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Singular “they” Exposure Increases Singular Interpretations in Ambiguous Pronouns

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Abstract

Evidence is accumulating that patterns of use for singular “they” are changing in English. The pronoun is becoming the preferred generic when the gender of the referent is unknown or backgrounded. This change reflects a shift in patterns of acceptability for uses of singular “they” which is in turn linked to the increased frequency of singular they. We predict that adaptation may be a cognitive mechanism underlying this change, and if so, we may see short-term adaptation within a lab session. In the present study, we use a between-subjects priming paradigm to test whether participants adapt to the frequency with which they encounter singular or plural senses of “they” in the local discourse. We find that selections of singular “they” are significantly more likely after participants have been exposed to unambiguously singular vs. plural uses of “they”. This finding implicates adaptation and suggests that adaptation may link changes in the frequency of linguistic forms to changes in their acceptability.

Keywords: Singular “they”; pronoun comprehension; discourse adaptation; psycholinguistics

investigated in greater detail by psychologists (Conrod, 2019; McWhorter, 2024). The ongoing incorporation of gender-neutral language into English led to a period in which the prescribed method for gender neutral reference in print was for writers to circumvent a singular use of “they” by pluralizing the subject, repeating a noun, or other indirect strategies (Nunberg, 2016). Interestingly, it has been known since the late 1990s that generic or epicene singular “they” is processed with similar ease to other 3rd person singular pronouns as long as the antecedent does not carry a gender feature or strong gender stereotype (Foerstch & Gernsbacher, 1997).

The common singular uses for “they” in the past have been a quantified usage in which the pronoun refers to a prior quantified noun phrase (1a) and a generic usage (1b) in which either the gender of the referent is unknown or the individual referred to is socially distant from the speaker (Camilliere et al., 2021; Han & Moulton, 2022).

1a. Someone_i is freaking out over there. They_i keep running around in circles.

b. My dentist_i is on vacation. They_i went to Aruba.

The generic or epicene form may be acceptable to a range of English native speakers who might not accept definite specific or nonbinary uses of “they” (Konnelly & Cowper, 2020; Konnelly et al., 2023). Definite uses of singular “they” coindex the pronoun with proper names or specific, definite noun phrases (2a). We use the term “Nonbinary they” to represent the subset of definite specific uses where the pronoun is being used to refer to a specific individual who is known to use they/them as their personal pronouns. In these cases, the antecedent is a proper name (2b) or potentially another type of noun phrase if coreference is licensed by the discourse context (e.g., “my sister”). Often this usage signals that the person it refers to has a nonbinary or gender-fluid identity (Bailey et al., 2024; Konnelly et al., 2023)

2a. That student_i never turns in their_i homework.

b. Alex_i cracked two eggs into a pan. Then they_i whisked the eggs together.

Not all English speakers accept the use of singular “they” as a 3rd person singular pronoun for individuals with a nontraditional gender identity, and this form differs in important ways from other 3rd person singular pronouns like

1. Introduction

Singular “they” is an established form in English that has existed for centuries (Conrod, 2020; McWhorter, 2018), but prescriptively it has been discouraged until recently. As recently as 2015, the 6th edition APA style blog advised against using “they” for singular referents like *the participant*, despite advocating in favor of “they” as a personal pronoun for transgender and nonbinary individuals in the same post (Lee, 2015). Nevertheless, acceptance of this generic sense of singular “they” has been expanding (Camilliere et al., 2021; Bjorkman, 2017; Konnelly & Cowper, 2020). Paralleling this trend, the APA publication manual’s 7th edition (2019) endorsed the use of singular “they” for generic antecedents (Phipps et al., 2023). The use of singular “they” was actively discouraged throughout the 19th and early 20th century in favor of a singular generic use of “he” for entities of unknown gender; this was prevalent in written sources. In the 1970s the “oxymoronic” masculine generic (Gastil, 1990) began to attract more criticism and was

“he” or “she”. At the same time, generic or epicene uses of singular “they” may be thought of as closely related to the specific, definite uses of singular “they”. The distinction is a little nebulous and seems to be a function of subtle differences in the definiteness and specificity of the antecedent that is sought out by the pronoun (A student vs. That student; Konnelly et al., 2023). Processes influencing nonbinary “they”, specifically, may be an important part of a broader pattern in which singular “they” is increasing in overall frequency and scope. However, the relationship between what we term generic “they” and nonbinary “they” has yet to be established. Here we will primarily focus on the development of singular “they” in its generic uses.

