

# Interspeaker Variation in the Syntactic Processing of Referential Singular They

by

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# Abstract

Singular *they* is suggested to be acceptable in the grammar only when referring to indefinite or gender-neutral antecedents. Previous studies have used antecedents of varying gender expectation to test whether singular *they* can refer to antecedents with gender, but no experimental studies have considered the social variables that could affect the acceptability of singular *they* in speech. The goal of this study is to compare the acceptability and processing of singular referential *they* between cisgender and non-binary individuals, as people who identify as non-binary tend to use *they*, *them*, and *their* as their pronouns of personal reference. This study shows that there are no effects of gender-expectancy in on-line processing across cisgender and non-binary individuals. I also show that sentences with singular *they* are overall more natural to non-binary individuals than cisgender individuals, suggesting that social variables affect off-line judgments, but not on-line processing.

**Keywords:** pronoun processing, singular they, gender identity, experimental syntax

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# Chapter 1

## Introduction

### 1.1 Objective and Motivation

This thesis investigates the acceptability and processing of singular referential *they* in English, comparing cisgender and non-binary individuals. Cisgender individuals are people who are assigned as a male or female at birth and identify with the same gender. Non-binary individuals are people who are assigned as a male or female at birth, but do not identify as either male or female in gender. This is not to be confused with transgender individuals, who are assigned as a male or female at birth and then identify as a gender different to what they are assigned.

The acceptability and processing of singular referential *they* will be assessed between antecedents with low gender-expectancy, as in (1a), and antecedents with high gender-expectancy, as in (1b). Proper names will also be evaluated, as in (1c).

- (1) a. I knew a customer<sub>*i*</sub>. **They**<sub>*i*</sub> were great.
- b. I knew a mechanic<sub>*i*</sub>. **They**<sub>*i*</sub> were great.
- c. I knew Steve<sub>*i*</sub>. **They**<sub>*i*</sub> were great.

The current literature suggests that singular referential *they* is only accepted by all individuals when referring to indefinite antecedents, such as *someone*, or gender-neutral antecedents, such as *customer* in (1a) (Foertsch & Gernsbacher, 1997; Laitinen, 2008). More recently, people who identify as non-binary have adopted singular *they/them/their* as pronouns of personal reference – example in (1c) – over the standard masculine *he/him/his* or feminine *she/her/hers*. This usage has led to a lot of conflict across social communities, where some people argue that *they* is strictly plural and cannot refer to singular nouns, let alone proper names. However, singular *they*, both referential and non-referential, has been observed in English for hundreds of years in formal writing, and even more recently in presidential speeches.

- (2) a. If a **person**<sub>*i*</sub> is born of a ... gloomy temper ... **they**<sub>*i*</sub> cannot help it. (Chesterfield, 1759)

- b. Now **nobody**<sub>*i*</sub> does anything well that **they**<sub>*i*</sub> cannot help doing. (Ruskin, 1873)
- c. If **anyone**<sub>*i*</sub> tells you that America’s best days are behind her, then **they**’re<sub>*i*</sub> looking the wrong way. (Bush, 1991)

Singular *they* requires plural agreement with the verb, which can lead one to believe that *they* must be plural in the grammar. However, we observe the same phenomenon when looking at singular and plural *you* in Modern English.

- (3) a. **They**<sub>*sg*</sub>/**You**<sub>*sg*</sub> are not looking very well.
- b. **They**<sub>*pl*</sub>/**You**<sub>*pl*</sub> are not looking very well.

In Early Modern English, singular *thou* and plural *ye* were two different forms for nominative *you* and required different subject-verb agreement patterns, shown in (4).

- (4) a. **Thou hast** made me very mery (Palsgrave, 1530).
- b. **Ye have** made me very mery.

Over time, nominative *ye* and accusative *you* merged and *you* became standard for both cases. Furthermore, *thou*’s use as an informal 2nd person singular pronoun disappeared, and now both singular and plural cases of the 2nd person pronoun in English have plural agreement. The current usage of singular *they* may not have merged from separate forms in English, but the fact that singular *they* agrees with the plural form of a verb is not an impossibility and does not mean that *they* must be plural.

It is possible that there are people who interpret *they* only as a plural pronoun. Off-line naturalness ratings reflect how natural or grammatical a sentence sounds to a speaker once they have had time to consciously evaluate it. On-line processing data, collected using reading times across regions of words, reflects the speaker’s internal grammar and whether or not the construction is generally expected or accepted by the speaker. If a person’s internal grammar accepts only plural *they*, possibly due to the lack of exposure or use of singular *they* with singular antecedents, then every case of singular referential *they* should see low off-line naturalness ratings and poor on-line processing. If a person’s internal grammar accepts singular *they* in any capacity, but that person’s view rejects gender-neutral language, or vice-versa, then there might be differences between off-line naturalness judgments and on-line processing in at least one of the tested conditions. Further factors affecting off-line and on-line differences, such as encountering unheralded pronouns, or social attitudes towards gender-neutral language or the LGBTQ+ community are discussed in chapter 2.

## 1.2 Outline

The current study investigates whether social factors, such as gender-identity, and grammatical factors, such as antecedent gender, affect the off-line naturalness ratings and on-line

processing of singular referential *they*. In chapter 1, I have briefly provided evidence that singular *they* indeed exists in English and explained some reasons why differences in off-line and on-line data could exist across participants.

In chapter 2, I discuss the relevant experiments in the literature involving referential *they* and its usage with respect to antecedents of varying gender and varying number. Then, current social attitudes towards gender-neutral language are discussed, introducing the various social variables that could influence the acceptability and processing of singular *they*.

In chapter 3, I introduce the experiment in this thesis and evaluate the on-line processing results with respect to gender-identity as a social variable and show that there are no differences between *they* conditions regardless of the gender-expectancy of the antecedent or the gender-identity of the participant. Then, I investigate whether there are differences within the cisgender population and show that exposure to gender-neutral language within the cisgender population does not affect on-line processing.

In chapter 4, the naturalness ratings of the experiment are discussed, showing that non-binary participants prefer sentences with *they* more than cisgender participants. This difference is especially present with proper names. I also investigate the differences within the cisgender participants and show that exposure to gender-neutral language is a significant factor when evaluating the naturalness ratings of using singular *they* with both proper names, low-, and high gender-expectancy antecedents. I also comment on the relationship between on-line processing and naturalness ratings.

Finally, in chapter 5, a brief summary of the experiments is discussed as well as its implications on the current status of singular referential *they* and its variable acceptability across speakers.

## Chapter 2

# Literature Review

English does not have a unique gender-neutral pronoun for third-person singular, but *they* has been used for centuries to fill that gap (Bodine, 1975; Laitinen, 2008; Balhorn, 2009; Baron, 2016). This literature review explores the history, usage, and status of singular *they* with a focus on experimental studies. Furthermore, sociolinguistic aspects such as gender, variation in *they* usage, and attitudes towards gender-neutral language are discussed.

### 2.1 History and Usage of Referential *They*

Balhorn (2004) has shown through several corpus studies that singular *they* as a bound variable pronoun and referential pronoun in Modern English has been steadily rising in use over the past few centuries. Most examples from early texts use singular *they* as a bound variable pronoun, or use it within a conditional structure. Examples of the referential use are presented in (5a) and (5b). For each of the sentences in (5), the antecedents that *they* refers to are singular and genderless.

- (5) a. I had a **friend**<sub>*i*</sub> in Paris, and **they**<sub>*i*</sub> had to go to hospital for a month. (Swan, 2005)
- b. I do not see what good it does the Navy to have a **student**<sub>*i*</sub> become an expert football player. Once **they**<sub>*i*</sub> are on a ship, who knows or cares?

Corpus data from Laitinen (2008) supports the fact that singular *they* has been commonly used as an anaphor to indefinite, genderless antecedents, such as *a person*, as early as the sixteenth century. Even though the use of singular *they* was not uncommon, singular *he* was used much more frequently in written texts.

More recently, Balhorn (2009) analyzed five major U.S. newspapers between 2004 and 2006 and observed a statistical difference between gender-neutral antecedents, such as *person* or *customer*, and gender-stereotyped antecedents, such as *nurse* or *doctor*, with respect to pronoun choice. When the antecedents were gender-neutral, *he* was used as a referential pronoun in 40% of all occurrences, while *he or she* and *they* were used in 30% and 28%

of all occurrences respectively. With gender-stereotyped antecedents, *‘he or she’* was used as a referential pronoun in 50% of all occurrences, *he* was used in 40%, and *they* was used in only 7% of all occurrences. This data demonstrates that, in writing, *they* is used to refer primarily to gender-neutral antecedents, but can be used to refer to gender-stereotyped antecedents.

There are differences in pronoun choice and usage between formal writing and informal writing. To look at the usage of referential singular pronouns in informal writing, LaScotte (2016) performed a study where native English speakers were tasked with describing habits of an “ideal student” in a few sentences. Because the “ideal student” has no gender, the goal of the study was to determine whether men and women differed in pronoun use in informal settings, and whether speakers were consistent with their pronoun choice. LaScotte (2016) discovered that in informal writing, *they* was used with the highest frequency, followed by *one*, *you*, and then finally *he* with the lowest frequency. In terms of consistency, LaScotte (2016) noticed that only about two-thirds of the participants used the same pronoun throughout their entire description of the “ideal student”, often using *he* and *they* within the same text. Differences were found between formal and informal settings as well. When asked which pronoun would be most appropriate to describe the “ideal student” in formal writing, participants responded and said that *‘he or she’* would be the most appropriate pronoun to use. When asked about informal writing, subjects concluded that *they* would be the most appropriate pronoun. Only a small minority of participants mentioned that *she* would be acceptable in either context.

In formal academic writing, many style guides have rejected the use of singular *they* (APA, 2010; Chicago, 2017). Instead, it is recommended that a writer avoid using singular *they* by substituting it with generic *he* in every instance that singular *they* would have been used. It is only recently that the American Psychological Association has published a statement re-evaluating the usage of singular *they* with respect to proper names and gender. The APA guidelines state that singular *they* may be used when referencing participants in experimental data to maintain anonymity and confidentiality, or when a person identifies as non-binary and wishes to be referred to as *they/them/their*, instead of the standard pronouns *he/him/his* or *she/her/hers* (Lee, 2015). Consequentially, it would be expected that referential singular *they* would rarely be observed in published academic articles.

Another area where singular *they* is considered unacceptable is in legal writing. Guides on pronoun usage in legal documentation are available online from many law schools. An example from the style guide from the CUNY School of Law (2017) is presented in (6), explicitly showing that singular *they* is unacceptable, even if the antecedent consists of a group of people.

- (6) \*The **court**<sub>i</sub> stated that **they**<sub>i</sub> were ill-equipped to second-guess the trial court judge’s determination.

The British Columbia Law Institute (1998) guide book on gender-neutral language also encourages writers to avoid third person singular references entirely in legal writing.

In speech, *they* is used more frequently than *he* when referring to indefinite, genderless antecedents (Matossian, 1997; Newman, 1997). The phrase ‘*he or she*’ is used with the least frequency when referring to indefinite DPs with or without gender in speech, but in writing it appears more commonly than singular *they* (Matossian, 1997; Balhorn, 2009). To check whether formal or informal contexts were a factor, Matossian (1997) conducted oral interviews with residents in Philadelphia and Minneapolis asking about local interests and history. In the interviews, it was noted that *he* was rarely used with genderless antecedents, and was only used about 50% of the time with male gender-stereotyped antecedents, looking as if generic *he* is competing with generic *they*. For female gender-stereotyped antecedents, residents used *they* with the highest frequency. In contrast, *she* was rarely used to refer to female-stereotyped antecedents, which could be explained by the fact that there is no generic *she* in English. Although very few studies have looked at spoken corpora or the usage of referential singular *they* in speech across different levels of formality, it is expected that speakers will prefer *they* in informal contexts more than formal contexts.

## 2.2 Pronoun Processing

### 2.2.1 Number Mismatch

Because *they* and *them* have been traditionally considered third-person plural pronouns in formal writing, it could be expected that a number-mismatch effect would occur if *they* refers to a singular antecedent.

Sanford and Filik (2007) conducted an eye-tracking experiment which showed that *them* has a processing cost when it refers to a singular antecedent, suggesting that *them* is initially interpreted as plural. In the experiment, participants were asked to read 24 paragraphs that consisted of three sentences each in the following order: a scene-setting sentence, a target sentence, and a concluding sentence. The scene-setting sentence introduced the agent and context. The target sentence included both the antecedent of the pronoun and the referential pronoun. The concluding sentence was included so that the target sentence was not the final sentence. In each target sentence, the number of the antecedent was manipulated as either singular or plural, and the pronoun was manipulated to be either singular (*him/her*) or plural (*them*). The target sentence was broken up into regions, as indicated by a ‘/’ in the following example sentences. The critical region containing the pronoun is region 1.

- (7) Mr. Jones was looking for the station...
- a. He saw **someone** on the other side of the road, so he crossed over and /<sub>1</sub> asked **her** <sub>1/2</sub> politely <sub>2/3</sub> where the station was.

- b. He saw **someone** on the other side of the road, so he crossed over and /<sub>1</sub> asked **them** <sub>1/2</sub> politely <sub>2/3</sub> where the station was.
  - c. He saw **some people** on the other side of the road, so he crossed over and /<sub>1</sub> asked **her** <sub>1/2</sub> politely <sub>2/3</sub> where the station was.
  - d. He saw **some people** on the other side of the road, so he crossed over and /<sub>1</sub> asked **them** <sub>1/2</sub> politely <sub>2/3</sub> where the station was.
- ...It was in a different part of town.

On 50% of the trials, participants were asked a yes-no comprehension question about the sentence. No acceptability ratings were collected.

In region 1, a singular pronoun referring to a plural antecedent (7c) took 100ms longer on average to read compared to a singular pronoun referring to a singular antecedent (7a). Also, a plural pronoun referring to a singular antecedent (7b) took 60ms longer on average to read compared to a plural pronoun referring to a plural antecedent (7d). It was found that mismatches with singular pronouns show significant effects in region 1 with more regressions out, longer regression-path times, longer first-pass reading times and total reading times.<sup>1</sup> Plural pronouns only show significant effects in region 1 with total reading time. The results suggest that a number-mismatch occurs when the number of the antecedent and pronoun differ. The differences in reading times between the mismatch cases are observed due to *them* having a larger antecedent range than *him/her* (Moxey et al., 2004; Sanford & Filik, 2007). Singular *him/her* require an antecedent that is singular and has gender, so resources are utilized immediately to find a suitable antecedent. Because *them* can be used for a wider range of antecedents, such as singular collective nouns or split antecedents, the processor does not immediately allocate resources to find a suitable antecedent. This results in *him/her* having a longer overall reading time and more regressions out to find an antecedent in the mismatch cases.

To investigate Sanford and Filik's (2007) results further, Sanford et al. (2008) conducted a follow-up ERP study investigating the differences between *he/she* and *they* when antecedents were explicitly defined (8a, 8b) and when antecedents were not explicitly defined (8c, 8d). Particularly, the experiment aimed to demonstrate that the semantic integration of singular and plural pronouns were not similar by showing differences in N400 negativity upon reading the pronoun. N400 effects are observed in processing when a semantic integration violation occurs, such as trying to reference a *singular* pronoun with a *plural* antecedent, or when an encountered word is not predicted by the processor, such as en-

<sup>1</sup> *Regression-path time* refers to the total time between the first entry into the region from the left and the first exit out of the region to the right. *Regressions out* refers to the total number of times that the region is exited from the left side. *First-pass reading time* refers to the time spent in the region between the first entry point and first exit point, regardless of direction. *Total reading time* refers to the sum of all time spent within a particular region.



countering *she* when you expect *he*. Therefore, if the number-mismatch effects are different for singular and plural pronouns, or if the processor predicts a different pronoun within the sentence, then it is expected that the negativity of the N400 effect differs as well.

- (8) a. The in-flight meal I got from the **stewardess** was more impressive than usual. In fact, **she** courteously presented the food as well.
- b. The in-flight meal I got from the **stewardess** was more impressive than usual. In fact, **they** courteously presented the food as well.
- c. The in-flight meal I got was more impressive than usual. In fact, **she** courteously presented the food as well.
- d. The in-flight meal I got was more impressive than usual. In fact, **they** courteously presented the food as well.

It was found that singular pronouns *he/she* have a greater N400 negativity at the onset of the pronoun than the pronoun *they*. This is unexpected, as the general findings of N400 effects suggest a greater N400 negativity for a number mismatch between the antecedent and *they*, compared to a number match between the antecedent and *he/she*. Sanford et al. (2008) suggests that the greater negativity of *he/she* is due to a general difference in how singular and plural pronouns are processed. Singular pronouns seek an antecedent immediately, requiring more initial integration resources than plural pronouns, which do not seek an antecedent immediately. These results directly support the findings of Sanford and Filik (2007), suggesting a later integration time for *them* to establish co-reference with its antecedent. As for the original research question, no difference was found between the no-antecedent *they* condition and explicit-antecedent *they* conditions.

