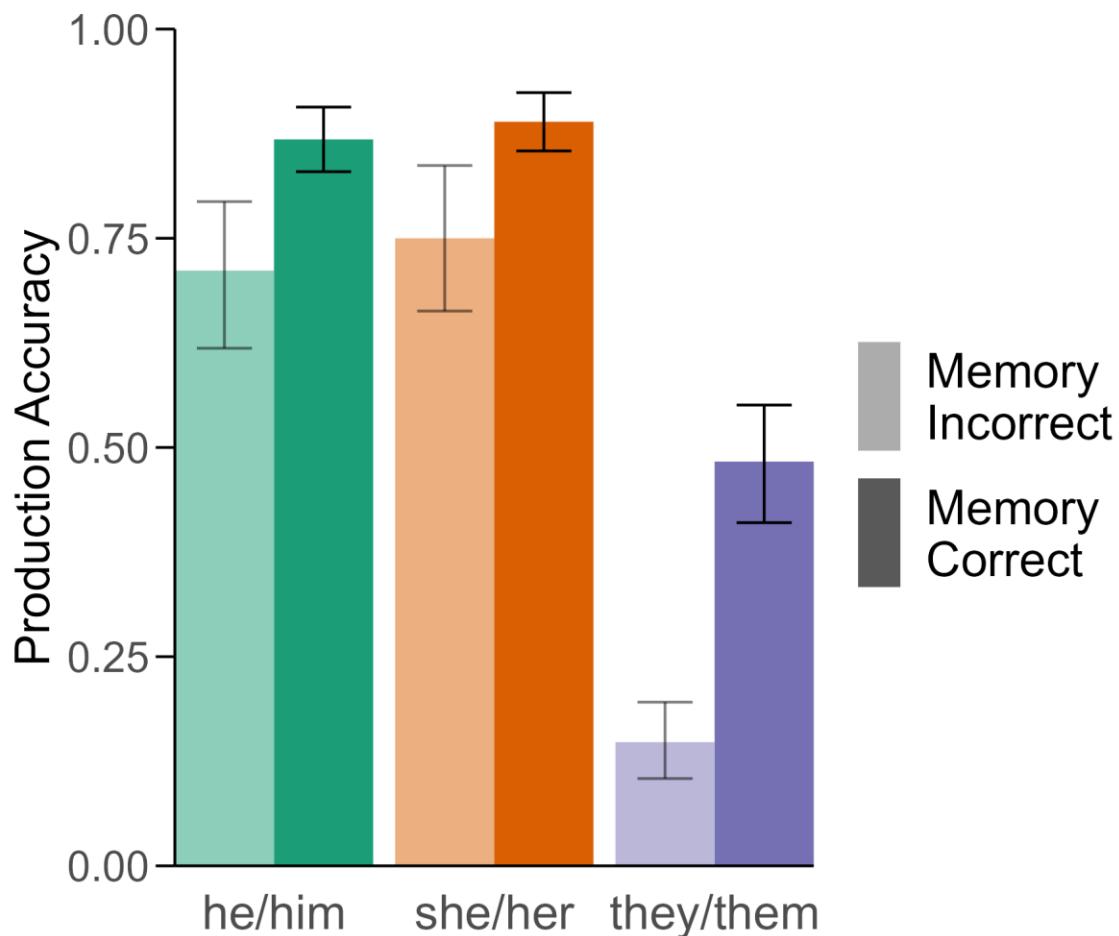


Pronoun
Produced

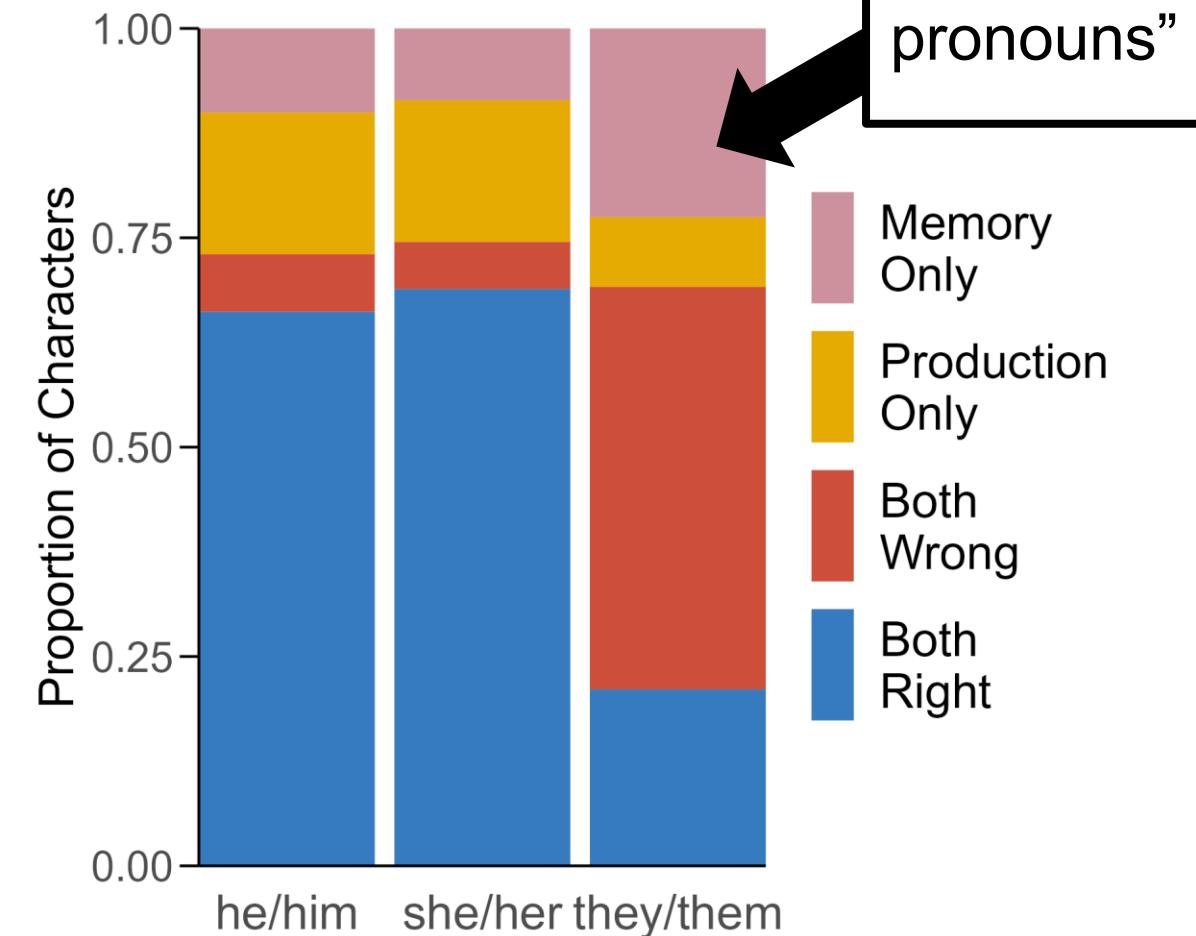
- he/him
- she/her
- they/them
- none

60%
produce
they/them
at least
once

Production Accuracy Split By Memory Accuracy



Combined Accuracy



- Other memory questions:
 - Accuracy for the 12 jobs was not at floor ($M = 0.21$)
→ experiment was not too difficult
 - Accuracy for the 3 pets ($M = 0.39$) was not significantly different from accuracy for they/them pronouns
- Are the differences between memory and production because of task order?
 - Follow-up study reversed the order of the tasks
 - Found the same pattern of results
→ differences between memory and production accuracy are primarily due to the tasks themselves
- Internal reliability was too low to do individual differences analyses

①

How is accuracy for they/them pronouns different than accuracy for he/him and she/her pronouns?

- People can learn to associate pronouns with a person
 - After only brief exposure to characters
 - When pronouns cannot be inferred from the name
- Remembering that a character uses **they/them** was more difficult than remembering **he/him** and **she/her** (~50% accuracy)
- Producing **singular they** in reference to a character was more difficult than **he** and **she** (~33% accuracy)

②

Does memory for pronouns predict production of pronouns?

- Relative difficulty of producing **they** was attenuated when participants had correctly remembered that the character uses they/them
- Differences between memory & production not primarily due to order



EXPERIMENT 2

Effects of a PSA and usage
modeling on written production

What might make remembering and producing singular *they* easier?

Direct Information

- EDI materials in educational, work, and social media contexts

Indirect Information

- Singular *they* is becoming a lot more common, making people more likely to encounter it, but not necessarily in a context where it's explained
(Minkin & Brown, 2021; Parker et al., 2019)

What might make remembering and producing singular *they* easier?

Direct Information

- Directly told the character used *they/them* → better comprehension for singular *they* (Arnold et al., 2021)
- Explanations in classroom → decreased use of generic masculine & increased use of non-sexist alternatives (Adamsky, 1981; Flanagan & Todd-Mancillas, 1982; Koeser & Sczesny, 2014)

Indirect Information

- Seeing gender-neutral alternatives modeled in task instructions → increased use of non-sexist forms, but not decreased use of generic masculine (Cronin & Jreisat, 1995)
- Reading text using gender-neutral alternatives → women used more non-sexist forms (Koeser et al., 2015)



PSA



Biographies

Gendered Language

- Why do people talk about their gendered language preferences?
- Using they/them pronouns
- Responding if someone corrects you

(GLSEN, 2020)

They

- Masculine name and **they/them** pronouns
- Feminine name and **they/them** pronouns
- Not directly explained

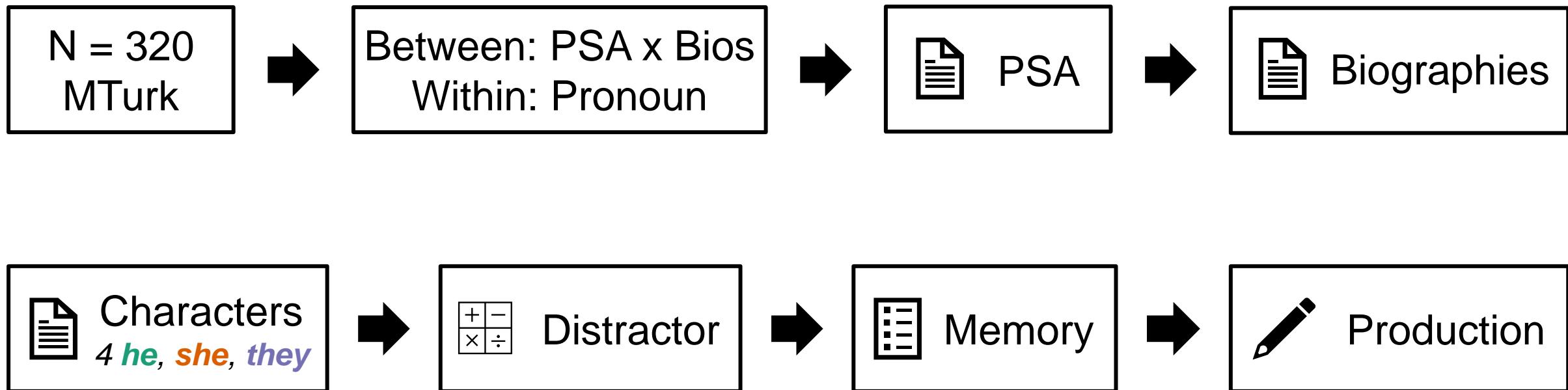
Unrelated

- Importance of spaying and neutering pets

(Humane Society, 2020)

He/She

- Masculine name and **he/him**
- Feminine name and **she/her**



1

Does information about gendered language support memory for and production of singular *they*?

2

Does seeing the usage of singular *they* modeled support accurate memory and production?

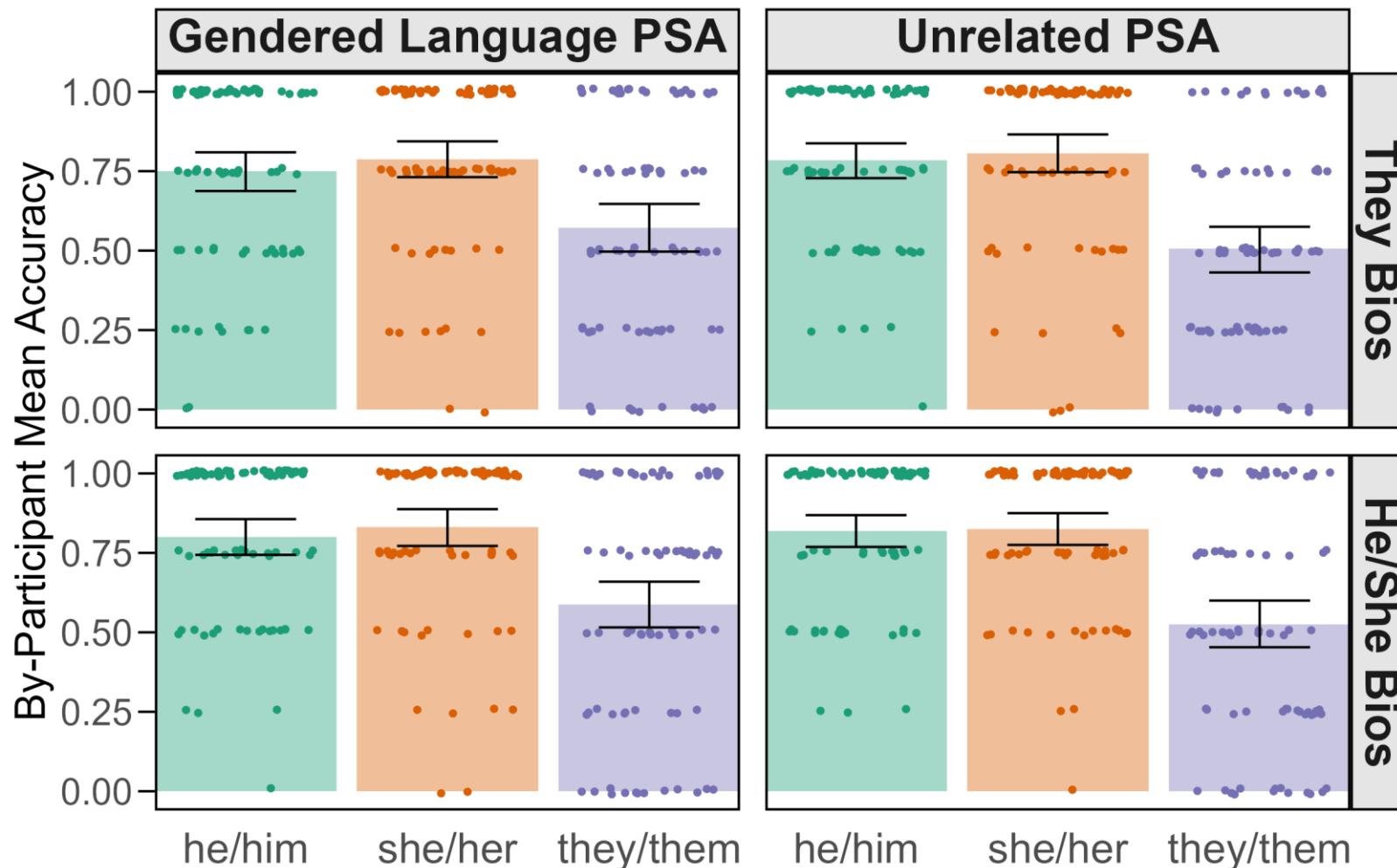
3

Does the combination work better than just one?

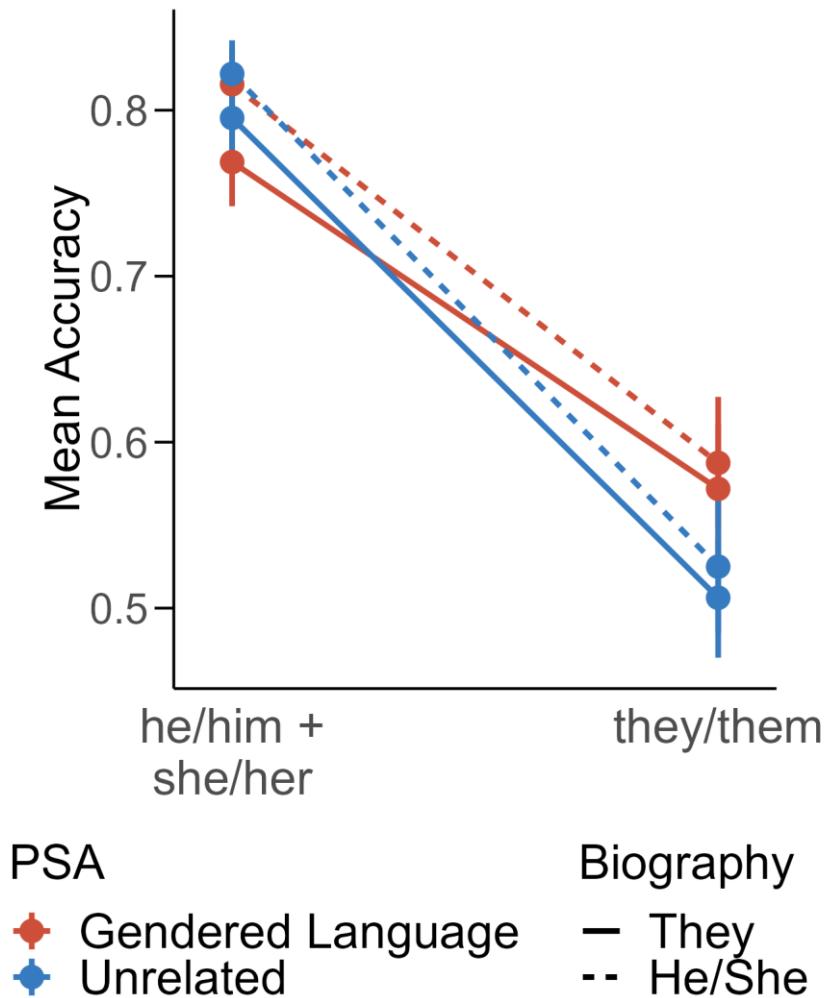
4

Are there different effects on memory and production?

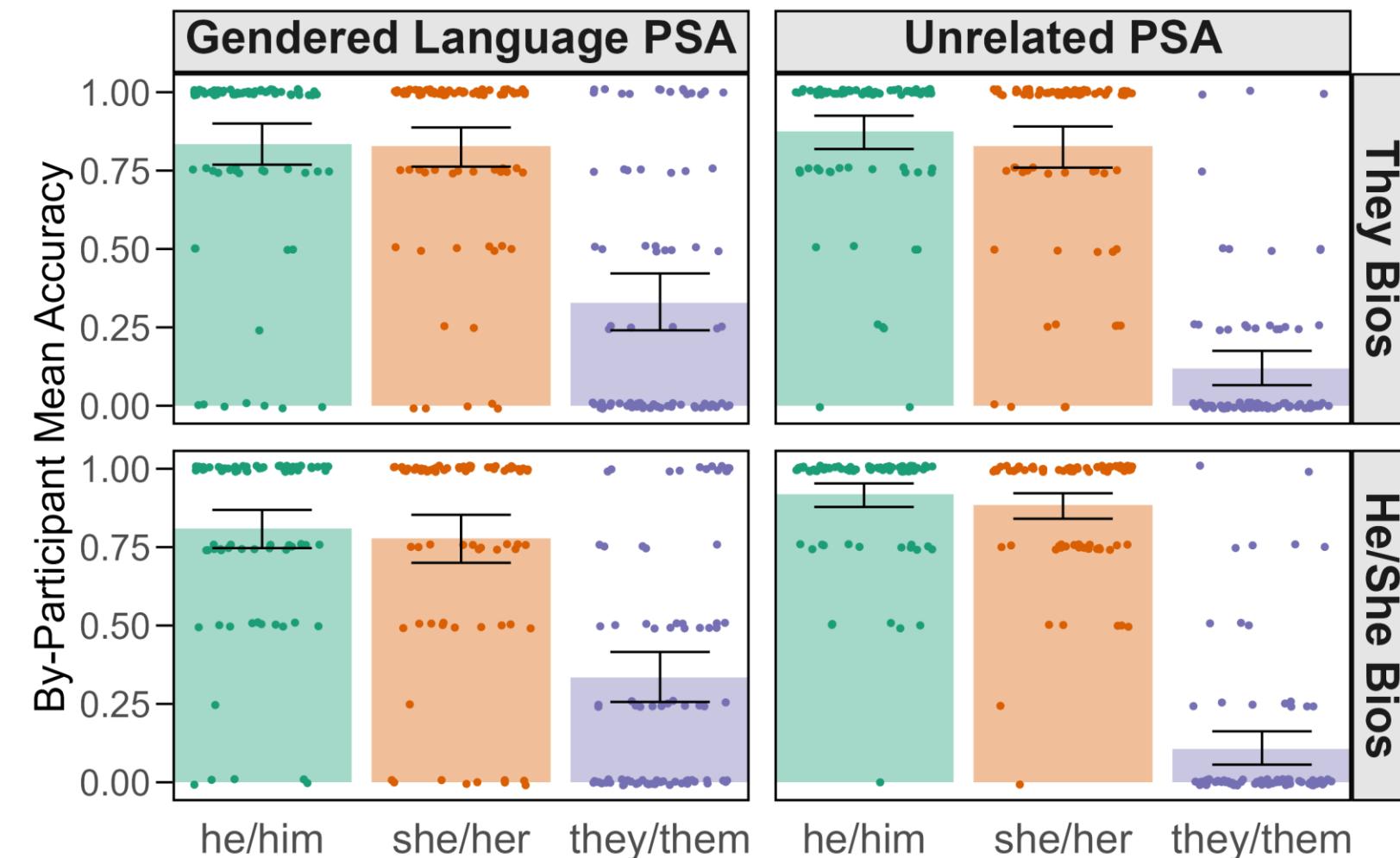
Memory Accuracy



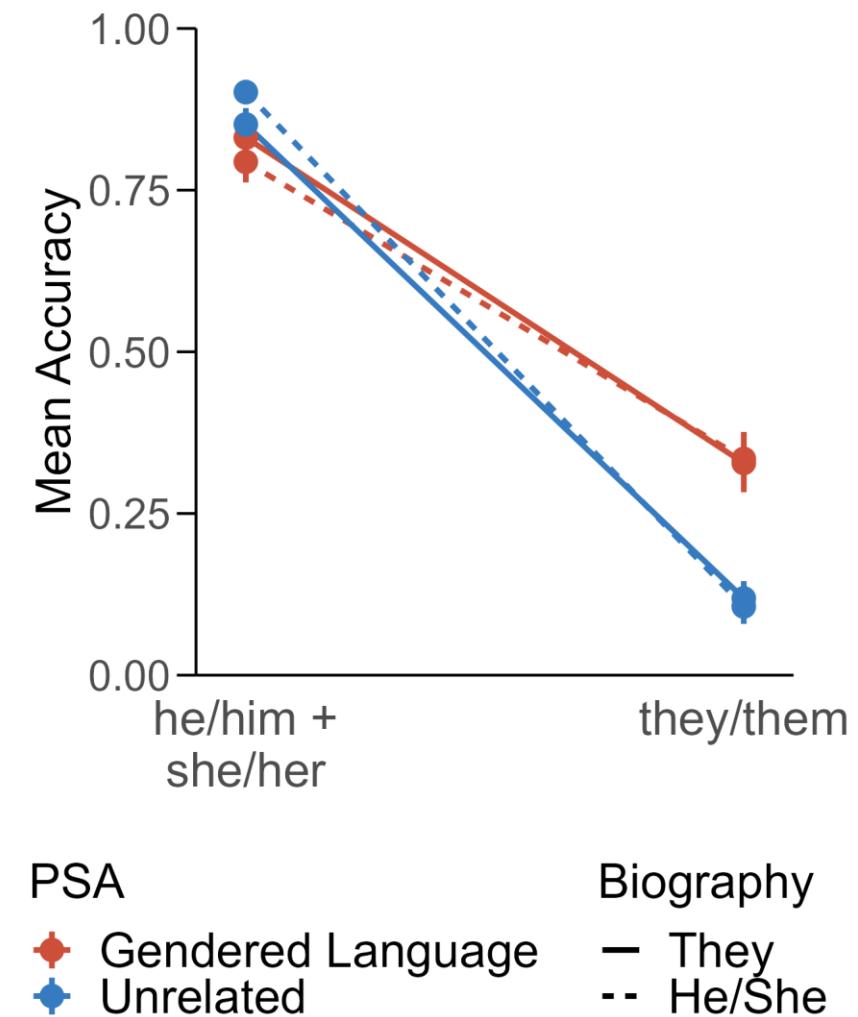
Condition Means



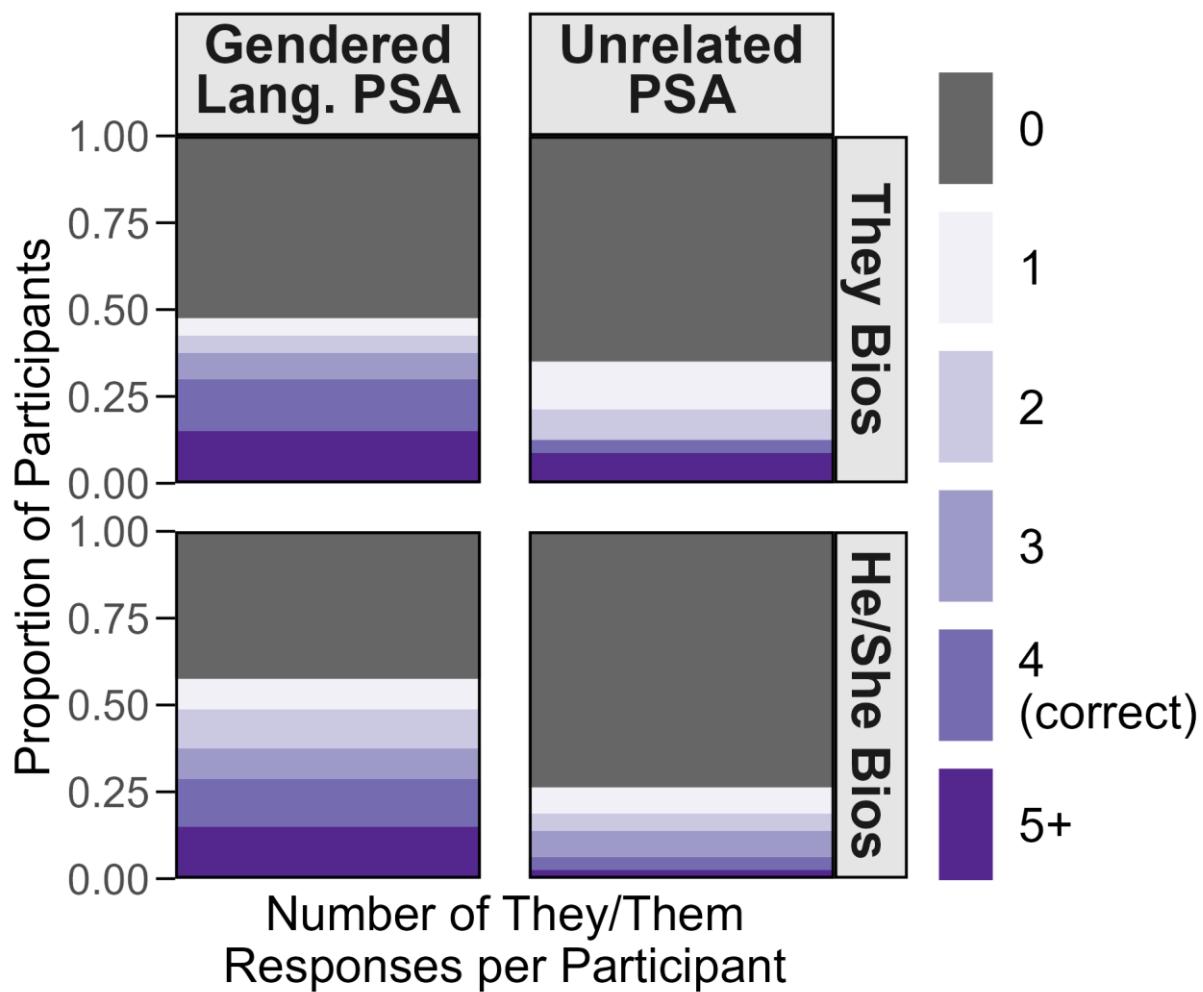
Production Accuracy



Condition Means



Produced Singular *They*



- Memory accuracy predicted production accuracy
- No interactions between memory accuracy and PSA/Biography conditions

1

Does information about gendered language support memory for and production of singular *they*?