1.1 More Environments for Generic “they”

There is indirect evidence that the generic form of “they” is being used more frequently in a wider range of circumstances over time. The increasing use of “they” with either quantified or indefinite antecedents over long time scales, consisting of decades, has been noted in text (Balhorn, 2004; Paterson, 2012) and speech (Pauwels, 2001). Balhorn (2009) found that in newspapers collected from 2004–2006, “they” was the most commonly used pronoun with indefinite and quantified antecedents. This was the case in both non-quoted text and quoted text that transcribes speech (Balhorn, 2009). Singular “they” was also used with some frequency (27%) to refer to gender neutral NPs. Noun phrases with a strong gender stereotype were more likely to be referred to using “he” or “she” in print. Using a corpus of US and UK newspapers collected in 2007 Parini (2012) found singular “they” to be the most frequently used epicene pronoun for definite, indefinite, and quantified antecedents. By the time an experimental study was performed by LaScotte (2016), 71% of a sample of college students used ‘they’, exclusively, for non-specific definite antecedents (“the ideal student”; Konnelly et al., 2023) in their free response writing and 74% said “they” was the most appropriate pronoun for use in informal contexts. The corpus studies do not delineate the non-specific definite, specific definite, and nonbinary readings of singular “they”. This may be because distinctions in definiteness and specificity are particularly subtle and require information about the discourse context.

We may also suspect that uses of singular “they” are becoming more frequent based on changes to the acceptability of these forms. Ratings of acceptability for linguistic structures are known to be correlated with the structure’s frequency (Christensen & Nyvad, 2024). In the case of forms of singular “they”, younger individuals tend to provide significantly higher acceptability ratings for generic (Camilliere et al., 2021; Moulton, 2020) and nonbinary “they” (Conrod, 2019). This may suggest that younger English speakers are exposed to a proportionally higher frequency of tokens of singular “they” within their language environment. Using the Apparent Time Hypothesis assumption, which suggests that age or generation-based changes in language use can be used as a proxy for real world changes that are in progress (Bailey et al., 1991), it can be

argued that increasing frequency and acceptability of generic and nonbinary singular “they” by age provides a second source of evidence that both forms are undergoing change. These changes appear relatively rapid for the specific, definite and nonbinary forms of “they” (Conrod, 2019; Camilliere et al., 2021). By contrast, changes to the use and processing of the epicene or generic “they” appear to be unfolding far more gradually, with this form first becoming the favored form for quantified and indefinite antecedents (Balhorn, 2004, 2009) and then expanding to non-specific definite antecedents (LaScotte, 2016). Speakers are less likely to be conscious of all of these changes but could have explicit awareness of “they” as a preferred gender-neutral pronoun (Noll et al., 2018; Moulton et al., 2020; Paterson, 2012).

1.2 The State of the English Pronominal System

One influential approach to describing the complex state of forms of singular “they” in English is to suggest that speakers have different grammars. Konnelly and Cowper (2020) take this approach, suggesting that speakers fall into one of three stages. Stage 1 speakers are those that will not accept nonbinary pronouns and accordingly these speakers treat feminine, masculine, and inanimate features as contrastive for the pronoun system; in this stage singular “they” is reserved for quantified antecedents and cases where gender is truly unknown. Stage 2 speakers are described as accepting coreference between “they” and referents that have gender, under the condition that the description or antecedent used is not gendered. This would be a use of “they” similar to (3a). The pronoun system is argued to be unchanged in Stage 2 as compared to Stage 1. The same set of morphosyntactic features is contrastive but speakers do not need to encode entries into the lexicon with a gender feature. This applies to words like “teacher” and names like “Jesse” that do not have a specified lexical gender feature. For words that do include a lexical gender like explicitly gendered names or roles like “brother” or “sister”, Stage 2 speakers disprefer coreference between “they” and these lexical items. Stage 3 speakers no longer treat masculine or feminine features as contrastive, viewing them instead as optional. This allows a very broad range of antecedents for singular “they” including explicitly gendered antecedents, as in sentences like (3b).

3a. Jesse_i is at the store. They_i needed to buy more AA batteries.

b. [My brother_i/John_i] says that they_i are stuck in traffic.