### 2.2.2 Gender Mismatch

It has been observed that singular referential *they* is acceptable when used to refer to singular, genderless antecedents, but its acceptability when used to refer to gender-stereotyped antecedents, such as *nurse* and *mechanic*, or gender-marked antecedents, such as *actress* and *boy*, is generally less accepted. This observation implies that gender may be involved in establishing co-reference between singular *they* and its antecedent, so gender-mismatch effects (GMMEs) could be observed alongside a number-mismatch.

GMMEs are observed in naturalness rating tasks and in online self-paced reading tasks. When a masculine or feminine pronoun in a sentence refers to an antecedent with the opposite gender, a GMME occurs. There are two observable consequences related to GMMEs. First, average reading times at the pronoun and the following few words are significantly longer than average reading times elsewhere in the sentence. Second, readers typically rate sentences with gender-known antecedents and gender-mismatched pronouns as unnatural or unacceptable relative to their gender-matching counterparts (Kennison & Trofe, 2003;

Kreiner et al, 2008). A clear example of a gender-mismatch is observed in sentence (9a), where the gender-known antecedent, *the king*, is clearly masculine, but the co-referring pronoun is feminine.

- (9) a. \*The **man**<sub>*i*</sub> loved **herself**<sub>*i*</sub>.  
b. The **secretary**<sub>*i*</sub> distributed an urgent memo. **He**<sub>*i*</sub> made it clear that work would continue as normal. (Kennison & Trofe, 2003)  
c. An **injured patient**<sub>*i*</sub> knew that **he**<sub>*i*</sub>/**she**<sub>*i*</sub> could not walk yet.

GMMEs are also observed in online processing when the referential pronoun has a gender opposite of the antecedents *expected* or *stereotypical* gender, as shown in (9b), where *the secretary* is expected to be feminine (Kennison & Trofe, 2003; Kreiner et al., 2008), but the co-referential pronoun is masculine. The fact that *secretary* and *he* elicits a GMME tells us that antecedents with high gender-expectancy are assigned a gender during online processing due to real-world expectancies about the antecedent (Kreiner, Sturt, & Garrod, 2008). ERP studies conducted by Canal et al. (2015) and Nieuwland (2014) confirmed that gender-mismatch occurs with high-expectancy antecedents by observing P600 responses at the pronoun. P600 effects are observed when participants encounter difficulties in syntactic processing, such as integrating a gender-mismatching pronoun with its antecedent, or when a reader mis-parses a garden path sentence.<sup>2</sup> However, GMMEs do not occur for low-expectancy antecedents, as given in (9c), and P600 effects are not observed either. Low-expectancy antecedents are not assigned gender during online processing because there are no real-world expectations about their gender. In contrast, naturalness ratings of the high gender-expectancy antecedents are similar to the naturalness ratings of the low gender-expectancy antecedents (Kreiner et al., 2008), which suggests that the gender invoked by a stereotype may only be temporary. Therefore, we see that gender-mismatching pronouns affect online processing when involving high-expectancy antecedents, but do not affect offline acceptability judgments.

Foertsch and Gernsbacher (1997) conducted the first online processing study on singular *they*. In two experiments, participants were asked to read sentences and determine whether or not they agreed with the content of the sentence. In experiment 1, each sentence contained a non-referential antecedent: either a stereotypical masculine antecedent (10a), stereotypical feminine antecedent (10b), or gender-neutral antecedent headed by an indefinite determiner (10c). The stereotypical masculine and stereotypical feminine antecedents will be referred to together as *gender-stereotyped* antecedents.

<sup>2</sup>Both P600 and N400 effects can be triggered within the same sentence if there are syntactic violations and semantic violations.

- (10) a. A **truck driver** should never drive when sleepy, even if **he/she/they** may be struggling to make a delivery on time, because many accidents are caused by drivers who fall asleep at the wheel.
- b. A **nurse** should have an understanding of how a medication works, even if **he/she/they** will not have any say in prescribing it, because nurses must anticipate how a patient will respond to the medication.
- c. A **runner** should eat lots of pasta the night before a race, even if **he/she/they** would rather have a steak, because carbohydrates provide fuel for endurance events, while proteins do not.

Sentences were presented on a per-clause basis, and reading times were reported per character within the clause containing the pronoun. Participants had full control over when the next clause would appear on screen to be read. It was found that singular *they* was read as quickly as gender-matching pronouns *he/she* when the pronoun’s antecedent was stereotypically masculine or stereotypically feminine. When referring to a gender-neutral non-referential antecedent, *they* was read more quickly than *he/she*.

In experiment 2, the same factors were tested, but definite or specific indefinite antecedents were used instead of indefinite antecedents. Specifically, antecedents were modified by *that*, *my*, or by relative clauses which expressed that the antecedent was personally known, as shown in (11).

- (11) a. That **truck driver** shouldn’t drive when sleepy, even if **he/she/they** may be trying to make a delivery on time...
- b. My **nurse** was able to explain how my medication would affect me, even though **he/she/they** had no say in prescribing it...
- c. A **runner** I knew always ate lots of pasta the night before a race, even when **he/she/they** would’ve rather had a steak...

It was discovered that singular *they* was read as quickly as *he* or *she* with gender-neutral antecedents, but read significantly longer when antecedents had stereotypical masculine gender. When antecedents had stereotypical feminine gender, singular *they* did not take significantly longer to read than *she*. Foertsch and Gernsbacher (1997) concluded that singular *they* “is not problematic for the majority of readers”, and that *they* only causes problems when used with an antecedent whose gender is likely known.

Because of the methodology employed in the experiment, no information could be reported about *where* processing delays occurred in each clause. Furthermore, antecedents with *that*, *my*, and relative clauses were all analyzed as a single condition, under the assumption that these manipulations would all have the same effect on the interpretation of the pronoun.

Following up on Foertsch and Gernsbacher’s (1997) results, Doherty and Conklin (2017) conducted two experiments to analyze how singular *them* is processed with respect to high-expectancy antecedents (12a), low-expectancy antecedents (12b), and gender-known antecedents (12c). In Experiment 1, they conducted an acceptability rating task via questionnaire to collect speakers’ judgments about whether *them* was acceptable given low-expectancy, high-expectancy, and gender-known antecedents. In Experiment 2, they conducted a self-paced reading eye-tracking experiment to determine how speakers process singular *them* online.

In both experiments, the same set of test items was used. Gender-known and high-expectancy antecedents were paired with gender-matching (him/her), gender-mismatching (him/her), and gender-neutral (them) pronouns. Low-expectancy antecedents were paired with gender-marked (him/her) and gender-neutral (them) pronouns because low-expectancy antecedents do not have any gender to match or mismatch with.

- (12) a. Patrick took his car to the local garage for an MOT. He saw a **mechanic<sub>i</sub>** there and asked **him<sub>i</sub>/her<sub>i</sub>/them<sub>i</sub>** warily if there were any problems. Later that week he scrapped the car.
- b. Adam recently had an accident in his car. He was emerging from a junction when he hit a **cyclist<sub>i</sub>** and knocked **him<sub>i</sub>/her<sub>i</sub>/them<sub>i</sub>** straight off the bike. Fortunately the cyclist was not badly hurt.
- c. John was a manager of a company when one of his staff noticed discrepancies in the finances. He called a **spokeswoman<sub>i</sub>** and instructed **him<sub>i</sub>/her<sub>i</sub>/them<sub>i</sub>** hurriedly to call a press conference. It was important to get to the press, before they found out about the story elsewhere.

Based on the data above, there are some predicted differences with *them* that are expected between low-expectancy, high-expectancy, and gender-known antecedents. With low-expectancy antecedents, it is expected that there would be no reading time delays when *them* is encountered, because *them* can refer to antecedents with unknown gender. With high-expectancy antecedents, we would expect some reading time delays because high-expectancy antecedents are initially assigned gender during processing. In terms of naturalness ratings, both low-expectancy and high-expectancy antecedents should elicit the same ratings, because the gender assigned to high-expectancy antecedents during processing is temporary, and speakers eventually realize that professions such as *mechanic* and *secretary* are not exclusively feminine or masculine. With gender-known antecedents, reading time delays are expected to occur, similar to high-expectancy antecedents, and naturalness ratings would be affected by either a number-mismatch or gender-mismatch upon reading *them*, since professions such as *spokeswoman* have explicit grammatical gender.

In the acceptability rating survey, Doherty and Conklin (2017) discovered that for low-expectancy and high-expectancy antecedents, as shown in examples (12a) and (12b),

singular *them* was rated more poorly than *him* or *her* in gender-matching and gender-mismatching cases. However, participants rated low-expectancy sentences with *them* significantly higher than high-expectancy sentences with *them*, suggesting that stereotypical gender can affect offline acceptability judgments. For gender-known antecedents, shown in (12c), singular *them* was rated significantly better than gender-mismatch cases, but worse than gender-match cases. Comparing *them* across the three conditions, singular *them* was rated least natural in the gender-known condition, and most natural in the low-expectancy condition.

Doherty and Conklin’s (2017) Experiment 1 results suggest that gender expectation influences the naturalness of singular *them*. However, in the high-expectancy conditions in Experiment 1, naturalness ratings for gender-matching pronouns *him/her* and gender-mismatching pronouns *him/her* were not significantly different, which means that the gender-stereotyped antecedent can co-refer with masculine or feminine pronouns just as gender-unknown antecedents can. Therefore, gender-expectancy should not be the only factor that causes a difference between the ratings of gender-neutral *them* with high-expectancy antecedents. If gender-expectancy was the only significant factor, then the naturalness of *them* would be rated at least as high as gender-matching *him/her* or gender-mismatching *him/her* in the high-expectancy cases, because the results showed stereotypical gender does not affect naturalness ratings. Therefore, the low naturalness ratings of *them* in the high-expectancy cases are likely due to number mismatch.

Interpreting Doherty & Conklin’s (2017) results, if we assume that *them* is plural by default, which is possible because a singular reading was not promoted in any of the test sentences, then the medial naturalness ratings of *them* across all three GENDER-EXPECTANCY conditions can be explained through both gender-mismatch and number-mismatch. The differences between low-expectancy *them* and high-expectancy *them* cases can be attributed to gender-mismatch. Mean naturalness ratings for low-expectancy antecedents and *them* is higher than high-expectancy antecedents and *them* because the gender is clearly unknown in low-expectancy cases, conforming with the current view that singular *them* can refer to any gender-unknown antecedent. What is likely happening is that the differences between low-expectancy *them* and low-expectancy *him/her* cases can be attributed to number-mismatch. Mean naturalness ratings for low-expectancy antecedents are higher for gender-marked pronouns than *them* because the antecedent is singular while the pronoun may be interpreted as plural for *them*. For the high-expectancy antecedents, low naturalness ratings for *them* are caused by number-mismatch and may be influenced by gender-mismatch. Although the high-expectancy antecedent has a stereotypical gender associated with it, which should be ignored in offline judgments, the *likelihood* of the antecedent having gender (whether relevant or irrelevant to the situation) may have an effect on the ratings of *them*, resulting in a smaller GMME. Finally, for gender-known antecedents, mean naturalness ratings with *them* are low because of a compounding effect of number-mismatch and gender-mismatch.

The antecedent is singular while the pronoun is interpreted as plural, and the antecedent has explicitly marked gender while *them* must refer to a genderless antecedent. These results show that participants do not find *them* acceptable with antecedents that have explicit gender.

In Experiment 2, Doherty and Conklin (2017) used the same materials that were used for the acceptability rating questionnaire, but they were presented in an eye-tracking while reading experiment. A few words in each test sentence were broken up into three different regions. Region 1 consisted of the verb and pronoun, region 2 consisted of the adverb, and region 3 consisted of the remainder of the test sentence.

- (13) Patrick took his car to the local garage for an MOT. He saw a mechanic there and /<sub>1</sub> asked him <sub>1/2</sub> warily <sub>2/3</sub> if there were any problems. <sub>3/</sub> Later that week he scrapped the car.

For each trial, all three sentences were presented on screen at once. Participants were able to read the sentences for as long as they wanted. Reading times were calculated for each region, based on how long a participant’s eyes were fixated on the region. It was discovered in region 1 that there were processing delays when *them* refers to high gender-expectancy antecedents, as in (12a), but there were no processing delays when *them* refers to low gender-expectancy antecedents, as in (12b). Processing delays with singular *them* were also greater for gender-known antecedents than for high-expectancy antecedents. However, standard gender-mismatch cases for the gender-known and high-expectancy conditions had greater processing delays than any of the singular *them* conditions.

The results of Experiment 2 tells us two important facts about referential singular *them*. First, there is some mismatch effect occurring during online processing when an antecedent with known or expected gender is referred to by the gender-neutral pronoun *them*. Second, speakers find singular *them* to be less disruptive than a pronoun that mismatches the *known* or *expected* gender of an antecedent during online processing, but antecedents with explicit gender cause more processing issues. In other terms, gender that is explicitly marked on an antecedent causes a greater disruption when reading *them* than gender that is temporarily invoked by a stereotype.

There are a few methodological issues with Doherty and Conklin’s (2017) study. In the naturalness rating task, participants were given a Likert scale from 1 to 5 with 1/5 meaning *impossible* and 5/5 meaning *natural*. The terminology within the scale conflates grammaticality and naturalness, since *impossible* suggests an ungrammatical construction, while *naturalness* suggests an acceptable construction. The scale labels could also reflect on the content of the sentence being *impossible*, rather than the structure of the sentence. Furthermore, the exemplar sentence for a 3/5 sentence was “*she played bad*”, which may not be considered grammatical by prescriptivist standards, but it certainly is acceptable. In addition, the questionnaire was paper-based, meaning that participants could view all

of the test sentences and potentially alter previous ratings to be consistent. Paper-based questionnaires also give participants a significant amount of time to consider whether a sentence is natural or not, instead of providing an initial impression. In addition, ratings could be influenced by a participant’s beliefs about gender-neutral language if a participant is able to discern the intention of the experiment. For the eye-tracking study, in some test sentences, there was more than one possible referent for singular *them* to refer to. Because *them* has been shown to initially be interpreted as plural, there may be cases where participants believe that *them* can refer to multiple antecedents in the test trial, as shown in (14).

- (14) John was a manager of a company when one of his staff noticed discrepancies in the finances. He called a spokeswoman and instructed them hurriedly to call a press conference.

In (14), the referent could be a spokeswoman and (one of) his staff. In this cases, there is no expectation that participants would need to re-read any previous regions, because *them* is plural and so is the antecedent.

### 2.2.3 Unheralded Pronouns

Gender-mismatch and number-mismatch effects occur with referential *they* because the pronoun and its antecedent establish co-reference. If no mismatch effects occur, then it is possible that referential *they* is not establishing co-reference.

When referential *they* appears in a sentence, it is possible that a speaker can interpret the pronoun as referring to some non-explicit antecedent. For example, *they* in (15) may be refer to *an athlete*, or it may refer to some other group of people such as *the charity*, *the spectators* or *the other players*.

- (15) **An athlete<sub>i</sub>** went to play in a charity’s baseball game. **They<sub>i/j</sub>** were disappointed with the overall performance.

If the pronoun refers to a non-explicit antecedent, then no co-reference would occur and therefore no mismatch effects would appear. Therefore, we must investigate whether this interpretation is likely to occur and the effects associated with it.

Pronouns that lack immediate antecedents are defined as unheralded pronouns (Gerrig, 1986). An example of an unheralded pronoun is given in (16a), where it is expected that real world knowledge will assist in establishing a referent for the pronoun *she*. Unheralded pronouns are also used frequently in colloquial speech, as shown in (16b), which is a transcription of one side of a phone conversation.

- (16) a. The in-flight meal I got was more impressive than usual. In fact, **she** courteously presented the food as well. (Sanford et al., 2008)

- b. Because I don't think that that would be warranted ... at at at the salary that **they**'re giving you. (Gerrig et al., 2011)

Studies have shown that when gender-marked unheralded pronouns, such *he* or *she*, are encountered in self-paced reading and eye-tracking experiments, there are reading delays or disruptions (Sanford et al., 2008). However, when *they* is encountered in a self-paced reading task, there are no significant reading time differences between referential *they* and unheralded *they* (Sanford et al., 2008).

Sanford et al. (2008) suggests that the difference between unheralded *he/she* and unheralded *they* can be explained by underspecification of the antecedent and the antecedent range of the pronoun. An underspecified antecedent is an antecedent that is not explicitly expressed. The gender-marked pronouns *he* and *she*'s antecedent range does not include underspecified agents, so failure to find an explicit antecedent causes processing delays (Garrod, Freudenthal, & Boyle, 1994). In contrast, *they* does not require an explicit antecedent to refer to, because *they*'s antecedent range includes underspecified antecedents. Therefore, when unheralded *they* is encountered in a sentence, it typically does not matter what the antecedent is, and *they* can refer to any underspecified, or "dummy", agent (Sanford et al., 2008).

