

Mama, Appa, and Titi: What Makes Words Sound Parental?

A phonological exploration of parental terms in and beyond the gender binary

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## Abstract

This paper addresses the following research question: What phonological components make a word sound ‘parental’ cross-linguistically and (how) do those components relate to the social genders associated with the word? The goal in answering this question is to extend Jakobson (1960) and Murdock’s (1959) work to be inclusive of our current understanding of gender and gender roles, and to create more options for queer parents and other families that are recognizable as parental terms, an important factor as found by Frank et al. (2017). The research consists of a literature review, an analysis of cross-linguistic parental terms, and an online survey. Participants were presented 29 terms and asked to judge if they sounded parental and what gender(s) they would associate the word with. The data was analyzed for the effects of reduplication, consonant manner of articulation, and vowels. The results maintained that words that sounded parental were most often correlated with the early language capabilities of infants. However, there was more flexibility around the above constraints, particularly regarding the gender associated with the term. A review of queer parental naming conventions is presented as well as potential conditions for new words gaining popularity.

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## 1. Introduction

Every language has words to refer to family members (Honkola & Jordan, 2023) called kinship terms. One of the most central categories within those terms is the words that are used to refer to or address parents; these are called parental terms. Kinship terms generally are quite useful tools for examining a wide variety of cultural features as well as a point for comparing linguistic change within a language. As Godelier (2011) notes: “analyzing the domain of kinship in a society amounts to exploring and reconstructing the ties between the following aspects of the society’s organization: 1) The modes of descent reckoning and the groups they engender...2) Marriage rules and alliance strategies...3) Representation of what a child is...as well as the rights and duties that bind various kinds of kin,” (Godelier, 2011). While I will not be performing any cultural comparison in this paper, an interest in the cultural impacts of parental terminology motivates this analysis of parental terms.

Parental terms became an area for linguistic study in the 20th century, spurred by the work of anthropologist A. L. Kroeber (1909) (Jonsson, 2008). Since then, the topic has expanded into a variety of different subfields of linguistics, including language development and phonology, the focus of this paper, and has recently been incorporated into the field of queer studies. This paper will use the word *queer* as an umbrella term for anyone who is part of the LGBTQIA2S+ community, falls outside of the gender binary of male and female, does not identify as cisgender, or does not identify as heterosexual.

Heteronormative cultures build heteronormative and cisnormative vocabularies, particularly as they relate to family terminology. In other words, a culture that assumes there are only two genders, one form of attraction, and only two parent families will have a very narrow set of terms to describe those people and relationships. One of the many ways that this

demonstrates itself is in the lexicon of parental terms, the words which children use to refer to their parents, such as “mama” or “papa.” The well-established lexicon for parental terms, in the United States and in many other cultures, is built off of the assumption that families follow the structure of the nuclear family, with one male parent and one female one (Frank et al., 2019). The standard lexicons of English, Spanish, Danish, Japanese and many other languages, do not offer an easy way to distinctively differentiate between two parents of the same social gender or parents who do not identify with the gender binary.

There has been a long-standing body of works (Jakobson, 1960; Leach, 2004; Murdock, 1959; Nevins, 2017b) that have studied cross-linguistic examples of nursery form parental terms. Nursery form parental terms are the parental terms that are conventionally adapted for talking to babies (Jakobson, 1960), such as using *mama* instead of *mom*. These studies have found a general trend that reduplicative terms, like *mama*, are more common cross-linguistically than non-reduplicative terms, like *mor* (‘mother’ in Danish). In terms of the initial consonants of parental terms, nasals, /n/ or /m/, are more commonly associated with female social gender while stops, such as /d/ or /p/, are more commonly associated with male social gender (Jakobson, 1960).

The research reported in Jakobson (1960) and Murdock (1959) assumes that all parents identify in the gender binary of male and female, determined by their sex assigned at birth. The analysis of this research also includes the assumption that female identifying people become the primary caretakers of children while the male identifying parents are breadwinners and much more absent in their parenting roles. Jakobson (1960) even assumes that all mothers breastfeed their babies and that is why their parental terms are more commonly associated with a bilabial nasal murmur.

This paper addresses the following research questions: are there phonological components that make a word sound ‘parental’ cross-linguistically and if so, what are they and (how) do those components relate to judgements on the social gender of the referent? The goal in answering these questions is to compare our current understanding of what words count as parental terms to the work of Jakobson (1960) and Murdock (1959) which 65 years later remain the only widely cited works that analyze cross-linguistic parental terms. This paper investigates if and how these phonological associations change when considering social gender and gender roles that allow for parents of the same gender, non-binary parents, parents of any gender in the workforce, shared caretaking between parents, a child that is not breastfed, families that are not genetically related, etc.

This study consists of an online research survey that collected participant judgements on a data set of potential parental terms. The conclusions from this research can be used not only to understand the ways in which parental terms are currently associated with certain social genders, primarily in the United States, but also to build a database of possibilities for creating new parental terms for queer families. The goal for these new terms is to offer more options to families that are still recognizable as parental terms, an important factor (Colonna, 2013) in the societal recognition of said terms as referring to parental relationships.

