Effect of Maternal Gender-Biased Speech on Children's Gender Socialization

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Introductions

Numerous studies in recent decades have demonstrated that gender role socialization starts from birth (e.g., Birns, 1976; Honig, 1983). Parents play a crucial role in influencing their children to engage in gender role stereotyped activities, and that these perceptual biases influence the children's own self-perceptions and activity choices (Eccles, Jacobs, & Harold, 1990).

In the field of language development, researchers have postulated that Infant-Directed Speech (IDS) is an ideal signal for language learning due to infants' strong preference for it, providing attentional, emotional, linguistic, and social cues (Ferjan Ramírez, 2022). Recent studies examining language input to boys and girls reveal distinct biases in IDS content, with boys exposed more to words associated with outdoor scenes and girls to terms related to clothing and body parts (Kachergis, Francis, & Frank, 2023; Wallentin & Trecca, 2023). Parents tend to discuss emotions more with girls than boys (Adams, Kuebli, Boyle, & Fivush, 1995), explain scientific content more to boys in certain settings (Crowley et al., 2001), and engage in cognitive development-promoting discussions more frequently with boys (Weitzman, Birns, & Friend, 1985).

Although parental interactions, name choices, and attire vary based on their children's sex, they are all crucial in shaping gender identity, and carry profound implications for cognitive processes and linguistic development (Perry, Pauletti, & Cooper, 2019). Infants demonstrate an early awareness of gender differences, showing preferences for gender-associated objects within the first year (Levy & Haaf, 1994). By age 3, most children exhibit awareness of gender stereotypes, influencing their preferences and behaviors (Martin & Little, 1990). Moreover, children increasingly regulate their behavior based on these gender-based conceptions once they develop a sense of their gender identity (Bussey & Bandura, 1999). Powlishta (1995) demonstrates that despite own-sex favoritism,

children between 8 and 10 years old already have differing views of the masculinity or femininity of personality traits. Both boys and girls ascribe certain personality attributes as masculine or feminine. Traits such as “polite”, “shares”, “soft-hearted”, “gentle”, “affectionate”, “gloomy”, and “cries” are perceived as feminine whereas qualities like “bold”, “strong”, “messy”, “fights”, “cruel”, “loud”, and “crude” are associated with masculinity. This divide aligns with the Stereotype Content Model (Cuddy, Fiske, & Glick, 2008). Researchers have also identified distinction between stereotypically feminine communal traits (matching the warmth dimension) and stereotypically masculine agentic traits (matching the competence dimension; Cuddy et al. (2008)).

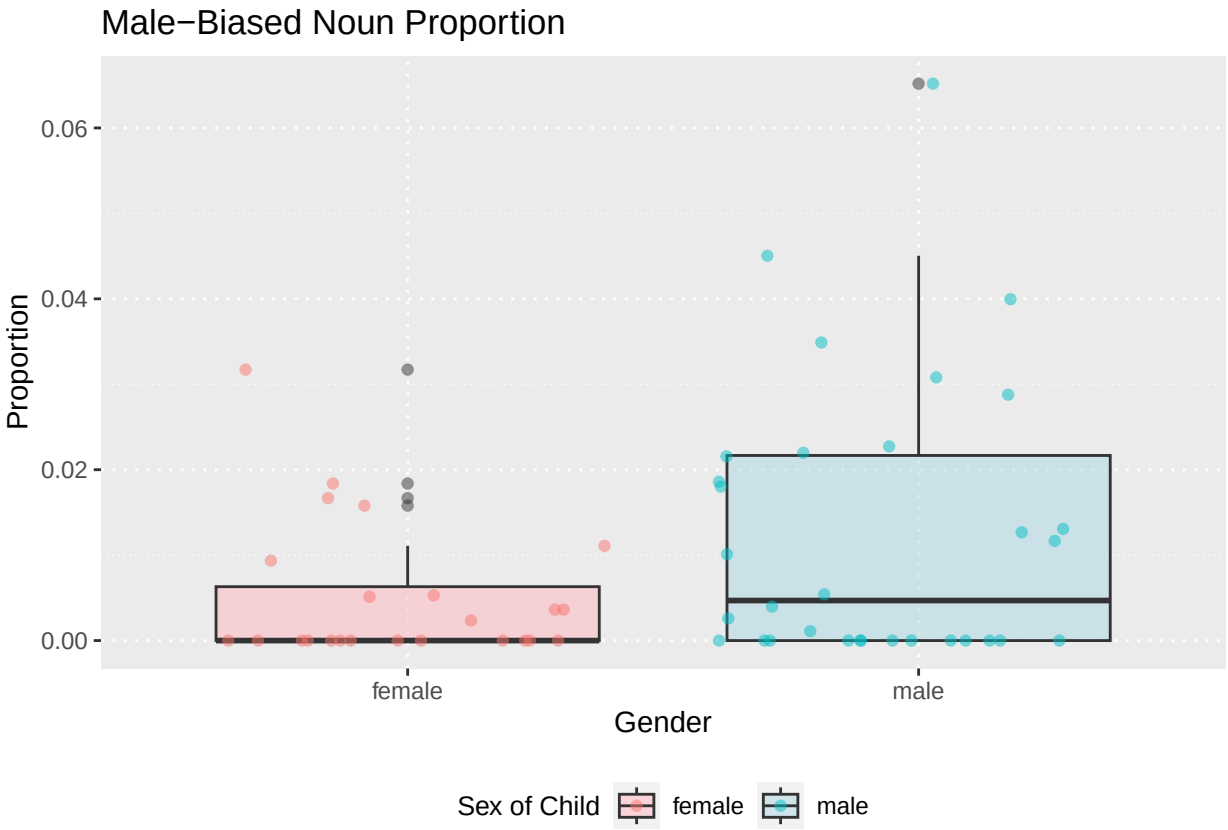
Despite this rich understanding, little is known about how gender-biased IDS from parents influences children’s development of gender concepts. It is vital for us to ask these questions because biases in parental communication can significantly shape children’s attitudes towards relationships, educational equality, career aspirations, and overall well-being (Wei & Hendrix, 2009).