- (17) **They** prepared a meal for the inmates.

For example, in sentence (17), *they* can refer to an underspecified agent. This underspecified agent could be a *team of prison kitchen staff*, any *particular staff member*, or even a *special visitor*. The listener or reader does not necessarily need to know specifically who *they* refers to in (17) in order to understand the content of the sentence, so when there is no explicit antecedent which *they* can refer to, the sentence does not trigger any processing delays (Ferreira, Ferraro, & Bailey, 2002).

Unheralded and unspecified *they* is important to consider in interpreting experimental results. Although contextually it should be possible to eliminate the possibility of *they* referring to an unspecified referent, if reading times for *they* appears to be similar to reading times for any control condition, then it is possible that participants have treated *they* as unheralded and unspecified.

#### 2.2.4 Proper Names and Anaphora

Only one study has been conducted that investigates gender-mismatch effects with proper names and gender-neutral pronouns. Ackerman et al. (2018) conducted two acceptability judgment experiments that specifically look at proper names and gender-mismatch effects with reflexive anaphora.

Experiment 1 was an offline acceptability judgment task, where participants would rate sentences on a Likert scale from 1 to 7 where 1/7 means *bad* and 7/7 means *good*. It was a



3 × 3 factorial design of GENDER-BIASED PROPER NAME (feminine, masculine, ambiguous) × ANAPHORA (herself, himself, *themselves*). An example of the test sentences is presented in (18).

- (18) As a young toddler, **Sophie/Jacob/Taylor** dressed **herself/himself/themselves** every morning without help.

For gender match cases (feminine-herself, masculine-himself), acceptability ratings were high as expected, and gender mismatch cases (feminine-himself, masculine-herself) were rated poorly. For ambiguous cases (ambiguous-herself, ambiguous-himself), ratings were nearly as high as gender-match for the other two conditions, meaning that gender expectations on ambiguous names is generally flexible. However, on all three cases with *themselves* as the anaphor, ratings were much lower than gender-mismatch cases. The results of this experiment show that the gender-neutral *themselves* is not accepted when referring to proper names, regardless of whether the gender of the person is unambiguous (Sophie, Jacob) or ambiguous (Taylor). The low acceptability ratings may have resulted from testing *themselves*, a non-standard reflexive, rather than *themselves*. Ackerman et al. (2018) address this confound in a second experiment comparing ANTECEDENT (pronoun, proper name) × ANAPHOR (*themselves*, *themselves*). An example is presented in (19).

- (19) **Someone/Chloe** could be persuaded to attempt to teach **themselves/themselves** computer programming.

The results showed that *themselves* is always preferred over *themselves*, regardless of the antecedent, indicating that the non-standardness of *themselves* might have led to lower ratings in the first experiment. *Someone* as an antecedent was preferred over any proper name as an antecedent, regardless of the anaphor, showing that gender-neutral pronouns prefer indefinite antecedents over proper names. Finally, *someone-themselves* cases were rated higher than the three other cases. The results of Ackerman et al.'s (2018) Experiment 2 verify that the gender-neutral anaphora prefer antecedents with unknown gender over antecedents with known gender.

Interactions with non-binary and transgender individuals was an additional factor that was analyzed. Overall, a correlation was found where participants who interact more frequently with non-binary and transgender individuals tend to have higher acceptability ratings for *someone-themselves*, *name-themselves*, and *name-themselves* cases. This correlation is important because it shows that experience with using gender-neutral pronouns to refer to individuals can increase the acceptability of using *themselves* or *themselves* with any proper name. The increase in acceptability ratings of *someone-themselves* cases may also indicate the acceptance of *themselves* as a *singular* counterpart of *themselves*.

To summarize Ackerman et al. (2018), there is experimental evidence that some speakers may not be restricted to using *themselves* only with gender-unknown antecedents, non-specific antecedents, or antecedents where the discourse gender is unimportant to the content

of the sentence, but have expanded that range to now include proper names. Although the study did not explore referential singular *they* or *them* in a context with proper names, it is reasonable to expect a similar outcome when *they* is not reflexive.

### 2.3 Attitudes Towards Gender-Neutral Language

Gender-neutral language has been a controversial topic in North America for many years. As shown through style guides and legal writing, gender-neutral language in general is typically encouraged, but the usage of the singular gender-neutral pronoun is highly dis-preferred. Recently, society has become more accepting of individuals identifying as non-binary. Non-binary people do not identify as either a man or a woman, meaning that their gender is neither masculine nor feminine. Non-binary individuals may not use *he/him/his* or *she/her/hers* pronouns, but instead opt to use *they/them/their*, *xe/xim/xer*, or other sets of pronouns. In some cases, individuals may accept multiple sets of pronouns, such as *he/him/his* and *they/them/their*. However, not all communities are accepting of gender-neutral language, gender-neutral pronouns, or non-binary individuals. As a consequence, some people have negative attitudes towards gender-neutral pronouns such as singular *they*.

Senden, Back, and Lindqvist (2015) conducted a longitudinal study that looked at general attitudes towards the singular gender-neutral pronoun *hen* in Swedish, which was formally adopted in 2012. It was discovered that 56.5% of the attitudes towards *hen* were negative in 2012, but that decreased to 9.6% in 2015. Interestingly, the attitudes towards *hen* became less negative over three years, but the usage of *hen* had not increased over those three years. Senden, Back, and Lindqvist (2015) identify several factors for why attitudes towards *hen* had improved. First, the longer a word has been known, the more acceptable it is in society. Second, younger people and students were more likely to rate *hen* as positive than older people. Third, people who were labeled as right-wing or gave more sexist responses had more negative attitudes towards *hen*. Although this study was conducted for Swedish, it is reasonable to suggest that the same attitudes and factors may affect offline judgments for singular *they* in English. Vergoossen et al. (2016) extended Senden, Back, and Lindqvist's (2015) study and surveyed 250 people to ask why they did not support gender-neutral *hen*, or gender-neutral language in general. The most common responses were that "there were other words to use", "gender identity is important", "binary sexism is acceptable", and "change is too difficult". Sarrasin, Gabriel, and Gygax (2012) found similar reasoning from French and German speaking students in Switzerland.

Hord (2016) conducted an online survey to discover what pronouns are commonly used by English-speaking non-binary and transgender individuals. Over 63% of all respondents were from Canada or the United States, with the majority being between ages 16 and 30. Out of the 182 respondents, 37% referred to themselves with only gender-neutral pronouns (*they*, *xe*, *it*), 29% referred to themselves with a mix of gendered and neutral pronouns, and

26% referred to themselves with only gendered pronouns (*he/she*). Generally speaking, the majority of non-binary and transgender individuals surveyed refer to themselves with some form of gender-neutral pronoun. Hord (2016) also asked whether gender-neutral pronouns were considered to be trans-specific or unique to the LGBTQ+ community. 44% of the respondents said that gender-neutral language was trans-specific, and 4% claimed that only singular *they*, compared to other singular pronouns such as *xe*, *it*, was common outside of LGBTQ+ communities. Following that question, only 20% of all respondents believe that the current gender-neutral language we have in English is adequate for inclusiveness. Written responses from respondents were encouraged. One particular quote from a respondent in Hord’s (2016) study describes the respondent’s choice in determining which pronouns to use.

When I was using gender-neutral pronouns in English, it was almost impossible to get anyone who wasn’t in the queer community to use *they* for me consistently. This was at an early stage ... so I think people were still getting used to the idea of any pronoun other than *she* for me. But I had the impression that people ... had an even harder time with the idea of a gender-neutral pronoun than with the idea of someone crossing gender lines ... so *he* felt a lot safer to me since it was farther away from *they* and easier for people to wrap their minds around it.

Clearly, there is an observable consequence of people’s attitudes towards gender-neutral language and the relatively new usage of singular referential *they* that refers to gender-known antecedents and proper names. The participant indicated that asking people to use *he* instead of *she* was more easily accepted than asking people to use *they* instead of *she*, due to beliefs about gender-neutral language or gender-neutral pronouns. This anecdote suggests that there could be an influence of personal negative biases towards the LGBTQ+ communities, or personal negative biases towards specific members of the LGBTQ+ communities that result in a socially- or politically-motivated view that singular *they* cannot refer to any proper name. For this reason, it is important to emphasize a *naturalness* rating of a set of sentences rather than an *acceptability* rating of a pronoun as an attempt to decrease the influence of negative attitudes towards LGBTQ+ communities or LGBTQ+ members when collecting offline data.

## 2.4 Classifying *They* Users

The current theoretical literature suggests that inter-speaker variation exists and that speakers can be classified into different stages based on which types of antecedents *they* can refer to, and non-binary identity, as well as the conceptual representations of gender, may play a role (Konnelly & Cowper, 2019; Ackerman, 2019). Bjorkman (2017) suggests that two types of *they* users exist: conservative users and innovative users. Conservative *they* users can use

singular *they* to refer to non-specific antecedents, quantified antecedents, such as *anyone* or *somebody*, or antecedents without any syntactic or discourse gender, such as *friend* or *customer*. Innovative *they* users can use singular *they* in all the situations that conservative speakers can, but can also use *they* to refer to singular definite antecedents whose discourse gender is known but unimportant to the conversation. Some examples are shown in Table 2.1.

	Conservative	Innovative
<b>Quantified Antecedents</b> I like someone. They are great.	✓	✓
<b>Genderless Antecedents</b> I knew a customer. They were friendly.	✓	✓
<b>Gender-known, but unimportant, DPs</b> Where is your friend? They left early.	✗	✓
<b>Gender-marked DPs</b> Call the waitress. They should be around.	✗	✗
<b>Proper Names</b> I like Steve. They are great.	✗	✗

Table 2.1: Conservative and Innovative *They* Users

According to Bjorkman (2017), the syntactic gender of a nominal expression refers to the gender inherent to the lexical item, such as *boy*, *woman*, *actress*, or *mailman*. Proper names that are associated only with one gender are also said to have syntactic gender, such as *David* or *Mary*. We say that the syntactic gender is morphologically-marked if it contains a morpheme, such as “-ess” in “*actress*”. Discourse gender is determined by the properties of the discourse referent (Bjorkman, 2017). Discourse gender is not explicitly marked on the nominal expression. Some examples of nominal expressions with discourse gender that are not syntactically marked for gender are ambiguous proper names such as *Taylor* or *Chris*, nominals such as *actor* or *nurse* which both have stereotypical gender mental representations, and any nominal expression whose gender is expressed at some point earlier in the conversation, such as assigning *she* to *student* in an earlier statement.

- (20) a. I met **someone**<sub>*i*</sub> last week. **They**<sub>*i*</sub> were really friendly.  
b. A **friend**<sub>*i*</sub> came to the party, but **they**<sub>*i*</sub> left early.
- (21) a. A **secretary**<sub>*i*</sub> walked by when I was goofing off. **They**<sub>*i*</sub> gave me a dirty look.  
b. I had a class with a tough **professor**<sub>*i*</sub>. **They**<sub>*i*</sub> always gave impossible exams.

Both conservative speakers and innovative speakers accept the sentences in (20) because the antecedents are either non-specific (*someone*) or do not have any discourse or syntactic

gender (*friend*). Conservative speakers do not accept (21) because the antecedents have discourse gender. Only innovative speakers accept the sentences in (21) because the antecedents do not have syntactic gender and the antecedent's discourse gender may be unimportant or unknown to the speakers<sup>3</sup>.

Neither conservative nor innovative users are said to allow singular *they* when the syntactic gender of an antecedent is known, or when the discourse gender of an antecedent is important. Bjorkman (2017) observed this contrast in acceptance between the following two examples:

- (22) a. I really love **their** costume. (*while pointing someone out*)  
b. \*I just saw the lead **actress**<sub>i</sub>, and I really love **their**<sub>i</sub> costume.
- (23) a. My **friend**<sub>i</sub> left **their**<sub>i</sub> sweater here.  
b. \***Janet**<sub>i</sub> left **their**<sub>i</sub> sweater here.

Although Bjorkman (2017) formally explains these differences in terms of optional gender features in the syntactic representation of pronouns and antecedents, the differences can be interpreted more generally with respect to discourse gender and syntactic gender. In (22a), the gender of the person wearing the costume is considered unimportant to the conversation, so the discourse gender is unimportant and is therefore accepted by all innovative speakers, even though both the speaker and the hearer can presumably identify the gender of the person wearing the costume. However, in (22b), the syntactic gender of *actress* is explicit, so a gender-marked pronoun must be used for innovative and conservative speakers. In (23a), the speaker knows the gender of the friend, but it is not important information for the hearer to know, so *they* is accepted by innovative speakers. Singular *they* cannot be used in (23b) because *Janet* is an unambiguous proper name that carries important feminine syntactic gender.

It is unclear whether *nurse* or *mechanic* can be referred to with singular referential *they* by innovative speakers according to Bjorkman's (2017) conservative and innovative classification. These nominals have stereotypical gender associated with them, however it is not necessary that a nurse has feminine gender or that a mechanic has masculine gender. We know that these high-expectancy gender-stereotyped antecedents are assigned temporary gender in online processing and exhibit gender-mismatch effects (Kennison & Trofe, 2003; Kreiner et al, 2008), so they should behave similarly to nominals like *actress* which have syntactic gender.

<sup>3</sup>This operates under the assumption that *professor* has stereotypical masculine gender and that the speaker knows the gender of the professor. Conservative speakers must use *he* or *she* if the gender is known to the speaker (Bjorkman, 2017).

## 2.5 Research Question

No studies have yet to look at the potential differences in naturalness ratings and online processing for singular referential *they* between cisgender and non-binary individuals. Given that differences in writing have been observed between males and females when choosing *he* or *they*, and given that Ackerman et al’s (2018) results show a positive correlation between the naturalness ratings of gender-neutral *themselves* and frequency of interaction with non-binary or transgender individuals, it is likely that differences will be observed between cisgender and non-binary individuals with their acceptance and processing of singular referential *they*.

The current study aims to show that gender-identity is a contributing factor that can influence the naturalness rating and processing of referential singular *they*. The pronoun *they* is widely used by speakers who identify as non-binary and prefer gender-neutral language, so inter-speaker variation should be observed across cisgender and non-binary populations. The results of this experimental study can be used to evaluate the current proposals for classifying *they* users. Therefore, the research question stated in (24) will be addressed in this study.

- (24) Does gender-identity influence the naturalness ratings and on-line processing of referential singular *they*?

In particular, three antecedent types will be evaluated. First, low-expectancy gender-neutral antecedents without syntactic gender or discourse gender, such as *cyclist* and *employee*, will be evaluated. According to Bjorkman (2017), both conservative and innovative speakers will allow referential singular *they* to refer to these antecedents. Second, high-expectancy antecedents with stereotypical discourse gender, such as *mechanic* and *nurse*, will be evaluated. It is not clear whether Bjorkman’s (2017) model will allow innovative speakers to use singular *they* with these high-expectancy antecedents, but conservative users should not allow it. Finally, unambiguous proper names with discourse gender, such as *Kate* and *Ben*, will be evaluated. Bjorkman (2017) claims that no speakers will allow singular *they* to refer to unambiguous proper names.

The results of the experiment in this thesis will have direct implications on the modeling and theoretical account of singular referential *they* in order to account for all speakers.

## Chapter 3

# Experiment: Self-Paced Reading

The current study investigates online processing differences between cisgender and non-binary participants when pronouns *he/she* and *they* refer to low- or high-expectancy indefinite DPs. Low-expectancy antecedents (e.g. customer) do not have syntactic gender and do not have discourse gender associated with them. High-expectancy antecedents (e.g. nurse) also do not have syntactic gender, but do have discourse gender associated with them because they each have a stereotypical gender.

Based on Doherty & Conklin’s (2017) results, it is expected that, across all participants, processing delays will occur when *they* refers to high-expectancy indefinite DPs upon reading the pronoun, but no delays will occur when *they* refers to low-expectancy indefinite DPs upon reading the pronoun. Gender mismatch effects should be observed in processing when *he/she* refers to a high-expectancy indefinite DP with a mismatched gender, but not when *he/she* refers to a low-expectancy indefinite DP since *he/she* can refer to singular genderless antecedents without difficulty.

There are a few possible outcomes regarding the differences between cisgender and non-binary participants when reading singular *they* in high-expectancy cases. If non-binary participants have faster reading times for high-expectancy *they* cases compared to cisgender participants, then it is possible that frequent exposure to hearing or using singular referential *they* to refer to high-expectancy indefinite DPs is a contributing factor to the differences between gender groups. If both groups of participants experience slower reading times, then it is possible that the participants’ grammars do not allow *they* to refer to high-expectancy indefinite DPs. Finally, if neither group of participants exhibit slower reading times, then it is likely that the grammar allows singular *they* to refer to high-expectancy indefinite DPs.