The objective reality of these stages is supported by an experiment from Camilliere and colleagues (2021). Their clustering analysis of acceptability or naturalness ratings for singular “they” found that grouping participants into three groups provided the best fit with their data. When participant responses were analyzed according to these 3 groups they provided average acceptability ratings that were in line with the three stages predicted by Konnelly & Cowper (2020).

This syntactic change interacts with pragmatic factors articulated by Heim’s Maximize Presupposition (Grice, 1975; Lauer, 2016). This pragmatic principle suggests that

speakers should use pronouns encoding the information that is relevant to their communicative goals. Thus, listeners may presuppose that an individual using singular “they” is communicating either unawareness of the referent’s gender or that gender is not relevant. This leads to a further inference that the speaker is socially distant from the referent being described because gender is often relevant in close social relationships. This is particularly clear for the closest social relationships like parents or spouses (Camilliere et al., 2021). Indeed, despite recent changes, singular “they” remains most felicitous to English speakers when the pronoun refers to socially distant referents without explicit gender features.

1.3 Current Study

The fact that the English pronominal system is changing has been the subject of extensive discussion in both mainstream news and more scientific venues (McWhorter, 2018). However, the cognitive mechanisms for expanding the use of a pronoun are not well understood. A sociolinguistic analysis might describe this as a change “from above” (Conrod, 2018). Generic “they” may be gaining traction because gender-neutral language is, on average, increasing in social value or prestige. But this is more of a theory for why the change is observed, rather than how it is occurring. We suggest that pronominal change may be enacted through implicit learning, more specifically adaptation.

Adaptation is theorized to be an adjustment of mental representations associated with either structures or processing routines made in response to variations in the statistical distribution of a structure (Johnson & Arnold, 2023; Kaan & Chun, 2018). Adaptation responds to both the statistical frequencies for structures encountered over a language user’s lifetime (globally) and those found locally or in recent input (Johnson & Arnold, 2023; Roy et al., 2024). Local input is weighted more heavily, as evidenced by the fact that exposure to a proportionally minute sample of an unusual referential pattern can shift pronoun interpretation biases (Ye & Arnold, 2023a).

We ask whether referential adaptation is a mechanism for explaining how the acceptability of linguistic structures like singular “they” change over time in step with changes to the construction’s frequency (Christensen & Nyvad, 2024). In the present study, we use a between-subjects priming paradigm that utilizes processes occurring during the resolution of ambiguous pronouns to probe relationships between singular interpretations of “they”. If participants are exposed to a set of stories featuring unambiguously singular interpretations this may lead to priming or adaptation. This can shift participants’ representations of local pronoun resolution statistics, leading participants to a relatively higher rate of singular responses when tasked with resolving ambiguous pronouns.

Experiment 1 utilized this method to establish that generic “they” can prime itself by exposing participants to either plural exposure stories or exposure stories using singular generic “they”. A set of critical items designed to be ambiguous between a plural and a generic reading of “they”

were used to measure the effect of exposure (“The gardener showed the man some new snapdragons, and then they decided to wash up.”). In critical stories the first noun phrase describes a generic role, and the second noun phrase also describes a generic role but one with a strong notional gender bias or gender feature. This makes the most available resolutions of “they” either the first generic noun phrase (“the gardener”) or a plural interpretation (“they” refers to both the gardener and the man). The interpretation where “they” refers to the second noun phrase alone (“the man”) is expected to be less frequent for two reasons. First, English shows a bias to resolve pronouns with the first mentioned noun phrase (Arnold, 2000; Arnold et al., 2021). Second, for the majority of English speakers a strongly gendered noun phrase will not be viewed as a good candidate for coreference with “they” (Camilliere et al., 2021; Konnelly & Cowper, 2020). We predict that adaptation effects will manifest as a larger number of singular interpretations following exposure to singular generic prime stories, as compared to the number of singular interpretations in the plural exposure condition. We manipulate exposure with sentences like (4a) and (4b) that differ only in the plurality of the first noun phrase.

4. The cyclist walked into the store, and then they bought some milk.

b. The cyclists walked into the store, and then they bought some milk.

Experiment 1 permits us to test whether adaption is a good candidate to explain change in the acceptability of generic “they” over time that is occurring as constructions using generic “they” increase in frequency (Balhorn et al., 2004; Foertsch & Gernsbacher, 1997; Konnelly & Cowper, 2020; Noll et al., 2018).