- PSA reduced relative difficulty of *they/them* for both memory and production
- PSA increased the proportion of people who tried to produce singular *they*

2

Does seeing the usage of singular *they* modeled support accurate memory and production?

- Not really

3

Does the combination work better than just one?

- Not really

4

Are there different effects on memory and production?

- Stronger effects on production than memory

Conclusions

- PSA motivates people to pay attention to information about pronouns in the introductions and/or try to retrieve that information later
- Support for a model where people use episodic memory to select pronouns → context can influence which strategies people use
- Encouraging to see an effect of a low-cost, easy buy-in intervention

Open Questions

- How long does the PSA effect last?
- Does this extend to spoken language?



EXPERIMENT 3

Effects of including pronouns in
introductions and on nametags
on spoken production

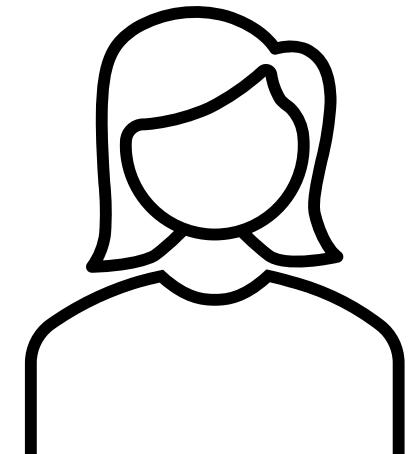
- What information does this convey?
 - How you want to be referred to
 - Your gender
 - Your beliefs about gender, language, and politeness
 - Your stance towards LGBTQ+ communities as a whole and trans and gender-diverse (TGD) people specifically
- Common EDI policy recommendation
- Option on many social media platforms, institutional accounts, and online tools (e.g., Zoom, Instagram, Brightspace, university registrar, LinkedIn, GitHub)
- Goal is that if more people treat gendered language as something to state preferences for, it will become less marked for TGD people



- Direct information about a character using they/them supports
 - Comprehension (Arnold et al., 2021)
 - Production (Arnold, Venkatesh et al., 2022)
- LGBTQ+ people evaluated a fictional company more positively when employee bios included pronouns (she/her for a person where she/her would have been assumed) (Johnson et al., 2021)
- If TGD people perceive the environment as safer and more accepting
 - More likely to choose that environment
 - More likely to ask for correct gendered languageBoth good outcomes!
- But does encouraging people to indicate their pronouns mean that people who use they/them actually get misgendered less frequently?
- This isn't very useful as an EDI practice recommendation if it doesn't change allies' concrete behavior

Does making information about pronouns more salient (Intros) and accessible (Nametags) affect pronoun *production*?

I'm Bethany,
and I use
they/them
and she/her



Bethany Gardner (they/she)

+Nametag

+Intro



-Nametag

-Intro



3 images described with *she* or *they* in norming study, and 3 images described with *he* or *they*

6 gender-neutral names



Sam
(he/him)

Jaime
(they/them)



Jaime's Brother



Sam's Sister



Jaime (they/them)



Sam (he/him)



Jaime's Sister

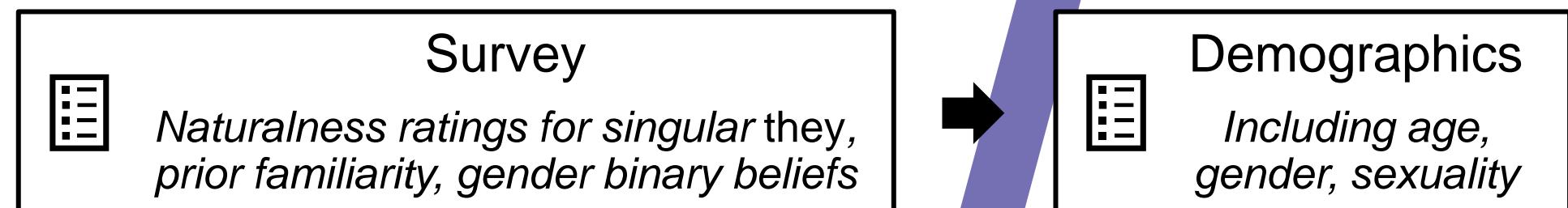
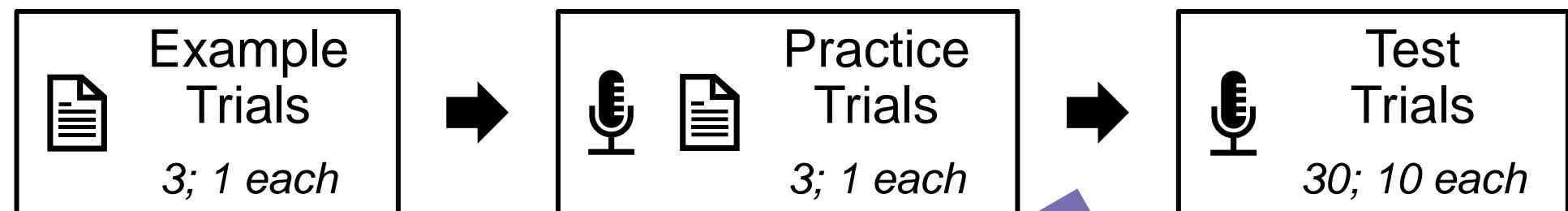


8
sec

Jaime gave the apple
to their brother.



Sam's Brother



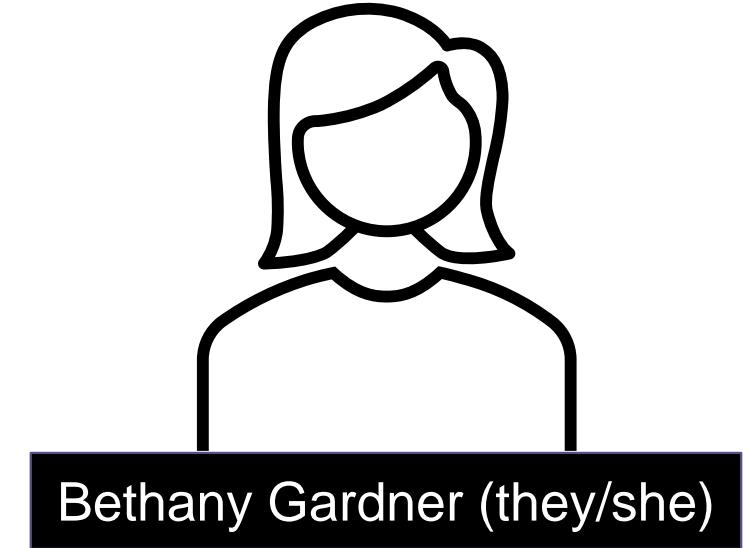
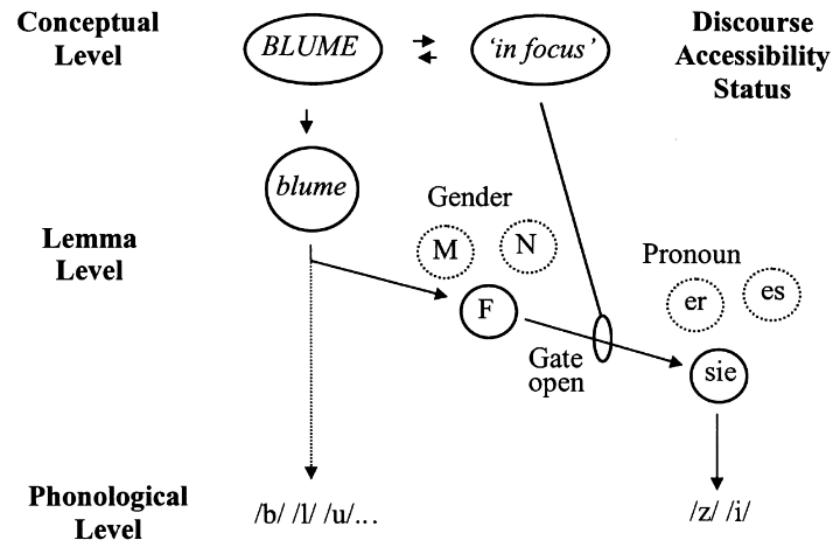
seen ≥ 5 examples
of pronouns

- ① Can people produce specific singular *they* in a speech production task?

- ② Does making information about pronouns salient when introducing the character support use of singular *they*?

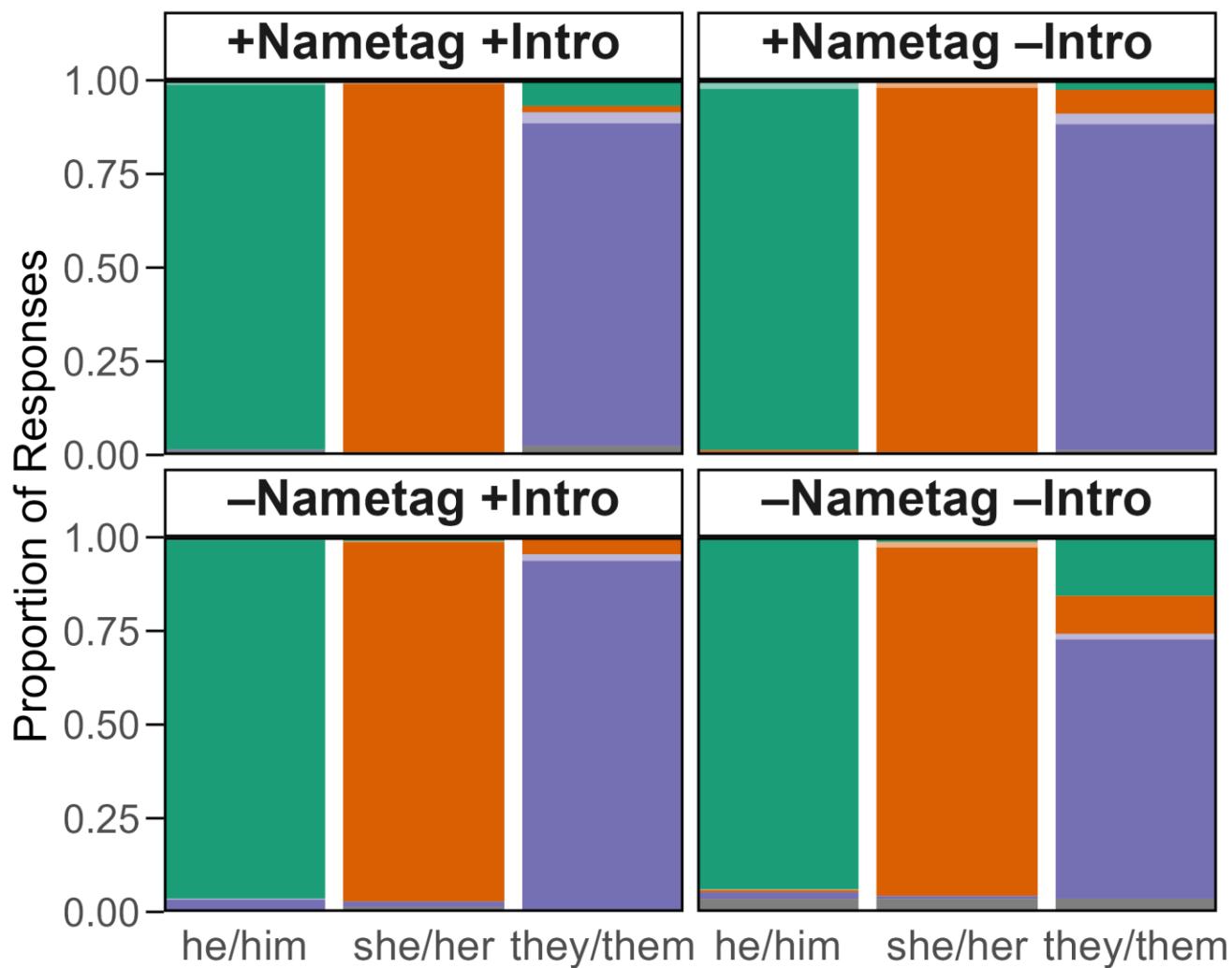
- ③ Does keeping information about pronouns accessible through nametags support use of singular *they*?

- ④ If speakers do incorporate this information, is the combination more effective than just one?

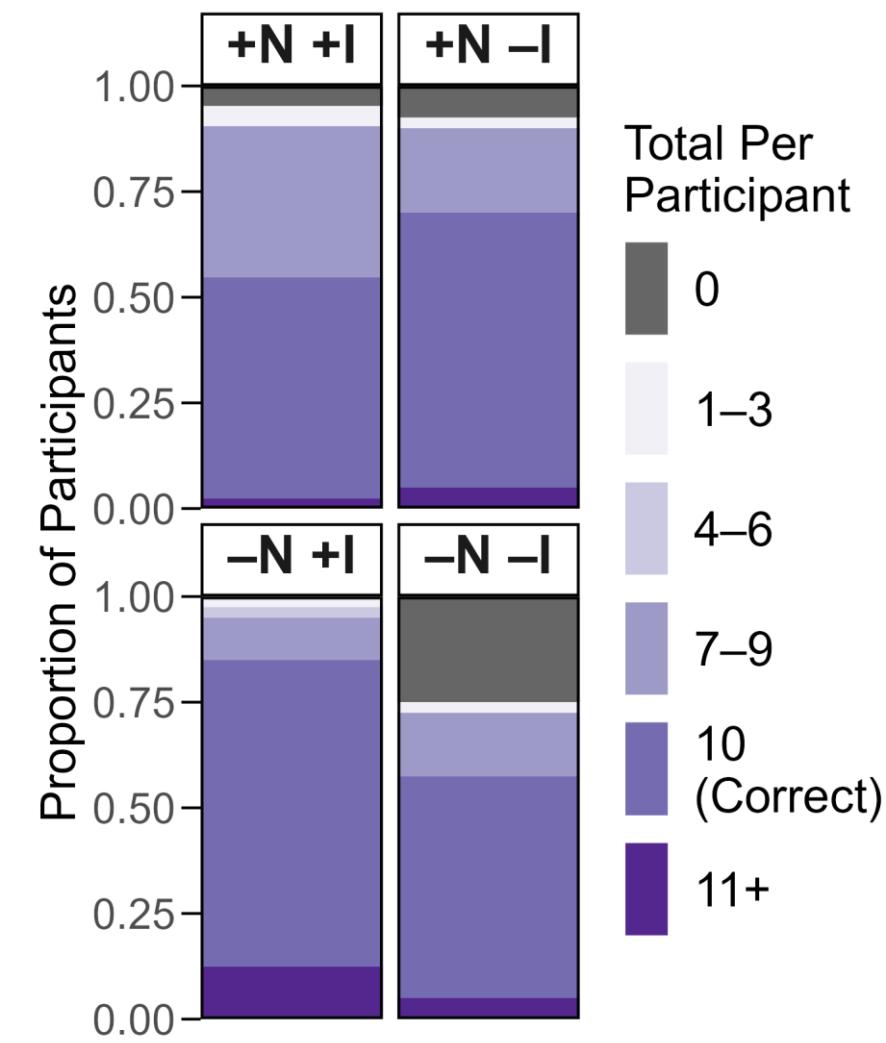


Sources of information that aren't necessarily linked together,
causing errors like “she uses they/them pronouns”