Methods

The current study will re-analyze data from the CHILDES (Child Language Data Exchange System) database, the child language component of the TalkBank system. The CHILDES includes transcripts of child language in 26 languages from 230 different corpora which record spontaneous conversational interactions between young monolingual children and their parents, playmates, and teachers. Measures Child sex. This variable will be determined based on the infant information (“Target_Child’s sex”: male; female) provided in the CHILDES database. Gender-biased nouns. Nouns extracted from the two lists “Top 10 most female/male biased words in English (America) for comprehension data” of the Wordbank data report (2016) will be treated as gender-biased language data. We will calculate the percentage of nouns in each transcript that meets these criteria. Competence and warmth adjectives. Based on the SCM’s categorization (2008), warmth scales include

"good-natured", "trustworthy", "tolerant", "friendly", and "sincere", whereas competence scales include "capable", "skillful", "intelligent", and "confident". We will calculate the percentage of adjectives within each transcript that comes from these scales. ## Analysis Plan Using statistical analyses, specifically t-tests, we will compare the occurrence rates of gender-biased nouns and adjectives from mothers' IDS towards male and female infants. To ascertain the significance of the observed differences while considering the multiplicity of comparisons, corrections for multiple comparisons such as Bonferroni or False Discovery Rate (FDR) adjustments will be applied. This step ensures the maintenance of an appropriate overall alpha level, minimizing the possibility of chance findings due to conducting numerous tests. Subsequently, a multivariate analysis will be conducted to assess the combined influence of child sex, child age, and maternal language type. The ultimate goal is to discern any significant differences in language usage based on child sex, specifically examining the presence and frequency of gender-biased and gender-neutral vocabulary, as well as competence and warmth-related trait descriptors in maternal speech directed towards male and female infants. This approach will offer insights into how gendered language patterns contribute to early gender socialization processes.

Data analysis



X-axis: The gloss variable, representing different words (like “dress”, “doll”, “necklace”, etc.). Y-axis: The count or frequency of each word, indicating how often each word appears in the dataset. Type of Plot: Bar Chart. Comparison Across Groups?: Yes Anticipated Findings: mothers speak more female-biased nouns to female infants than to male infants

As seen in Figure 1, There’s gender bias in the nouns of mother’s infant-directed speech.