### 3.1 Participants

83 native English speakers in Vancouver were recruited for this study. 54 participants identified as cisgender, preferring to be referred to with *he/him/his* or *she/her/hers* pronouns, and the remaining 29 participants identified as non-binary, who all preferred to be referred

to with *they/them/their* pronouns. 7 non-binary participants noted that they use both *they/them/their* and *he/him/his* or *she/her/hers* pronouns in everyday life. Most participants were bilingual speakers, but all participants spoke English as an L1.<sup>1</sup> Each participant was tested in a 25 minute session online and paid \$10 CAD in the form of an Amazon gift card.

## 3.2 Design and Materials

The stimuli have a  $2 \times 2 \times 2$  factorial design, with one between-subjects factor with two levels, PARTICIPANT-GENDER (*cisgender*, *non-binary*), and two within-subjects factors with two levels each: GENDER-EXPECTANCY (*high*, *low*), and PRONOUN (*marked*, *they*). The pronoun in the *high-marked* condition mis-matched the gender of the indefinite antecedent. An additional control condition was also tested, where the indefinite antecedent had *high* gender-expectancy and the pronoun was *marked*, matching the gender of its antecedent. The five conditions are summarized below in Table 3.1. The control condition offers a baseline for reading times and naturalness ratings because no processing delays should occur when a high-expectancy indefinite antecedent matches the expected gender of its referential pronoun.

Condition	Description
High-Marked	The indefinite antecedent’s gender is <i>highly</i> predicted and the referential pronoun mismatches the expected gender ( <i>he</i> or <i>she</i> ).
High-They	The indefinite antecedent’s gender is <i>highly</i> predicted and the referential pronoun has no gender ( <i>they</i> ).
Low-Marked	The indefinite antecedent’s gender is <i>unknown</i> and the referential pronoun has gender ( <i>he</i> or <i>she</i> ).
Low-They	The indefinite antecedent’s gender is <i>unknown</i> and the referential pronoun has no gender ( <i>they</i> ).
Control	The indefinite antecedent’s gender is <i>highly</i> predicted and the referential pronoun matches the expected gender ( <i>he</i> or <i>she</i> ).

Table 3.1: Experiment Conditions

This experiment improved upon Doherty & Conklin’s (2017) original design, which included sentences with multiple potential referents that allow the possibility of a split-antecedent reading, by promoting a singular reading early in the context sentence. This was

<sup>1</sup>Shook et al. (2018) has found that L1 and L2 English speakers do not have significantly different reading times for *they* and *he/she* for both non-referential and referential antecedents. Therefore, bilingualism should not have any effect on the results of the experiment.



accomplished by restricting the context sentence to include only one possible antecedent, using the phrase “*was V-ing alone*”, so that split-antecedent readings were not accessible.

### 3.2.1 Test Sentences

30 test item sets were created, resulting in 150 total test sentences. A test item set is presented in (25), and the corresponding yes-no comprehension question is presented in (25f). Every condition in a particular test item set used the same comprehension question and answer. Regions range from 1 to 10 and are denoted by ‘/’.

- (25) a. High-Marked Condition  
**A secretary**  $1/2$  was working  $2/3$  alone  $3/4$  at the front desk.  $4/5$  After sending  $5/6$  an email,  $6/7$  **he**  $7/8$  happened  $8/9$  to receive  $9/10$  good news.
- b. High-They Condition  
**A secretary**  $1/2$  was working  $2/3$  alone  $3/4$  at the front desk.  $4/5$  After sending  $5/6$  an email,  $6/7$  **they**  $7/8$  happened  $8/9$  to receive  $9/10$  good news.
- c. Low-Marked Condition  
**An intern**  $1/2$  was working  $2/3$  alone  $3/4$  at the front desk.  $4/5$  After sending  $5/6$  an email,  $6/7$  **he**  $7/8$  happened  $8/9$  to receive  $9/10$  good news.
- d. Low-They Condition  
**An intern**  $1/2$  was working  $2/3$  alone  $3/4$  at the front desk.  $4/5$  After sending  $5/6$  an email,  $6/7$  **they**  $7/8$  happened  $8/9$  to receive  $9/10$  good news.
- e. Control Condition  
**A secretary**  $1/2$  was working  $2/3$  alone  $3/4$  at the front desk.  $4/5$  After sending  $5/6$  an email,  $6/7$  **she**  $7/8$  happened  $8/9$  to receive  $9/10$  good news.
- f. Comprehension Question  
Did someone work in the storage room?  
**Answer:** No

In each item set, the antecedent is introduced early in region 1. In region 3, the word “*alone*” restricts the context to include only the antecedent introduced in region 1, so participants should not consider the referential pronoun to be unheralded (Nieuwland, 2014). The referential pronoun *he/she/they* appears in region 7, the critical region.

The context sentences were constructed so that the context would not promote any gender stereotypes independent of the antecedent. This means that sentences with situations that are stereotypically masculine, such as the scenario presented in (26), were mostly avoided.

- (26) An employee was laboring alone in the fields.

Although *employee* does not have any stereotypical gender associated with it, “*laboring*” and “*in the fields*” may evoke a masculine stereotype. Instead, situations *such as* the one

presented in (27) were used so that the context did not assign a temporary gender to *employee* during online processing.

(27) An employee was working alone in the storage room.

The test sentences were counterbalanced such that half of the high-expectancy sentences contained an indefinite antecedent that was stereotypically masculine, and half of the high-expectancy sentences contained an indefinite antecedent that was stereotypically feminine.

### 3.2.2 Fillers

30 filler items were constructed. Filler items were identical to the test sentences except that region 1 consisted of a proper name rather than a low-expectancy indefinite antecedent or high-expectancy indefinite antecedent. 10 fillers contained a non-ambiguous masculine name co-referring with the pronoun *he*, as in (28a). 10 fillers contained a non-ambiguous feminine name co-referring with the pronoun *she*, as in (28b). Finally, the remaining 10 fillers used non-ambiguous masculine and feminine names co-referring with the pronoun *they*, as in (28c) and (28d). All proper names were picked from a list of common male and female names. Context sentences were constructed so that the context did not enforce any particular gender bias.

(28) a. Masculine-Marked

**James**  $_{1/2}$  was shopping  $_{2/3}$  alone  $_{3/4}$  in the clothing store.  $_{4/5}$  While picking out  $_{5/6}$  new clothes,  $_{6/7}$  **he**  $_{7/8}$  tried  $_{8/9}$  to get  $_{9/10}$  some assistance.

b. Feminine-Marked

**Natalie**  $_{1/2}$  was birdwatching  $_{2/3}$  alone  $_{3/4}$  in the park.  $_{4/5}$  After seeing  $_{5/6}$  an exotic bird,  $_{6/7}$  **she**  $_{7/8}$  decided  $_{8/9}$  to write  $_{9/10}$  a journal entry.

c. Masculine-They

**David**  $_{1/2}$  was sailing  $_{2/3}$  alone  $_{3/4}$  in the ocean.  $_{4/5}$  After reaching  $_{5/6}$  land,  $_{6/7}$  **they**  $_{7/8}$  expected  $_{8/9}$  to greet  $_{9/10}$  the townsfolk.

d. Feminine-They

**Kimberly**  $_{1/2}$  was gardening  $_{2/3}$  alone  $_{3/4}$  in the front yard.  $_{4/5}$  After planting  $_{5/6}$  some flowers,  $_{6/7}$  **they**  $_{7/8}$  attempted  $_{8/9}$  to plant  $_{9/10}$  some vegetables.

The fillers served two purposes. First, the gender-marked cases served as a second control to confirm whether participants were properly completing the task. The sentences should not have elicited unheralded pronoun effects, number-mismatch effects, or gender-mismatch effects. Second, the *they* cases provide further insight as to whether there are gender differences when singular *they* refers to proper names. According to Ackerman et al.'s (2018) preliminary eye-tracking data, all participants should experience a processing delay after reading singular *they* when it refers to a proper name.

### 3.3 Procedure

Participants were sent a link over email to access the experiment which was hosted online on IbeX Farm (Drummond, 2013). First, participants filled out a brief demographic survey, providing information on their age, gender, and language background. After providing consent, participants were shown two practice sentences (29) in a moving-window self-paced reading task. After each practice sentence, participants were asked to select how natural the previous sentence was on a Likert scale from 1 (unnatural) to 7 (natural).

- (29) a. Shawna  $\frac{1}{2}$  knew that  $\frac{2}{3}$  she  $\frac{3}{4}$  really loved  $\frac{4}{5}$  itself.  
b. Jack  $\frac{1}{2}$  said that  $\frac{2}{3}$  he loved  $\frac{3}{4}$  to eat  $\frac{4}{5}$  spaghetti.

Participants were given feedback on the practice sentences so that it was clear that (29a) should be rated as 1 (unnatural), while (29b) should be rated as 7 (natural). Following the two practice sentences, participants proceeded to complete the test block, consisting of 30 test items and 30 filler items. All sentences in the test block were presented randomly, following a Latin Square design.

Lists were automatically generated in a Latin Square design using IbeX Farm (Drummond, 2013). Each participant read only one condition from each test item, resulting in reading a total of six sentences per condition from the thirty test items. Each participant read all thirty fillers. All items were fully randomized for each participant.

Each item was presented as part of a moving-window self-paced reading task. Participants were only able to view one region at a time, progressing forward on each space bar press. Participants were unable to re-read previous regions. Following every trial, participants would be randomly assigned one of two tasks: a naturalness rating task, or a yes-no comprehension question. For the naturalness rating task, participants were asked to choose a rating on a Likert scale from 1 (unnatural) to 7 (natural). For the comprehension question, participants answered a yes/no question about the sentence they had just read. No feedback was provided upon submitting a response to either task. Images of both tasks are presented in Figure 3.1 and Figure 3.2.

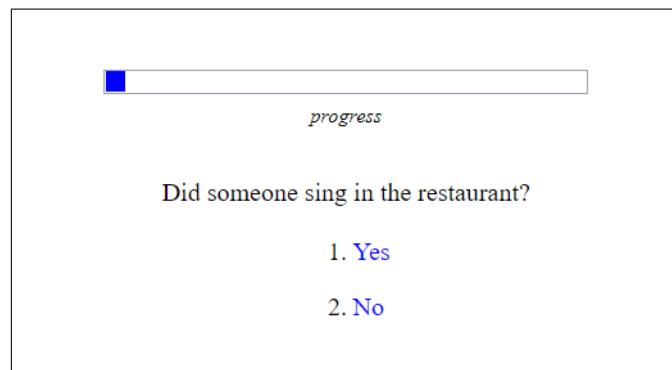


Figure 3.1: Example of a yes/no comprehension question.

Figure 3.2: Example of the naturalness rating task.

Following the self-paced reading task, participants filled out a second demographic survey. This post-test survey asked for information about how long each participant has used their pronouns and whether any family or friends use gender-neutral pronouns. The pre- and post-test surveys are presented in Appendix B.

## 3.4 Results

Reading times for each region were recorded, determined by the amount of time each region was present on the screen. Reading times below 150ms and above 2000ms were discarded. Mean reading times were analyzed and reported as  $\log(\text{ms})$  per region.

### 3.4.1 Test Items

The analysis was conducted by fitting a mixed effects model (Bates, Mächler, Bolker & Walker, 2015) in R (R Core Team 2016) with PARTICIPANT-GENDER, GENDER-EXPECTANCY, and PRONOUN as fixed factors, and *item* and *participant* as random factors. No participants scored less than 75% on the comprehension questions, so all participants' data were used.<sup>2</sup>

Figure 3.3 shows the mean reading times of all cisgender and non-binary participants across test items. No significant effects were observed in r07, the critical region. In the spillover region, r08, main effects of GENDER-EXPECTANCY ( $Est. = -0.06022$ ,  $SE = 0.01846$ ,  $t = -3.262$ ,  $p < 0.01$ ) and PRONOUN ( $Est. = -0.04577$ ,  $SE = 0.01839$ ,  $t = -2.488$ ,  $p < 0.05$ ) were found. Sentences with *high-expectancy* antecedents had slower reading times than sentences with *low-expectancy* antecedents. Sentences with *gender-marked* pronouns

<sup>2</sup>Comprehension scores were coded as either 0 (incorrect) or 1 (correct). The average comprehension score across all participants was 90.7%, including test items and fillers.

had longer reading times than sentences with referential *they*. An interaction of GENDER-EXPECTANCY  $\times$  PRONOUN ( $Est. = 0.03408$ ,  $SE = 0.02607$ ,  $t = 2.458$ ,  $p < 0.05$ ) was observed in r08. *High-marked* sentences had longer reading times than any other test condition, showing a gender mismatch effect. There were no observed effects of PARTICIPANT-GENDER in the critical region or spillover region.

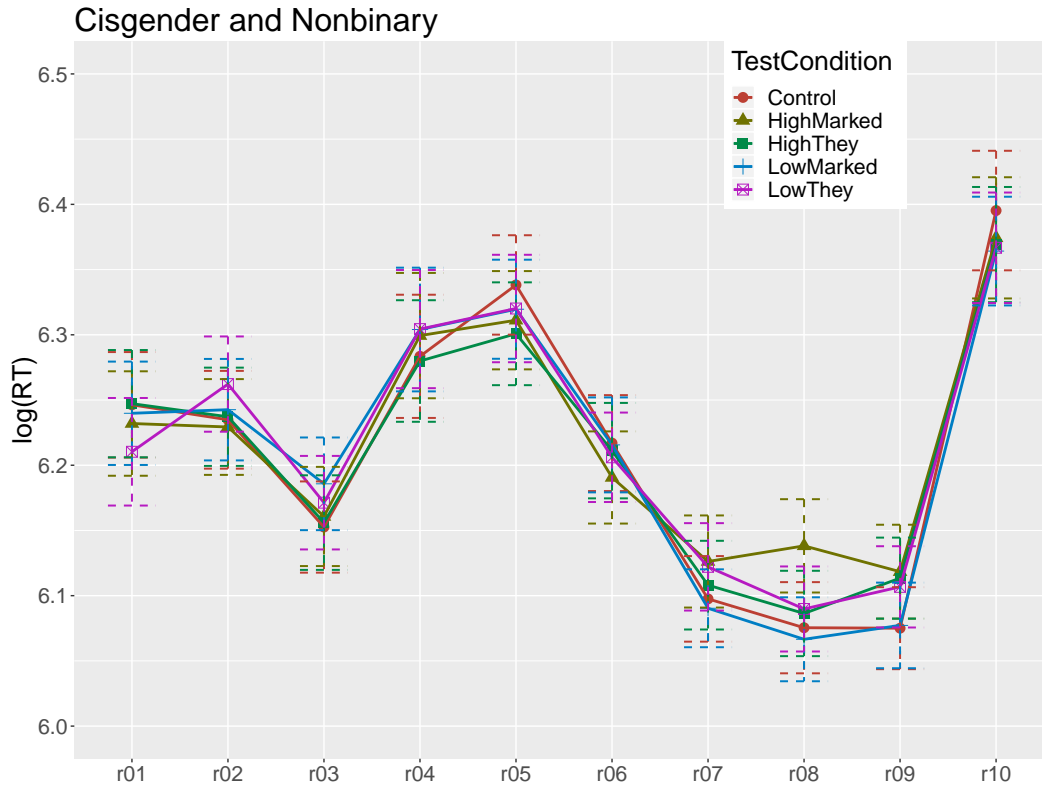


Figure 3.3: Mean reading times in log(ms) of all cisgender and non-binary participants across test trials.

### 3.4.2 Fillers

Figure 3.4 shows the mean reading times of all cisgender and non-binary participants across fillers. PRONOUN and PARTICIPANT-GENDER were analyzed as fixed factors, and *item* and *participant* as random factors. No significant effects were observed in r07. In r08, a main effect of PRONOUN ( $Est. = 0.09637$ ,  $SE = .01857$ ,  $t = 5.190$ ,  $p < 0.001$ ) was observed. Across all participants, sentences where *they* referred to proper names had significantly longer reading times than sentences with *he* or *she*. No effects of PARTICIPANT-GENDER were observed in either region.