Before turning to my study, I provide additional background information in §2, including a summary of research on parental terms, phonological acquisition, and queer parental naming practices. I will also provide an analysis of a data set of cross-linguistic parental terms in §3. Then I will present the methodology of my study in §4, before presenting the results of the study and an analysis in §5. Finally, I will discuss those findings, limitations, and future directions in §6.

## 2. Background

### 2.1. General Terms

Any study of parental terms falls under the study of kinship terminology, as kinship terms consist of the words that are used to refer to any family member or relative. For their simplicity and concrete reference, I will be using the following terms: “kin terms,” “parental kin terms,” “parental terms,” and “parental names” which have been used by a variety of linguists (Frank et al., 2019; Jakobson, 1960; Jonsson, 2008; Murdock, 1959; Wierzbicka, 2017). For this paper, *parental terms*, *parental kin terms*, and *parental names* are synonymous terms which refer to the words, both referential terms and terms of address, used to refer to a parent. I will also be using the term “nursery forms,” (used by Murdock (1959)), which distinguishes forms like *mama* and *papa*, from the standard parental term forms like *mother* and *father*. The distinction of nursery forms is an important one because nursery forms are those most associated with early childhood language acquisition and are the forms that are most consistent cross-linguistically. In many cultures, the nursery form is also continuously used throughout every stage of life, whereas the formal form is only used by older children and adults and often only in formal situations (Wierzbicka, 2017).

### 2.2. Previous Studies: Jakobson (1960) and Murdock (1959)

The research on the phonological components of parental terms has been somewhat limited. Beyond the work of Murdock (1959) and Jakobson (1960), who analyzed cross-linguistic morphological components of parental terms, there has not been a significant amount of research on the phonological components of parental terms. Jakobson (1960) attempted to verify Murdock’s (1959) hypothesis that parental words across languages are phonologically similar due to their development from infant speech.

Murdock (1959) built a data set of 531 mother terms and 541 father terms from 474 cultures. The words were from many language families including Indo-European, Malayo-Polynesia, and Niger-Congo. For the purpose of analysis, Murdock removed words that followed the form of *mama* and *papa* to try to avoid term borrowings between languages, particularly in the European languages. He reduced each word to its first syllable, and then reduced the vowels to three categories, and the consonants to 13 categories. This resulted in 39 different syllable types. He tabulated the occurrence of each syllable type across the data set, which is shown in part in Table 1. His hypothesis was that unrelated languages have similar terms because of the language capacity of young children. He reasoned that the low vowels like [a] are easiest to pronounce, which would explain their prevalence. He noted that father terms need to contrast mother terms but still need to be easy to pronounce, which is likely why they have a different set of initial consonants. He concludes that his data clearly validates the hypothesis that cross-linguistic parallels in parental terms correlate to infant speech development.

<u>Sound classes</u>	<u>Denoting Mother</u>	<u>Denoting Father</u>
Ma, Me, No, Na, Ne, and No	273 (52 %)	81 (15 %)
Pa, Po, Ta, and To	38 ( 7 %)	296 (55 %)
All 29 others	220 (41 %)	164 (30 %)

Table 1: The count of each sound class in the female parental terms and male parental terms in Murdock's (1959) analysis (Murdock, 1959, p.4, Table 2).

Jakobson (1960) wanted to further verify that the cross-linguistic similarities of nursery form parental terms were the result of the constraints of infant language capabilities. Jakobson connects the lack of consonant clusters, present in only 1.1% of Murdock's (1959) terms, to the

lack of consonant clusters in early speech. He notes that complete oral closure consonants (i.e. stops and nasals) and wide vowels, in particular /a/ are the most common. He also mentions the principle of maximal contrast, such as having a very closed consonant with an open vowel, playing an important role in the ease of articulation and the creation of intelligible syllables. Jakobson describes it as the “polarity between optimal consonant and optimal vowel” (Jakobson, 1960). Parental terms with maximal contrast include consonant-vowel pairs that are easier to pronounce but still offer intelligible contrast. He notes that reduplication can mark the boundary between babbling and language formation; the reduplication of syllables in language development could indicate the early formation of meaning. However, the commonality of reduplication was not documented in Murdock’s table, it is only an observation made by Jakobson. Jakobson postulates that nasals are frequent in female terms because breast feeding is often accompanied by a nasal murmur from the infant. That nasal sound is expanded to expressing needs and wants to the mother and eventually used in reference to the mother. Jakobson stresses that the conformity to language acquisition is the main factor in the similarity of these terms cross-linguistically: “Although the mama-papa terms are nursery words, they conform to the developmental character of infant language, and neither their penetration into the national language nor their international diffusion invalidates this basic conformity,” (Jakobson, 1960). Because of this, Jakobson believes Murdock’s choice to exclude the language data that was similar to *mama* and *papa* was unnecessary since he believes that even in related the languages the terms were developed separately from infant babbling.