2. Methods

2.1 Participants

Participants were 81 undergraduate students at a North American university, recruited using the online SONA system. Participants were compensated for their participation with course credit in a basic level psychology course. The goal was to recruit 80 participants (n=40 per list) to take the survey. This figure was reached based on a power analysis in simr (Green & MacLeod, 2016) using 80% power and the exposure effect size from the ambiguity between pronoun resolution of 3rd person singular pronouns with either a subject or non-subject noun phrase (Roy et al., under review). The analysis indicated we would achieve 80% power with 70 participants.

2.1.1 Inclusion Criteria

Participants failing to complete the entire survey (n=2), reporting a language disorder (n=3), or learning English after the age of 6 (n=2) were excluded from the survey and were not included in the analysis. Participants scoring below 75% on simple reading comprehension questions were not included in the analysis (n=6). Data were collected from 101

participants. Out of this total 83 participants met the pre-registered inclusion criteria. Two of these participants were excluded for taking over 150 minutes to complete the survey. Participants were intended to complete the survey in one sitting. The median completion time was around 20 minutes. Ultimately, 81 (55 female, 24 male, 1 nonbinary, 1 unknown cisgender) individuals were included in the analysis.

2.2 Procedure

Participants were recruited using the SONA subject pool. After clicking a link on the SONA page participants were redirected to Qualtrics. Following completion of the survey they are returned to the SONA page and granted course credit.

2.3 Materials & Design

The survey started with demographic questions, which assessed inclusion criteria and language background. This was followed by an introduction to the named characters and their pronouns (Ana-she/her; Liz-she/her; Matt-he/him; Will-he/him), two example questions, and the main story response task. The second block of demographic questions appeared at the end of the task and asked for the participants' biological sex, gender identity, experience with people with non-traditional gender identities, and experience using nonbinary pronouns. These questions were included at the end to avoid influencing participants' perception of questions involving singular "they".

In the main task participants read short stories and answered two questions about each story. Participants were instructed to use only the information contained in the story to answer the questions. One question probed interpretation of a pronoun in the second clause of the story. The second question was based on reading comprehension and was used as an attention check. The stories come in three varieties: exposure stories, critical stories, and filler stories (See table 1). There were 56 stories including 20 exposure stories, 20 critical stories, and 16 filler stories. All filler stories were about named characters, and they came in 4 variations: one-character stories with a feminine pronoun, one-character stories with a masculine pronoun, two-character stories where the pronoun refers to the first mentioned character, and two-character stories where the pronoun refers to the second mentioned character.

Stories were ordered such that the main task began with four exposure stories in a block. This was followed by a pseudo-random ordering of the remaining 52 items, with the constraint that no repetitions of exposure or critical story types longer than two in a row occurred. A manual adjustment was also made such that 4 more exposure items occurred in the first half of each list, while correspondingly four more fillers occurred during the second half of each list. We hypothesized that adaptation would be strengthened by presenting a higher concentration of exposure items in the first half of each list. In total, there were two lists which differ in the 20 exposure stories, which used either plural they (List 1) or singular generic they (List 2). Exposure stories all included "they" which unambiguously referred to the subject

of the first sentence, but the subject was either singular or plural. In both lists, the subject is occupied by a role name character or characters (e.g., the cyclist/the cyclists), rather than by named characters. The 20 ambiguous critical items were the same across the two lists. Each critical story describes a scenario with a generic role character as the subject of the first clause as they interact with a second character with a role that is strongly gendered. This strikes a balance in the critical sentences where "they" could refer to the first character or both characters but is less likely to refer to the second role character alone.

2.4 Analytical Approach

The outcome variable of interest for Experiment 1 is whether participants chose a singular or plural interpretation for the pronoun "they" in the critical stories. The primary pre-registered analysis used a dichotomized outcome variable (1=both types of singular responses, 0=plural) and analyzed this outcome using a mixed effects logistic regression model. The data was analyzed using the R package lme4 (Bates et al., 2015) with a binomial distribution and a logit link. The predictor variable was exposure condition (plural/generic). Random intercepts were included in the model for items and participants and random slopes for exposure condition by items were included. Random effects that contributed significantly to model fit were maintained leaving a model with random intercepts for items and participants.

2.5 Results

Our critical finding was that people took a singular interpretation of "they" more often in the singular exposure condition than in the plural exposure condition (see Figures 1 and 2). In list 1 the pronoun "they" was resolved with a singular noun phrase 32.63% of the time, while in list 2 a singular selection was observed 44.02% of the time.