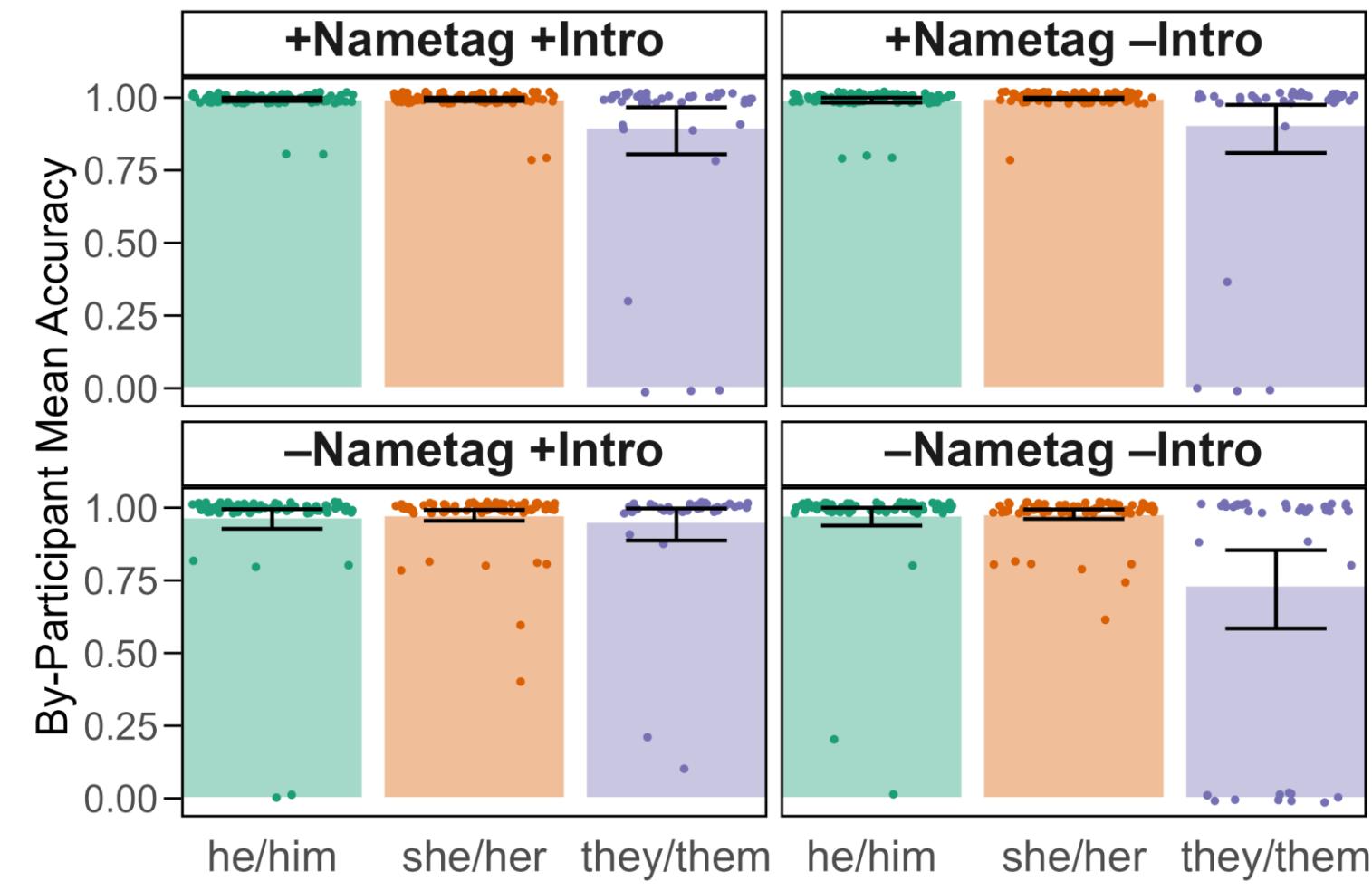
Final Pronouns Produced



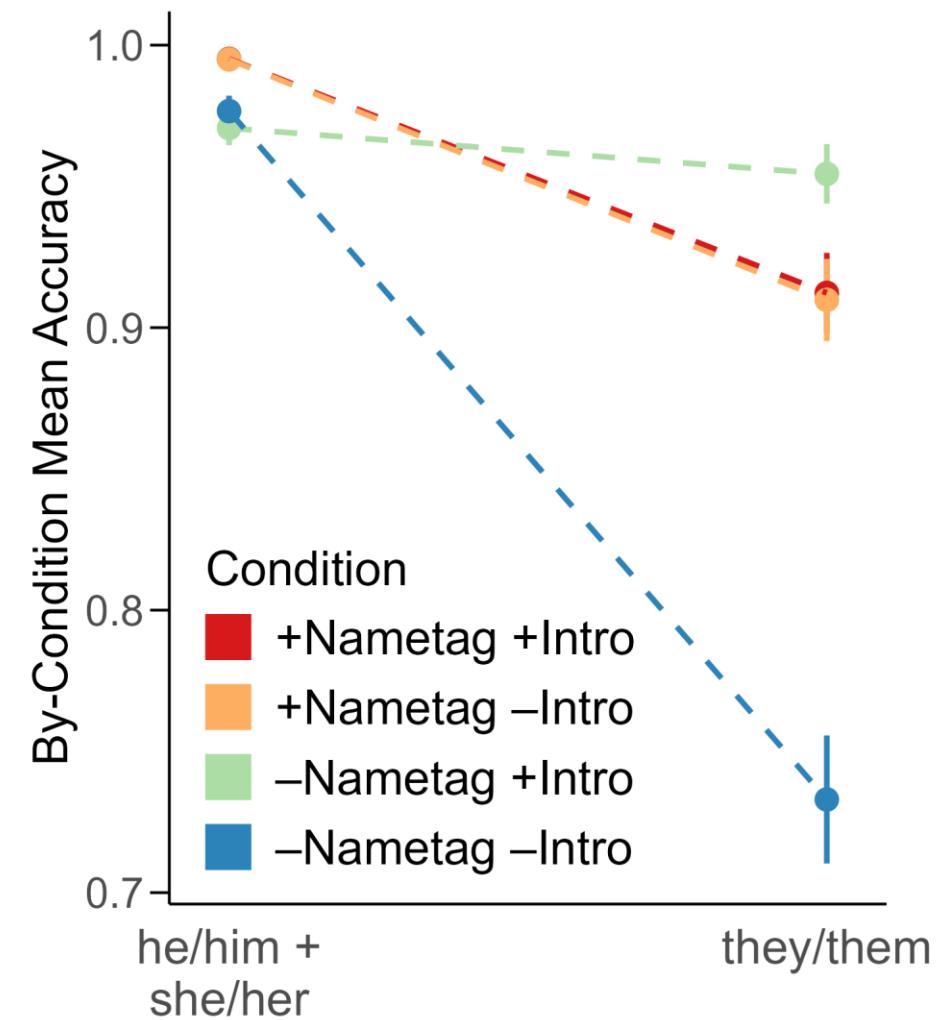
Their Responses



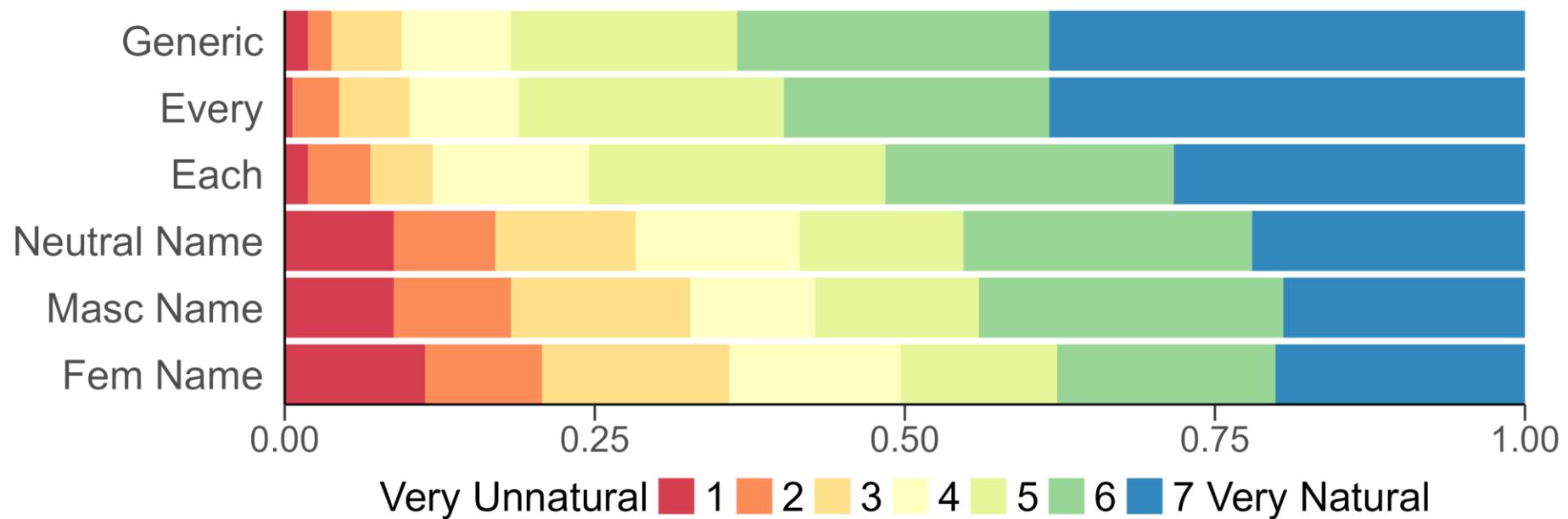
Accuracy



Condition Means



Singular *They* Naturalness Ratings



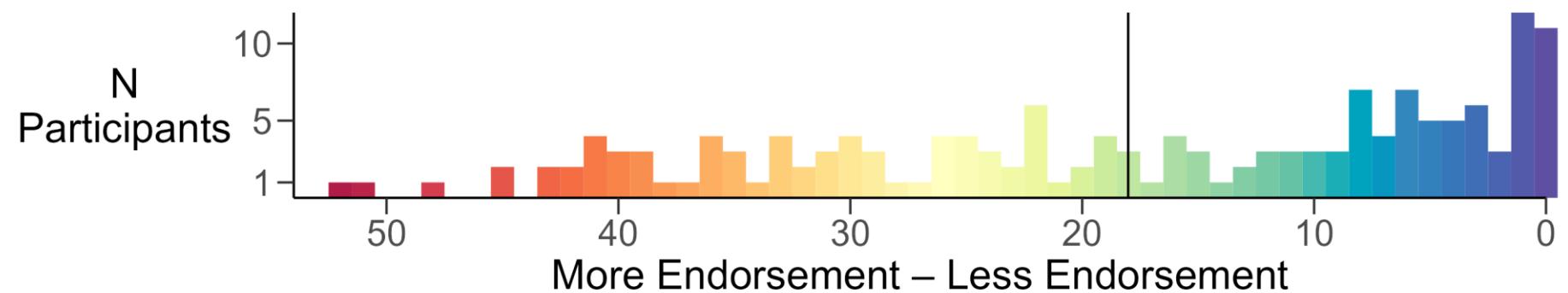
N = 162

Age: median 34

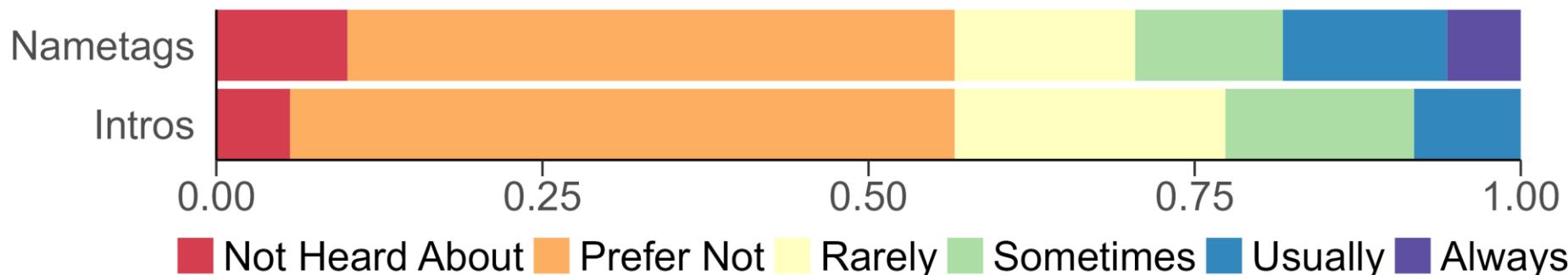
LGBQ+: 38

TGD: 6

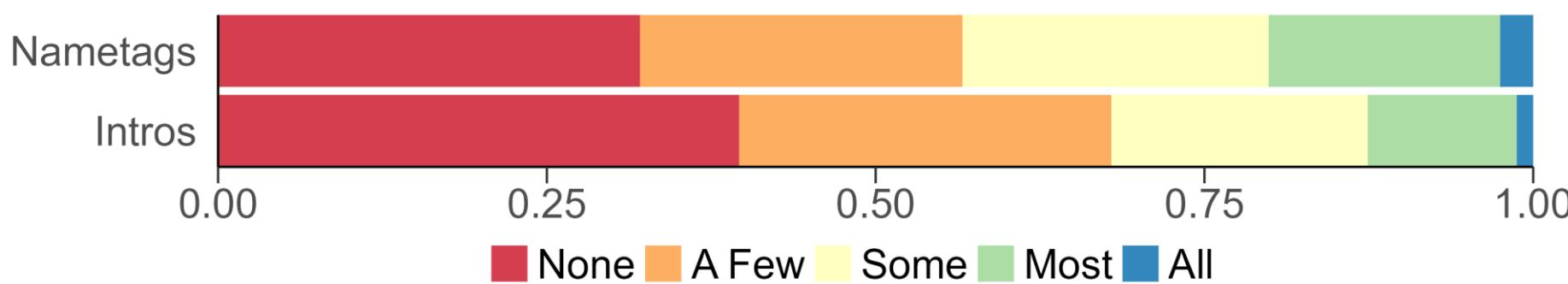
Gender Binary & Gender Essentialism Beliefs



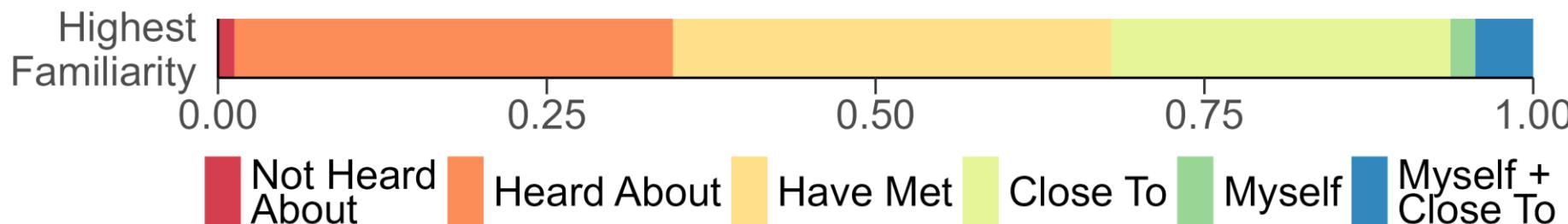
Familiarity With Pronoun-Sharing Practices: Self



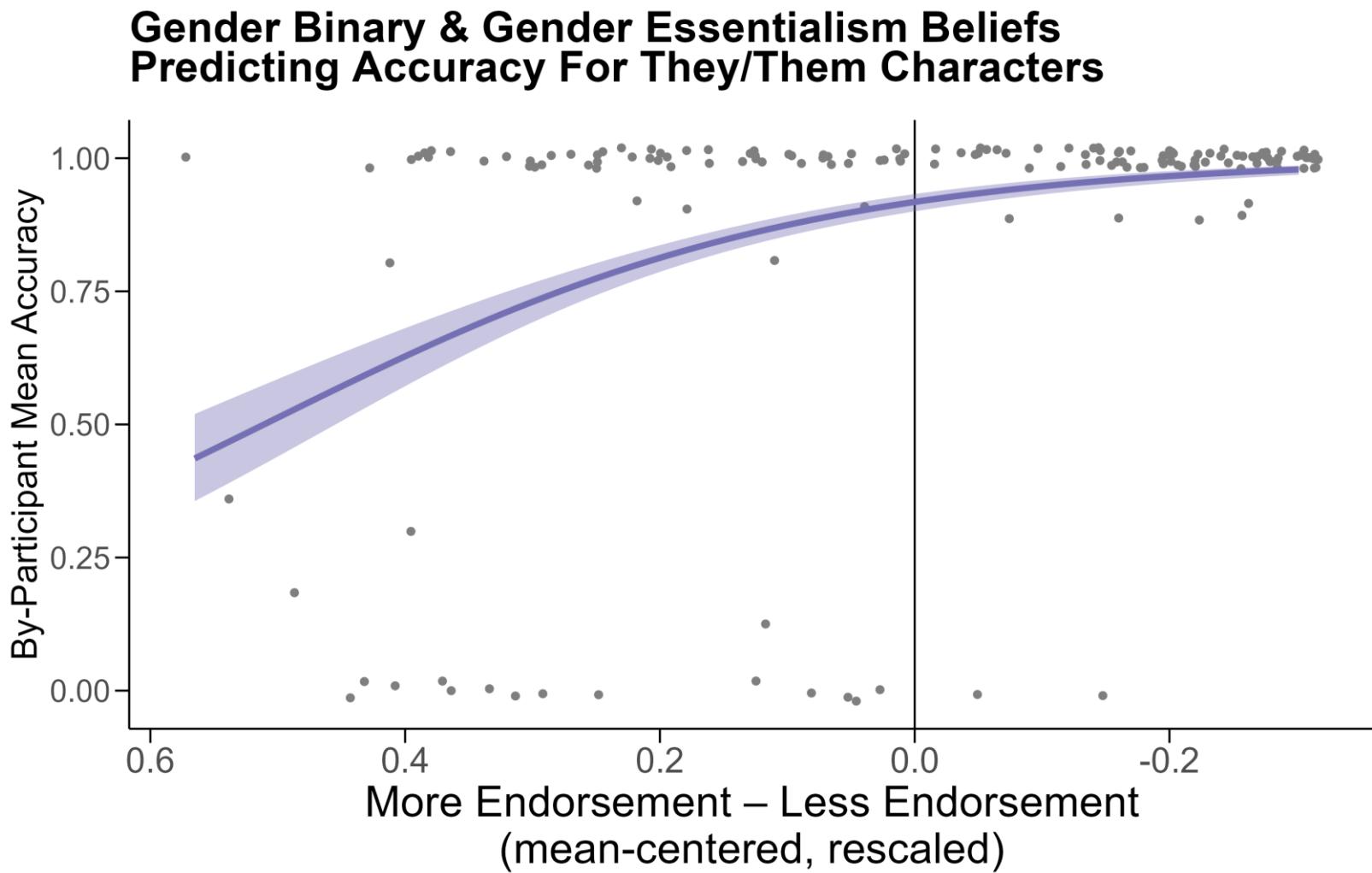
Familiarity With Pronoun-Sharing Practices: Others



Experience Using They/Them Pronouns



- High internal reliability → exploratory analysis testing if adding participant covariates to hypothesis-testing model improved fit (Hedge et al., 2017; Staub, 2021)
- Replicate correlations with acceptability judgments
- However, acceptability judgments for singular *they* don't predict production
- Strongest predictor is gender beliefs



- ① Can people produce specific singular *they* in a speech production task?
→ ~70% accurate after seeing 5 examples
- ② Does making information about pronouns salient when introducing the character support use of singular *they*?
→ Yes! (90–95% accurate)
- ③ Does keeping information about pronouns accessible through nametags support use of singular *they*?
→ Yes! (90% accurate)
- ④ If speakers do incorporate this information, is the combination more effective than just one?
→ No...?



EXPERIMENT 4

Online processing

- One of the most common objections to singular *they* is that it's too ambiguous (Hekanaho, 2020)
- But we don't know much about the actual processing difficulty
 - Generic *they*: some processing cost, but easily accommodated (Sanford & Filik, 2007; Doherty & Conklin, 2017)
 - Specific *they*: less data, mixed results. Higher processing cost than generic *they*, but still manageable? (Arnold et al., 2023; Chen et al., 2021; Prasad & Morris, 2020)
- Reasons we would predict it would be harder:
 - New
 - Low-frequency
 - Dislike things that take more effort to process (Alter & Oppenheimer, 2009; Dragojevic et al., 2016, 2017, 2020)
- But people's metalinguistic attitudes don't necessarily match their actual language processing

Intro	Exp 1	Exp 2	Exp 3	Exp 4	Background	Design	Predictions	Results	Summary
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Is it *really* that hard?

...when you can learn to anticipate it?

- Most reading time studies use isolated sentences, with new names/characters for each trial
- Since singular *they* is low frequency even for people who have it in their grammar, this is maybe an extra high bar

...using what strategies?

- Using the same processing mechanisms as other pronouns, or something different?
- Testing whether singular *they* follows the same order of mention discourse constraints as *he* and *she*

✗ 6 Characters



This is Jaime.
They work as
a nurse.

✗ 6 Characters



This is Jaime.
They like rock
climbing.

Click on Jaime.



Correct,
they are
Jaime.

**✗ All 6
Correct**



Incorrect,
he is Sam.



They are
Jaime.

Arnold et al. (2000, 2007); Brown-Schmidt & Toscano (2017); Falandays et al. (2020)



Jaime is painting
a portrait of Sam...



Name 2 characters,
always a pair that uses
different pronouns

Arnold et al. (2000, 2007); Brown-Schmidt & Toscano (2017); Falandays et al. (2020)



Jaime is painting
a portrait of Sam...

Identify target and
competitor characters

Arnold et al. (2000, 2007); Brown-Schmidt & Toscano (2017); Falandays et al. (2020)



...as some paint is spilling on the floor...

Upcoming pronoun can refer to either, but is more likely for first-mentioned

Arnold et al. (2000, 2007); Brown-Schmidt & Toscano (2017); Falandays et al. (2020)

Jaime
(they/them)



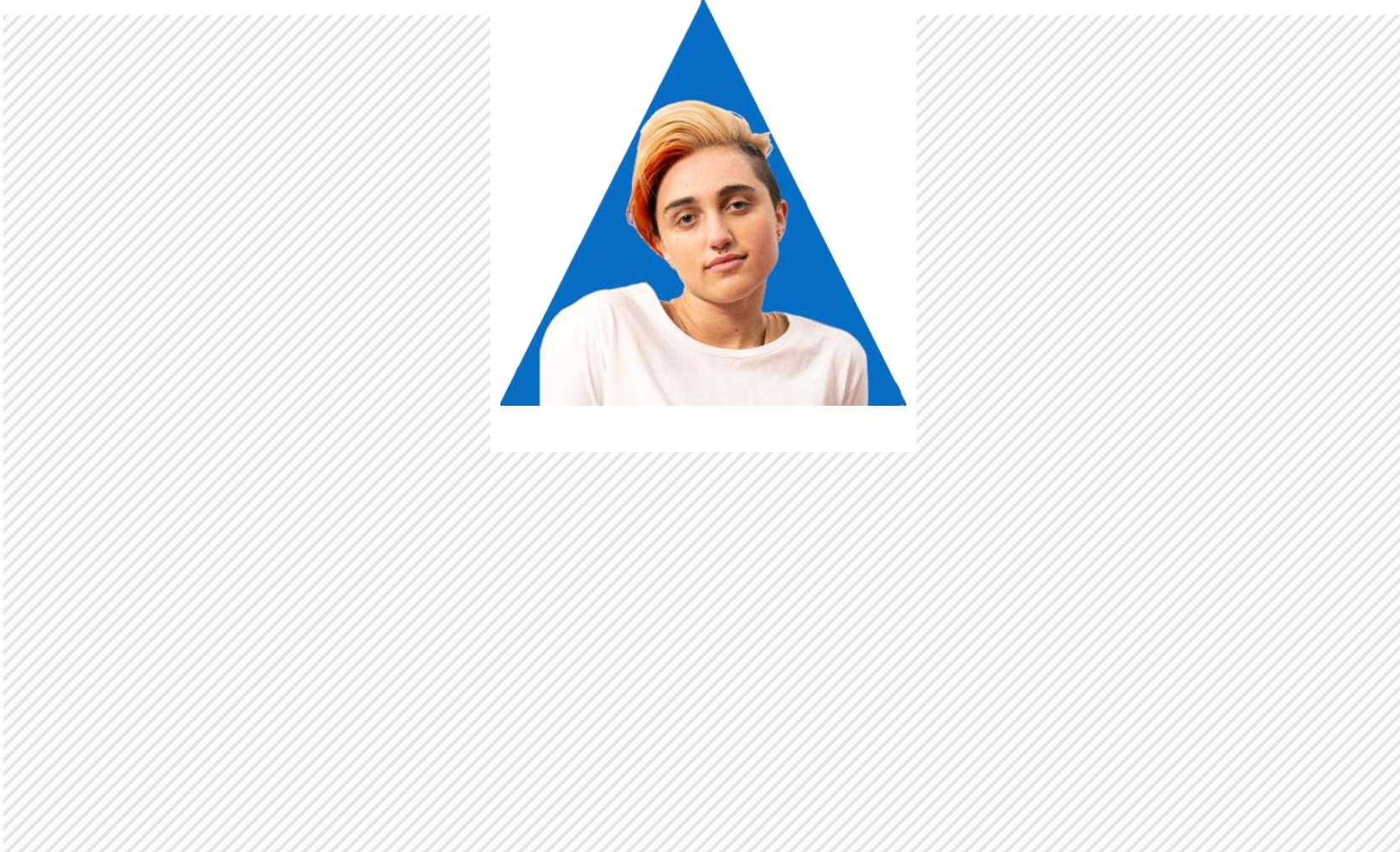
Sam
(he/him)



...They are standing in
a blue...

Same color, different shape
→ ~1200ms to observe
processing of pronoun

Arnold et al. (2000, 2007); Brown-Schmidt & Toscano (2017); Falandays et al. (2020)



...triangle, and the painting looks amazing.

Can identify target without using pronoun

Arnold et al. (2000, 2007); Brown-Schmidt & Toscano (2017); Falandays et al. (2020)



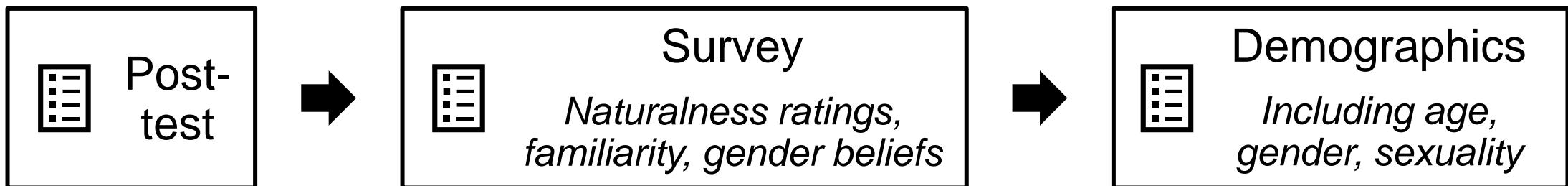
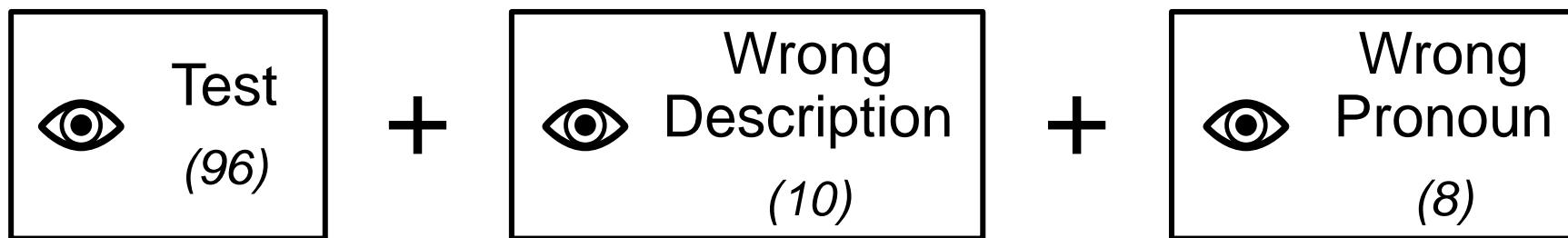
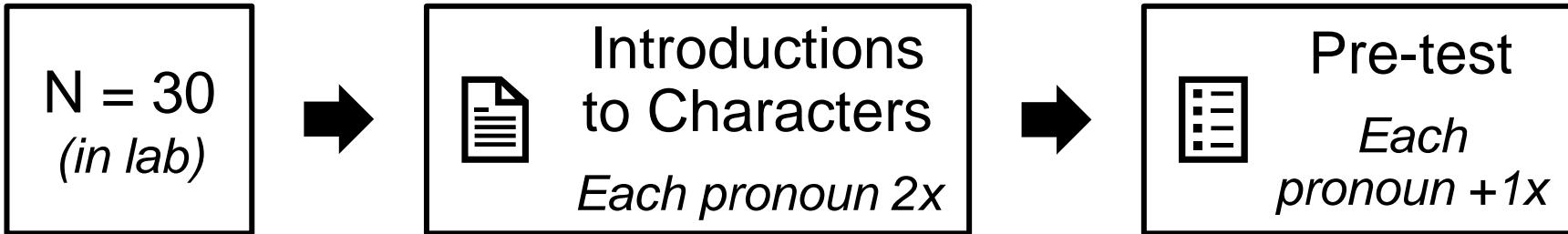
YES

Did the story match the picture?

NO

Why this design?

- Established baseline data for how *he* and *she* are processed
- But *they* is ambiguous between singular and plural here...
- Options for coercing a singular interpretation
- The issue with these constructions is that they don't have a long enough ambiguous period where the pronoun could plausibly refer to multiple pictured referents – the key thing you need for a visual world study (vs. reading time)
- These stories create a long enough ambiguous region without violating discourse expectations about how pronouns work
- We don't typically encounter singular *they* in 100% singular contexts anyway!



Pronoun Pair
Target | Competitor

“He/She”

“They
Competitor”

“They Target”

HeShe|SheHe

HeShe|They

They|HeShe

Order
Target Mentioned

First

Second

Jaime is painting
a portrait of
Sam...They

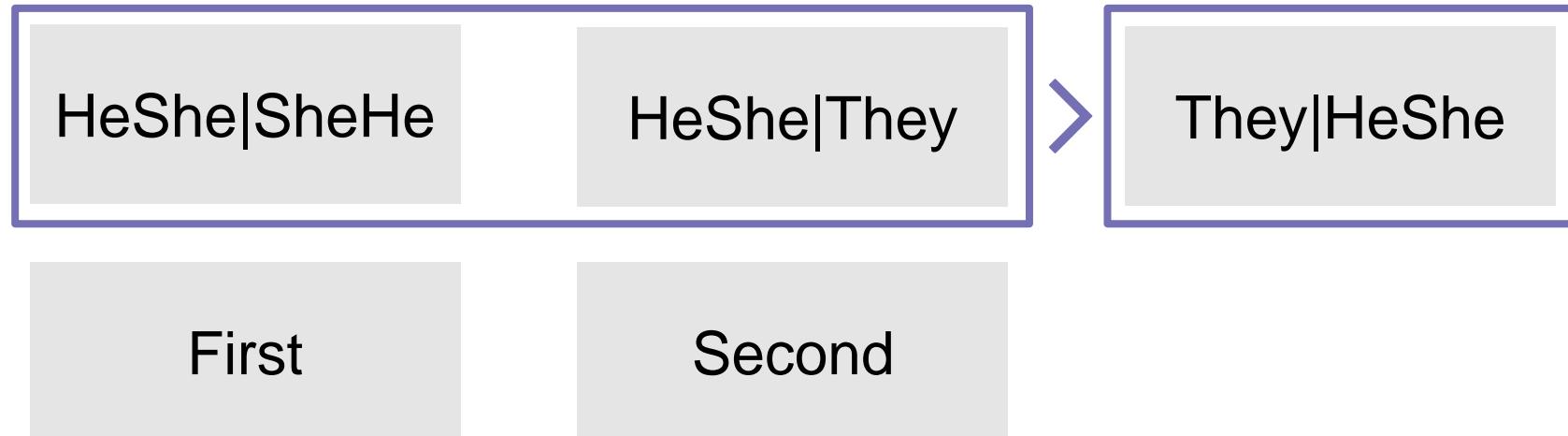
Sam is painting
a portrait of
Jaime...They

- Analysis window: 200ms after pronoun onset – 1210ms (earliest shape onset)
- 10ms bins, coded by whether the participant is looking at the target (=1) or not (=0)
- Two additional predictors to account for auto-correlation
(Brown-Schmidt et al., 2020; Cho et al., 2018)
 - AR(1): were they looking at the target in the previous bin?
 - Trend: time during trial
- In the visual world paradigm, people look at what they think is being talked about
(Allopenna et al., 1998; Sedivy et al., 1999; Spivey et al., 2002; Tanenhaus et al., 1995, 2000)
- More likely to be looking at the target character = more likely to have identified the target character as the referent of the pronoun

①

Can listeners use singular *they* to identify the referent?

- Yes, but less than for *he* and *she*
- No, because they can't
- No, because they choose to wait



② Does the pronoun of the competitor character matter?

- HeShe|They has more looks to target
→ treating the more ambiguous referent as less likely to be referred to, in general or with a pronoun?
- HeShe|They has less looks to target
→ causing interference?