Jakobson’s conclusion is that the nursery forms of parental terms, in particular the English words *mama* and *papa*, conform to infant language capabilities because they need to fit within those capabilities to meet the requirements of inter-infant-adult-speech. The nursery forms

fit those requirements because they match the limited phonetic range, lack of consonant clusters, high percentage of wide low vowels, low energy consonant and vowel pairing, consonant plus vowel structure, and vowel to consonant tonal assimilation of infant speech. Jakobson gives a thorough analysis of cross-linguistic parental kinship terms but heavily relies on a narrow set of gender norms, an outdated understanding of gender that includes only male and female, and only biologically related families.

The patterns found by Jakobson (1960) and Murdock (1959) are not present in all terms of their data; they are patterns, not rules. This paper will compare Jakobson and Murdock's findings against judgements from survey participants in 2025, focusing on whether certain terms sound parental and which social genders each term is associated with.

### 2.3. Counterexamples

Beyond the examples of contrast within Murdock's (1959) data set, there are select counter examples that offer interesting insight into what other factors might influence the development of these terms. According to Andrew Nevins (2017b), there are languages like Kaingang from Brazil whose phonologies don't allow for *ma* or *pa* syllables, and thus do not have a form similar to *mama* and *papa*. This shows that the constraints of a given language will impact the creation of parental terms, a constraint that supersedes the constraints of infant language capabilities.

Another fascinating counter example to the trend of *mama*- and *papa*-like words is the example of parental terms in Georgian. The word for father in Georgian is *mama* and the word for mother is *deda* (Koridze, 2023). There is no obvious cause of this flip from the norm, but it shows that even cross-linguistically the association of nasals to mothers and stops to fathers is not universal.

#### 2.4. Responses to Jakobson (1960)

Jakobson's conclusions that parental terms are primarily controlled by infant articulation capabilities are not uncontested. Bancel & Matthey de l'Etang (2013) disputed Jakobson's explanation of parental term similarities being developed from infant language tendencies by tracing cross-linguistically similar parental terms back to shared origin languages which have one common ancestral language. They claim that *mama/papa* parental terms are not reinvented in separate languages but are the result of parental terms passed down from shared ancestral languages. They continue that these parental terms are re-conditioned in each new generation as babies begin to babble and their parents correct that babbling into the known parental terms. This argument ties in the previously acknowledged language acquisition concepts and babies' language production capabilities, while using probability and historical evidence to back up their argument of lexical inheritance.

Other linguists have built upon Jakobson's argument. This includes Leach (2004) who largely agrees with Jakobson's conclusions that the phonological patterning in parental terms has semantic significance such as nasals being associated with mothers and stops being associated with fathers. He maintains Jakobson's claim that nursery form parental terms are largely shaped by the speaking capabilities of infants. Leach investigates whether phonological patterns can extend beyond parental terms to all kinship terminology. With the language of Sinhalese as an example, he tests his hypothesis that phonology can have semantic patterning, at least within kinship terms, which can provide insight into the cultural significance of different relationships. In other words, Leach found sound patterns across different kin term categories that coincided with sociological factors like birth order or whether a relationship is socially taboo. Leach's suggestion that kinship terminology may on occasion be grouped by phonological constraints

provides an interesting contrast to the traditional groupings of kinship types used in anthropology. Additionally, the correlation between sounds and kinship types presents interesting potentials for further work in sound symbolism, a field which I will discuss further in §2.6.

## 2.5. Early Phonological Acquisition

To understand the context of Jakobson's argument it is important to have a general understanding of the acquisition of phonological components, a topic with significant cross-linguistic parallels due to the universal pattern of the physical development of the voice mechanism. Young kids have underdeveloped speech mechanisms and poor motor control which have an impact on early articulation and speech development. For example, fricatives develop after stops because they are more difficult to produce. Repetition of syllables is also more common than two different syllables in one word because it takes less articulation effort (Rose et al., 2021). Figure 1 shows the mean age of consonant acquisition cross-linguistically from a number of studies and Table 2 shows the same data across 15 studies of children in the United States. Both figures show the acquisition of nasals and stops at roughly the same time, with fricatives acquired later. This aligns with our observation that parental terms, which are usually among the first words to be acquired, are more likely to include stops and nasals and not fricatives.



## CONSONANT AGE OF ACQUISITION

**Table 2.** Average age of acquisition of consonants across 15 studies of children within the United States ( $n = 18,907$ ).