We assessed the reliability of this pattern with a mixed effects logistic regression model, which revealed a main effect of exposure ($B1=.77$, $SE=.36$, $z=2.1$, $p<.05$). People exposed to sentences with generic "they" were 2.16 times as likely to select a singular resolution for "they" as they responded to ambiguous critical sentences in the singular exposure condition compared to participants in the plural exposure condition.

A pre-registered secondary analysis was performed to examine the tendency to select the second gendered role character alone. The second character was selected 6.22% in the singular exposure condition and 4.75% in the plural exposure condition. In this analysis, only singular responses were included and the rate of second position singular responses was assessed. The secondary analysis used logistic mixed effects models in a similar fashion to the main analysis (1=NP2 singular, 0=NP1 singular), and found that the effect of exposure was not statistically significant ($B1=.047$, $SE=.32$, $t=.15$, $p=.88$). Put another way, under the condition that a response is singular, the probability that the response referred to the second gendered role character was similar across the two exposure conditions.

3 Discussion

One proposed mechanism for change in the patterns of acceptability for linguistic structures over time is adaptation. If adaptation plays a role in the changing acceptability of referential structures, a higher rate of singular resolutions should be observed in the generic exposure condition of experiment 1. This is, in fact, what we observe in our primary analysis, suggesting that exposure can have significant effect on the prevalence and interpretation of singular “they”.

This finding suggests that comprehenders can adapt to the frequency with which they encounter a singular interpretation vs. a plural interpretation of “they”. This differs from prior studies that have established that statistical learning occurs in language comprehension for referential expressions like pronouns (Johnson & Arnold, 2023; Ye & Arnold, 2023b). These studies demonstrate that participants can learn certain kinds of pronoun-antecedent relationships implicitly through exposure. The participant might learn that in the context of the experiment a pronoun is likely to follow the English default and be resolved with the syntactic subject or they may see a less common antecedent like a second-mentioned prepositional object. Learning this pattern would be an example of referential structural adaptation. The singular pattern of exposure effects in the present experiment appears to represent a different type of referential adaptation than has been observed previously (Ye & Arnold, 2023a, 2023b). Participants may be adapting in response to a context where “they” is resolved with a singular antecedent at a higher rate. The pronoun “they” could also be represented as two distinct lexical items, one singular and one plural. This would allow participants to track the rate at which they encounter each form separately.

It is worth highlighting that our exposure items differed in structure from the critical items used to assess adaptation. Exposure items featured one plural NP “the cyclists”. The critical items used a different structure with two NPs interacting, e.g. “The gardener showed the man some new snapdragons.” This implies that arriving at a plural interpretation for the critical items requires a mental representation that groups the two NPs together to form a representation of plural “they”. The fact that we observe exposure effects may indicate that the singular/plural distinction is treated abstractly and is not dependent on the sentence’s surface structure.

There is substantial theoretical (Bjorkman, 2017; Konnelly & Cowper, 2020) and empirical evidence (Bradley et al., 2020; Camilliere et al., 2021) supporting the proposal that English speakers vary in their acceptance of forms of singular “they”. Speakers range in their acceptability judgements from individuals who think of singular “they” as wrong and will barely accept singular “they” with quantified antecedents (Balhorn, 2004, 2009) to super-innovative speakers who will accept “they” as a referring expression for any animate referent (Camilliere et al., 2021). Despite this diversity we observed a robust cumulative priming effect. This is

interesting because we assume that our sample would include participants with a degree of viewpoint diversity, although our sample consists of college age students which may influence the average baseline acceptance for forms of singular “they” in this procedure. An interesting follow up might be to collect data on participants’ attitudes towards pronoun use and see if this influences their susceptibility to adaptation effects.

An open question is whether adaptation is an ongoing process that calibrates the language system throughout an individual’s life span or whether critical elements of the system are inflexible after youth. The Apparent Time Construct assumes that language traits are relatively stable at the level of generations based on the assumption that the language of each generation reflects the language at the time that they learned it (Bailey et al., 1991). But this stability reflects an average across many individuals. Our study suggests that changing the local input received by particular individuals can lead to changes in their decisions while resolving ambiguous pronouns, which suggests an adjustment of discourse processing.