HeShe|SheHe

HeShe|They

They|HeShe

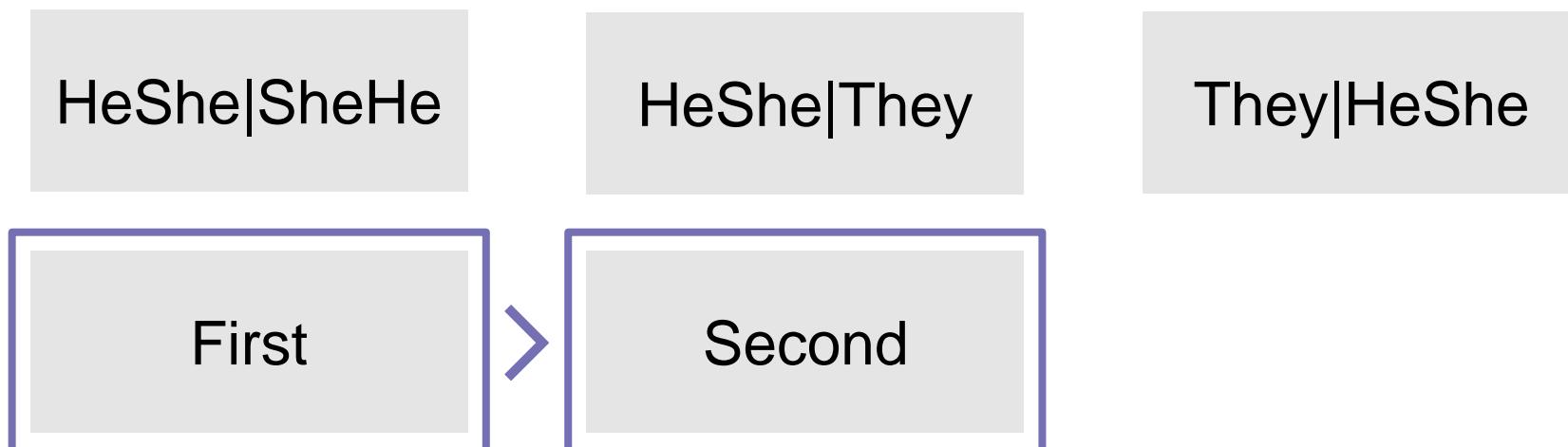
First

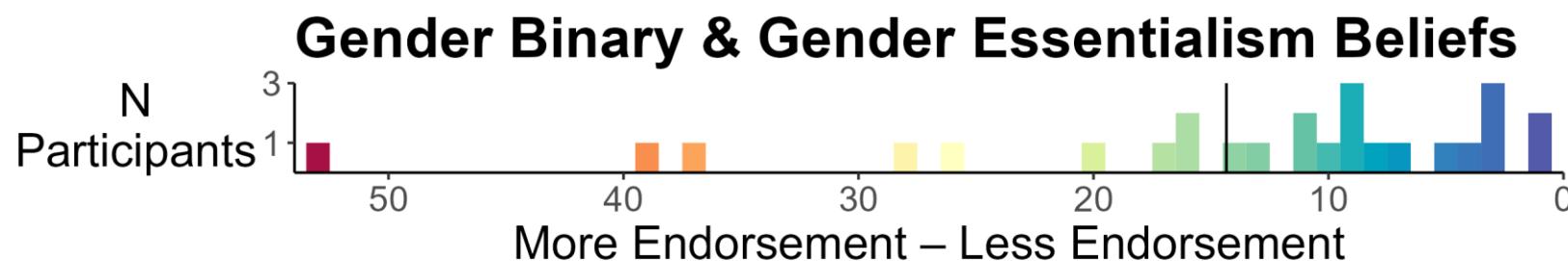
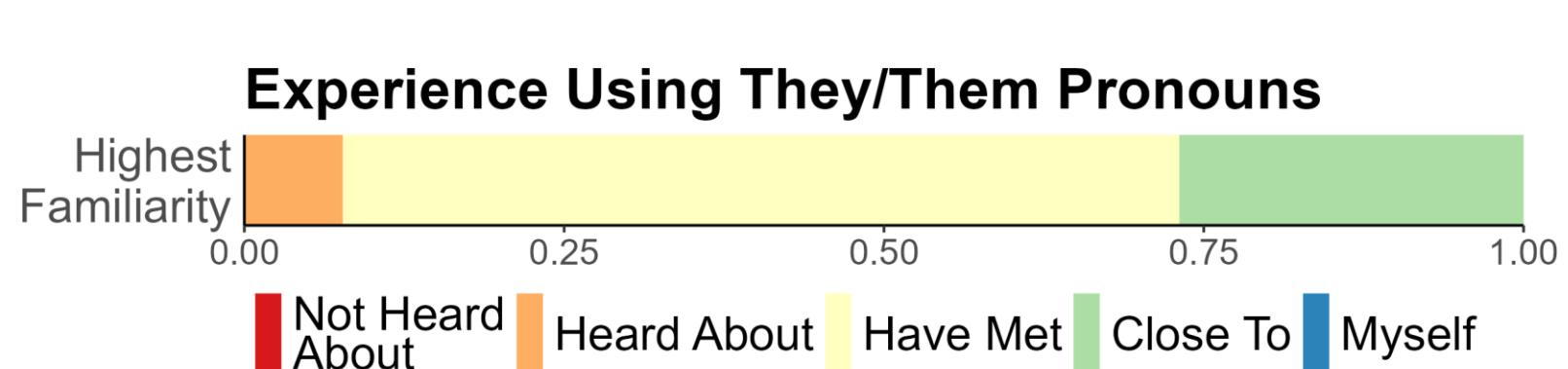
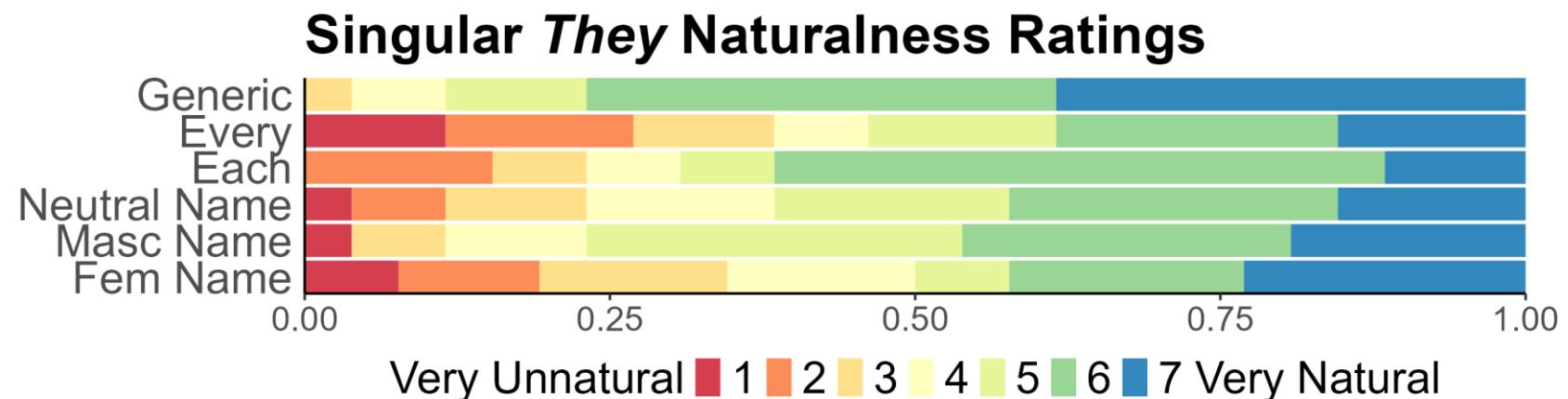
Second

③

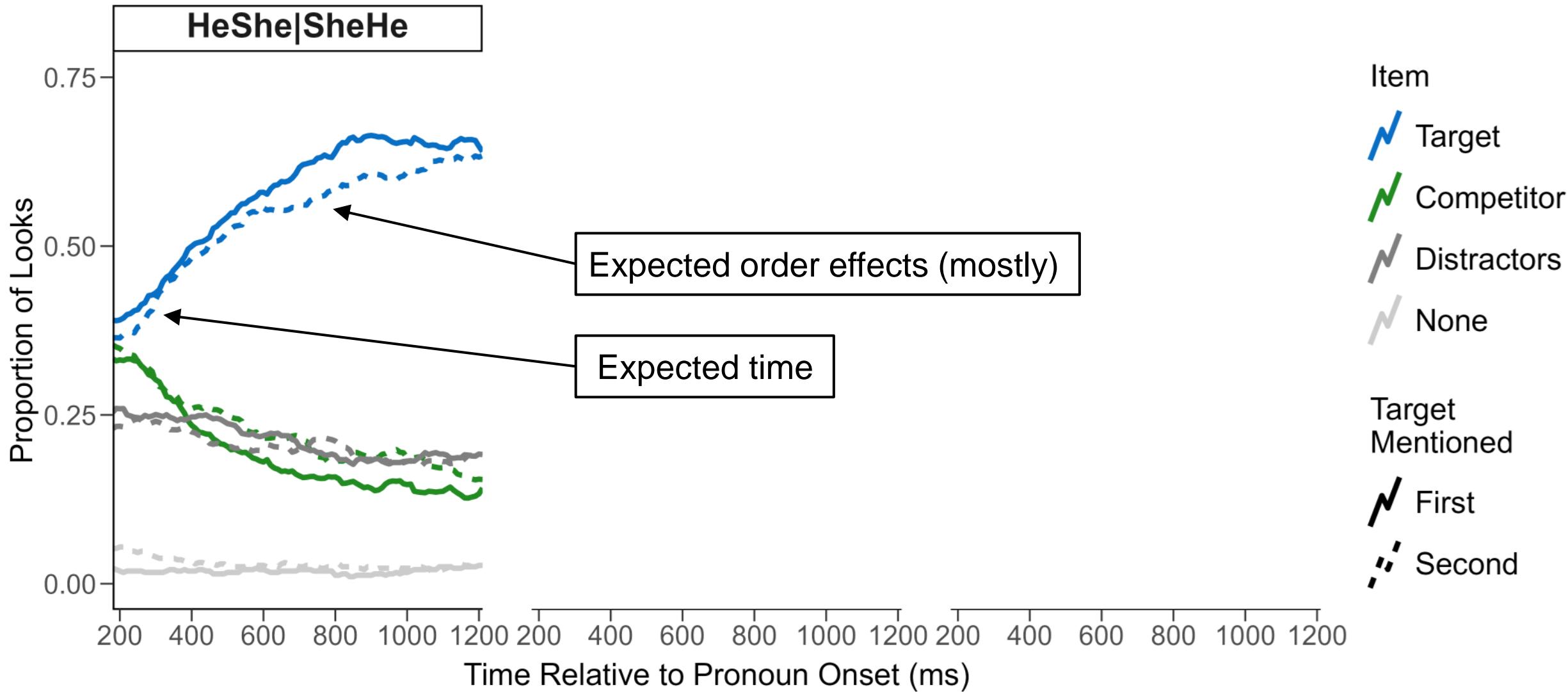
Does singular *they* show an order of mention effect?

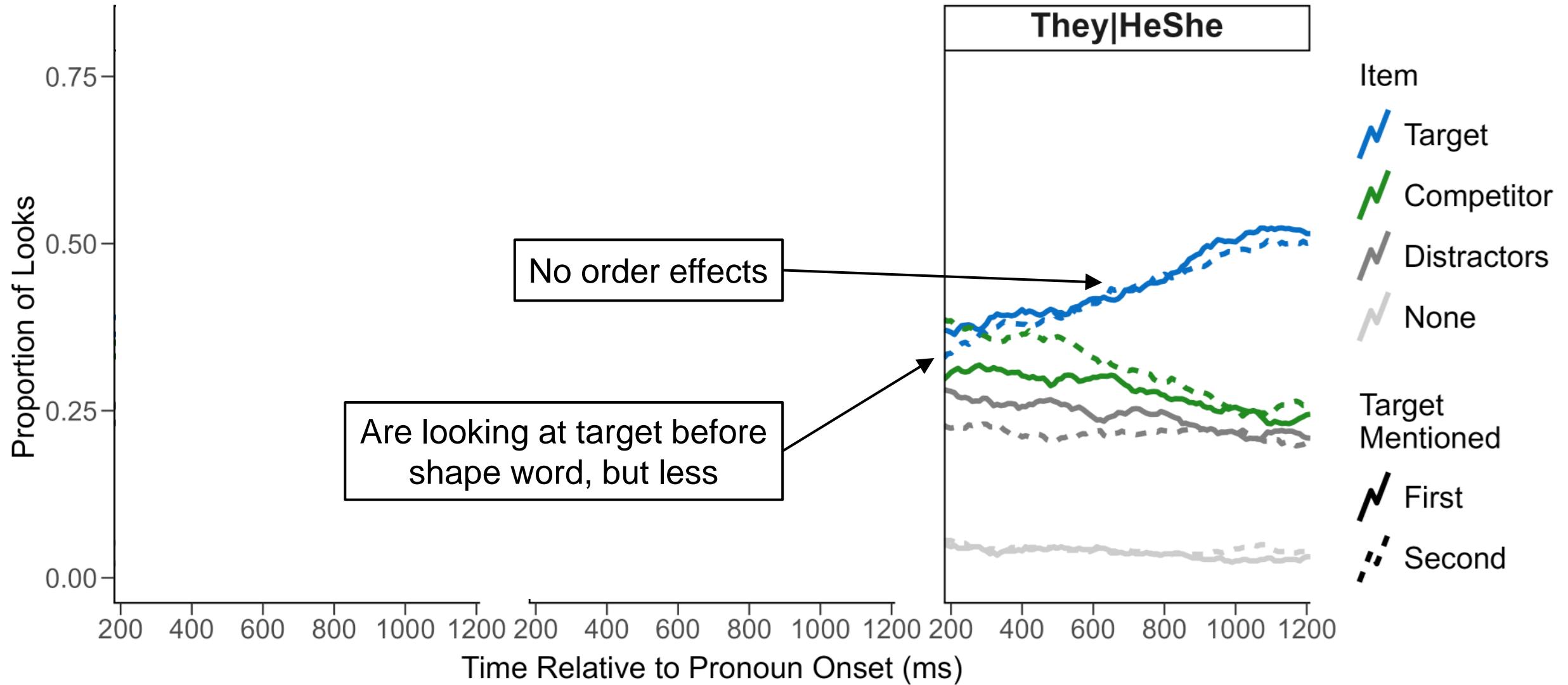
- Less likely to be looking at targets mentioned first than second (Gernsbacher, 1989; Kaiser & Trueswell, 2011)
- Expect to replicate prior findings for *he/she* (Arnold et al., 2000, 2007; Brown-Schmidt & Toscano, 2017; Falandays et al. 2020)
- If singular *they* does show an order effect, it suggests that it is being integrated into typical reference processing mechanisms (Arnold et al., 2023)

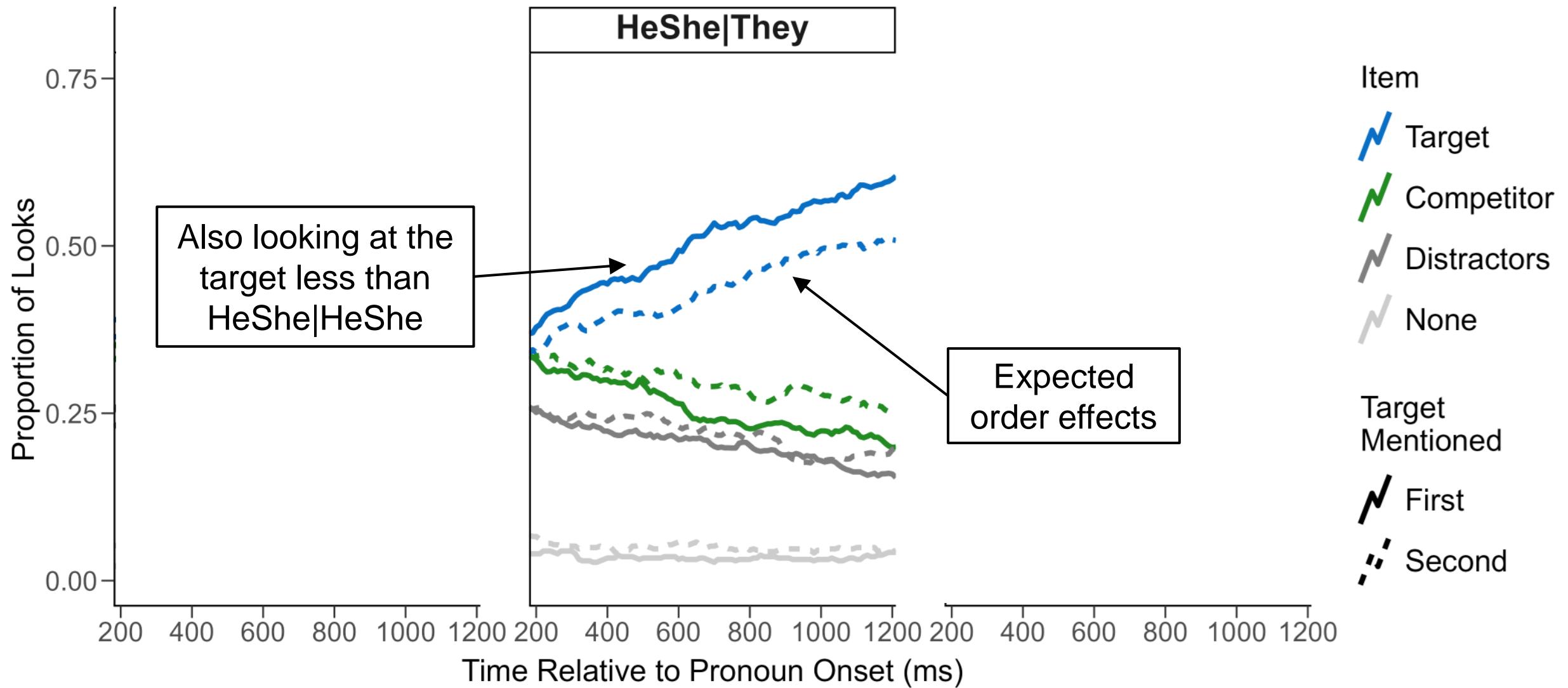


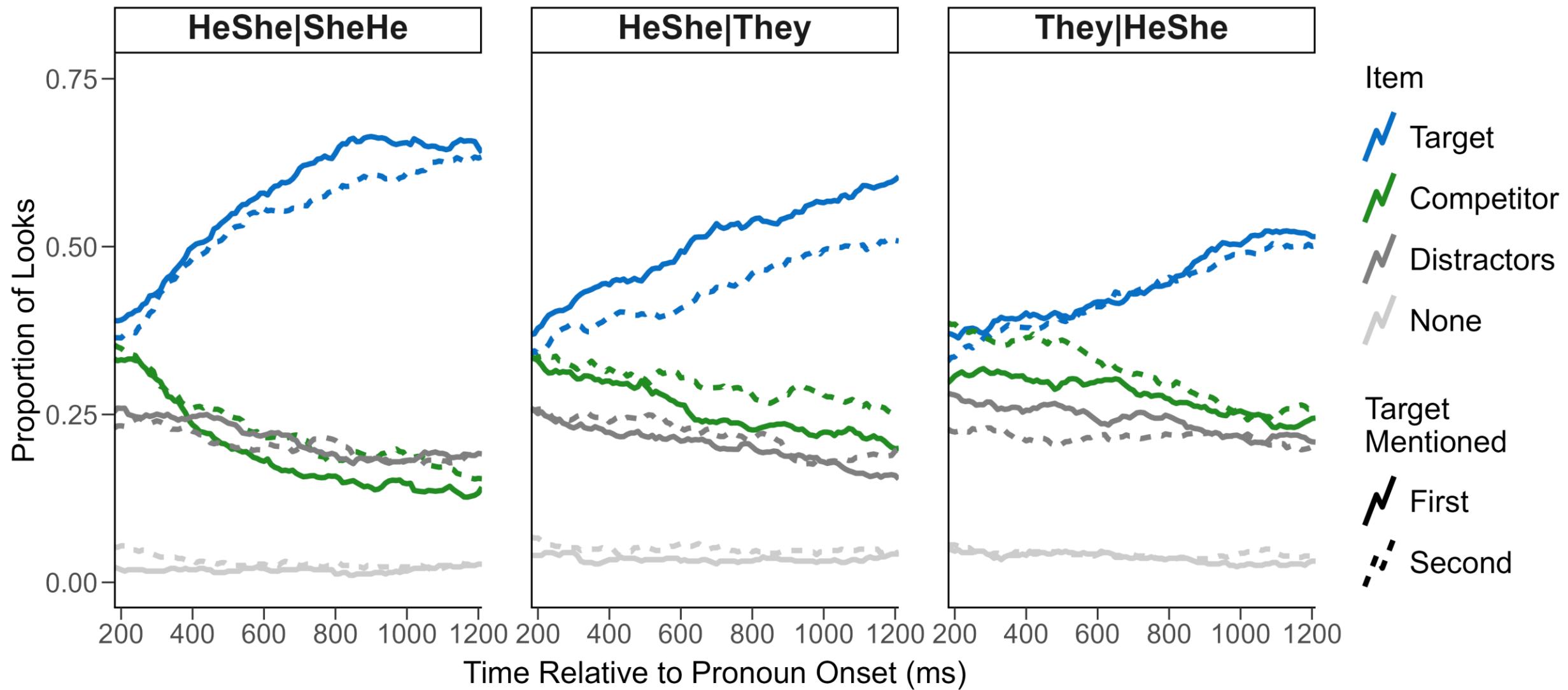


N = 30
Age: median 19
LGBQ+: 6
TGD: 0









①

Can listeners use singular *they* to identify the referent?

→ Yes, but less than with *he* and *she*, resembling patterns seen in children (Arnold et al., 2007; Song & Fisher, 2005) and L2 adults (Cunnings et al., 2017; Grüter et al., 2012; Speyer & Schleef, 2019)

②

Does the pronoun of the competitor character matter?

→ Yes, trials where the competitor uses *they/them* are slower than trials where the competitor uses *he/him* or *she/her*, even though singular *they* is never used in the story

③

Does singular *they* show an order of mention effect?

→ No, suggesting that listeners may be using different processing strategies

Additional Results:

- Not less likely to say that *they* stories matched the picture, but were slightly slower to decide
- Collecting more data to be able to do tree-based item response modeling, which can test additional hypotheses by distinguishing between looks to the target, the competitor, and everything else (Cho et al., 2020)
- A processing cost that is theoretically significant for psycholinguistics, but manageable for listeners

Future Directions:

- What would these results look like with kids who have grown up with singular *they* as part of their grammar?
- What about adults in 10 years, when we've all had more experience?

- Singular *they* provides an opportunity to extend existing processing models, and for psycholinguistics to do socially-relevant research
- Support for a model where speakers can use episodic memory about a person's stated pronouns or which pronouns other speakers use to refer to them when choosing which pronoun to produce
- A PSA about gendered language, including pronouns in introductions, and including pronouns on nametags can support accurate use of singular *they*
- Learning to comprehend and produce singular *they* can be difficult, but it is manageable

THANK YOU!

Sarah Brown-Schmidt

Feedback on various stages:

- Joint Lab
- HSP & LSA
- Duane Watson, Lisa Fazio, & Melissa Duff

RA: Morrigan Dunlap-Loomis

Open-source tools, especially PClbex

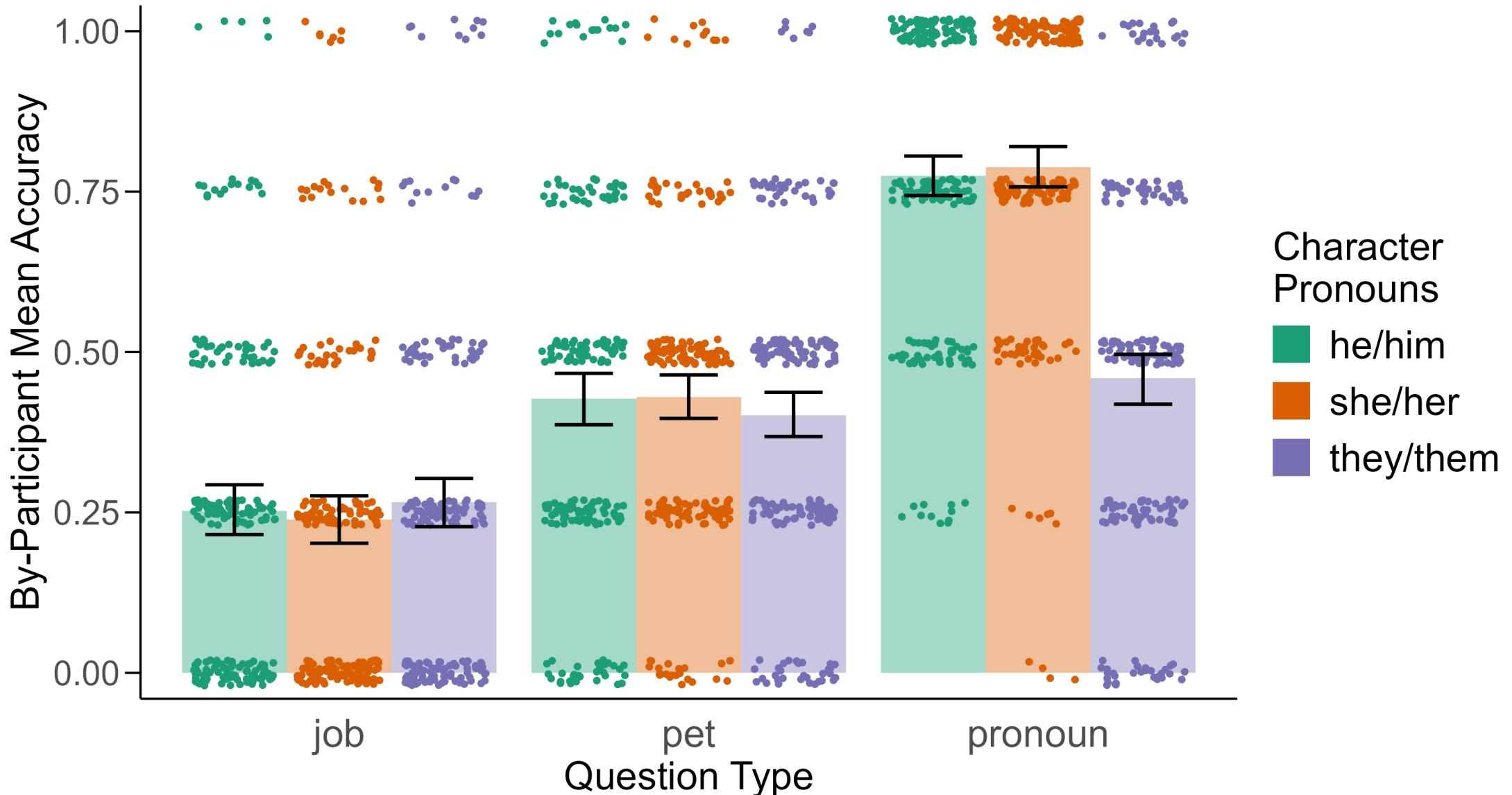


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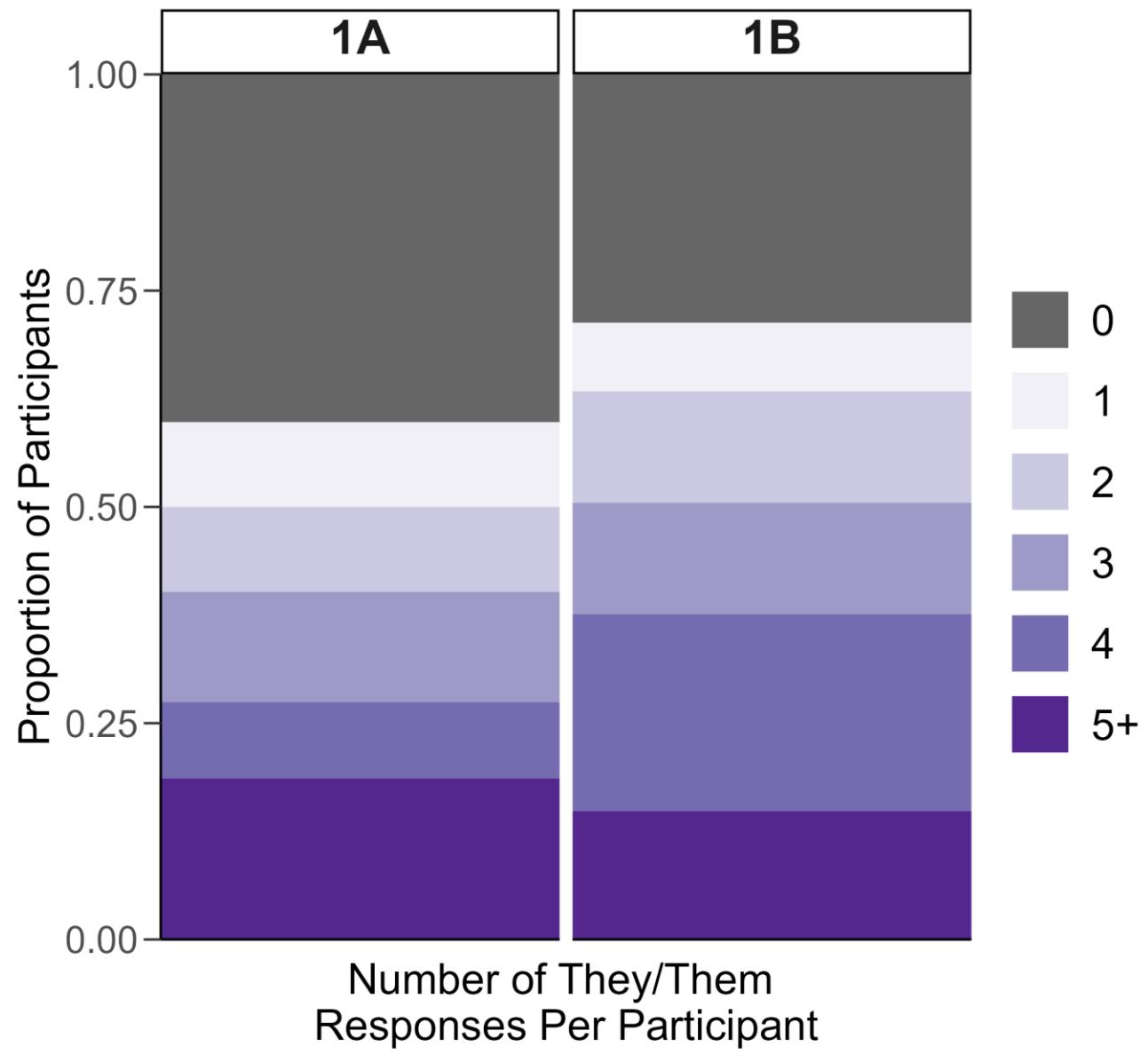
APPENDIX