Consonant	50% Criterion <sup>a</sup>				75% Criterion <sup>a</sup>				90% Criterion <sup>a</sup>			
	<i>M</i> (months)	<i>SD</i> (months)	Range (months)	No. of studies <sup>b</sup>	<i>M</i> (months)	<i>SD</i> (months)	Range (months)	No. of studies <sup>b</sup>	<i>M</i> (months)	<i>SD</i> (months)	Range (months)	No. of studies <sup>b</sup>
Plosives												
p	30.60	7.18	18–36	10	32.73	5.61	24–36	11	33.25	6.94	24–48	12
b	30.60	7.18	18–36	10	32.73	5.61	24–36	11	31.38	7.81	24–48	13
t	31.20	6.20	24–36	10	33.82	7.24	24–48	11	38.54	9.19	24–60	13
d	30.60	7.18	18–36	10	33.09	5.09	24–36	11	35.69	6.68	24–48	13
k	31.20	6.20	24–36	10	33.82	4.85	24–36	11	37.69	7.30	24–48	13
g	31.20	6.20	24–36	10	33.82	4.85	24–36	11	36.77	6.61	24–48	13
Nasals												
m	30.60	7.18	18–36	10	32.73	5.61	24–36	11	33.23	6.66	24–48	13
n	30.60	7.18	18–36	10	32.73	5.61	24–36	11	33.08	7.42	24–48	13
ŋ	30.00	6.41	24–36	8	36.67	12.17	24–66	9	40.30	10.75	24–55	10
Fricatives												
f	31.20	6.20	24–36	10	33.82	4.85	24–36	11	38.31	6.26	24–48	13
v	32.80	5.27	24–36	10	42.73	11.64	30–72	11	50.83	10.77	36–66	12
θ	46.00	7.66	36–60	10	64.20	4.94	60–72	10	77.00	7.44	72–96	10
ð	41.80	4.94	36–48	10	56.73	7.28	48–72	11	69.00	11.33	54–96	12
s	32.40	5.80	24–36	10	38.55	10.00	24–60	11	51.33	16.32	24–84	12
z	33.40	5.97	24–42	10	44.40	17.02	24–84	10	56.82	14.28	30–84	11
ʃ	32.40	5.80	24–36	10	41.27	10.21	24–60	11	55.00	10.50	36–72	12
ʒ	37.00	8.25	28–48	4	54.00	16.54	36–84	6	70.67	12.22	60–84	3
ʍ	32.00	5.66	28–36	2	48.00	16.97	36–60	2	—	—	—	0
h	30.60	7.18	18–36	10	32.73	5.61	24–36	11	35.00	6.95	24–48	13
Approximants, laterals												
ɹ	35.40	7.18	24–48	10	47.64	13.02	24–66	11	66.58	18.62	30–96	12
j	33.00	5.10	24–36	10	39.60	7.59	24–48	10	45.77	10.96	30–60	13
l	33.20	5.01	24–36	10	40.91	7.97	24–48	11	53.75	10.43	24–60	12
w	30.60	7.18	18–36	10	32.73	5.61	24–36	11	35.23	6.76	24–48	13
Affricates												
tʃ	34.20	4.05	24–36	10	41.64	8.71	24–54	11	53.50	10.69	36–72	12
dʒ	34.20	4.05	24–36	10	41.27	8.68	24–54	11	51.00	11.82	36–72	13

Note. — dashes indicate not acquired by the oldest child in the study, not assessed, or no variability.

<sup>a</sup>Each reported criterion relates to the definitions used in each of the 15 studies. Typically, 90% criterion indicates that 90% of the participants produced the consonant correctly.

<sup>b</sup>The number of studies varies because of whether the consonant was included in the study or whether it was not acquired by children in the oldest age group examined in the study.

*Table 2: “Average age of acquisition of consonants across 15 studies of children within the United States” (Crowe & McLeod, 2020, p.2161, Table 2).*

### 2.6. Sound Symbolism

Jakobson’s (1960) analysis of the cross-linguistic trends in parental terms, particularly regarding consonant and social gender overlap, is based on assumptions about sound symbolism, namely that there is a significant association between sounds and what they refer to. Research on sound symbolism since Jakobson (1960), such as Nuckolls (1999), has used Jakobson’s findings as evidence of the existence of innate and cross-linguistic sound symbolism. Nuckolls (1999) describes sound symbolism as the often unconscious yet prevalent non-arbitrary connection of certain sounds to their referents. Examples include the initial consonant cluster *gl-* at the beginning of words that describe shimmering things in English, or the correlation between vowel

shape and the size of the referent. Documented examples of sound symbolism span across many language families and across syntactic categories (Nuckolls, 1999).

Imai & Kita (2014) suggest that sound symbolism is a vital tool in the acquisition of language, particularly in the acquisition of terms of reference in connection to their referents, a hypothesis they call the sound symbolism bootstrapping hypothesis. A famous test in the field of sound symbolism is the *kiki* and *bouba* test which is derived from a type of stimuli introduced by Köhler (1929) and further developed by Werner (1934). The test asks participants to match the words *kiki* and *bouba* to two different shapes and finds that participants almost always make the same pairing of words and shapes. Imai & Kita (2014) present studies from different countries where the *kiki* and *bouba* test was performed on young children resulting in successful evidence of sound symbolism recognition during first language acquisition that aligned with the sound symbolism judgements of adults. Not only were these associations present in children but they were also present in toddlers and infants cross-linguistically (Imai & Kita, 2014). One study showed that sound symbolism helped 14-month-olds learn and retain referential terms better (Miyazaki et al., 2013). The authors also collaborated on a study on the effects of sound symbolism on word-referent pair recognition in 11-month-olds which showed a higher engagement in the language-processing network of the brain for the terms with a sound symbolism correlation (Asano et al., 2015). Imai & Kita's (2014) argument is that sound symbolism plays an important role in language acquisition and that it should be considered a more central part of language. The research that has succeeded Jakobson (1960) indicates that sound symbolism is not an insignificant concept in human language, and that Jakobson's assumptions that sound-symbolic connections might explain cross-linguistic patterns are not unfounded.