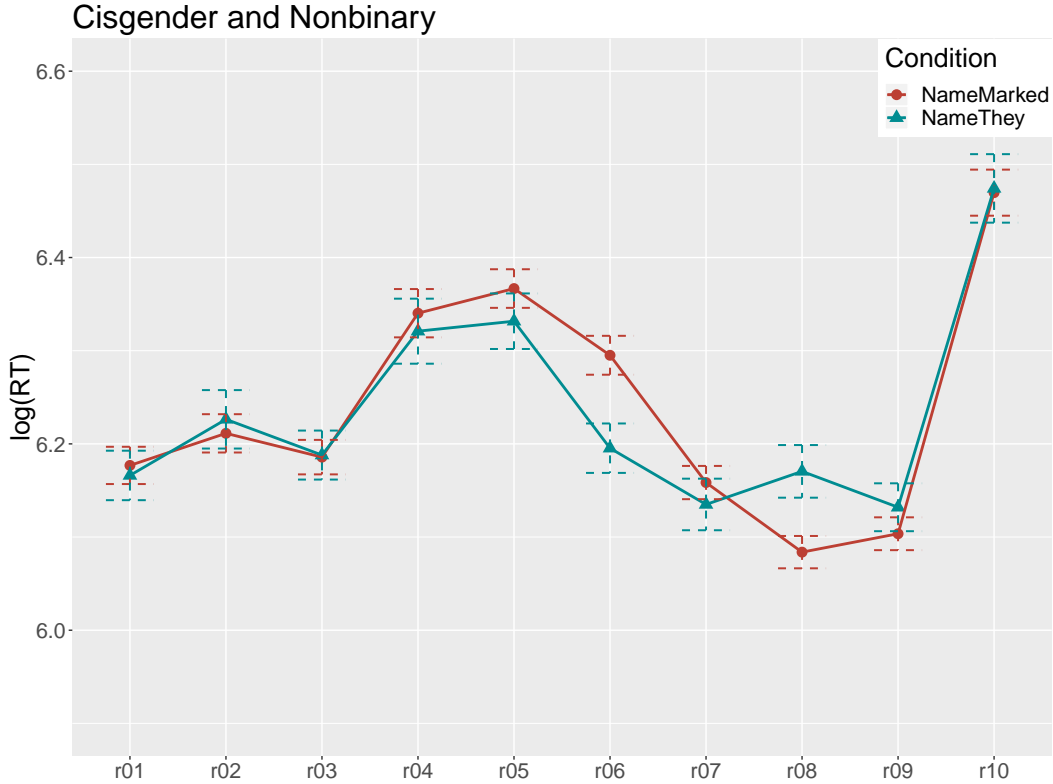


Figure 3.4: Mean reading times in log(ms) of all cisgender and non-binary participants across fillers.

## 3.5 Discussion

### 3.5.1 Experiment Results

This self-paced reading task has shown that cisgender and non-binary participants do not have difficulties with processing singular *they* when it refers to indefinite antecedents with low- or high gender-expectancy. Across all participants, *low-they* and *high-they* conditions had reading times similar to the control condition in the critical and spillover regions. This indicates that the gender-expectancy of the indefinite antecedent does not have any effect on processing singular *they*. Furthermore, the fact that *gender-marked* pronouns had overall longer reading times than *they* indicates that no number-mismatch effect was elicited, suggesting that *singular they* is accessible and allowed in the grammar.

One could suggest that *they* was being processed as an unheralded pronoun and thus did not show any gender- or number-mismatch effect. However, that is clearly not the case here. First, gender-mismatch effects were observed with *high-marked* sentences, confirming that participants have attempted to establish co-reference between the indefinite antecedent and the pronoun. Second, the *name-they* sentences in the fillers also showed longer reading

times compared to *name-match* sentences, confirming that participants were attempting to establish co-reference between the proper name and the pronoun. If participants were treating the pronouns as unheralded, then these differences in reading times would not have been observed in the test items and fillers.

Doherty and Conklin’s (2017) eye-tracking experiment showed that when singular *them* referred to high-expectancy antecedents rather than low-expectancy antecedents, processing delays occurred in the region containing the pronoun. Unlike Doherty and Conklin’s (2017) study, this experiment’s findings do not indicate that there is a gender mismatch effect in the *they* cases. The lack of a gender mismatch effect with *they* may be due to the difference in experimental paradigm. With moving-window self-paced reading tasks, words appear and disappear, tracking only reading times for how long each region is on screen. If a participant wanted to verify their interpretation, they cannot do so and must continue the sentence. In Doherty and Conklin’s (2017) eye-tracking experiment, all three sentences were presented on screen for the entire trial, so participants could look back at the pronoun at any time. The eye-tracking paradigm used allows participants to check their initial interpretations, so Doherty and Conklin’s (2017) experiment may have been more sensitive to quickly-resolved processing difficulties that moving-window self-paced reading tasks cannot find.

Differences may also have been observed due to the different populations that were tested in each experiment. Most participants in this study have been raised in BC or have lived in Vancouver for at least two years. Vancouver supports a large LGBTQIA+ community, and many residents are aware of gender-neutral language and gender-neutral pronouns, which may mean that a large majority of participants were at least familiar with constructions where singular *they* refers to indefinite antecedents.

### 3.5.2 Exposure to Gender-neutral Pronouns

In the post-test survey, all participants were asked whether they had friends or family who used *they/them/their* pronouns instead of, or in addition to, *he/him/his* or *she/her/hers*. 31 out of 54 cisgender participants answered yes to that question, as well as 26 out of 29 non-binary participants. We will say that participants who have friends or family that use *they/them/their* pronouns are participants who are *exposed* to gender-neutral pronouns.

Further analysis was conducted on the test items and fillers containing singular *they*, comparing cisgender participants who have been exposed to gender-neutral pronouns with cisgender participants who have not.<sup>3</sup>

<sup>3</sup>Non-binary participants were not included in the *exposure* analysis because only 3 non-binary participants were considered *not exposed* to gender-neutral pronouns. Non-binary participants also use gender-neutral pronouns to refer to themselves, so the exposed/not-exposed distinction does not apply to that group.

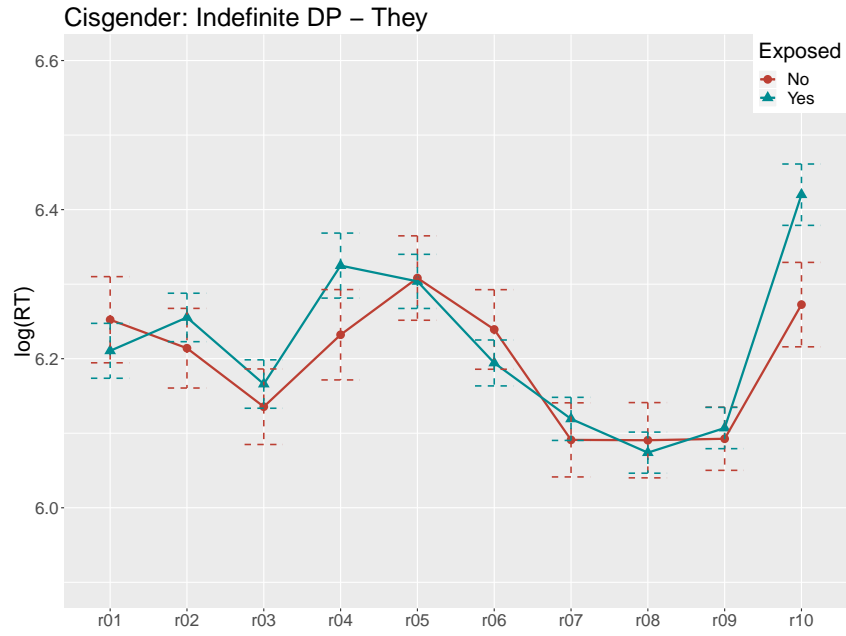


Figure 3.5: Mean reading times in log(ms) of all cisgender participants across test items with the pronoun *they*.

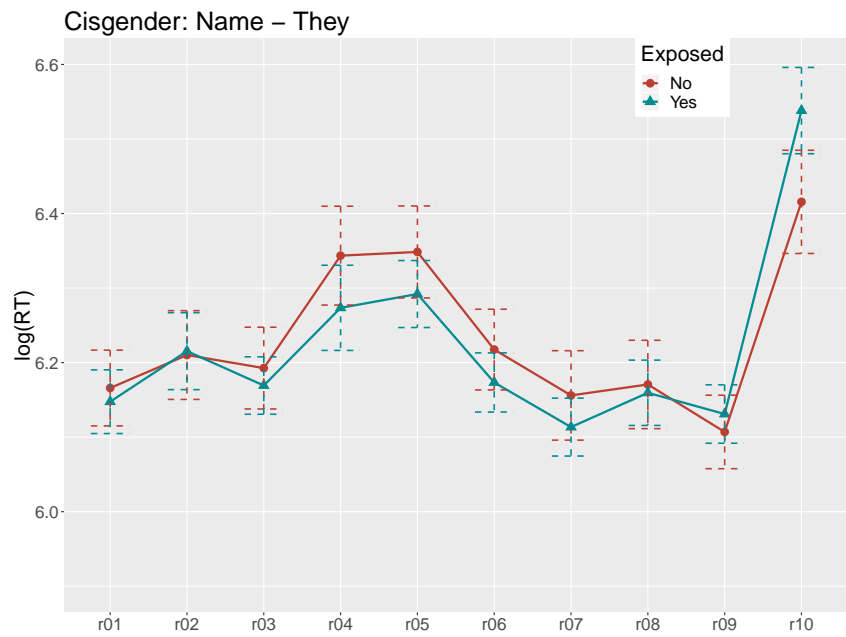


Figure 3.6: Mean reading times in log(ms) of all cisgender participants across fillers with the pronoun *they*.



For both the test items and fillers containing singular *they*, EXPOSURE (yes, no) was analyzed as a fixed factor, and *item* and *participant* as random factors.<sup>4</sup> No significant effects were found in the critical region, r07, or the spillover region, r08, in either the test items (Figure 3.5) or the fillers (Figure 3.6).

The processing results found in this study are similar to the naturalness rating judgments observed in Ackerman et al.'s (2018) study with reflexive *themselves*. Participants, regardless of their gender identity, considered *name-themselves* less natural than *name-himself/herself*, *someone - themselves*, and *someone-himself/herself* cases. In the self-paced reading experiment in this thesis, I have observed a similar pattern, where *name-they* cases experience a delay while all others do not. I have also shown that exposure and participant-gender are not significant factors that affect the reading times of *they* with proper names.

The analysis of the present study does not suggest that exposure has an effect on processing singular *they* when it refers to indefinite antecedents or proper names. In the case of indefinite antecedents, no differences were expected between exposed cisgender participants and unexposed cisgender participants because the test data had already shown that participants allow singular *they* to refer to low-expectancy and high-expectancy indefinite antecedents. If exposure were to have any effect on processing, it would most likely appear in the *name-they* cases, since exposed participants would use *they* to refer to a particular friend or family member in everyday speech. No differences were found between exposure groups in the *name-they* case. This result could be attributed to the fact that speakers who regularly use gender-neutral pronouns do not suddenly assume that *all* people are genderless, but rather that certain individuals identify as genderless and prefer *they* over *he* or *she*. In other words, the default assumption when reading *sentences with* unambiguous proper names is that proper names have masculine or feminine gender, and thus cannot be referred to with singular *they*.

These processing results have implications for Bjorkman's (2017) categorization of *they* speakers. According to the current classification of conservative and innovative *they* users, it is unclear whether high-expectancy indefinite DPs function similarly to low-expectancy indefinite DPs, which both conservative and innovative *they* users allow *they* to refer to, or whether high-expectancy indefinite DPs function similarly to gender-known indefinite DPs, which neither conservative nor innovative *they* users allow *they* to refer to. The processing data indicates that high-expectancy indefinite DPs are processed similarly to low-expectancy indefinite DPs. This means that both conservative and innovative *they* users should allow singular *they* to refer to any indefinite DP that is not morphologically-marked with syntactic gender. The processing data for proper names confirms Bjorkman's (2017) claim that neither conservative nor innovative speakers allow *they* to refer to unambigu-

<sup>4</sup>GENDER-EXPECTANCY was not analyzed as a fixed factor since it was proven to be not be significant in the main analysis.

ous proper names. Both cisgender and non-binary participants experienced reading time delays in the spillover region for the *name-they* condition, but not the *name-match* condition. Exposure to gender-neutral pronouns via friends and family members also did not have any effect on processing, further supporting the current *conservative* and *innovative* classification.

### 3.6 Summary

This self-paced reading experiment tested whether there were differences in processing when singular *they* refers to low- and high-expectancy indefinite DPs. No reading time delays were observed in cisgender or non-binary participants when they established co-reference between *they* and indefinite DPs without syntactic gender. No reading time differences were observed between cisgender and non-binary participants in any of the test conditions. Furthermore, exposure to friends or family members who use *they/them/their* pronouns did not have any effect on processing across cisgender participants. The results indicate that Western Canadian English speakers allow singular *they* to refer to indefinite DPs without syntactic gender in the grammar.

In chapter 4, naturalness ratings for the same stimuli will be investigated to determine whether there are differences in offline judgments between cisgender and non-binary participants.

## Chapter 4

# Experiment: Naturalness Ratings

This chapter investigates the results of the naturalness rating task discussed in Chapter 3. It investigates whether there are differences in mean naturalness ratings between cisgender and non-binary participants when pronouns *he/she* and *they* refer to low or high gender-expectancy indefinite DPs.

Based on Doherty and Conklin’s (2017) results, it is expected that all participants will rate sentences where *they* refers to low- or high-expectancy indefinite DPs less natural than sentences with *he* or *she*, regardless of whether there is a gender-mismatch or not. It is also expected that low-expectancy sentences with *they* will be rated more natural than high-expectancy sentences with *they*. This difference is expected because low-expectancy antecedents do not have discourse gender associated with them, while high-expectancy antecedents have a discourse gender, thus causing a ‘gender’-mismatch effect between the pronoun and the antecedent.

Bjorkman’s (2017) classification of *they* users provides some predictions about mean naturalness ratings. Conservative users allow singular *they* to refer to antecedents without discourse gender or syntactic gender. Innovative users allow singular *they* to refer to antecedents with discourse gender, as long as the gender of the antecedent is not important. I hypothesize that gender identity is a factor in influencing naturalness ratings. That is, cisgender participants are more likely to behave as conservative speakers, and non-binary participants are more likely to behave as innovative speakers. Therefore, I expect to see that non-binary participants rate sentences with *they* more natural than cisgender participants do for high-expectancy antecedents. No difference should be observed between the gender groups with low-expectancy antecedents.

As for proper names, based on Ackerman et. al’s (2018) study, it is expected that sentences where *they* refers to proper names will be rated less natural than sentences where *he* or *she* matches the gender of the proper name. If gender identity is a factor in influencing naturalness ratings, then non-binary participants should rate sentences with *they* as natural as cisgender participants rate sentences with gender-matching *he* or *she*.

## 4.1 Design and Materials

### 4.1.1 Participants

This naturalness rating task was part of the experiment presented in Chapter 3. Therefore, the same 83 participants, consisting of 54 cisgender participants and 29 non-binary participants were tested.

### 4.1.2 Materials

The stimuli have a  $2 \times 2 \times 2$  factorial design, with one between-subjects factor with two levels, PARTICIPANT-GENDER (*cisgender*, *non-binary*), and two within-subjects factors with two levels each: GENDER-EXPECTANCY (*high*, *low*), and PRONOUN (*marked*, *they*). A control condition (*high-marked*) with matching genders was also tested. The filler items were constructed similar to the test sentences, except that all antecedents were proper names, and the marked pronouns always matched the gender of the proper name. A summary of all test and filler materials is repeated in Table 4.1.

Condition	Description
Test: High-Marked	The indefinite antecedent’s gender is <i>highly</i> predicted and the referential pronoun mismatches the expected gender ( <i>he</i> or <i>she</i> ).
Test: High-They	The indefinite antecedent’s gender is <i>highly</i> predicted and the referential pronoun has no gender ( <i>they</i> ).
Test: Low-Marked	The indefinite antecedent’s gender is <i>unknown</i> and the referential pronoun has gender ( <i>he</i> or <i>she</i> ).
Test: Low-They	The indefinite antecedent’s gender is <i>unknown</i> and the referential pronoun has no gender ( <i>they</i> ).
Test: Control	The indefinite antecedent’s gender is <i>highly</i> predicted and the referential pronoun matches the expected gender ( <i>he</i> or <i>she</i> ).
Filler: Marked	The proper name’s gender is masculine or feminine and the referential pronoun matches the expected gender ( <i>he</i> or <i>she</i> ).
Filler: They	The proper name’s gender is masculine or feminine and the referential pronoun has no gender ( <i>they</i> ).

Table 4.1: All Experiment Conditions

The naturalness rating task improved upon Doherty and Conklin’s (2017) naturalness rating questionnaire due to a few changes. First, participants were only given unnatural (1/7) and natural (7/7) exemplar sentences so that they could independently determine which constructions would be given a medial naturalness rating. Second, the study was conducted online in a moving-window self-paced reading paradigm so that participants could not re-read sentences, and therefore must have made naturalness rating judgments

based on their initial reading of the sentence. Third, all test items had only one possible antecedent so that split-antecedents readings were not possible. Split antecedents allow a plural interpretation of *they*, which could increase naturalness ratings overall.

### 4.1.3 Procedure

Each trial consisted of a self-paced reading task and a yes/no comprehension question or a naturalness rating task. There was a 50% chance that a participant would encounter the naturalness rating task screen. The screen asked the participants how natural the previous sentences were. Participants rated sentences on a scale of 1 (unnatural) to 7 (natural).