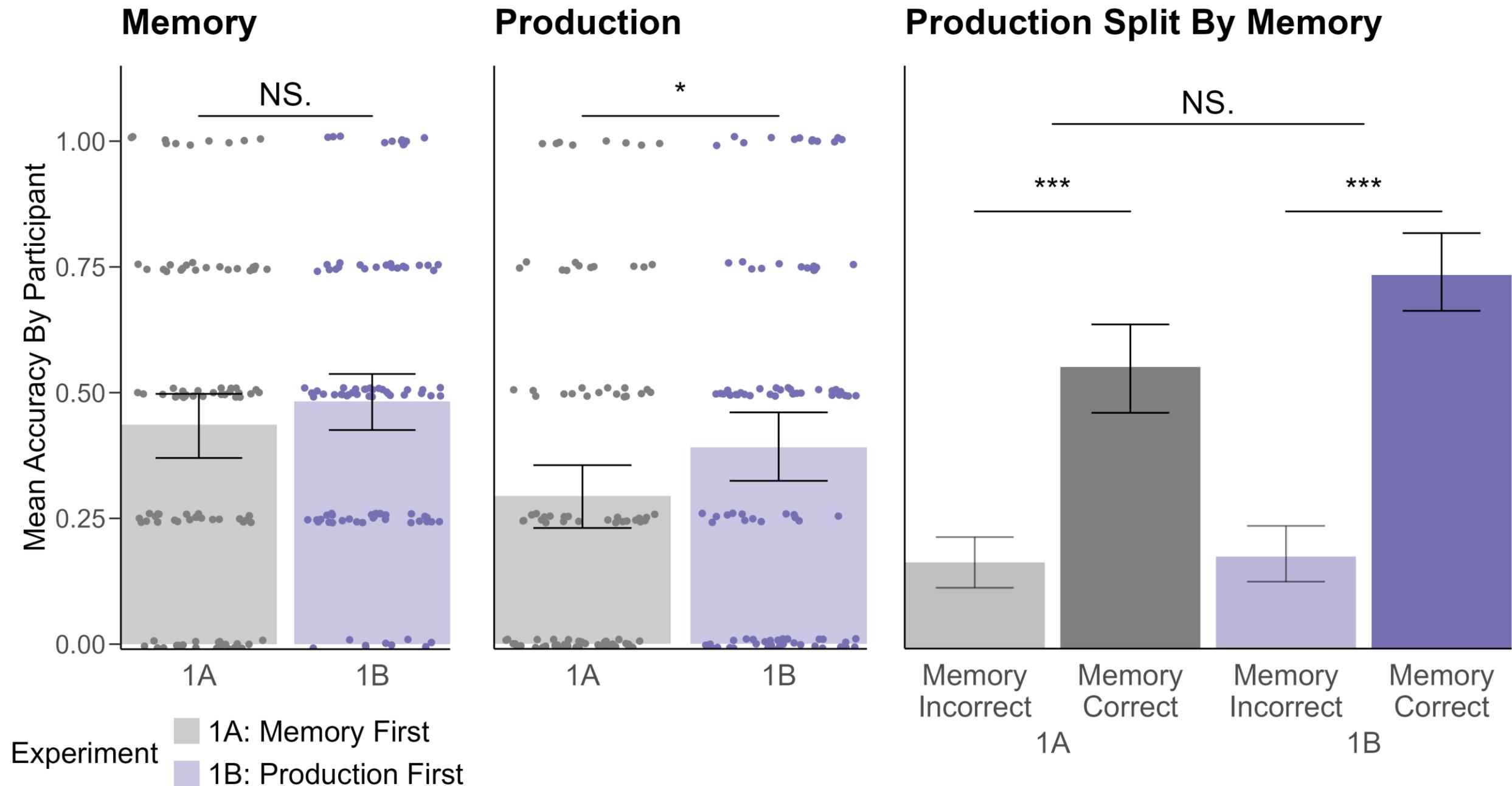
Experiment 1 Results

1A & 1B: All Memory Questions



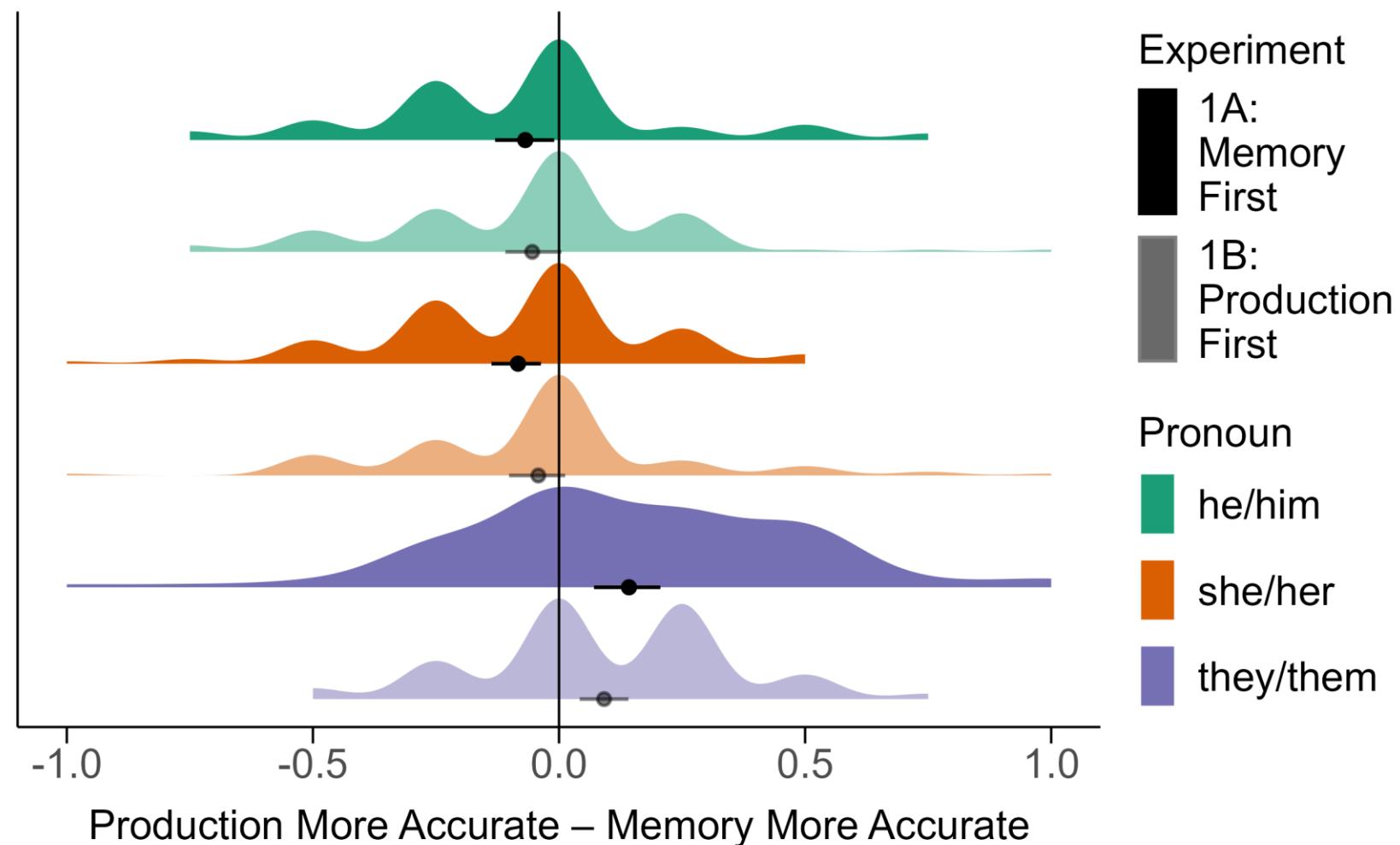
Produced Singular *They*

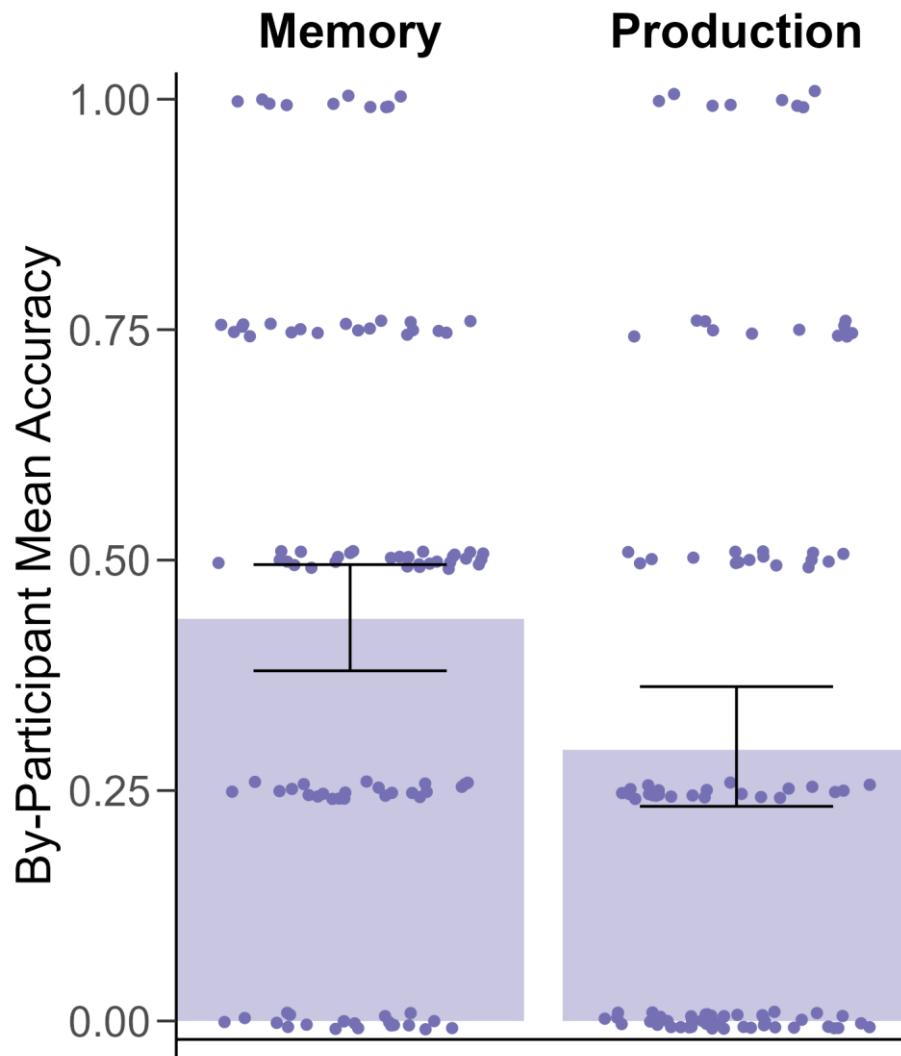




Difference Between Memory & Production Tasks

- Wait, are differences between memory and production accuracy because of task order?
- Replication study ($N = 102$) with task order flipped finds same pattern of results

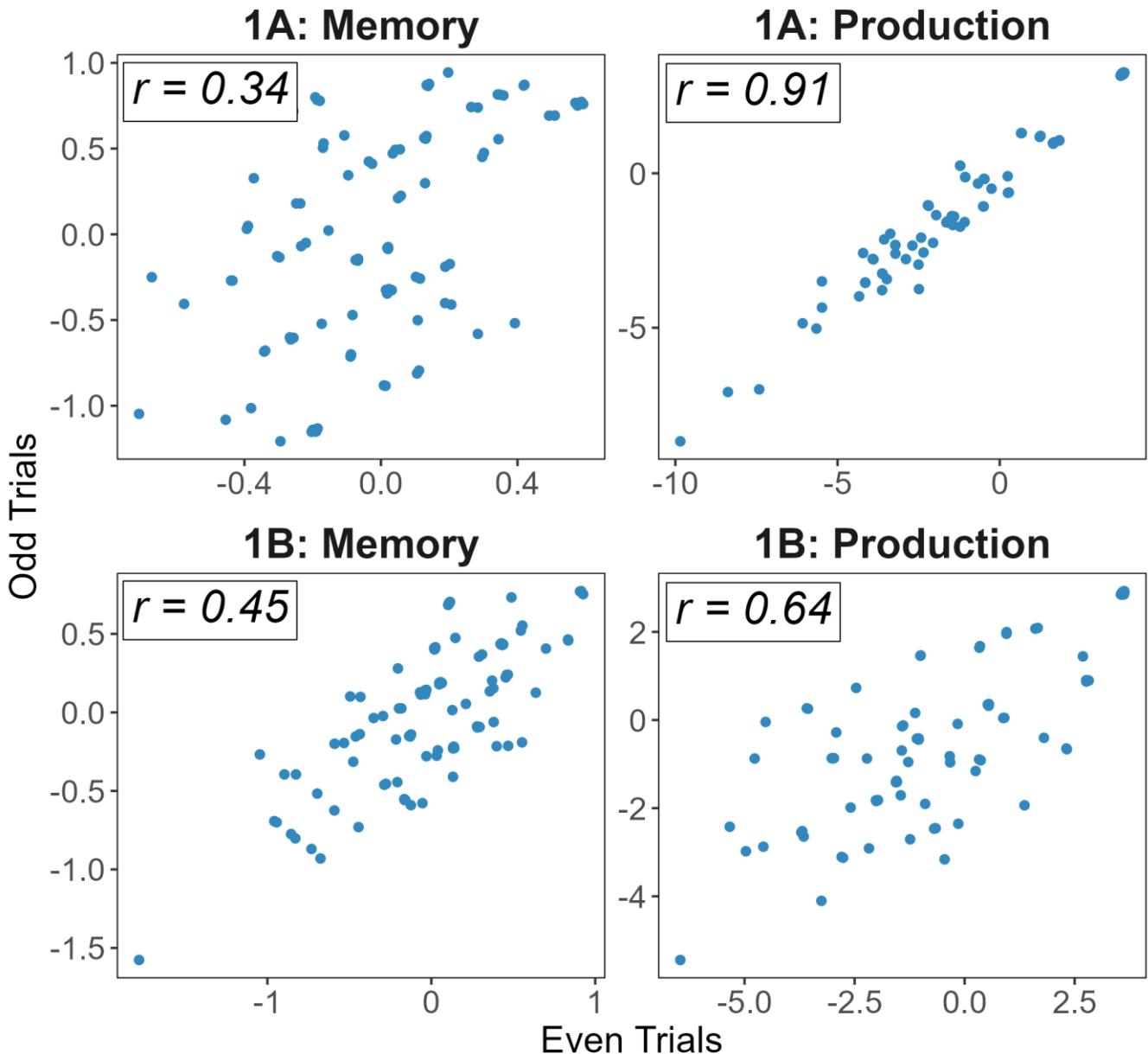




- People varied a lot in how well they learned they/them. Why?
- Need to show that a task has sufficient internal reliability before doing individual differences analyses (Hedge et al., 2017)

- Estimated reliability by correlating by-participant slopes for each half of the data (Staub, 2021)
- Internal reliability is low for memory and medium for production
- People *do* vary in their accuracy for they/them, but it's unclear how much comes from theoretically interesting factors, general factors, or noise
- Character learning task is better suited to questions about how people's behavior varies in different contexts

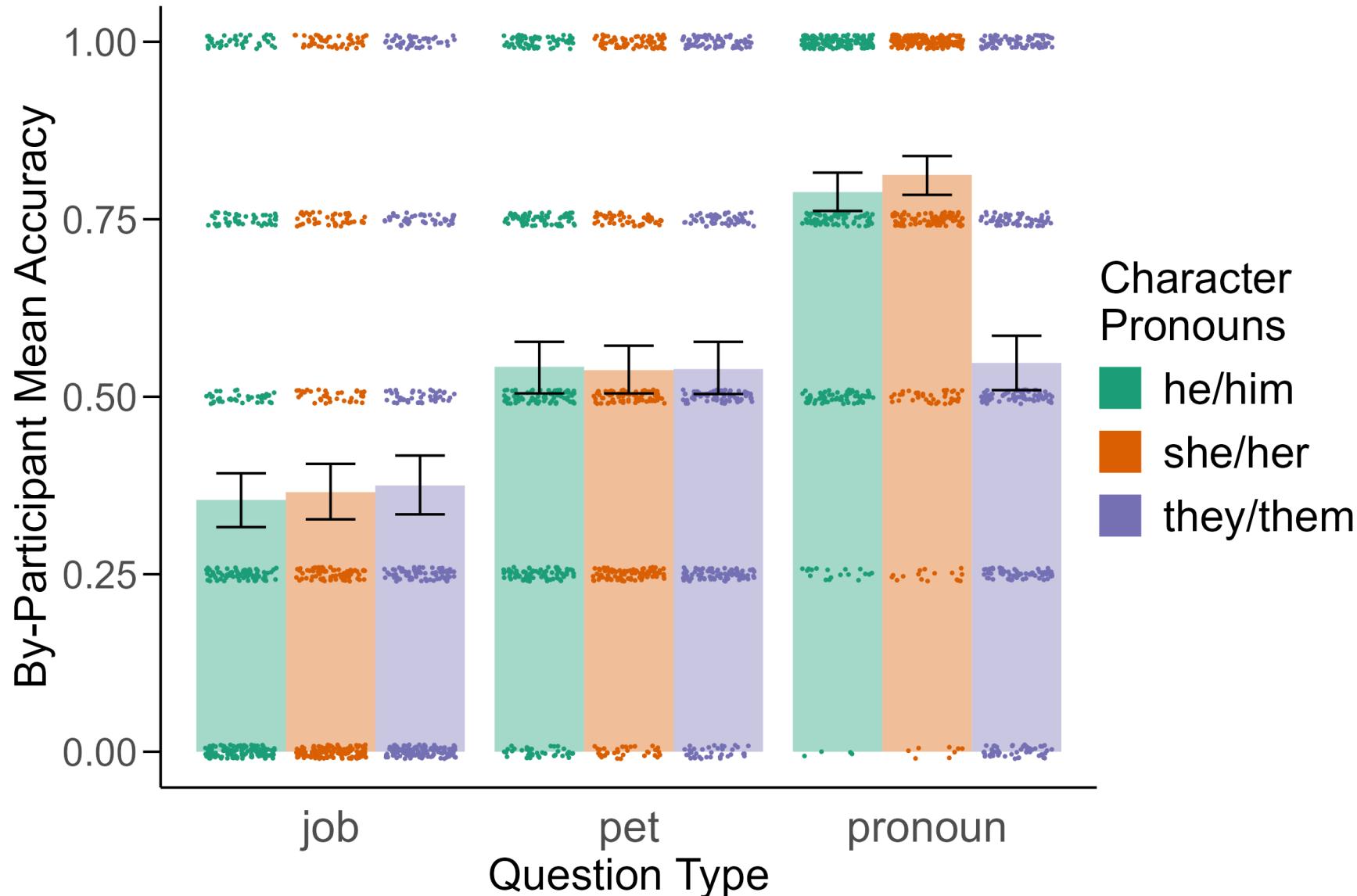
By-Participant Slope Estimates for Pronoun