## 2.7. Parental Term Acquisition

Brooks-Gunn and Lewis (1979) and Ruke-Dravina (1976) studied the acquisition of parental terms in the vocabulary of young children. Brooks-Gunn and Lewis (1979) developed a systematic study of when parental terms showed up in infant speech and whether one parental term, male or female, consistently developed first. In this study, infants in different age groups were shown a series of slides with pictures of either their parents or strangers. Intelligible words were recorded and subsequently analyzed. They concluded that there was more accuracy in labeling the father than the mother and that the father term was used earlier and more widely. Ruke-Dravina (1976) aimed to develop an overview for how the equivalents for ‘mama’ and ‘papa’ are acquired in Latvian, particularly in comparison to other words and how stable they are in the first few years. This included a study that was carried out through journaled observations and audio recordings of two children, one male and one female, who were siblings. The observations/recordings were taken from the first stages of language development until kindergarten age. The conclusions included that *mama* and *papa* were high frequency words but not necessarily the first or the only frequent words and that the variability between the two children was likely because of circumstances surrounding each of their early development periods. Both pieces of research rely on biological and so-called traditional families and Ruke-Dravina (1976) is limited to a small population size and a singular sample language.

An interesting example that counters the general patterns is the early parental term acquisition of Danish (Wehberg et al., 2007). Wehberg et al. (2007) compare longitudinal data on language acquisition of Danish children to data on American English and Italian. In both American English and Italian, the acquisition of *mama* and *papa* terms (or their equivalent) were consistently among the first words that were acquired. In Danish however, the equivalent words,

*mor* and *far*, which are the simplest parental term forms, are ranked as 11<sup>th</sup> and 13<sup>th</sup> (on average) in the order of words acquired. As the authors mention, factors including lack of reduplication and complexity of pronunciation likely contribute to the comparatively delayed acquisition of these terms. Wheberg et al. (2007) also conjecture that the English and Italian terms align more with the natural babbling of infants, so they are likely to be sooner corrected into parental terms by the parent, whereas babbling in Danish is more likely to be corrected into words such as *mad* (meaning “food” and pronounced [ˈmað]). As presented by the data in that study, there is a correlation in these three languages, that words that conform to infant speech are acquired faster, which explains the trends observed by Jakobson (1960) that the cross-linguistic patterns in parental terms aligned with infant speech capabilities.

## 2.8. Social Impacts of Gendered Parental Terms

Recent work has begun to document the social impact of traditional parental term structures. Many same-sex parents decide to use derivatives of either *mama* or *papa*. Mason Bergen et al. (2006) found that the majority of two-mom families in their study used parallel address terms. The researchers define parallel address terms based on the three categories they observed: “(a) parallel derivative forms of ‘mother’ (e.g., ‘Mommy’ and ‘Mama’); (b) identical derivative forms of ‘mother,’ distinguished by each mother’s first name or initial (e.g., ‘Momma T’ and ‘Momma M’); and (c) a derivative form of ‘mother’ in English for the biological mothers with a derivative form of mother from another culture for the nonbiological mother (e.g., ‘Mommy’ and ‘Ama’)” (Mason Bergen et al., 2006). These ways of creating paired parental terms allow for a pair of two parental terms that are easily recognizable, both to the general public but also as an identity within the family.

In 2011, before the national legalization of gay marriage in the United States, Padavic & Butterfield interviewed co-parents (which they define as a non-biological parent) in lesbian couples in Florida about their engagement with parenthood, both linguistically, culturally, and legally (since the non-biological parents were not legally recognized as parents), and the barriers that they faced. One of the main barriers that they recognized was “that the language used to identify parents relies on the norm of ‘one mother–one father,’ which provides no descriptively accurate label for women who lack a biological or legal tie to the child. Naming is a central—and fraught—component of identity for many lesbian parents,” (Padavic & Butterfield, 2011). They found that the non-biological mothers in the group tended to create their own identity groups within parenthood, instead of ascribing to the traditional mother role. Additionally, the selection of parental terms was often central to the conversation of parental identity in their interviews. Two-thirds of the participants used either *mother* or *father* or some variation of one of them. These parents discussed feeling that one felt more fitting than the other, but many chose to purposely embody a reinvention of these terms or to challenge the assumptions that came along with them. The remaining third of the participants used the term *mather* which came out of a community effort to find a third, more neutral term.