Prettified Plot

X-axis: female/male infants

Y-axis: counts of frequency of female-biased nouns Type of Plot: box plot

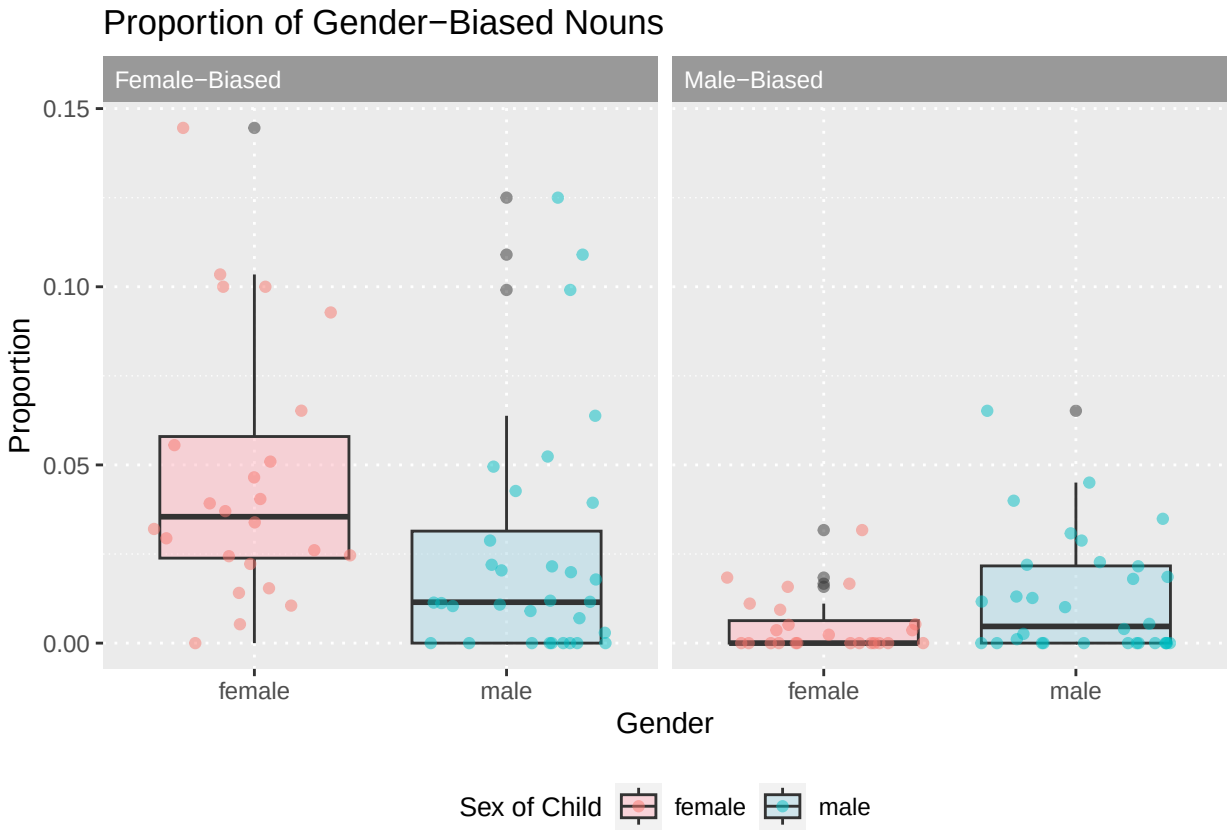
Comparison Across Groups?: Yes

Anticipated Findings: mothers speak more female-biased nouns in CDS to female infants than to male infants

As shown in Table 1, the gender distribution in the dataset varies, with a higher percentage of Female compared to Male.

***Descriptive Analysis*: Examining Maternal Gender-Biased Language Imput Patterns**

```
## # A tibble: 2 x 4
##   target_child_sex mean_mnoun median_mnoun sd_mnoun
##   <chr>                <dbl>        <dbl>    <dbl>
## 1 female             0.00513      0        0.00817
## 2 male               0.0128       0.00469  0.0165
```



As shown in Figure **??**, this descriptive analysis will involve calculating means and standard deviations for the usage of gender-biased language across mothers of boys and girls. We will visualize these patterns through box and jitter plots to identify any apparent differences in language input based on the child's gender.