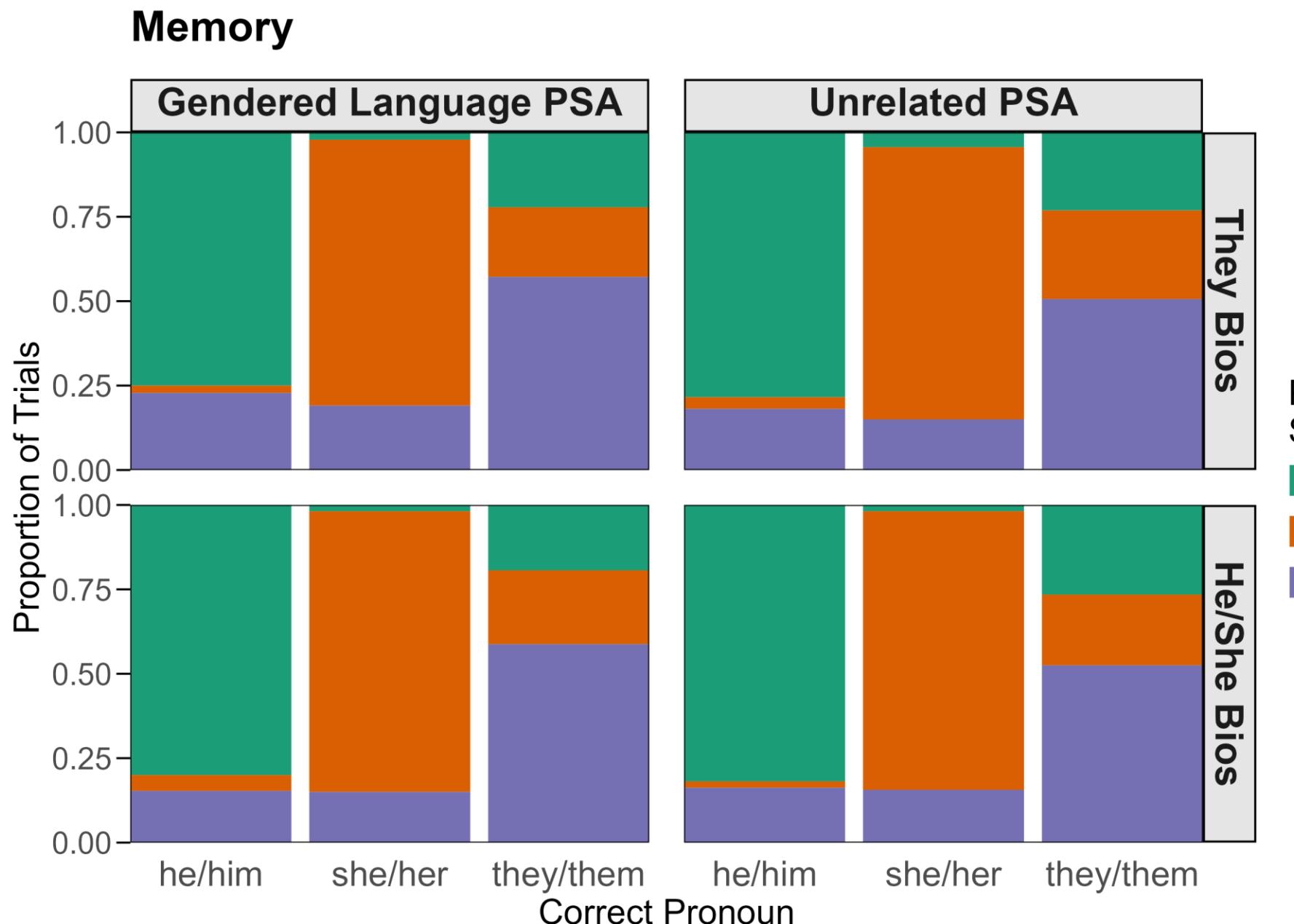


APPENDIX

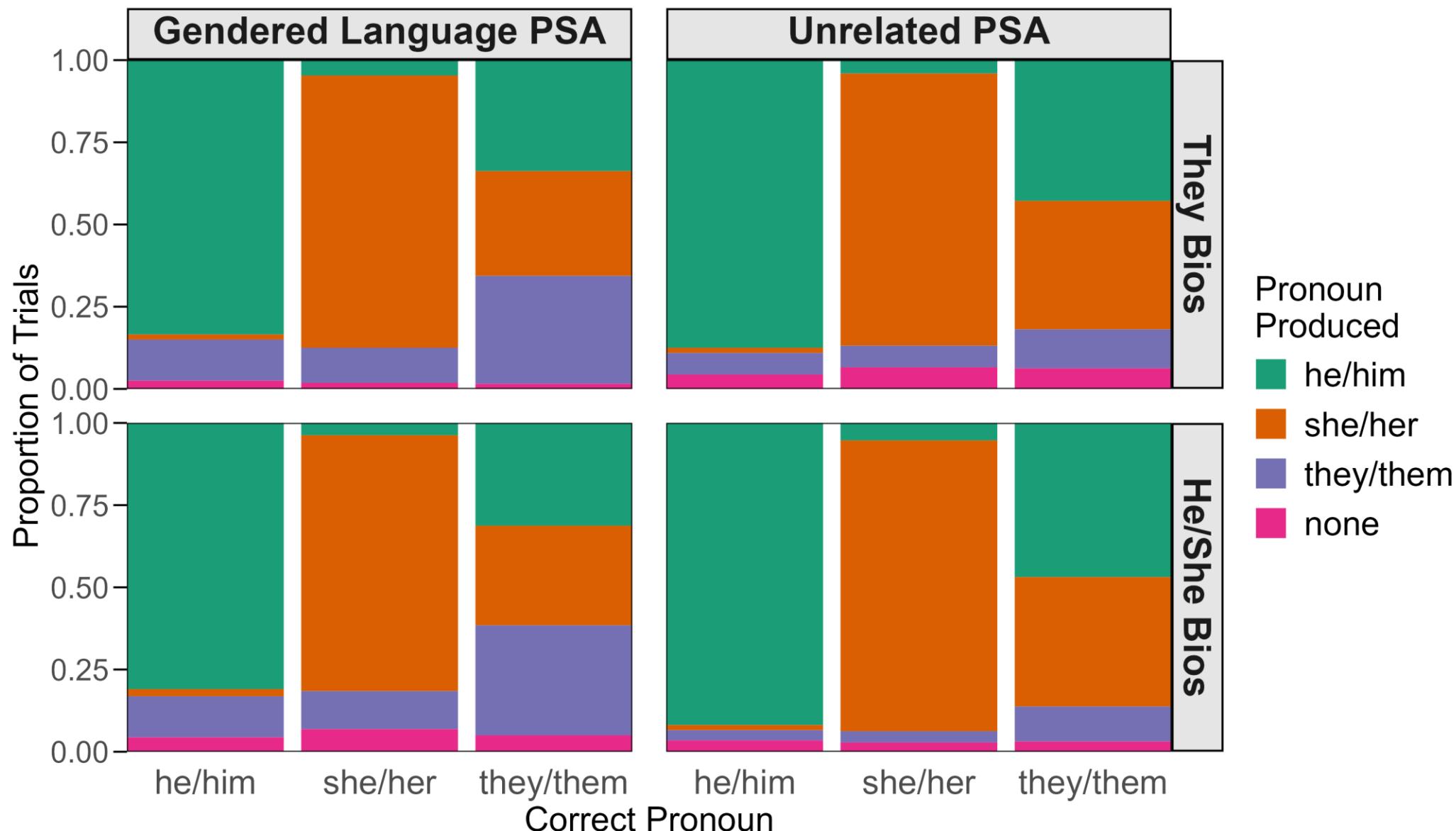
Experiment 2 Results

All Memory Questions

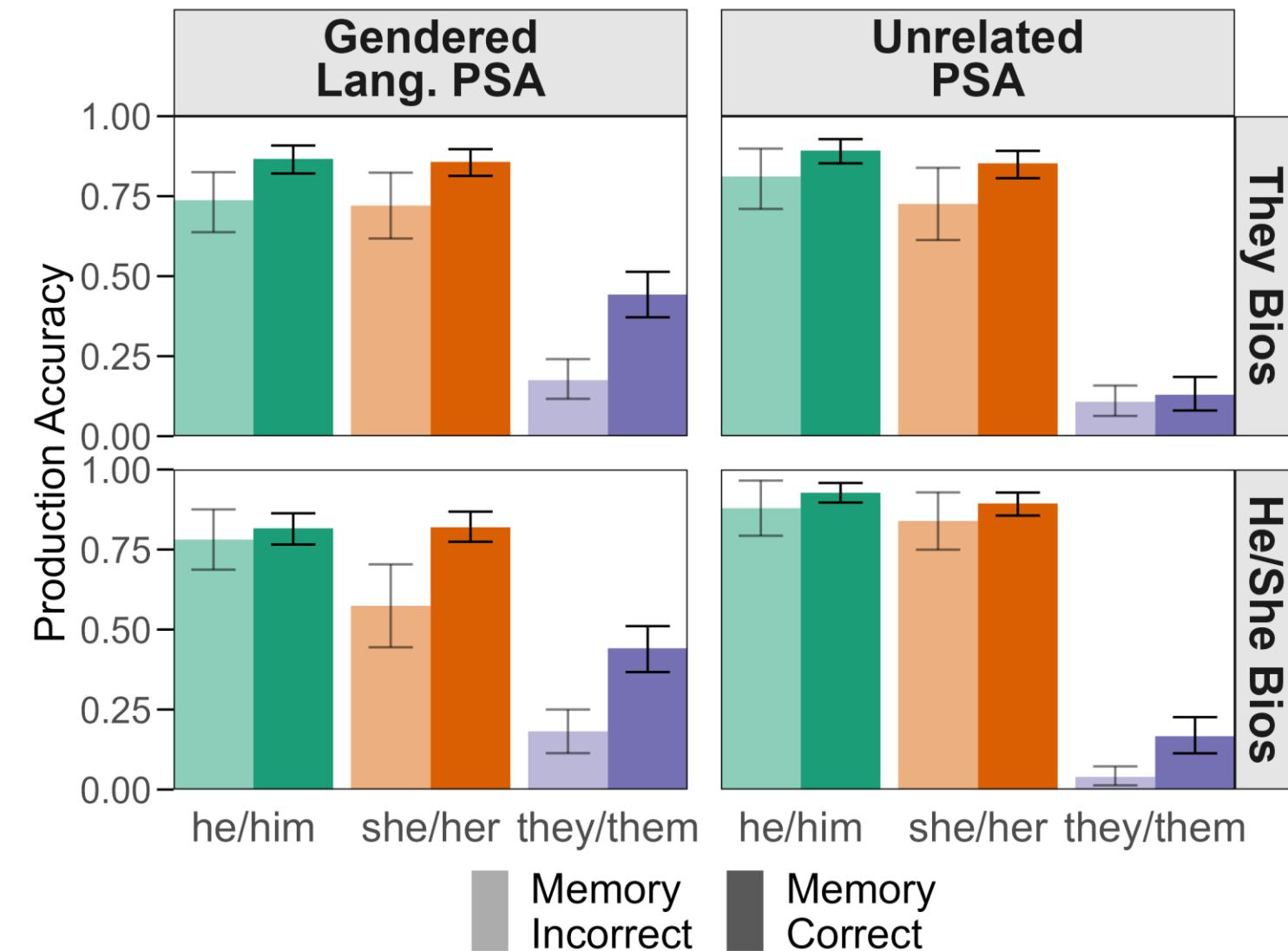




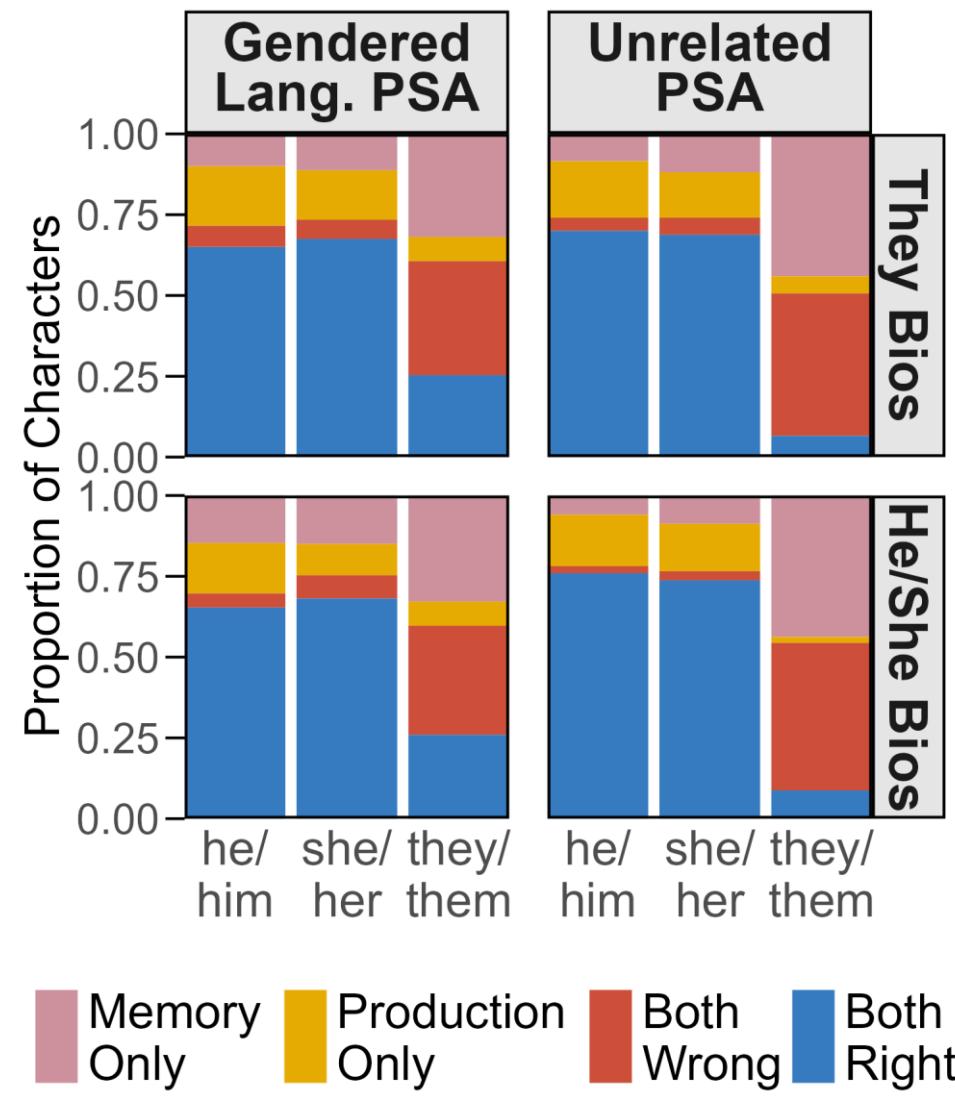
Production



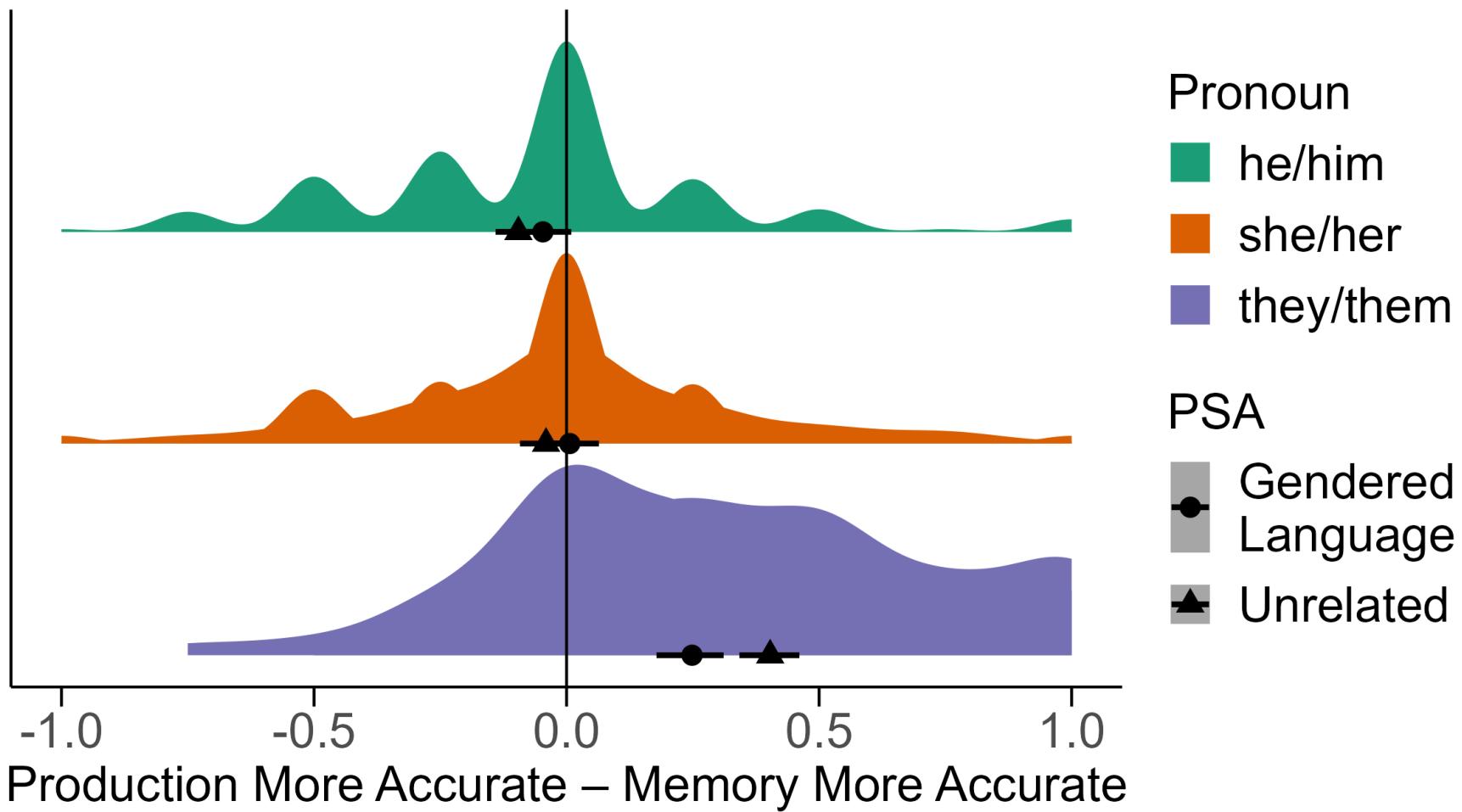
Production Split By Memory Accuracy



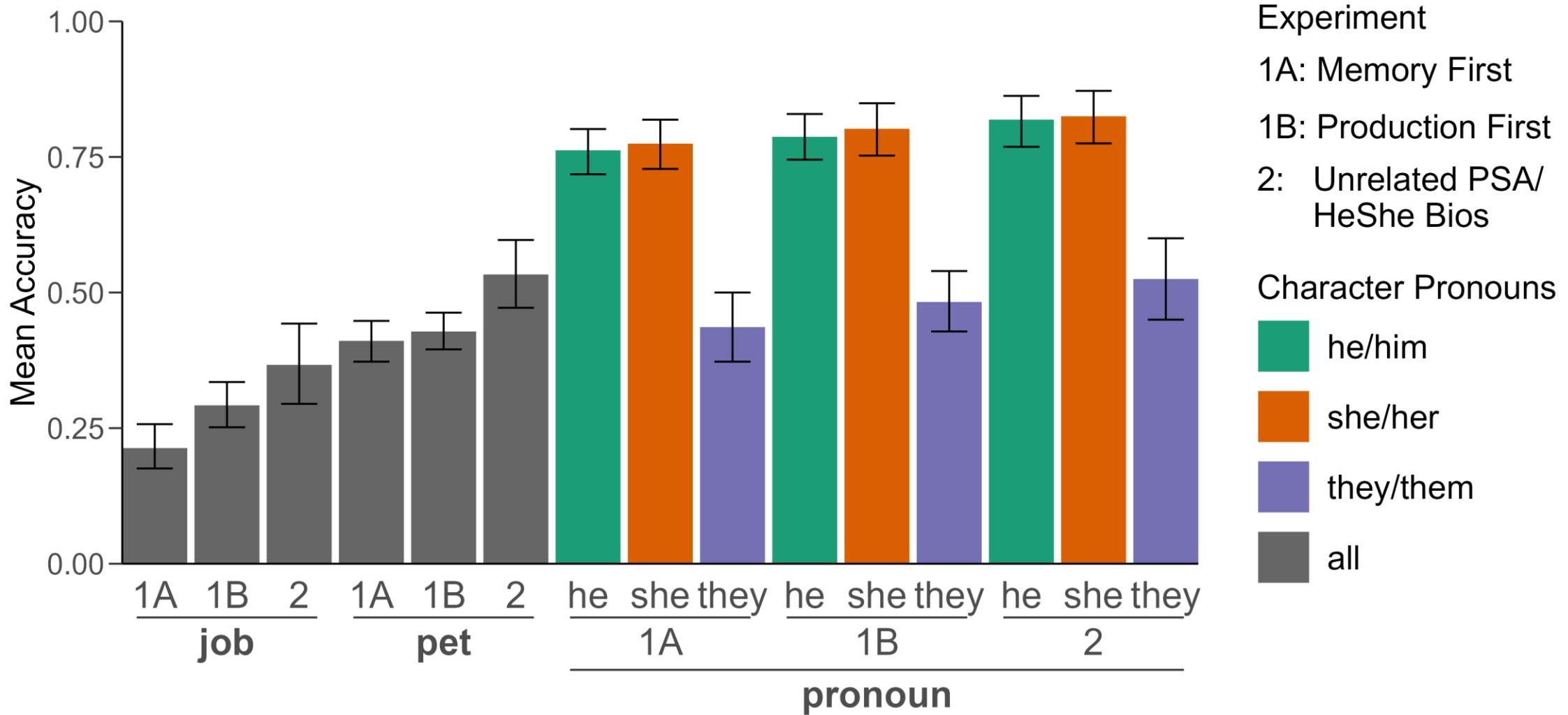
Combined Accuracy



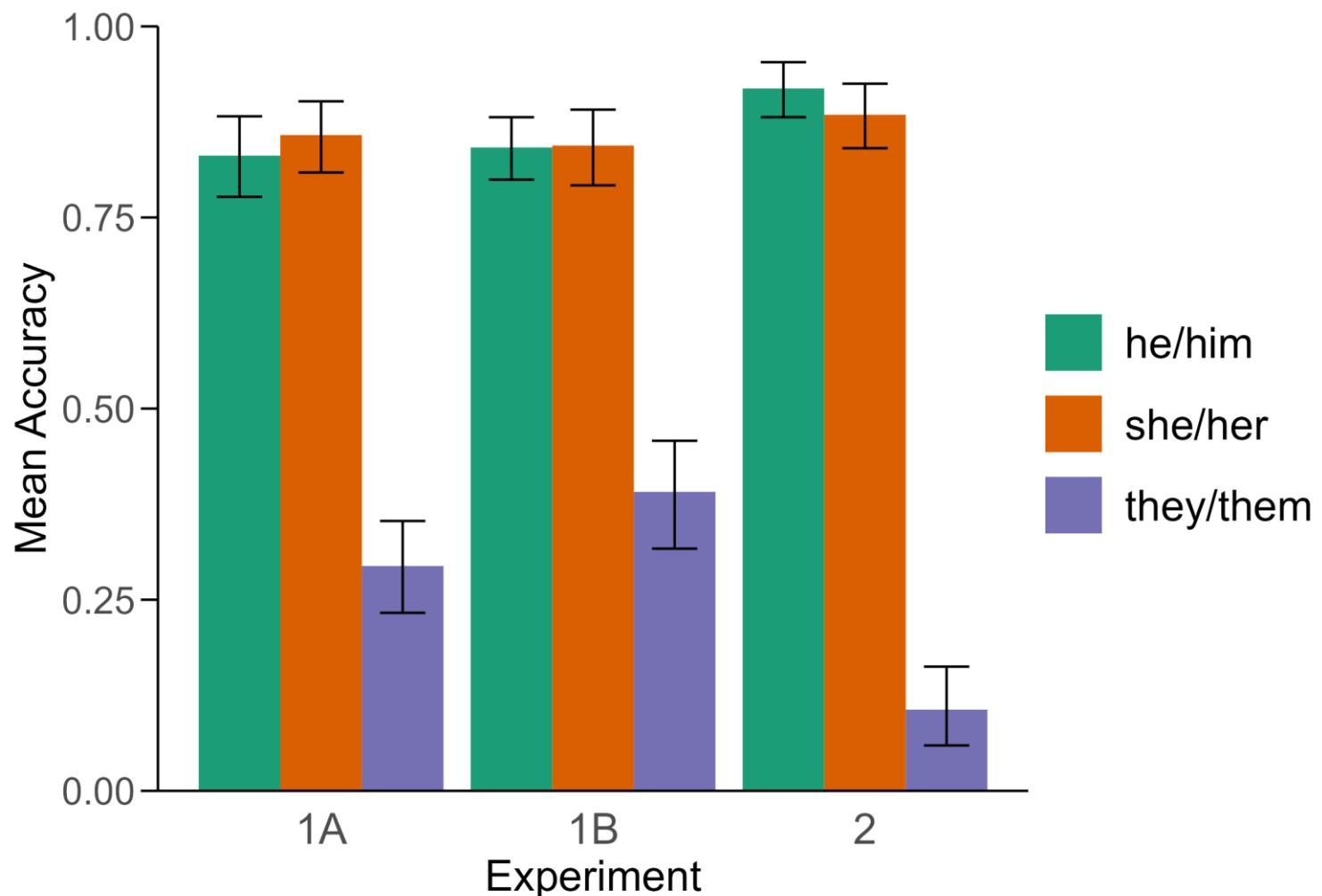
Difference Between Tasks



Experiments 1 & 2: Memory Accuracy



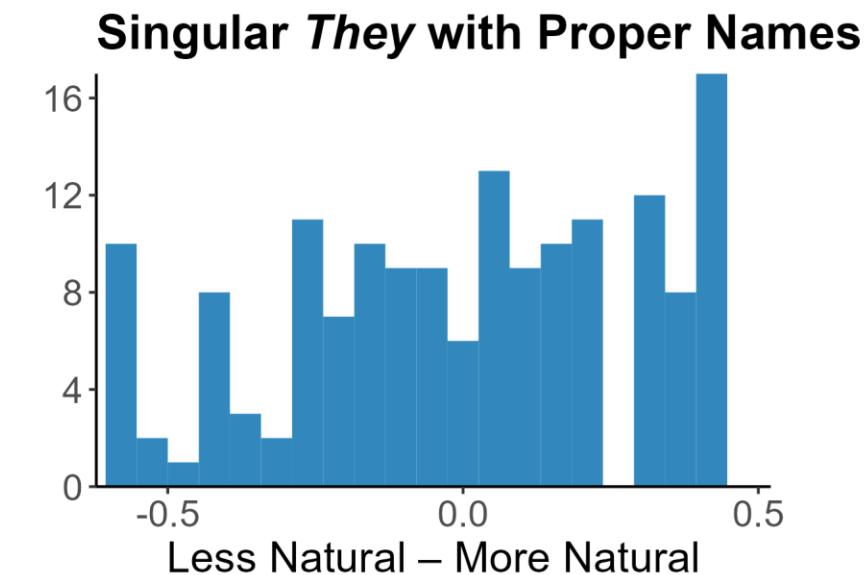
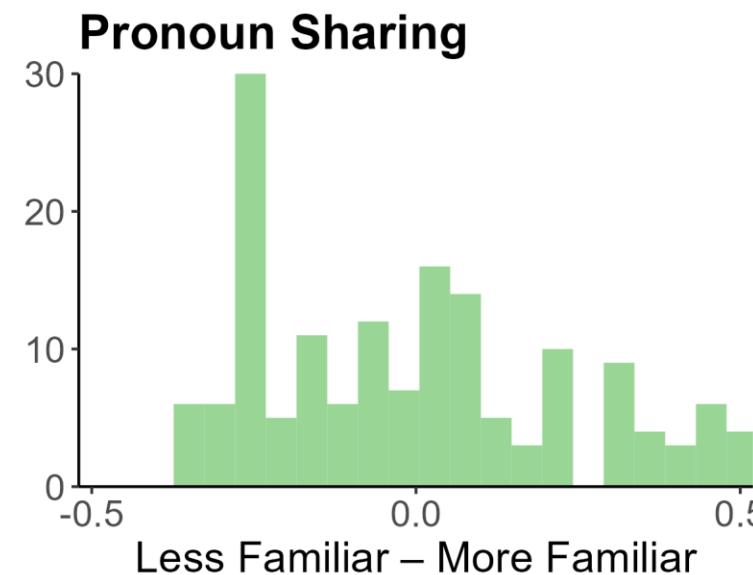
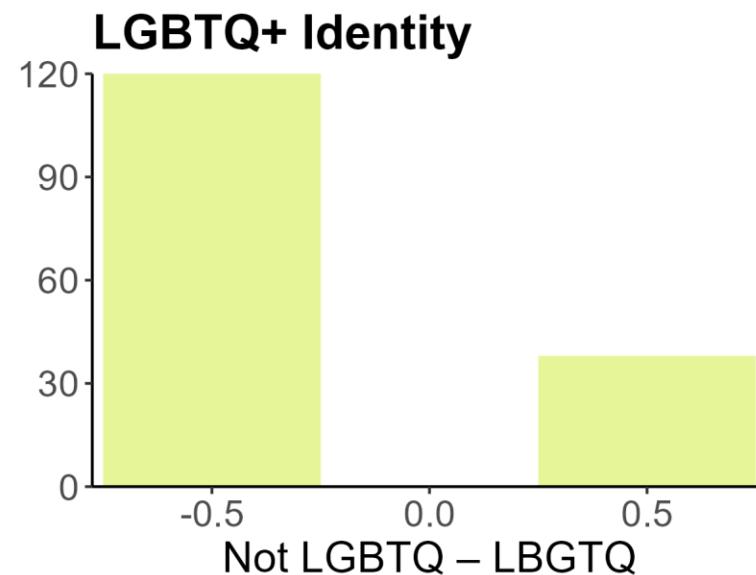
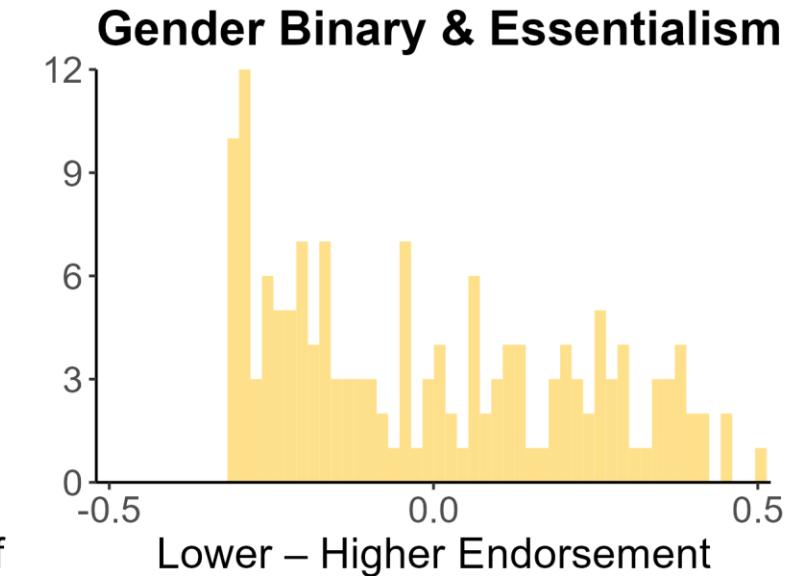
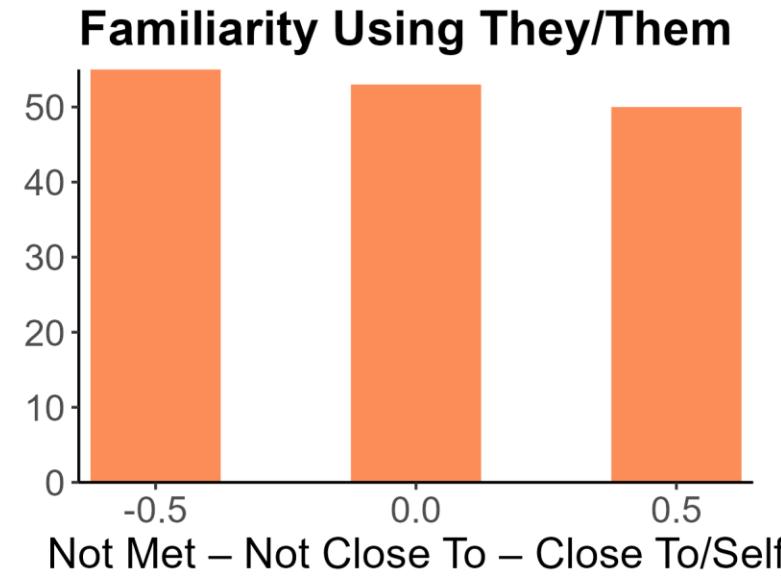
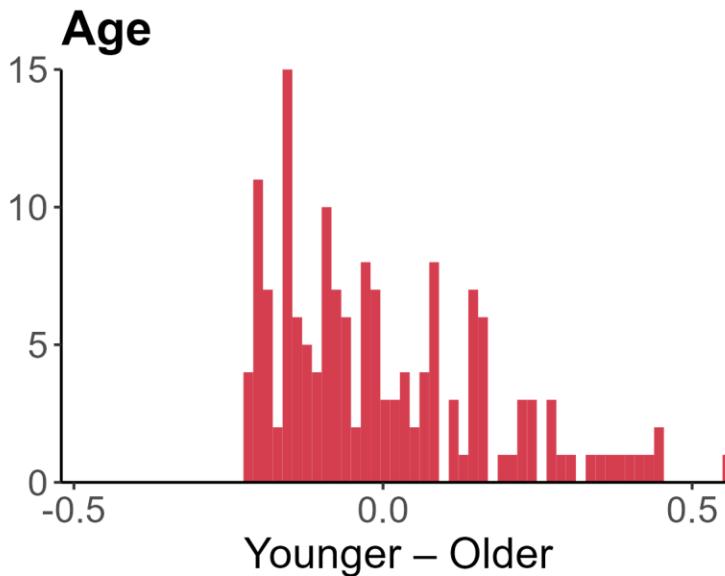
Experiments 1 & 2: Production Accuracy