## 4.2 Results

### 4.2.1 Test Items

The analysis was conducted by fitting a mixed effects model (Bates, Mächler, Bolker & Walker, 2015) in R (R Core Team 2016) with PARTICIPANT-GENDER, GENDER-EXPECTANCY, and PRONOUN as fixed factors, and *item* and *participant* as random factors. No participants assigned an average naturalness rating of 5/7 or less to the control sentences, so all participants' data were used.<sup>1</sup>

Figure 4.1 and Figure 4.2 show the mean naturalness ratings of all cisgender and non-binary participants in the test items. No significant effects of GENDER-EXPECTANCY were found. A main effect of PRONOUN ( $Est. = -0.54370$ ,  $SE = 0.09868$ ,  $t = -5.510$ ,  $p < 0.001$ ) was found. Participants rated sentences with *they* less natural than sentences with *he* or *she*. An interaction of PRONOUN  $\times$  PARTICIPANT-GENDER ( $Est. = 0.39021$ ,  $SE = 0.16575$ ,  $t = 2.354$ ,  $p = 0.0188$ ) was found such that the lowest ratings were of *they* sentences by cisgender participants. No further main effects or interactions were found.

<sup>1</sup>An average rating of 5/7 or less on the control sentences would suggest that participants may have ignored the 7/7 exemplar model, or have misunderstood the task.

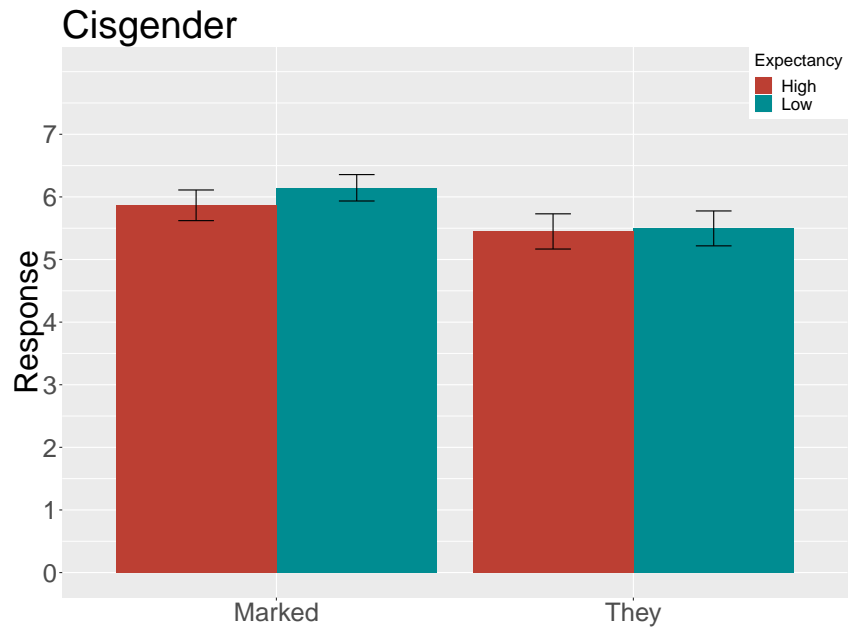


Figure 4.1: Mean naturalness ratings of all cisgender across test trials.

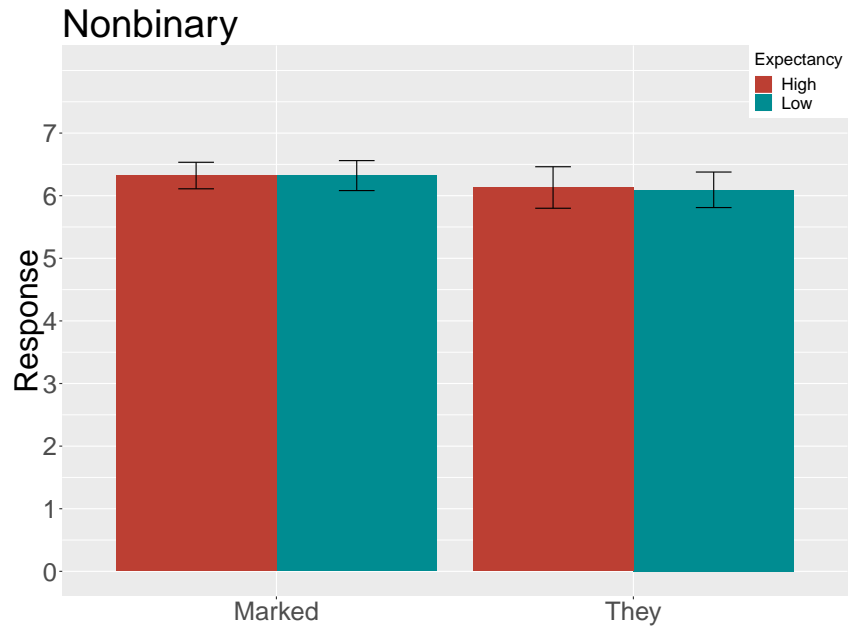


Figure 4.2: Mean naturalness ratings of all non-binary participants across test trials.

## 4.2.2 Fillers

Figure 4.3 shows the mean naturalness ratings of all cisgender and non-binary participants in the fillers. PRONOUN and PARTICIPANT-GENDER were analyzed as fixed factors, and *item* and *participant* as random factors. No significant effects of PARTICIPANT-GENDER were found. A main effect of PRONOUN ( $Est. = -1.4602$ ,  $SE = 0.1304$ ,  $t = -11.197$ ,  $p < 0.001$ ) was found. Sentences with *they* were rated as less natural than sentences with *he* or *she* matching the gender of the proper name. An interaction of PRONOUN  $\times$  PARTICIPANT-GENDER ( $Est. = 1.1426$ ,  $SE = 0.1759$ ,  $t = 6.495$ ,  $p < 0.001$ ) was found such that the lowest ratings were of *they* sentences by cisgender participants.

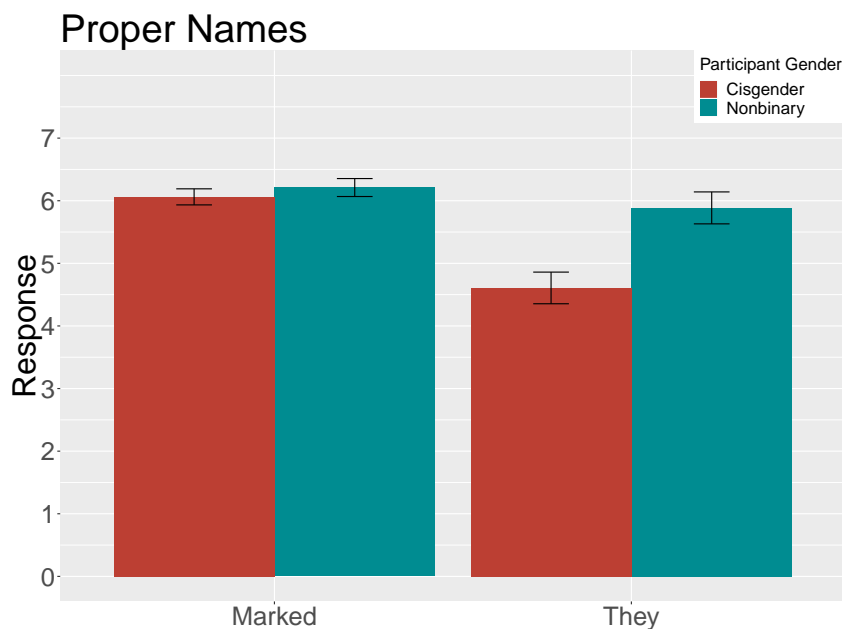


Figure 4.3: Mean naturalness ratings of all cisgender and non-binary participants across fillers.

## 4.3 Discussion

### 4.3.1 Experiment Results

Contrary to Doherty & Conklin’s (2017) experiment, there was no difference between low-expectancy and high-expectancy antecedents across pronouns *he/she* and *they*. For this sample of Western Canadian English speakers, it is clear that the discourse gender of the indefinite DP antecedent did not have an effect on the naturalness of the sentence.

Cisgender and non-binary participants did not exhibit significantly different naturalness ratings across sentences with gender-marked pronouns. But, there were differences in the sentences with singular *they*, where cisgender participants rated them lower than non-binary

participants. The degree of exposure to gender-neutral language likely accounts for some of this interaction. This result will be explored further in section 4.3.2. Looking at the raw scores for the current task, the average naturalness rating for *he/she* and *they* were both above a 5/7 score, meaning that all three pronouns are generally considered natural when referring to an indefinite DP.

Cisgender participants were found to rate sentences where *they* refers to proper names less natural than any other condition. According to Bjorkman (2017), unambiguous proper names have syntactic gender, which means that all speakers should reject sentences where *they* refers to a proper name. However, in the *name-they* condition, non-binary participants accept the construction with a mean rating of 6/7, and cisgender participants tend to accept the construction with a mean rating of 5/7, suggesting that using *they* to refer to a proper name is generally accepted, contrary to Bjorkman’s (2017) predictions.

There could be a couple reasons why there is a 1 point difference in naturalness ratings across non-binary and cisgender participants in the *name-they* case. First, cisgender participants who have not been exposed to gender-neutral language or gender-neutral pronouns may be rejecting *name-they* sentences as unnatural, while cisgender participants who have been exposed to gender-neutral pronouns would likely find the construction more natural. Second, the influence of personal attitudes towards gender-neutral pronouns could be affecting the mean naturalness ratings. Cisgender participants who disagree with gender-neutral language or gender-identity may rate *name-they* sentences less natural than those who don’t. Similarly, non-binary participants who identify with the pronoun *they* may have rated the sentences as more natural because of their social beliefs, gender identity, or attitudes.

### 4.3.2 Exposure to Gender-neutral Pronouns

Further analysis was conducted on the test items and fillers comparing cisgender participants who have been exposed to gender-neutral pronouns and cisgender participants who have not.<sup>2</sup> For both the test items and fillers, EXPOSURE (yes, no) and PRONOUN were analyzed as fixed factors, and *item* and *participant* as random factors.<sup>3</sup>

Figure 4.4 shows the mean naturalness ratings of cisgender participants separated into groups by exposure across the test items. In these test items there was a main effect of PRONOUN ( $Est. = -0.93013$ ,  $SE = 0.16039$ ,  $t = -5.799$ ,  $p < 0.001$ ). Cisgender participants rated sentences with *they* less natural than sentences with *he* or *she*. An interaction of PRONOUN  $\times$  EXPOSURE ( $Est. = 0.75230$ ,  $SE = 0.21095$ ,  $t = 3.566$ ,  $p < 0.001$ ) was

<sup>2</sup>Non-binary participants were not included in the *exposure* analysis because only 3 non-binary participants were considered *not exposed* to gender-neutral pronouns. Non-binary participants also use gender-neutral pronouns to refer to themselves, so the exposed/not-exposed distinction does not apply to that group.

<sup>3</sup>GENDER-EXPECTANCY was not analyzed as a fixed factor since it was proven to be not significant in the main analysis.



found. The lowest rated sentences contained *they* and were rated by unexposed cisgender participants. No main effect of EXPOSURE was found.

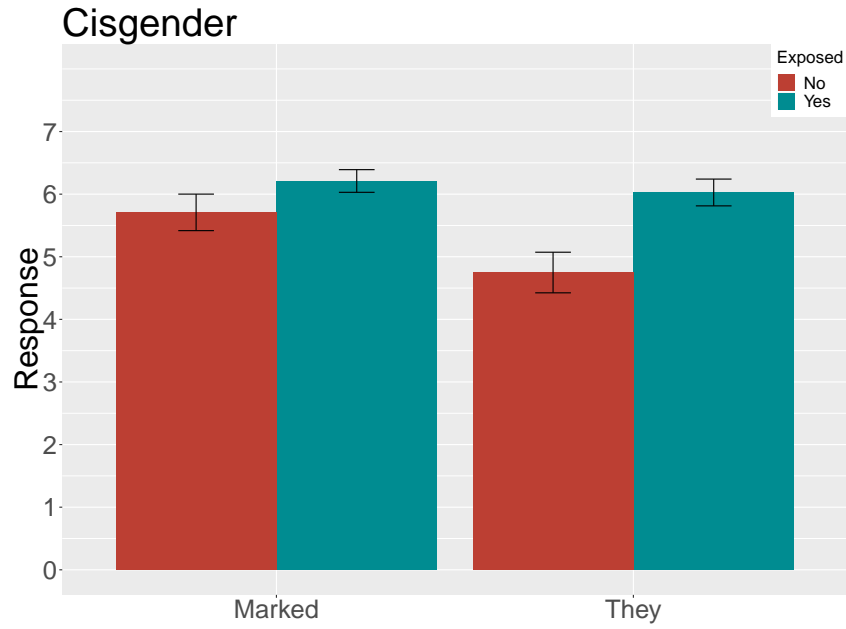


Figure 4.4: Mean naturalness ratings of all cisgender participants across test items.

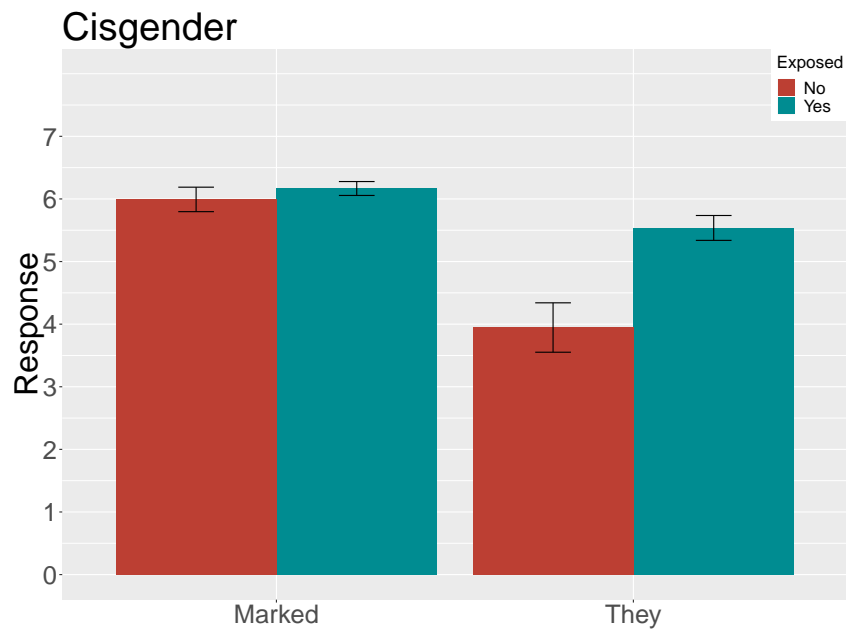


Figure 4.5: Mean naturalness ratings of all cisgender participants across fillers.

Figure 4.5 shows the mean naturalness ratings of cisgender participants separated into groups by exposure across the fillers. In the fillers, a main effect of PRONOUN ( $Est. = -2.3042$ ,  $SE = 0.1784$ ,  $t = -12.909$ ,  $p < 0.001$ ) was found. Cisgender participants rated sentences where *they* referred to proper names as less natural than sentences where *he* or *she* matched the gender of the proper name. An interaction of PRONOUN  $\times$  EXPOSURE ( $Est. = 1.4603$ ,  $SE = 0.2152$ ,  $t = 6.785$ ,  $p < 0.001$ ) was found. Across both exposure and pronoun conditions, the lowest rated sentences contained *they* and were rated by unexposed cisgender participants. No main effect of EXPOSURE was found.

The interaction of PRONOUN  $\times$  EXPOSURE in both the test items and the fillers have shown that cisgender participants who have not been exposed to gender-neutral pronouns rate sentences with *they* lower than cisgender participants who have been exposed to gender-neutral pronouns. Naturalness ratings are off-line judgments, so participants have time to think about the sentence before making a judgment. If a cisgender participant is not familiar with gender-neutral pronouns, even though their grammar may allow them to establish co-reference between the indefinite DP or proper name with the pronoun, they may not find the connection between the antecedent and referential pronoun natural. This could be due to the fact that a participant may consciously believe that *they* is only a plural pronoun, and cannot be natural if it refers to a singular entity. It could also be the case that some participants' beliefs about gender-neutral language or social views have a negative effect on their ratings of singular *they*.

### 4.3.3 SPR and Naturalness Ratings

The on-line self-paced reading task and off-line naturalness rating task each reveal important information about the grammar and the speakers. I consider the self-paced reading data to be reflective of the participants' internal grammar, and the naturalness ratings to be a result of the participants' internal grammar combined with factors such as familiarity with gender-neutral language, attitudes towards gender-neutral language, and other social beliefs.