Colonna (2013) interviewed 25 lesbian couples about how they navigated biological/non-biological motherhood and how public perception affected the selection of parental terms. They discuss the importance of social recognition of parental terms in the construction of parental identities, and how the recognition of parental terms comes with social, inter-family, and legal impacts (Colonna, 2013). Recognition of parental terms can be correlated with social and institutional support of parents and parental identities. They insightfully note that “As ‘nontraditional’ family forms become increasingly common, normative expectations of what

families 'are' or 'ought to be' are likely to change. However, such changes will not happen overnight and, when they occur, are likely to do so amidst the daily struggles for self-meaning and public recognition experienced by marginalized families," (Colonna, 2013). This expresses the pivotal role that queer families and parental terms both play in the changing landscapes of what parenthood and family looks like, a role that can have significant impacts on the lives of individuals within the queer community. Participants in this study talked about how non-traditional parental terms were often met with questions about personal information that they did not always feel comfortable divulging, leading them to choose a more traditional term, even if it felt less fitting. Nearly all the participants in the study used derivatives of *mama/mommy*, occasionally using the first name of the parent in conjunction with the *mother* derivative.

Frank et al. (2019) documented what parental names lesbian and gay adoptive couples choose for themselves, the derivations of those names, and the considerations that were made in making those decisions. Forty couples participated in separate interviews with the researchers. While the research is very specific to queer adoptive families, the paper also discusses considerations that are relevant to many other queer family configurations. One of the many challenges discussed by Frank et al. (2019) is that unlike the situation for straight couples, there is no standard set of parental terms for same-sex or queer couples. Many parents also expressed a concern that non-traditional parental terms would result in judgement from outside sources and they did not want their kids to feel ostracized. Parents will also have varying relationships or attachments to certain words. These may be because of the relationship with their own parents or their own relationship with gender and how different parental terms express gender and gendered expectations. The last prominent consideration of the couples being interviewed was trying to maintain equality in the relationship between the parents. Parental terms linguistically represent

the relationship between parent and child and so the choice of words can be very personal and important, putting outsized weight on the decision. The conclusions of the research were that couples most often used derivations of the traditional *mom/mama* or *dad/papa*, but that culturally relevant parental terms, such as slang terms or terms in other languages, and well-known name pairings from other queer couples in their community were also used.

A more recent paper written by Bower-Brown (2022) aims to address the gap in research on how gendered assumptions affect parents who are transgender or non-binary, and how the effects are felt differently by people with different gender identities within that group. The authors continually highlight the way that parent term selection has a complex interaction with gender norms and can be a tool for identity expression. They discuss the frequent balancing that transgender and non-binary parents must do between expressing their own gender identity and protecting themselves and their children from transphobia. The participants spoke about the variety of ways in which gendered assumptions about parenthood and parental terms have been institutionalized, both legally and across communities, which has significant impacts on the ways they can interact with those spaces in ways that does not negatively impact their mental health. One such story was explained by a genderqueer participant: “[Be]coming a parent has really brought me into contact again with like a huge amount of quite painful cisgender policing really, and so I have felt, I’ve sat in a lot of quote unquote ‘mother and baby groups’ and felt like massively othered,” (Bower-Brown, 2022). The conclusion of this paper was that all participants experienced gendered assumptions in different ways but everyone in the sample found a way to reinvent parenthood (similar to in Padavic & Butterfield (2011)), whether creating a new type of parenthood by way of a new parental term or simply by confronting the expectations assigned to *mum* or *dad*.

Frank et al. (2019), Padavic & Butterfield (2011), Colonna (2013), and Bower-Brown (2022) fill in some of the gaps in research on queer parental naming conventions as well as outline potential influences and considerations, such as the impact of parental names on how families and children are accepted by their communities. It also builds a body of work that challenges assumptions made by Jakobson (1960) and others about the inherent link between parental names, gender, biology, and gender roles.

As we have discussed above, *mama* and *papa* or derivatives thereof do not feel fitting for all families. Non-binary or third gender parents in particular may not feel comfortable using pre-existing gendered terms. The goal of the research presented in this paper is to aid parents in finding alternatives to those options to fit their personal needs in a parental term. This paper aims to continue the research on phonological components of parental terms in a way that challenges the heteronormative and cis-normative assumptions of previous work, while adding to the literature that supports queer parents, and all parents, in selecting their parental names.

### **3. Cross-linguistic Parental Term Data**

The data set created by Murdock (1959) no longer exists, at least in a publicly accessible form. However, in 2017 Andrew Nevins with help from Evan DeFrancesco (Nevins, 2017a) created a data set of parental terms through crowd sourcing as a means of recreating some of Murdock's data. In this section I will analyze those terms, which include 92 female parental terms and 99 male parental terms from 54 languages (Nevins, 2017a). Nevins (2017a) provides his own analysis of the data (Nevins, 2017b). However, to better compare the cross-linguistic terms to the results of the participant survey in this paper, I completed a separate analysis with phonological categories which I will outline below.