Theoretically, age could be a factor influencing referential adaptation because an older individual would have a different ratio of local pronoun statistics to lifetime experience using pronouns when compared to a younger individual. This would be a relatively straightforward explanation for processing differences in older individuals. Their greater prior experience with using pronouns might make them less likely to shift their interpretation biases in response to exposure. Our current participant population has very little age diversity so we can’t assess potential differences according to age based on this procedure.

In conclusion, we have observed that the patterns of acceptability and use for singular “they” are changing (Balhorn, 2004, 2009; LaScotte, 2016; Noll et al., 2018). This is notable for the generic singular form as well as the nonbinary form because the range of antecedents considered appropriate for singular “they” is expanding among innovative (stage 2) and super-innovative (stage 3) speakers (Bjorkman, 2017; Camilliere et al., 2021; Konnelly & Cowper, 2020). Here we focused on the changes occurring with the generic form and propose that adaptation may be a mechanism for changes in the English pronominal system.

Data Availability

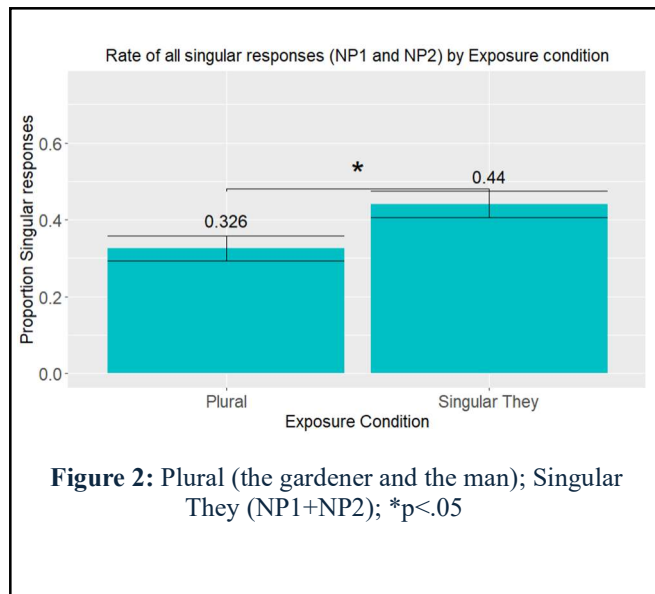
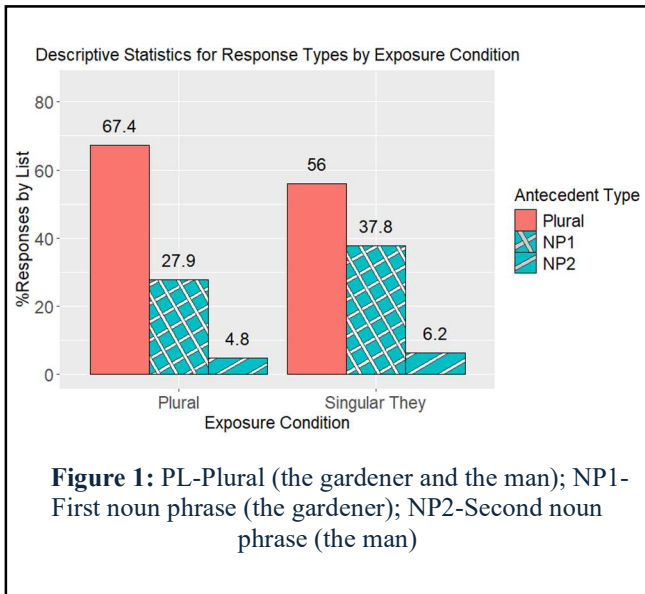
All data and materials are available online at <https://osf.io/35g8s>

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Table 1. Example stimuli

Plural Exposure Story Pronoun Question Reading Comp. Question	<u>The cyclists</u> walked into the store, and then <u>they</u> bought some milk. Who bought some milk at the store? What item did they buy?
Singular Exposure Story Pronoun Question Reading Comp. Question	<u>The cyclist</u> walked into the store, and then <u>they</u> bought some milk. Who bought some milk at the store? What item did they buy?
Critical Story (Ambiguous) Pronoun Question Reading Comp. Question	<u>The gardener</u> showed <u>the man</u> some new snapdragons, and then <u>they</u> decided to wash up. Who decided to wash up? (The gardener / The man / The gardener and the man) Who was shown new flowers?
Filler Story Pronoun Question Reading Comp. Question	Will got caught in a traffic jam with Ana, and then he missed an important appointment. Who missed an important appointment? What did Will and Ana get caught in?



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