APPENDIX

Experiment 3 Results

Distribution of Rescaled and Centered Participant Covariates

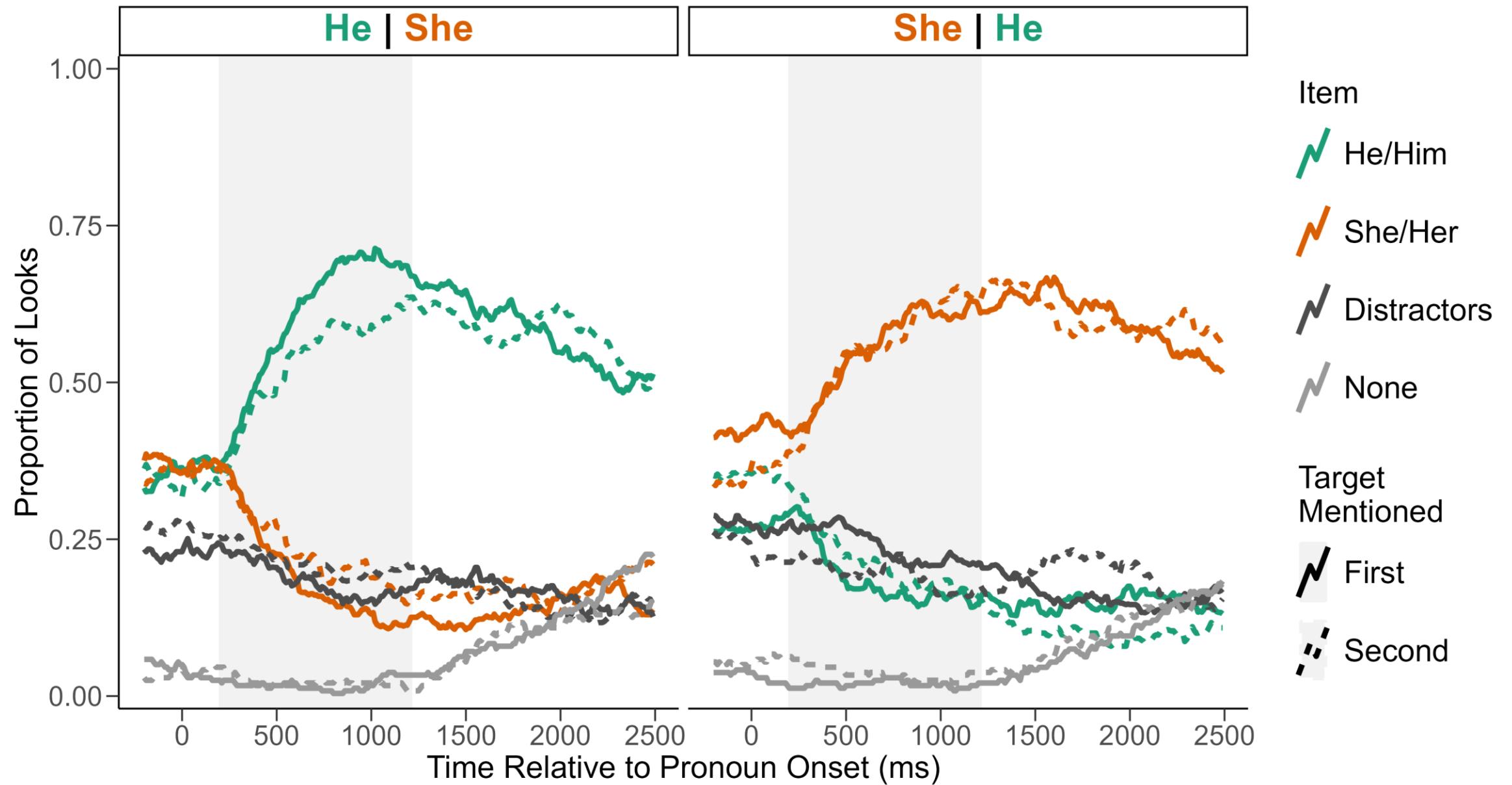


Correlations Between Participant Covariates

	Name Ratings	Sharing	Familiarity	Indefinite Ratings	Age	Gender Beliefs
Age					0.21	
Indefinite Ratings				0.12	-0.02	
Familiarity			0.02	-0.29	-0.47	
Sharing		0.62	-0.06	-0.3	-0.44	
Name Ratings	0.38	0.33	0.07	-0.22	-0.52	
LGBTQ	0.3	0.28	0.27	-0.05	-0.3	-0.38
Camilliere et al. (2021)						
Conrod (2019)						
Hekanaho (2020)						
Hernandez (2020)						
Nichols et al. (2019)						
Parker et al. (2019)						

APPENDIX

Experiment 4 Results



Intro

Exp 1

Exp 2

Exp 3

Exp 4

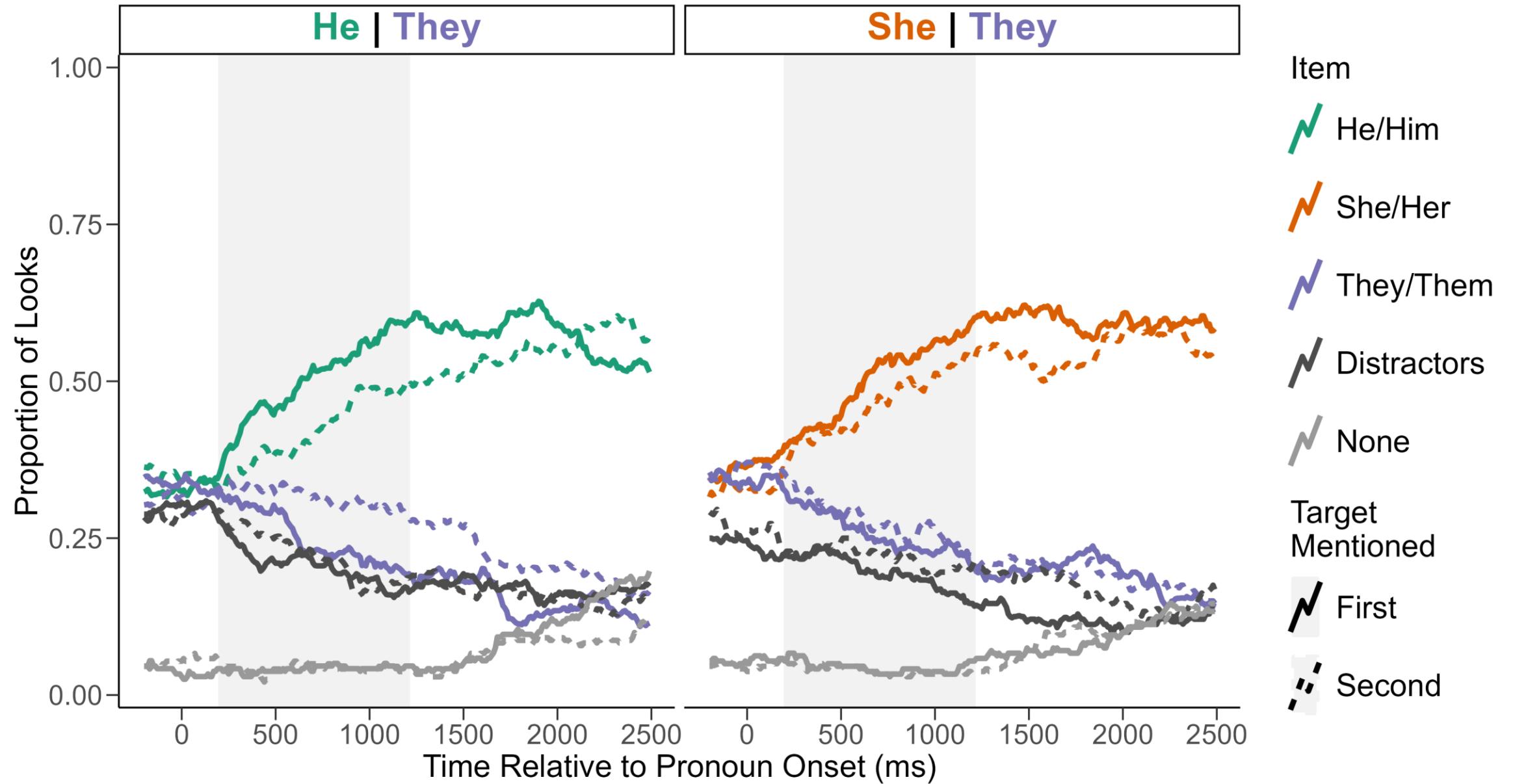
Background

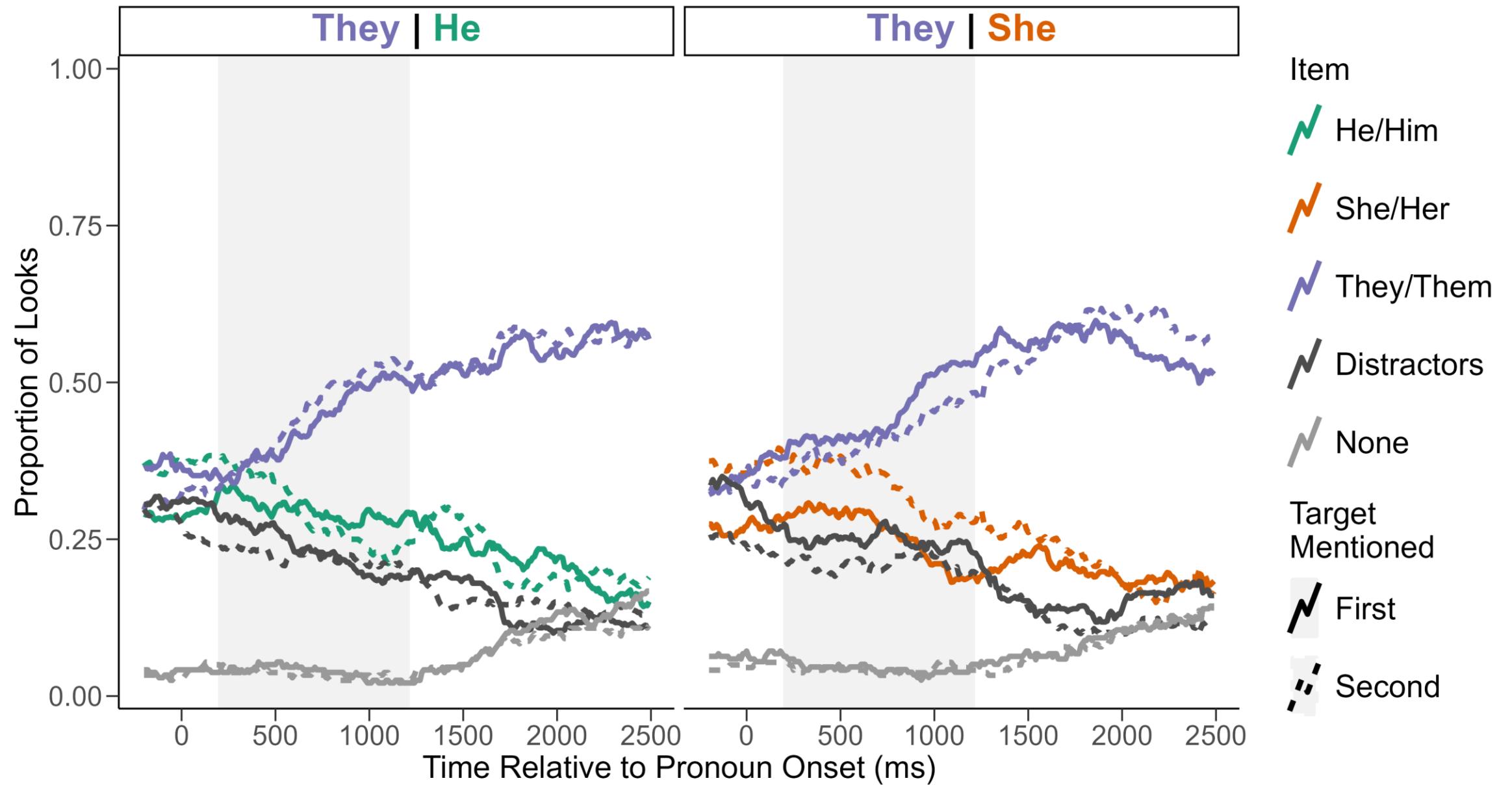
Design

Predictions

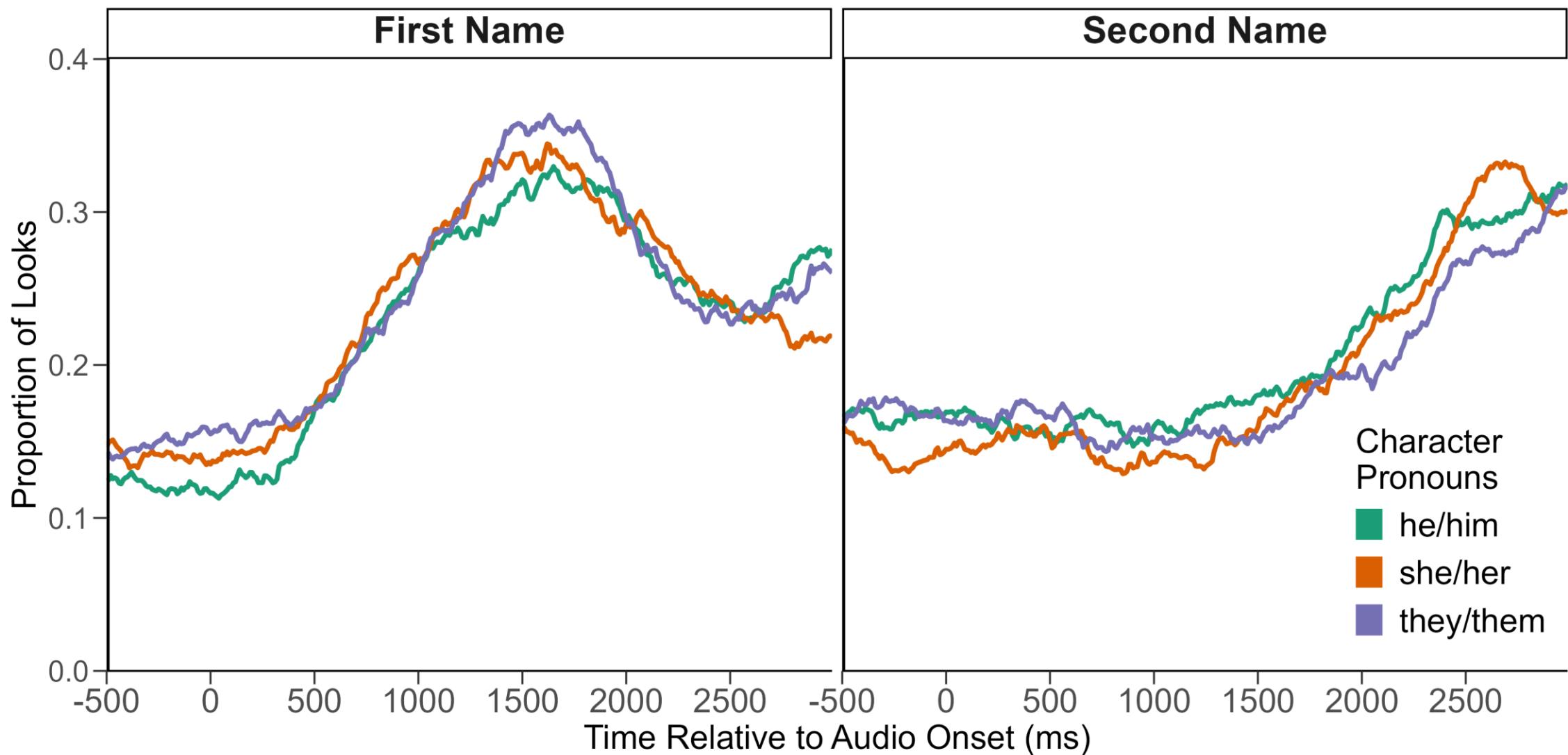
Results

Summary

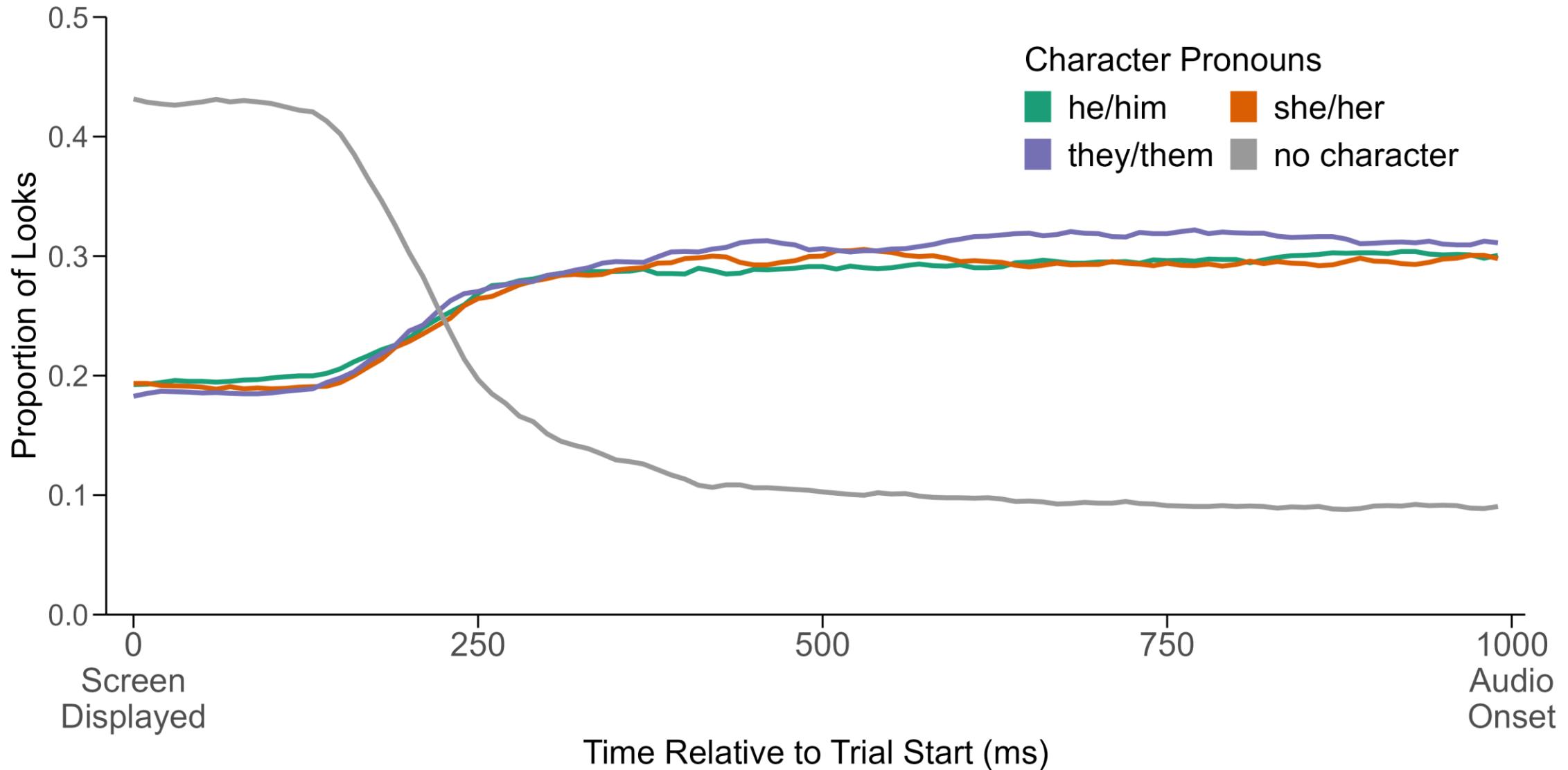




Looks to the Named Characters

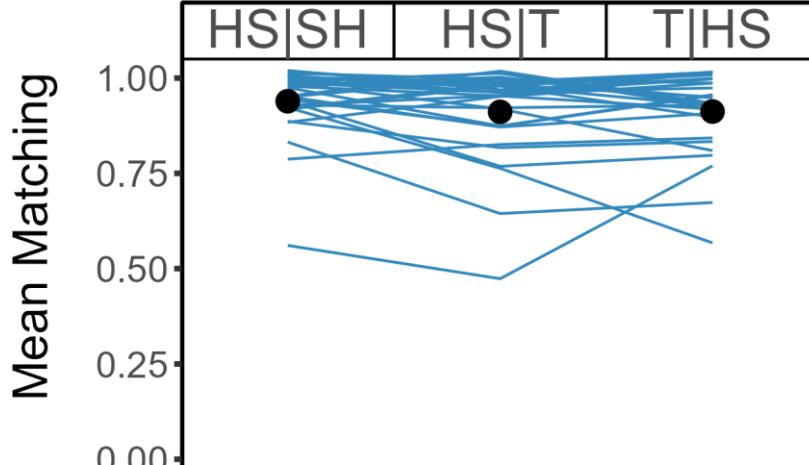


Looks During Preview Window

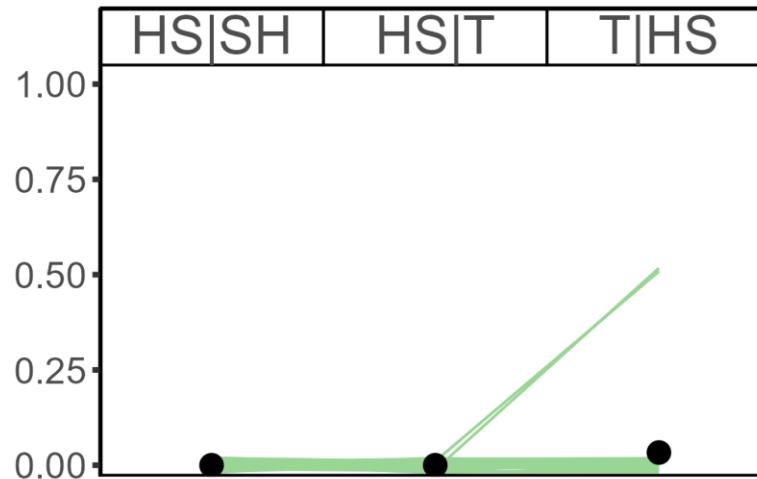


Did the story match the picture? YES or NO:

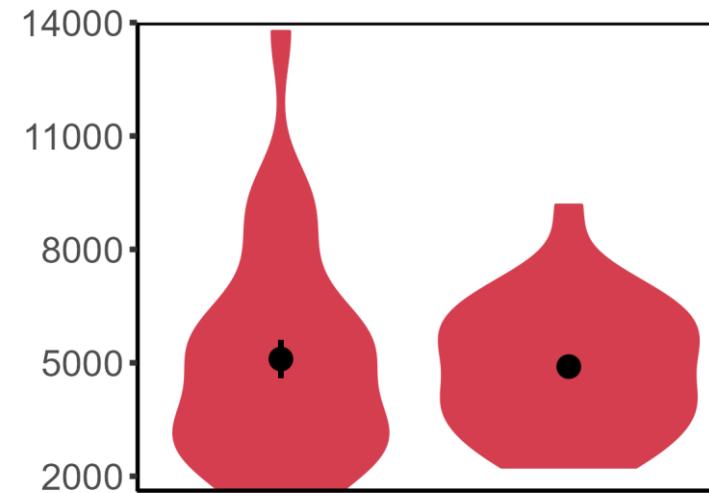
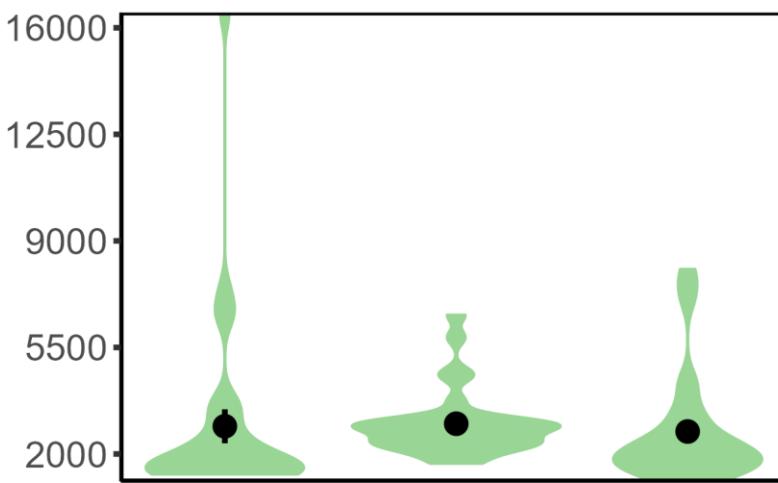
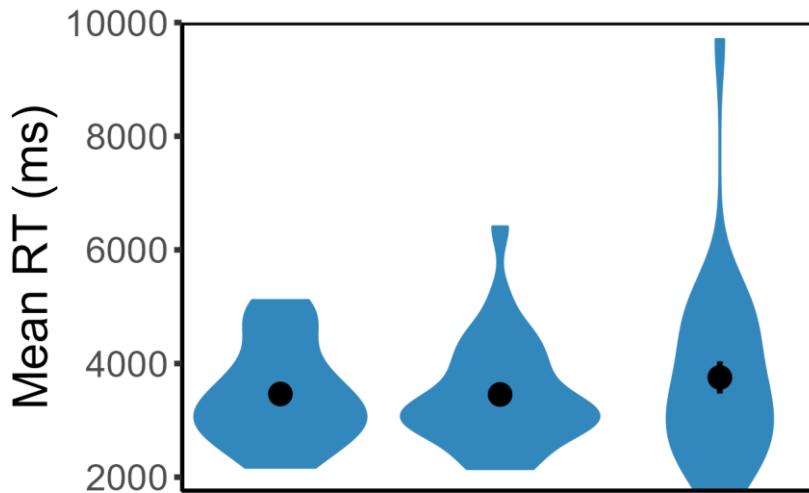
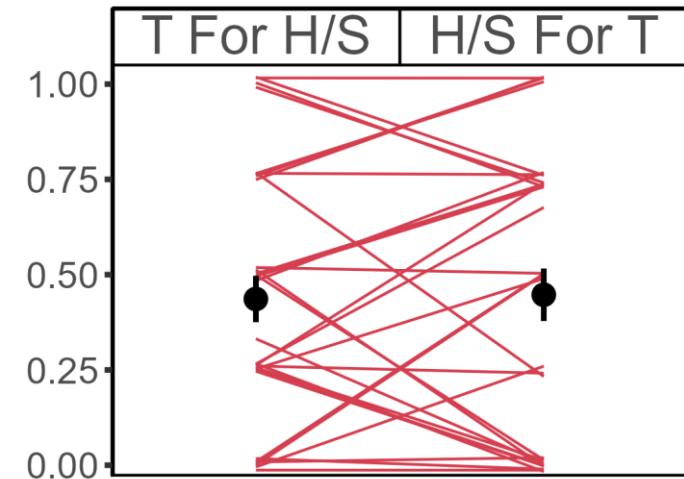
Test Trials



Wrong Description



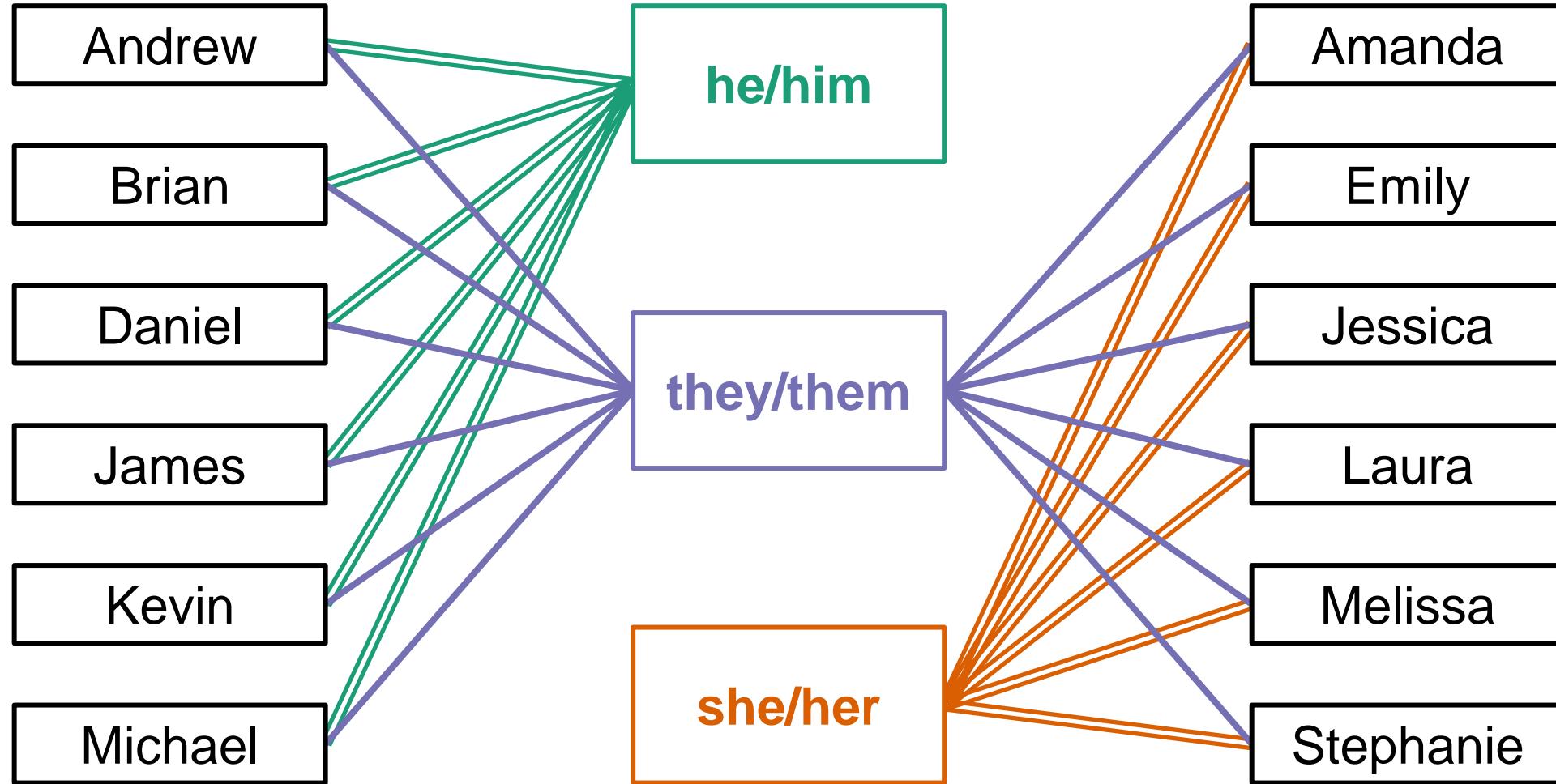
Wrong Pronoun



APPENDIX

Materials

Names & Pronouns:



Jobs: accountant, doctor, engineer, food service, IT, janitor, mechanic, nurse, retail, salesperson, teacher, uber driver

Pets: cat, dog, fish

Pronoun Guide

This guide is created to help anyone learn how to use people's correct pronouns. Everyone in your community should engage in learning, educating, and advocating for the inclusive use of pronouns for all.

What Are Pronouns?

Pronouns are the words you may like others to use for you in place of your proper name. Some examples include "she/her" or "he/him" or gender-neutral pronouns, such as "they/them." Here is an example of using "they/them" in a sentence: John is substituting for me today and they are an incredible mathematician. Singular "they" pronouns have been used in the English language for centuries. If you are still struggling with using this, remember, it takes practice!

Why Focus on Pronouns?

You may have noticed that people are sharing their pronouns in introductions, on name tags, and at the beginning of meetings. This gives everyone in the room the opportunity to self-identify instead of assuming someone's identity or which pronouns they use. Including pronouns is a first step toward respecting people's identity and creating a more welcoming space for people of all genders.

How Is This More Inclusive?

Pronouns can sometimes be a signifier for someone's gender identity, but not always. We do not want to assume people's gender identity based on expression (typically shown through clothing, hairstyle, mannerisms etc.) By providing an opportunity for people to share their pronouns, you're showing that you're not assuming that their gender identity is based on their appearance.

Misgendering refers to the experience of being labeled by others as a gender other than one that a person identifies with. Because many (not all) associate their pronouns with their gender identity, using the wrong pronouns intentionally or unintentionally is a form of misgendering. If you accidentally use the wrong pronoun when identifying someone, please apologize or say “thank you”, and immediately use the right pronoun, i.e., “This is Alex, she is one of my science students.” (you are corrected because Alex uses they/them/theirs pronouns). “Sorry, they are one of my science students” or “Thank you, they are one of my science students.”

Everyone makes mistakes; please take accountability for your mistake and start using the correct pronoun. The important thing to be mindful of is to not unload your guilty feelings on transgender, nonbinary, and gender nonconforming people or expect forgiveness. They might have a strong reaction to the misuse of their pronouns and need space to recenter themselves.

Tips for Gender-Neutral Language

Practice, practice, practice! Use gender-neutral pronouns such as “they” while visualizing the person who uses them. This is especially useful to do right before you’re about to see the person.

When addressing groups of people or people whose pronouns you haven’t been told, use gender-neutral language such as, “siblings,” “third graders,” “students”, “friends,” “folks,” “all,” or “y’all,” rather than “brothers and sisters,” or “guys,” “ladies,” “ma’am,” or “sir.”

Use descriptive language if you do not know a person’s gender, pronouns, or name. e.g. Can you give this paper to the person across the room with the white t-shirt and short brown hair?

Intro	Exp 1	Exp 2	Background	Design	Predictions	Results	Summary	Exp 3	Exp 4
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Biography 1

The sky is their/her limit: New astronaut gets ready to travel to the ISS

Ashley Green was born in Chicago in 1990, into a family that always encouraged them/her in their/her interest in science. As a child, Ashley was fascinated by astronomy and stories of space travel.

They/She learned to fly a plane before learning how to drive and spent as much time as possible in the sky. Ashley got their/her bachelor's degree in mechanical engineering at the California Institute of Technology and their/her PhD in aerospace engineering at Stanford University.

In 2016, Ashley was one of over 18,000 candidates applying to the astronaut training program at NASA, and one of only 10 candidates chosen. Training to be an astronaut takes two years, which Ashley spent flying training jets, learning medical and survival skills, and learning Russian. To get used to zero gravity, Ashley and other recruits flew in a plane that creates around 20 seconds of weightlessness each time it climbs and dives. Because so many people get sick experiencing zero gravity for the first time, astronauts jokingly call this the “vomit comet” or the “weightless wonder.” To practice spacewalks, Ashley spent hours working underwater in a massive pool. They/she say/says that astronaut training was exhausting, but it was exciting to be working with such a passionate and talented team.

In two months, Ashley will be lifting off for the first time, headed to the ISS for a four-month stay.

They/She will be working with a team of 5 other astronauts from 3 countries. Ashley’s primary job will be upgrading and testing robotic tools used to conduct experiments and do maintenance on the ship. Life on the ISS is busy and isolating, but Ashley says they/she are/is excited to be one the few people to see the earth from orbit.

Intro	Exp 1	Exp 2	Background	Design	Predictions	Results	Summary	Exp 3	Exp 4
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Biography 2

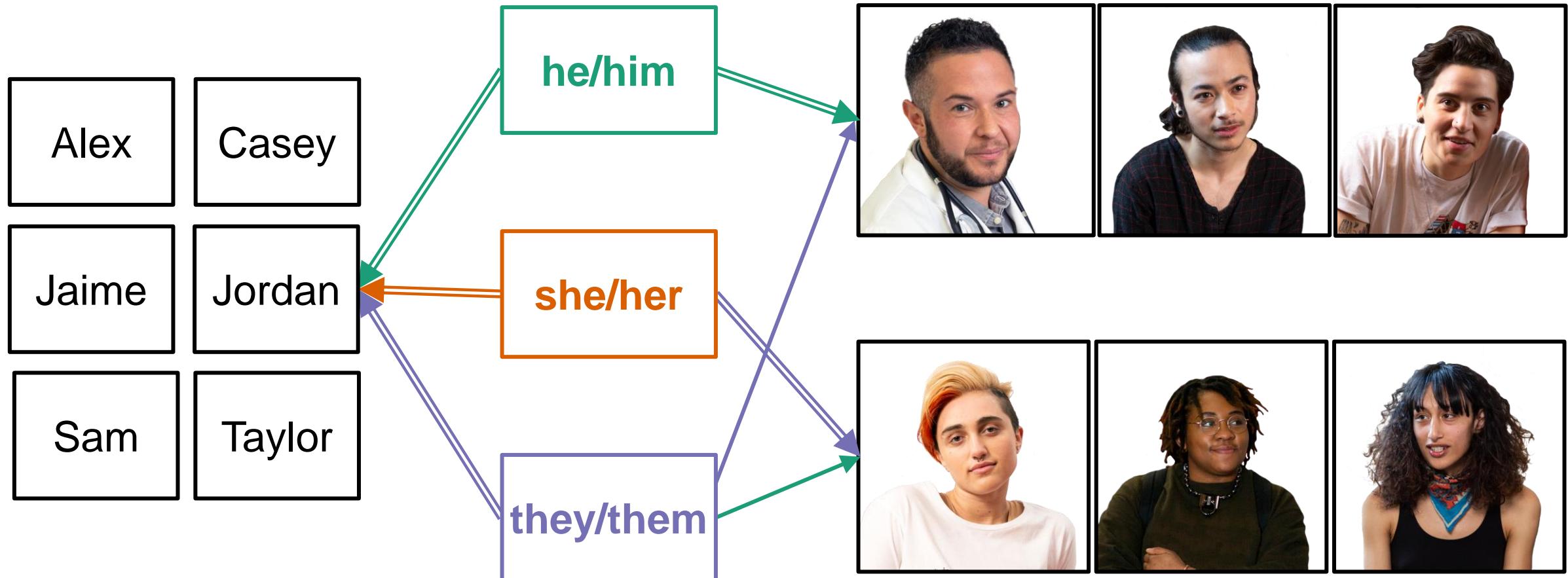
An animal-lover's journey to keeping their/his own beehives

James Wright was born in Ohio in 1985. They/he loved animals from an early age, since they/he grew up with their/his family's dogs, cats, chickens, and horses. James began volunteering at the local animal shelter in middle school and caring for foster dogs in high school.

Their/His love of the animal world led James to study biology at The Ohio State University. During this time, they/he also became interested in botany and wanted to learn more about the relationships between plants and animals that exist together in the same environment. A friend recommended a local organization of beekeepers, and James found the perfect combination of their/his interests.

Today, James owns their/his own bee farm, where they/he raise/raises hives to sell to other beekeepers and produce honey. They/He are/is most excited about the free classes they/he run/runs for the community about creating gardens friendly to pollinating insects, caring for your own beehive, and identifying local plants and animals. James hopes to inspire people to learn more about the environments around them and work towards a sustainable future.

Outside of their/his farm business, James is kept busy with their/his 5- and 2-year-old daughters, 3 dogs, and an ever-changing number of cats. They/He also enjoy/enjoys hiking, photography, woodworking, and trying new recipes that use fresh honey.



ST1



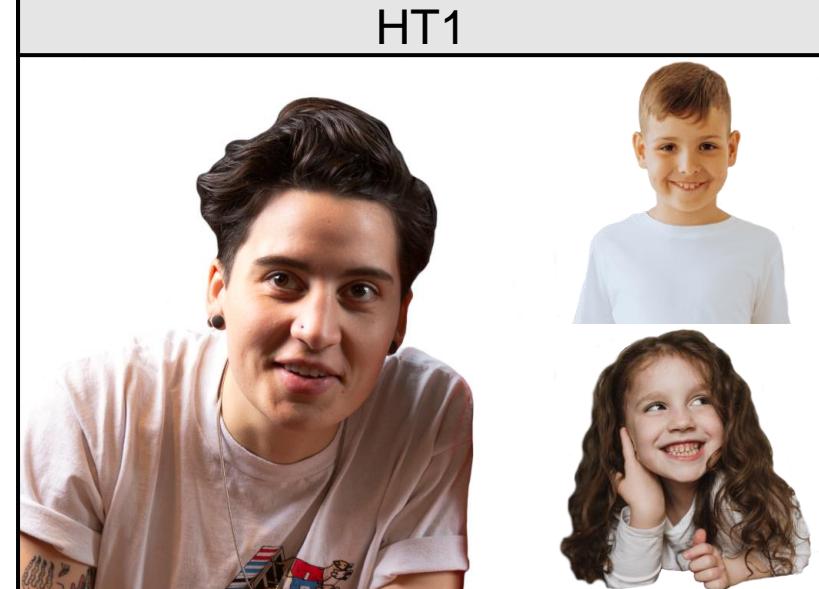
ST2



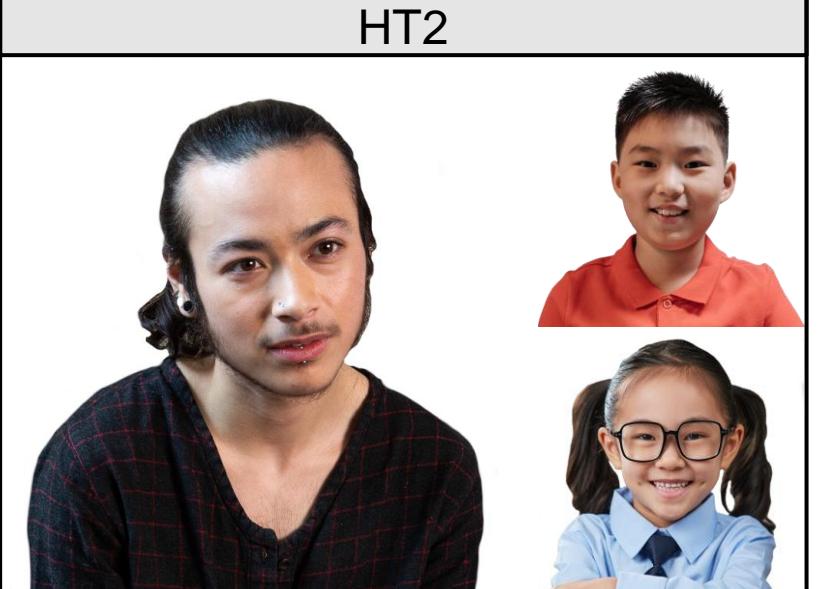
ST3



HT1



HT2



HT3



1 = “very unnatural”, 7 = “very natural”

generic

The ideal barista is very attentive. They will always make drinks carefully and quickly.

quantifier: every

Concerts are very popular. Every music fan tries to buy their ticket early.

quantifier: each

Dogs are very cute. Each dog owner tries to take their dog's picture constantly.

gender-neutral name

Jordan is very funny. They can make a pun out of almost any word.

masculine name

Mark is very generous. They usually have a spare dollar to give to a good cause.

feminine name

Sarah is very clumsy. They can't try a new sport without getting injured.

1 = “completely disagree”, 7 = “completely agree”

1. I don't like it when someone is flirting with me, and I can't tell if they are a man or a woman.
2. I think there is something wrong with a person who says that they are neither a man nor a woman.
3. I would be upset, if someone I'd known a long time revealed to me that they used to be another gender.
4. I avoid people on the street whose gender is unclear to me.
5. When I meet someone, it is important for me to be able to identify them as a man or a woman.
6. I believe that the male/female dichotomy is natural.
7. I am uncomfortable around people who don't conform to traditional gender roles, e.g., aggressive women or emotional men.
8. I believe that a person can never change their gender.
9. A person's genitalia define what gender they are, e.g., a penis defines a person as being a man, a vagina defines a person as being a woman.

Sometimes people say what kinds of gendered language they want other people to use for them. One way of doing this is saying what pronouns you use when you introduce yourself, like “I’m Emily and I use she/her.” How familiar are you with this?

People tend to include their pronouns when introducing themselves in ____ of the groups I am in.

- All
- Most
- Some
- A few
- None

I include my pronouns when introducing myself:

- Always
- Usually
- Sometimes
- Rarely
- Never, because I prefer not to
- Never, because I had not heard of this before

Another way of communicating what kind of gendered language you want people to use for you is by including pronouns in places where you write your name, like on nametags, display names, social media bios, and email signatures. How familiar are you with this?

People tend to include their pronouns in places like nametags, display names, bios, and signatures in ____ of the groups I am in.

- All
- Most
- Some
- A few
- None

I include my pronouns in places like nametags, display names, bios, and signatures:

- Always / whenever possible
- Usually
- Sometimes
- Rarely
- Never, because I prefer not to
- Never, because I had not heard of this before

Some people use they/them pronouns instead of he/him or she/her pronouns. An example of this is “Alex raised their hand.” How familiar are you with this? (select all that apply)

- I use they/them pronouns for myself.
- I am close to someone who uses they/them pronouns.
- I have met someone who uses they/them pronouns, but am not close to them.
- I have heard about people using they/them pronouns, but have not met someone who does.
- I had not heard about people using they/them pronouns before this study.

APPENDIX

Participant Demographics

Experiment 1A

Age	
18–24	101
25–34	1
Gender	
Female	79
Male	22
Nonbinary	1
English Experience	
Native (learned from birth)	86
Fully competent in speaking, listening, reading, and writing, but not native	15
Limited but adequate competence in speaking, reading, and writing	1
Total Participants	102

Experiment 1B

Age	
18–24	101
Gender	
Female	72
Male	29
English Experience	
Native (learned from birth)	82
Fully competent in speaking, listening, reading, and writing, but not native	17
Limited but adequate competence in speaking, reading, and writing	2
Total Participants	101

Experiment 2

Age	Total
18-24	12
25-34	129
35-44	93
45-54	46
55-64	27
65-74	12
75+	1

Total
320

Gender	Total
Female	125
Male	194
Did not provide	1

English Experience	Total
Native (learned from birth)	304
Fully competent in speaking, listening, reading, and writing, but not native	14
Limited but adequate competence in speaking, reading, and writing	1
Some familiarity (e.g., a year of instruction in school)	1

Experiment 3

Age	162	Transgender & Gender-Diverse	238
18-24	31	I consider myself cisgender	63
25-34	53	I consider myself transgender	4
35-44	35	I don't consider myself cisgender or transgender	12
45-54	19	My gender is the same as what was written on my original birth certificate	150
55-64	12		
65-74	8	My gender is different than what was written on my original birth certificate	6
75+	1		
Prefer not / Missing data	3	Prefer not to answer / Missing data	3
Gender	162	Sexuality	175
Male	63	Asexual	6
Female	88	Bisexual/Pansexual	24
Nonbinary	4	Gay/Lesbian	6
Genderqueer	1	Heterosexual/Straight	120
Female/nonbinary	1	Queer	9
Woman/questioning	1	Questioning	3
Prefer not / Missing data	4	I use a different term	2
		Prefer not to answer / Missing data	5

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Experiment 3

English Experience	162	Race/Ethnicity	176
Native (learned from birth)	151	American Indian or Alaska Native	4
Fully competent in speaking, listening, reading, and writing, but not native	8	Asian	9
Prefer not to answer / Missing data	3	Black, African American, or African	21
		Hispanic, Latino, or Spanish	19
Education	162	Middle Eastern or North African	2
Less than high school	2	Native Hawaiian or Pacific Islander	0
High school graduate	23	White	112
Some college	24	I use a different term	2
2-year degree	16	Prefer not to answer / Missing data	7
4-year degree	63		
Professional degree	23		
Doctorate	7		
Prefer not to answer / Missing data	4		

Experiment 4

Gender	30	Age	30
Female	19	18-24	26
Male	11	25-34	4
Transgender & Gender-Diverse	47	English Experience	30
I consider myself cisgender	17	Native (learned from birth)	27
I consider myself transgender	0	Fully competent in speaking, listening, reading, and writing, but not native	3
I don't consider myself cisgender or transgender	0	Race/Ethnicity	34
My gender is the same as what was written on my original birth certificate	30	Asian	10
My gender is different than what was written on my original birth certificate	0	Black, African American, or African Hispanic, Latino, or Spanish	1 6
		Middle Eastern or North African	1
		White	15
Sexuality	34	Prefer not to answer	1
Asexual	1		
Bisexual/Pansexual	3		
Gay/Lesbian	1		
Heterosexual/Straight	27		
Questioning	2		

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APPENDIX

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