In the indefinite DP cases, both cisgender and non-binary participants did not experience processing delays when gender-matching *he/she* or singular *they* refers to a low- or high-expectancy DP. This is reflected in the naturalness ratings, where both cisgender and non-binary participants assign sentences a naturalness rating score above 5/7. Although there is an interaction in the naturalness ratings, where cisgender participants disprefer singular *they*, this difference may be explained by the variation between participants with respect to exposure to gender-neutral language. Exposed cisgender participants rated sentences where *they* referred to an indefinite DP with a mean naturalness rating similar to non-binary participants in the same condition. For a subset of Western Canadian English Speakers, both the on-line data and off-line data suggest that singular *they* can refer to any indefinite DPs that are not marked for syntactic gender.

With respect to proper names, the self-paced reading task showed that *they* sentences took longer to read than *he/she* sentences after the pronoun region for all participants, but the naturalness rating task has shown that sentences with *they* are rated lower than sentences with gender-matching *he/she primarily* for cisgender participants. There are a few ways to interpret this difference. One interpretation could be that *name-they* cases take longer to read than *name-match* cases for all participants because *they* cannot refer to proper names in the grammar. Then, the difference between the naturalness ratings with cisgender and non-binary participants is due to conscious factors, such as gender identity and group identity, or the conscious usage of gender-neutral *they* with proper names. A second interpretation could be that the syntactic gender of the proper name causes a short delay when *they* initiates co-reference, but then repairs itself once co-reference is fully established. In this case, the grammar does not *reject* co-reference between proper names and singular *they*, but it is dis-preferred. Then, we may see social factors and attitudes influencing the naturalness ratings of both groups in opposite directions. In either case, further data collection is required to tease apart the baseline judgments and the influence of social factors.

## 4.4 Summary

This naturalness rating task tested whether there were differences in naturalness ratings when singular *they* refers to low- or high-expectancy indefinite DPs. It was found that across all participants, sentences with *they* were rated less natural than sentences with *he/she*. Furthermore, the lowest rated sentences contained singular *they* and were rated by cisgender participants. Investigating further into the exposure of the cisgender participants, it was found that unexposed cisgender participants rated singular *they* less natural than exposed cisgender participants, suggesting that exposure to gender-neutral language can be an influencing factor in naturalness ratings. Due to the overall high mean naturalness ratings, the results suggest that Western Canadian English speakers find sentences where singular *they* refers to syntactically-genderless DPs natural.

# Chapter 5

## Conclusion

### 5.1 Summary and Implications

The current study has shown that gender-identity does not influence the on-line processing of referential singular *they*, but does have a slight influence on the off-line naturalness ratings.

Overall, singular *they* is generally accepted by both cisgender and non-binary speakers by observing high scores in off-line naturalness rating judgments and undelayed reading times in on-line self-paced reading data. No differences in on-line data were observed with respect to low- and high-expectancy antecedents, suggesting that gender that is not syntactically marked on an indefinite DP antecedent does not have an affect on its co-reference with singular *they* during processing. Significant differences were found in off-line naturalness judgments between cisgender and non-binary participants when using singular referential *they*, but the mean naturalness ratings were still above 5/7. The only group of people who rated low- or high-expectancy antecedents with singular *they* less than 5/7 were cisgender people who claimed to not be exposed to gender-neutral pronouns, but that group of unexposed cisgender participants still provided a mean naturalness rating above 4.5/7.

Significant differences between cisgender and non-binary populations arose in the case of off-line naturalness ratings for proper names. Cisgender participants rated singular *they* with proper names significantly worse than non-binary participants do. However, this difference was apparent primarily due to cisgender participants who claimed to not be exposed to gender-neutral pronouns, providing a mean naturalness rating of less than 4/7. This *name-they* condition for unexposed cisgender participants is the only condition that the data has shown to be unacceptable. However, in on-line processing results, both groups tended to have slight difficulties processing *name-they* cases, suggesting that unambiguous proper names have a strong expectation to antecede referential *he* or *she* even if one is exposed to gender-neutral pronouns.

The results have a direct implication on Bjorkman's (2017) classification of *they* users. In her classification, neither conservative nor innovative speakers could use singular *they* to

refer to proper names. The present study has shown that there are people who find such co-reference natural, and thus requires at least one additional category for her current binary classification of *they* users.

## 5.2 Future Work

This thesis provides a snapshot of the acceptability and processing of singular *they* in the current era. I have tested antecedents with varying gender-expectancy as well as proper names, and there is still more work to be done.

With regards to the classification of singular *they* users, additional classifications have been proposed by Konnelly and Cowper (2019), separating users into three stages, rather than two distinct groups as Bjorkman (2017) has done. The three stage model suggests that antecedents belonging to separate categories, such as kinship terms, e.g. *sister* or *brother*, have the same level of acceptance as proper names. Whether or not this is true for all levels of exposure or gender-identity has yet to be experimentally proven. Further experiments could be useful for testing the differences between each of the stages that Konnelly and Cowper (2019) propose, as well as the differences in antecedent types. The three stage model also suggests a progression of acceptance for singular *they* with various antecedent types. A longitudinal study of the same participants spanning multiple months, or years, may yield insight into the acquisition of gender-neutral pronouns.

The acceptability ratings for singular *they* in this thesis covering Vancouver residents were not low across every condition. I suspect that in regions where gender-neutral language is less prevalent, the acceptability ratings will be lower for non-indefinite antecedents and proper names than what I have found. It does not take much time to find posts on social media that reject the usage of *they* to refer to proper names, so there must be some variable or group of people that this thesis has not been able to capture. Further investigations of age and length of exposure to gender-neutral language may also provide insight into the factors that can influence both acceptability and the processing of singular *they* with various antecedent types. The current study did not track how long a participant had been exposed to gender-neutral language, and thus no time exposure analysis could be performed.

Ackerman et al.'s (2019) study, Doherty and Conklin's (2017) study, and the present study all investigated separate forms of the singular third person pronoun. There has yet to be a study to check whether *they*, *them*, and *themselves* are accepted and processed similarly, or if one form is more acceptable or easily processed than the other. Ackerman et al.'s (2019) study investigating any differences between *themselves* and *themselves* is particularly interesting because it observes the use of a morphologically-marked plural reflexive to refer to a singular antecedent. If there is no difference between *they*, *them*, and *themselves* in terms of naturalness ratings and on-line processing, then we know, experimentally, that

English has a 3rd person singular gender-neutral pronoun and that *they/them/themselves* can be generalized as a set just as *he/him/himself* or *she/her/herself*.

Finally, a longitudinal study to capture the acquisition of singular *they* across ages would be useful, as it would capture the change of a pronoun over time with data. As singular referential *they* is used more commonly throughout our communities with more varied antecedents, it is likely that any differences between singular referential *they* and gendered pronouns *he/she* in both off-line judgments and on-line processing will eventually be eliminated. If there are particular groups of people who do not adopt singular referential *they*, then there may be factors influencing that acquisition that are worth evaluating.

## References

- Ackerman, L., Riches, N., & Wallenberg, J. (2018). Coreference dependency formation is modulated by experience with variation of human gender. In *The 92nd annual meeting of the linguistic society of america*. Salt Lake City, UT.
- Ackerman, L. M. (2019). *Syntactic and cognitive issues in investigating gendered coreference*. Retrieved from <https://ling.auf.net/lingbuzz/004064>
- Balhorn, M. (2004). The rise of epicene they. *Journal of English Linguistics*, 32(2), 79–104.
- Balhorn, M. (2009). The epicene pronoun in contemporary newspaper prose. *American Speech*, 84(4), 391–413.
- Baron, D. (2016). The words that failed: A chronology of early nonbinary pronouns. *English Department of Illinois University. University of Illinois Board of Trustees*.
- Bodine, A. (1975). Androcentrism in prescriptive grammar: singular "they", sex-indefinite "he", and "he or she". *Language in society*, 4(2), 129–146.
- British Columbia Law Institute. (1998). *Gender-free legal writing managing the personal pronouns*.
- Bush, G. (1991). *Address before a joint session of the congress on the state of the union*. Gerhard Peters and John Woolley, The American Presidency Project. Retrieved from <http://www.presidency.ucsb.edu/ws/?pid=19253>
- Canal, P., Garnham, A., & Oakhill, J. (2015). Beyond gender stereotypes in language comprehension: Self sex-role descriptions affect the brain's potentials associated with agreement processing. *Frontiers in Psychology*, 6, 1-16.
- Chesterfield, P. (1759). *Letters to his son, ccclv*. Harper (published 1845).
- The chicago manual of style*. (Seventeenth ed.). (2017). The University of Chicago.
- Cuny School of Law. (2017). *Grammar and style: Pronouns*. Retrieved 2017-08-08, from <http://www.law.cuny.edu/legal-writing/students/grammar/pronouns.html>
- Doherty, A. (2013). *The use of gender and number cues in l2 pronoun processing* (PhD Dissertation). University of Nottingham.
- Doherty, A., & Conklin, K. (2017). How gender-expectancy affects the processing of "them". *The Quarterly Journal of Experimental Psychology*, 70(4), 718–735.
- Ferreira, F., Bailey, K. G., & Ferraro, V. (2002). Good-enough representations in language comprehension. *Current directions in psychological science*, 11(1), 11–15.
- Filik, R., Sanford, A. J., & Leuthold, H. (2008). Processing pronouns without antecedents: Evidence from event-related brain potentials. *Journal of Cognitive Neuroscience*, 20(7), 1315–1326.
- Foertsch, J., & Gernsbacher, M. A. (1997). In search of gender neutrality: Is singular they a cognitively efficient substitute for generic he? *Psychological science*, 8(2), 106–111.
- Gerrig, R. J. (1986). Process models and pragmatics. *Advances in cognitive science*, 1, 23–42.

- Gerrig, R. J., Horton, W. S., & Stent, A. (2011). Production and comprehension of unheralded pronouns: A corpus analysis. *Discourse Processes*, 48(3), 161–182.
- Kennison, S., & Trofe, J. (2003). Comprehending pronouns: A role for word-specific gender stereotype information. *Journal of Psycholinguistic Research*, 32(3), 355–378.
- Konnolly, L., & Cowper, E. (2017). *The future is they: the morphosyntax of an english epicene pronoun*. Retrieved from <https://ling.auf.net/lingbuzz/003859>
- Laitinen, M. (2008). Sociolinguistic patterns in grammaticalization: He, they, and those in human indefinite reference. *Language Variation and Change*, 20(1), 155–185.
- LaScotte, D. K. (2016). Singular they: An empirical study of generic pronoun use. *American speech*, 91(1), 62–80.
- MacKay, D. G. (1980). On the goals, principles, and procedures for prescriptive grammar: Singular they. *Language in society*, 9(3), 349–367.
- Matossian, L. A. (1997). *Burglars, babysitters, and persons: A sociolinguistic study of generic pronoun usage in philadelphia and minneapolis* (PhD Dissertation). University of Pennsylvania.
- Newman, M. (1997). *Epicene pronouns: The linguistics of a prescriptive problem* (Unpublished doctoral dissertation). Outstanding dissertations in linguistics series.
- Nieuwland, M. S. (2014). Who’s he? event-related brain potentials and unbound pronouns. *Journal of Memory and Language*, 76, 1–28.
- Publication manual of the american psychological association*. (6th ed.). (2010). Washington, DC: American Psychological Association.
- Ruskin, J. (1873). *The works of john ruskin: The crown of wild olive*. George Allen.
- Sanford, A. J., Filik, R., Emmott, C., & Morrow, L. (2008). They’re digging up the road again: The processing cost of institutional they. *The Quarterly Journal of Experimental Psychology*, 61(3), 372–380.
- Sarrasin, O., Gabriel, U., & Gygax, P. (2012). Sexism and attitudes toward gender-neutral language. *Swiss Journal of Psychology*, 113–124.
- Sendén, M. G., Bäck, E. A., & Lindqvist, A. (2015). Introducing a gender-neutral pronoun in a natural gender language: the influence of time on attitudes and behavior. *Frontiers in psychology*, 6, 1–12.
- Swan, M. (2005). *Practical english usage 3rd edition*. Oxford University Press.
- Vergoossen, H., Bäck, E. A., Lindqvist, A., & Gustafsson Sendén, M. (2016). Contemporary arguments against gender-neutral language. In *28th annual convention of the association for psychological science (aps)* (pp. 26–29). Chicago, US.



# Appendix A

## Experiment Materials

### A.1 Test Items

- a. **Condition 1:** High-Expectancy, Gender-Marked Mismatch
  - b. **Condition 2:** High-Expectancy, They
  - c. **Condition 3:** Low-Expectancy, Gender-Marked
  - d. **Condition 4:** Low-Expectancy, They
  - e. **Control Condition:** High-Expectancy, Gender-Marked Match
  - f. Comprehension Question
- 
- 1.
    - a. A cheerleader was practicing alone on a routine. After working for hours, he decided to show the instructor.
    - b. A cheerleader was practicing alone on a routine. After working for hours, they decided to show the instructor.
    - c. A performer was practicing alone on a routine. After working for hours, he decided to show the instructor.
    - d. A performer was practicing alone on a routine. After working for hours, they decided to show the instructor.
    - e. A cheerleader was practicing alone on a routine. After working for hours, she decided to show the instructor.
    - f. Did someone practice a routine?
  - 2.
    - a. A babysitter was making food alone in the kitchen. Before cutting the vegetables, he needed to sharpen the knives.
    - b. A babysitter was making food alone in the kitchen. Before cutting the vegetables, they needed to sharpen the knives.
    - c. A teenager was making food alone in the kitchen. Before cutting the vegetables, she needed to sharpen the knives.
    - d. A teenager was making food alone in the kitchen. Before cutting the vegetables, they needed to sharpen the knives.
    - e. A babysitter was making food alone in the kitchen. Before cutting the vegetables, she needed to sharpen the knives.

- f. Did someone make a drink in the kitchen?
3.
    - a. A housekeeper was dusting alone in the bedroom. After wiping the windows, he went to grab more supplies.
    - b. A housekeeper was dusting alone in the bedroom. After wiping the windows, they went to grab more supplies.
    - c. A tenant was dusting alone in the bedroom. After wiping the windows, he went to grab more supplies.
    - d. A tenant was dusting alone in the bedroom. After wiping the windows, they went to grab more supplies.
    - e. A housekeeper was dusting alone in the bedroom. After wiping the windows, she went to grab more supplies.
    - f. Did someone grab more supplies?
  4.
    - a. A boxer was training alone in the gym. After finishing the workout, she wanted to take a shower.
    - b. A boxer was training alone in the gym. After finishing the workout, they wanted to take a shower.
    - c. An athlete was training alone in the gym. After finishing the workout, she wanted to take a shower.
    - d. An athlete was training alone in the gym. After finishing the workout, they wanted to take a shower.
    - e. A boxer was training alone in the gym. After finishing the workout, he wanted to take a shower.
    - f. Did someone want to a cold bath?
  5.
    - a. A farmer was planting alone on the hill. After planting the seeds, she hoped to grow a gigantic tree.
    - b. A farmer was planting alone on the hill. After planting the seeds, they hoped to grow a gigantic tree.
    - c. A worker was planting alone on the hill. After planting the seeds, he hoped to grow a gigantic tree.
    - d. A worker was planting alone on the hill. After planting the seeds, they hoped to grow a gigantic tree.
    - e. A farmer was planting alone on the hill. After planting the seeds, he hoped to grow a gigantic tree.
    - f. Did someone plant on a hill?
  6.
    - a. A flight attendant was working alone in the galley. Before taking a break, he had to help the customers.
    - b. A flight attendant was working alone in the galley. Before taking a break, they had to help the customers.
    - c. An airline worker was working alone in the galley. Before taking a break, she had to help the customers.
    - d. An airline worker was working alone in the galley. Before taking a break, they had to help the customers.

- e. A flight attendant was working alone in the galley. Before taking a break, she had to help the customers.
  - f. Did someone work on the deck?
- 7.
- a. A golfer was putting alone on the green. Before taking a shot, she started to feel very nervous.
  - b. A golfer was putting alone on the green. Before taking a shot, they started to feel very nervous.
  - c. An amateur was putting alone on the green. Before taking a shot, he started to feel very nervous.
  - d. An amateur was putting alone on the green. Before taking a shot, they started to feel very nervous.
  - e. A golfer was putting alone on the green. Before taking a shot, he started to feel very nervous.
  - f. Did someone start to feel nervous?
- 8.
- a. A hairdresser was cleaning alone in the back. After finishing up, he began to take more customers.
  - b. A hairdresser was cleaning alone in the back. After finishing up, they began to take more customers.
  - c. A staff member was cleaning alone in the back. After finishing up, she began to take more customers.
  - d. A staff member was cleaning alone in the back. After finishing up, they began to take more customers.
  - e. A hairdresser was cleaning alone in the back. After finishing up, she began to take more customers.
  - f. Did someone take a break?
- 9.
- a. A mechanic was restocking alone in the storeroom. After filling the shelves, she decided to take inventory.
  - b. A mechanic was restocking alone in the storeroom. After filling the shelves, they decided to take inventory.
  - c. An employee was restocking alone in the storeroom. After filling the shelves, he decided to take inventory.
  - d. An employee was restocking alone in the storeroom. After filling the shelves, they decided to take inventory.
  - e. A mechanic was restocking alone in the storeroom. After filling the shelves, he decided to take inventory.
  - f. Did someone restock in the storeroom?
- 10.
- a. A hunter was hiking alone in the woods. After finding an animal, she went to grab a camera.
  - b. A hunter was hiking alone in the woods. After finding an animal, they went to grab a camera.
  - c. A student was hiking alone in the woods. After finding an animal, she went to grab a camera.