### 3.1. Methods

This data analysis looks at the frequency of the constraints within the categories of reduplication, first consonant manner of articulation, and vowels in the data set. I sorted the data into categories for each of those types of constraints. The data was then separated into male and female terms as reported by participants in the data collection and then tallied for each constraint. The vowels were sorted from the International Phonetic Alphabet (IPA) into the corresponding 5 English written vowels <a>, <e>, <i>, <o>, and <u> for simplicity of analysis, and to match the constraints of the analysis of the survey results, which will be presented in §4. The reduplication categories were full reduplication, semi-reduplicative, and non-reduplicative. The full reduplication category consists of terms that had exact reduplication of the first syllable to the second syllable, with flexibility for variance in the International Phonetic Alphabet notation, if the corresponding sounds written in English would be the same. For example, the word *mama* can be pronounced both as [ˈmɑmə] and [mɑmɑ], but both pronunciations were considered fully reduplicative for this analysis. Semi-reduplication included the reduplication of the first sound of the first syllable but not the entire syllable, or if the first syllable was repeated but another sound was added. The non-reduplicative terms did not follow either of those patterns. The first consonant manner of articulation categories were stops, nasals, and fricatives, or null for terms that did not begin with any of those three.

### 3.2. Results

All terms				
Level of Reduplication				
full reduplication	semi reduplication	non reduplication		
52	41	98		
Manner of Articulation				
stop	nasal	fricative	liquid or vowel (null)	
75	71	4	41	
Vowel 1				
<a>	<e>	<i>	<o>	<u>
138	10	22	10	11
All Vowels				
<a>	<e>	<i>	<o>	<u>
225	13	57	15	19

*Table 3: Counts of all parental terms Nevins' (2017a) data by level of reduplication, first consonant manner of articulation, first vowel, and all vowels.*

The full results for the constraints in both the female and male parental terms can be seen in Table 3. Within the 92 female parental terms present in the data, 26 were full reduplication, 17 were semi-reduplicative, and 49 were non-reduplicative. 67 of the 92 terms began with a nasal, 5 began with a stop, 0 began with a fricative, and 20 began with vowels so were included in the null category. The first vowels were as follows: 63 counts of <a> vowels, 7 of <e>, 8 of <i>, 5 of <o>, and 9 of <u>. The second vowel were: 41 counts of <a> vowels, 2 of <e>, 18 of <i>, 1 of <o>, 5 of <u>, and 25 terms had no second vowel. These results can be seen in Table 4.

Female				
Level of Reduplication				
full reduplication	semi reduplication	non reduplication		
26	17	49		
Manner				
stop	nasal	fricative	vowel (null)	
5	67	0	20	
Vowel 1				
<a>	<e>	<i>	<o>	<u>
63	7	8	5	9
All Vowels				
<a>	<e>	<i>	<o>	<u>
104	9	26	6	14

*Table 4: Counts of the female parental terms in Nevins' (2017a) data by level of reduplication, first consonant manner of articulation, first vowel, and all vowels.*

The 99 male terms in the data consisted of 26 fully reduplicative terms, 24 semi-reduplicative, and 49 non-reduplicative. In terms of the initial consonant manner of articulation, 70 terms began with stops, 4 with nasals, 4 with fricatives, and 21 the began with none of the three categories. All but two of the null category terms for the male parental terms began with vowels, and the other two began with a trill or lateral approximant. The first vowels included 75 <a> vowels, 3 <e> vowels, 14 <i> vowels, 5 <o> vowels, and 2 <u> vowels. The second vowels were 46 <a>, 1 <e>, 17 <i>, 4 <o>, 3 <u>, and 28 that had no second vowel. The full results can be found in Table 5.

Male				
Level of Reduplication				
full reduplication	semi reduplication	non reduplication		
26	24	49		
Manner				
stop	nasal	fricative	liquid or vowel (null)	
70	4	4	21	
Vowel 1				
<a>	<e>	<i>	<o>	<u>
75	3	14	5	2
All Vowels				
<a>	<e>	<i>	<o>	<u>
121	4	31	9	5

Table 5: Counts of the male parental terms in Nevins' (2017a) data by level of reduplication, first consonant manner of articulation, first vowel, and all vowels.

### 3.3. Conclusions

The manner of articulation of the first vowels in the mother terms was mostly nasals and mostly stops in the father terms, and the number of fricatives was low in both categories. This is in line with the trends found by Murdock (1960). The vowels, both initial and second vowels, had <a> in higher frequency than any other vowels, which is also in line with the previous trends. However, the reduplication trends are not what we were expecting; there are significantly more non-reduplicative terms than reduplicative terms in both categories. Recall that reduplication was not numerically analyzed by Murdock (1959) or Jakobson (1960), so it is maybe less surprising that reduplication is not found in a majority of the terms. Despite this, there is still a decent percentage of terms that are reduplicative or semi reduplicative so this finding might still be significant.