***Hypothesis Testing Analysis*: Testing the Influence of Child's Gender on Maternal Language Input**

```
##                  Df   Sum Sq   Mean Sq F value Pr(>F)
## target_child_sex  1 0.000798 0.0007977   4.326 0.0423 *
## Residuals        54 0.009958 0.0001844
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
##                  Df  Sum Sq  Mean Sq F value Pr(>F)
## target_child_sex  1 0.00633 0.006327   5.252 0.0259 *
## Residuals        54 0.06506 0.001205
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

The ANOVA tests conducted on the proportions of female-biased nouns used by mothers reveal the following: The Tukey test results are:

For female-biased nouns used by mothers, the F-statistic is $F = 5.25$, $p = 0.03$.

And for male-biased nouns used by mothers, the F-statistic is $F = 4.33$, $p = 0.04$.

The results suggest that there is a statistically significant difference in the usage of gender-biased nouns by mothers when speaking to male children compared to female children, at the conventional 0.05 significance level.

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Table 1

Male-Infant Data

target_child_name	target_child_sex	gloss_count	fnoun_count	mnoun_count	mnou
Aaron	male	57	0	0	
Adam	male	201	4	0	
Alex	male	19296	135	225	
Alfred	male	91	2	2	
Alice	female	2081	106	66	
Allen	male	108	0	0	
Anthony	male	39	0	0	
Benjamin	male	914	36	1	
Brian	male	89	1	0	
Brooke	female	97	9	0	
Carol	female	83	12	0	
Danielle	female	90	5	0	
David	male	688	75	24	
Doug	male	88	1	2	
Emily	female	142	2	0	
Emma	female	180	4	3	
Erica	female	123	3	0	
Ethan	male	23210	269	715	
Jarret	male	99	0	1	
Jas	male	185	2	1	
Jase	male	1777	88	71	
Jeff	male	88	0	0	
Jessica	female	120	12	0	
Jillian	female	2550	75	6	
Johnnie	male	222	22	10	

Table 2

Tukey HSD Test Results for Target Child Sex

	diff	lwr	upr	p adj
male-female	-0.0214792	-0.0402707	-0.0026877	0.0258534

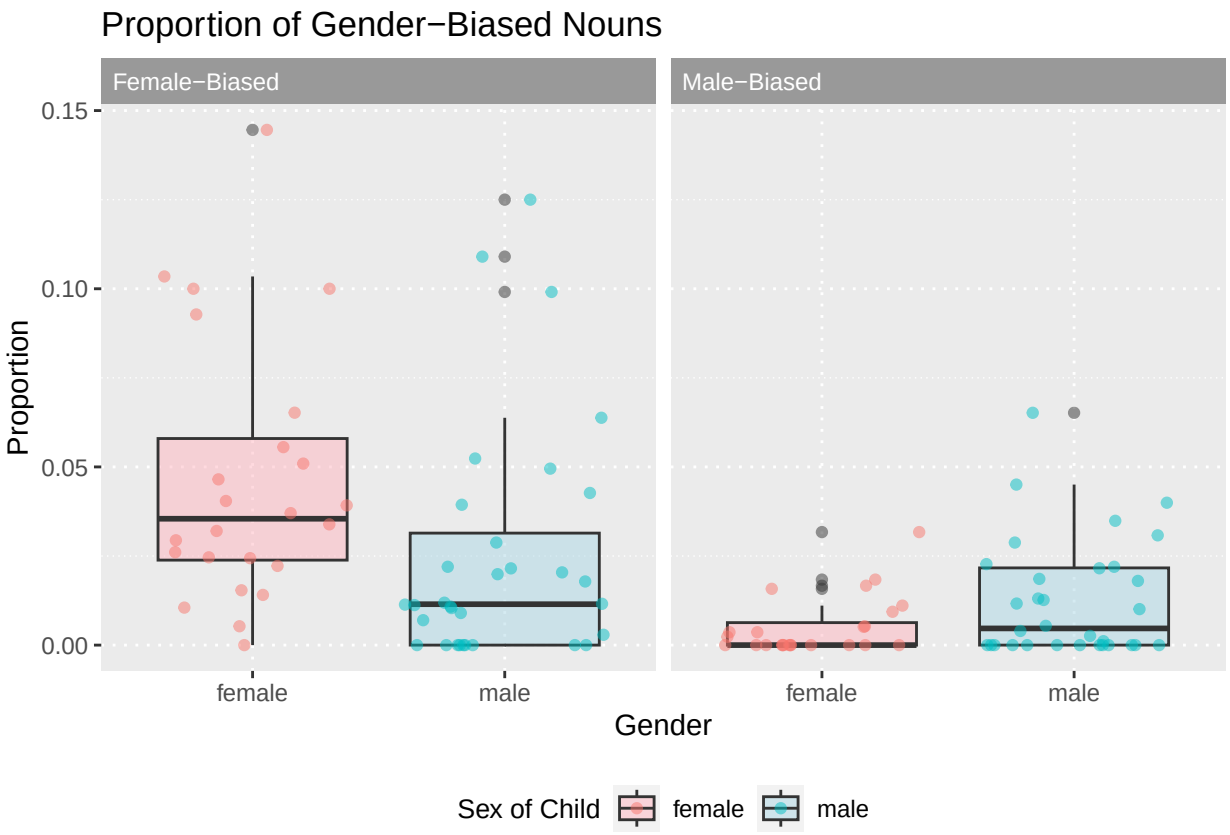

Figure 1. Proportion of Gender-Biased Nouns by Gender