- d. A student was hiking alone in the woods. After finding an animal, they went to grab a camera.
  - e. A hunter was hiking alone in the woods. After finding an animal, he went to grab a camera.
  - f. Did someone hike in the swamp?
- 11.
- a. A make-up artist was shopping alone in the store. After grabbing some items, he proceeded to pay the cashier.
  - b. A make-up artist was shopping alone in the store. After grabbing some items, they proceeded to pay the cashier.
  - c. A customer was shopping alone in the store. After grabbing some items, he proceeded to pay the cashier.
  - d. A customer was shopping alone in the store. After grabbing some items, they proceeded to pay the cashier.
  - e. A make-up artist was shopping alone in the store. After grabbing some items, she proceeded to pay the cashier.
  - f. Did someone pay the cashier?
- 12.
- a. A private detective was working alone in the office. After finishing some paperwork, she began to head back home.
  - b. A private detective was working alone in the office. After finishing some paperwork, they began to head back home.
  - c. A salesperson was working alone in the office. After finishing some paperwork, she began to head back home.
  - d. A salesperson was working alone in the office. After finishing some paperwork, they began to head back home.
  - e. A private detective was working alone in the office. After finishing some paperwork, he began to head back home.
  - f. Did someone head to a store?
- 13.
- a. A nurse was struggling alone in the emergency room. After the operation, he demanded to receive better help.
  - b. A nurse was struggling alone in the emergency room. After the operation, they demanded to receive better help.
  - c. A patient was struggling alone in the emergency room. After the operation, he demanded to receive better help.
  - d. A patient was struggling alone in the emergency room. After the operation, they demanded to receive better help.
  - e. A nurse was struggling alone in the emergency room. After the operation, she demanded to receive better help.
  - f. Did someone struggle in the emergency room?
- 14.
- a. A drummer was practicing alone in the music room. After playing a song, she wanted to make it more exciting.
  - b. A drummer was practicing alone in the music room. After playing a song, they wanted to make it more exciting.

- c. A band member was practicing alone in the music room. After playing a song, she wanted to make it more exciting.
  - d. A band member was practicing alone in the music room. After playing a song, they wanted to make it more exciting.
  - e. A drummer was practicing alone in the music room. After playing a song, he wanted to make it more exciting.
  - f. Did someone play at a concert?
- 15.
- a. A pilot was eating alone in the airport. Before the flight, she needed to make a phone call.
  - b. A pilot was eating alone in the airport. Before the flight, they needed to make a phone call.
  - c. A passenger was eating alone in the airport. Before the flight, he needed to make a phone call.
  - d. A passenger was eating alone in the airport. Before the flight, they needed to make a phone call.
  - e. A pilot was eating alone in the airport. Before the flight, he needed to make a phone call.
  - f. Did someone need to make a phone call?
- 16.
- a. An elementary school teacher was marking alone in the classroom. After grading the papers, he vowed to make easier exams.
  - b. An elementary school teacher was marking alone in the classroom. After grading the papers, they vowed to make easier exams.
  - c. A teaching assistant was marking alone in the classroom. After grading the papers, she vowed to make easier exams.
  - d. A teaching assistant was marking alone in the classroom. After grading the papers, they vowed to make easier exams.
  - e. An elementary school teacher was marking alone in the classroom. After grading the papers, she vowed to make easier exams.
  - f. Did someone want to make harder exams?
- 17.
- a. A sailor was mopping alone in the room. After cleaning the floor, she neglected to put away the mop.
  - b. A sailor was mopping alone in the room. After cleaning the floor, they neglected to put away the mop.
  - c. A camp counselor was mopping alone in the room. After cleaning the floor, he neglected to put away the mop.
  - d. A camp counselor was mopping alone in the room. After cleaning the floor, they neglected to put away the mop.
  - e. A sailor was mopping alone in the room. After cleaning the floor, he neglected to put away the mop.
  - f. Did someone mop in the room?
- 18.
- a. A secretary was working alone at the front desk. After sending an email, he happened to receive good news.

- b. A secretary was working alone at the front desk. After sending an email, they happened to receive good news.
  - c. An intern was working alone at the front desk. After sending an email, she happened to receive good news.
  - d. An intern was working alone at the front desk. After sending an email, they happened to receive good news.
  - e. A secretary was working alone at the front desk. After sending an email, she happened to receive good news.
  - f. Did someone work in the storage room?
- 19.
- a. A supermodel was eating alone in a restaurant. Before ordering a meal, he wished to see the full menu.
  - b. A supermodel was eating alone in a restaurant. Before ordering a meal, they wished to see the full menu.
  - c. A food critic was eating alone in a restaurant. Before ordering a meal, he wished to see the full menu.
  - d. A food critic was eating alone in a restaurant. Before ordering a meal, they wished to see the full menu.
  - e. A supermodel was eating alone in a restaurant. Before ordering a meal, she wished to see the full menu.
  - f. Did someone want to see the menu?
- 20.
- a. A police officer was training alone on the track. Before the fitness test, she intended to earn the top score.
  - b. A police officer was training alone on the track. Before the fitness test, they intended to earn the top score.
  - c. An olympian was training alone on the track. Before the fitness test, she intended to earn the top score.
  - d. An olympian was training alone on the track. Before the fitness test, they intended to earn the top score.
  - e. A police officer was training alone on the track. Before the fitness test, he intended to earn the top score.
  - f. Did someone want to fail the fitness test?
- 21.
- a. A criminal was plotting alone in the hideout. Before executing the plan, she hesitated to request additional help.
  - b. A criminal was plotting alone in the hideout. Before executing the plan, they hesitated to request additional help.
  - c. A cult member was plotting alone in the hideout. Before executing the plan, he hesitated to request additional help.
  - d. A cult member was plotting alone in the hideout. Before executing the plan, they hesitated to request additional help.
  - e. A criminal was plotting alone in the hideout. Before executing the plan, she hesitated to request additional help.
  - f. Did someone plot in the hideout?

22. a. A trucker was driving alone on the highway. After taking an exit, she prepared to visit the rest area.
- b. A trucker was driving alone on the highway. After taking an exit, they prepared to visit the rest area.
- c. A driver was driving alone on the highway. After taking an exit, she prepared to visit the rest area.
- d. A driver was driving alone on the highway. After taking an exit, they prepared to visit the rest area.
- e. A trucker was driving alone on the highway. After taking an exit, he prepared to visit the rest area.
- f. Did someone bike in the neighbourhood?
23. a. A wedding planner was researching alone on the internet. After finding a venue, he opted to select the cheapest one.
- b. A wedding planner was researching alone on the internet. After finding a venue, they opted to select the cheapest one.
- c. An entertainer was researching alone on the internet. After finding a venue, he opted to select the cheapest one.
- d. An entertainer was researching alone on the internet. After finding a venue, they opted to select the cheapest one.
- e. A wedding planner was researching alone on the internet. After finding a venue, she opted to select the cheapest one.
- f. Did someone select a cheap venue?
24. a. A knitter was reading alone in the cabin. After finishing the novel, he planned to read the sequel.
- b. A knitter was reading alone in the cabin. After finishing the novel, they planned to read the sequel.
- c. An author was reading alone in the cabin. After finishing the novel, she planned to read the sequel.
- d. An author was reading alone in the cabin. After finishing the novel, they planned to read the sequel.
- e. A knitter was reading alone in the cabin. After finishing the novel, she planned to read the sequel.
- f. Did someone want to stop reading?
25. a. A football coach was researching alone in the lobby. After deciding on a plan, she went to inform the team.
- b. A football coach was researching alone in the lobby. After deciding on a plan, they went to inform the team.
- c. A team advisor was researching alone in the lobby. After deciding on a plan, he went to inform the team.
- d. A team advisor was researching alone in the lobby. After deciding on a plan, they went to inform the team.
- e. A football coach was researching alone in the lobby. After deciding on a plan, he went to inform the team.

26.
  - a. A soap opera fan was watching alone in the media room. After finishing the finale, he wanted to watch another season.
  - b. A soap opera fan was watching alone in the media room. After finishing the finale, they wanted to watch another season.
  - c. A Netflix user was watching alone in the media room. After finishing the finale, she wanted to watch another season.
  - d. A Netflix user was watching alone in the media room. After finishing the finale, they wanted to watch another season.
  - e. A soap opera fan was watching alone in the media room. After finishing the finale, she wanted to watch another season.
27.
  - a. A romance novelist was writing alone in the coffee shop. After concluding the book, he planned to edit the chapters.
  - b. A romance novelist was writing alone in the coffee shop. After concluding the book, they planned to edit the chapters.
  - c. A novelist was writing alone in the coffee shop. After concluding the book, he planned to edit the chapters.
  - d. A novelist was writing alone in the coffee shop. After concluding the book, they planned to edit the chapters.
  - e. A romance novelist was writing alone in the coffee shop. After concluding the book, she planned to edit the chapters.
28.
  - a. A plumber was standing alone in the kitchen. After making a phone call, she decided to make some lunch.
  - b. A plumber was standing alone in the kitchen. After making a phone call, they decided to make some lunch.
  - c. A dog owner was standing alone in the kitchen. After making a phone call, she decided to make some lunch.
  - d. A dog owner was standing alone in the kitchen. After making a phone call, they decided to make some lunch.
  - e. A plumber was standing alone in the kitchen. After making a phone call, he decided to make some lunch.
29.
  - a. A carpenter was living alone in the apartment. Before heading out, she needed to lock the windows.
  - b. A carpenter was living alone in the apartment. Before heading out, they needed to lock the windows.
  - c. A citizen was living alone in the apartment. Before heading out, he needed to lock the windows.
  - d. A citizen was living alone in the apartment. Before heading out, they needed to lock the windows.
  - e. A carpenter was living alone in the apartment. Before heading out, he needed to lock the windows.
30.
  - a. A sunbather was resting alone on the beach. Before laying down, he remembered to apply some sunscreen.



- b. A sunbather was resting alone on the beach. Before laying down, they remembered to apply some sunscreen.
- c. A swimmer was resting alone on the beach. Before laying down, she remembered to apply some sunscreen.
- d. A swimmer was resting alone on the beach. Before laying down, they remembered to apply some sunscreen.
- e. A sunbather was resting alone on the beach. Before laying down, she remembered to apply some sunscreen.

## A.2 Fillers

a. Masculine-Match

b. Comprehension Question

1. a. Ben was building alone in the garage. After finishing the model train, he went to buy another one.  
b. Did someone build in the garage?
2. a. John was learning alone in the bookstore. After reading the math textbook, he wanted to prove an important theorem.  
b. Did someone learn in the video store?
3. a. James was shopping alone in the clothing store. While picking out new clothes, he tried to get some assistance.  
b. Did someone try to get assistance?
4. a. Ken was walking alone on the pier. After seeing the ocean, he wished to bring a date.  
b. Did someone want to bring a sibling?
5. a. Bill was camping alone in the woods. Before encountering a bear, he refused to carry a weapon.  
b. Did someone camp in the woods?
6. a. Bob was coloring alone in the classroom. While choosing a crayon, he refused to pick a bright color.  
b. Did someone color at the campsite?
7. a. Mark was snoring alone in bed. Before falling asleep, he refused to apply a nasal strip.  
b. Did someone refuse to apply a nasal strip?
8. a. Frank was dieting alone at the camp. After seeing some desserts, he chose to take a cheat day.  
b. Did someone drink lots of water?
9. a. Joe was patrolling alone around the campus. Before choosing the route, he tried to anticipate potential dangers.  
b. Did someone patrol around the campus?

10. a. Connor was cooking alone in the restaurant. While making the chili, he liked to add different spices.
- b. Did someone sing in the restaurant?

a. Feminine-Match

b. Comprehension Question

1. a. Mary was tanning alone at the beach. Before heading home, she wanted to stop at the gift shop.
- b. Did someone want to stop at the gift shop?
2. a. Sue was hunting alone in the forest. After seeing an animal, she planned to take a clean shot.
- b. Did someone plan to ignore the animal?
3. a. Kate was drawing alone in the studio. While drawing a sketch, she loved to look out the window.
- b. Did someone draw in the studio?
4. a. Emily was sculpting alone in the gallery. After finishing the sculpture, she hoped to make lots of money.
- b. Did someone dance in the gallery?
5. a. Emma was skateboarding alone in the skate park. After completing a difficult trick, she desired to show other skaters.
- b. Did someone want to show other skaters a difficult trick?
6. a. Olivia was shooting alone at the practice range. After taking the last shot, she managed to hit all the targets.
- b. Did someone miss all the targets?
7. a. Hannah was sneezing alone in the shed. After inhaling the dust, she tried to find some allergy medication.
- b. Did someone sneeze in the shed?
8. a. Sarah was starving alone on the train. After reaching the stop, she planned to grab some food.
- b. Did someone cry on the train?
9. a. Natalie was birdwatching alone in the park. After seeing an exotic bird, she decided to write a journal entry.
- b. Did someone decide to write a journal entry?
10. a. Linda was singing alone in the karaoke bar. After singing the song, she needed to order a drink.
- b. Did someone need to order food?

a. Masculine-They

b. Comprehension Question

1. a. Michael was drinking alone in the pub. After leaving the pub, they meant to stop at the liquor store.

- b. Did someone drink at the pub?
- 2. a. David was sailing alone in the ocean. After reaching land, they expected to greet the townsfolk.  
b. Did someone swim in the river?
- 3. a. Richard was sleeping alone in the bedroom. After waking up, they refused to make some breakfast.  
b. Did someone refuse to make some breakfast?
- 4. a. Robert was running alone on the track. After finishing a mile, they chose to drink some water.  
b. Did someone choose to drink some coke?
- 5. a. Matthew was swimming alone in the pool. Before diving in, they stopped to put on some swimming goggles.  
b. Did someone swim in the pool?

a. Feminine-They

b. Comprehension Question

- 1. a. Kimberly was gardening alone in the front yard. After planting some flowers, they attempted to plant some vegetables.  
b. Did someone garden in the back yard?
- 2. a. Nancy was laying alone in the hammock. After getting out, they intended to take another nap.  
b. Did someone intend to take another nap?
- 3. a. Rachel was weightlifting alone in the weight room. Before taking a break, they managed to lift a heavy dumbbell.  
b. Did someone fail to lift a heavy a dumbbell?
- 4. a. Jessica was figure skating alone in the ice rink. After warming up, they failed to perform a backflip.  
b. Did someone figure skate in the ice rink?
- 5. a. Julia was panicking alone in the bedroom. After opening the textbook, they started to feel even more anxiety.  
b. Did someone rest in the bedroom?

# Appendix B

## Experiment Surveys

### B.1 Pre-Experiment Instructions and Survey

This experiment has two parts. In the first part, you will be required to read a number of English sentences one region at a time. You can advance to the next word by pressing the space bar.

Following each question, you will do one of two tasks:

1. Rate how natural the previous passage was on a 1 (unnatural) to 7 (natural) scale.
2. Answer a yes/no comprehension question about the previous passage.

In the second part of the experiment, you will fill out a detailed survey and answer some questions about the experiment. You may refuse to answer any question given in the survey by leaving it blank.

Please fill out every box below. If you really wish to not answer a question, please write "prefer not to answer" in the box.

1. **Name:**
2. **Age:**
3. **Pronouns:** (e.g. he/him/his, they/them/their)
4. **Spoken Languages (Fluent):**
5. **Spoken Languages (Learning):**

## B.2 Post-Experiment Survey

Please complete the survey below. If there are any questions that you feel uncomfortable answering, you may leave them blank. Please complete as many questions as possible for the benefit of the study.

1. **What languages do you speak fluently?**
2. **What languages did you speak at home before the age of 12?**
3. **What languages did you speak at school before the age of 12?**
4. **What province did you grow up in?** If outside of Canada, please list the country.
5. **What do you identify as:** Cisgender, Nonbinary, Other
6. **What pronouns do you personally use?** (e.g. he/him/his, they/them/their)
7. **How long have you been using those pronouns?**
8. **Do you have any friends or family members that use they/them/their pronouns?**
9. **What sex were you assigned at birth?**
10. **Was there any material in the experiment that made you uncomfortable?**
11. **Are there any additional comments you would like to make about the experiment?**