## 4. Methods

To address the gap in understanding how phonology plays a role in newly formed parental terms and parental terms for gender non-conforming parents, I designed an online

survey through Qualtrics. The survey was approved by the Haverford College Institutional Review Board. It was taken by 309 participants between March 10, 2025, and September 26, 2025. Recruitment was done by snowballing method, and the completion process was anonymous and on a volunteer basis. The survey asked for basic demographics info including: 1) gender of the participant (multiple choice with an option for a free response ‘other’), 2) race (multiple choice with an option for a free response ‘other’), 3) age (multiple choice), 4) language experience (two free response questions), 5) gender and number of parents (open response), 6) parental terms that were used by the participant to refer to their own parents (open response), and 7) parental term the participant selected for themselves if they have kids. The survey format can be found in the appendix.

The study consists of linguistic judgments on 29 (potential) nursery form parental terms. The data set of terms consisted of 10 real examples of nursery forms from different languages (5 of female reference, 5 of male reference). The words were as follows:

Mother terms:

- 1) *mama* (English)
- 2) *mor* (Danish)
- 3) *omma* (Korean)
- 4) *mutti* (German)
- 5) *inay* (Tagalog)

Father terms:

- 6) *papa* (English)
- 7) *pita* (Hindi)
- 8) *vati* (German)
- 9) *far* (Danish)
- 10) *appa* (Korean)

The two terms in English, which are also present in Spanish and other languages, were provided primarily as a control variable. All participants had a sufficient knowledge of English that allowed them to understand the survey, which was in English, so they likely recognized *mama* and *papa* as parental terms. However, there is also potentially interesting data arising from

whether these terms are judged as being possible for non-binary people to use. The other eight pieces of data were chosen based on having at least one contrasting test condition from the English terms. All other eight terms I am defining as non-reduplicative, as they do not repeat the first syllable. Most of the terms also have a different initial consonant and a different initial vowel from the English terms. The goal was to have several of the data points be real terms that also filled different testing constraints. With the exception of *pita*, all of the terms above are confirmed as being a nursery or informal form (Beatrice, 2018; Bologna, 2018; Hong, 2023; Isabella, 2018; Kylie, 2021; Lee, n.d.; Tara, 2020).

Manner of Articulation	Reduplication	Vowels
Stops, Fricatives, Nasals, (Vowels)	Full-reduplication, Semi-reduplication, Non-reduplicative	<a>, <i>, <o>, <u>

*Table 6: Testing constraint categories for the parental term including the manner of articulation of the first consonant, the type of syllable reduplication, and the vowels.*

The rest of the test words were constructed based on the following constraints (shown in Table 6): the first being reduplicative vs non-reduplicative, the second being manner of articulation confined to nasals, stops, and fricatives, and the third being <a> and <i> vowels. Obviously, this data set does not include all possible parental terms. Morphology allows for an infinite number of possibilities for word creation; we can't test every possible word. Instead, I took inspiration from the real examples, from parental terms I know, and from the trends presented by Murdock (1959) and Jakobson (1960). However, Murdock's (1959) data set no longer exists, so the tested examples have no known correlation with the original ones in the 1960 paper. Additionally, the syllables are intentionally consonant-vowel (CV) pairs, with reduplicative terms following a CVCV pattern and semi-reduplicative being CVC where the

consonants are the same. This simplifies the analysis and does so in a way that follows the trends of reduplication and lack of consonant clusters that was observed by Jakobson (1960). The resulting constructed terms are: *bab, sis, nana, dad, mimi, tata, mam, vivi, shasha, mim, nin, did, nan, titi, fifi, thi, nini, bibi, zaza*. The terms *dad* and *mam* will be reclassified as parental terms during analysis to account for their existence in varieties of English.

	Articulation	Vowel 1	Vowel 2	Reduplication	Real/Potential
bab	stop	<a>	NA	semi	Potential
sis	fricative	<i>	NA	semi	Potential
nana	nasal	<a>	<a>	full	Potential
dad	stop	<a>	NA	semi	Real
vati	fricative	<a>	<i>	non	Real
mimi	nasal	<i>	<i>	full	Potential
tata	stop	<a>	<a>	full	Potential
mam	nasal	<a>	NA	semi	Real
vivi	fricative	<i>	<i>	full	Potential
omma	vowel	<o>	<a>	non	Real
pita	stop	<i>	<a>	non	Real
papa	stop	<a>	<a>	full	Real
appa	vowel	<a>	<a>	non	Real
shasha	fricative	<a>	<a>	full	Potential
mim	nasal	<i>	NA	semi	Potential
nin	nasal	<i>	NA	semi	Potential
did	stop	<i>	NA	semi	Potential
far	fricative	<a>	NA	non	Real
nan	nasal	<a>	NA	semi	Potential
titi	stop	<i>	<i>	full	Potential
mama	nasal	<a>	<a>	full	Real
mutti	nasal	<u>	<i>	non	Real
fifi	fricative	<i>	<i>	full	Potential
thi	fricative	<i>	NA	non	Potential
nini	nasal	<i>	<i>	full	Potential
mor	nasal	<o>	NA	non	Real
bibi	stop	<i>	<i>	full	Potential
zaza	fricative	<a>	<a>	full	Potential
inay	vowel	<i>	<a>	non	Real

*Table 7: Test words with constraints*

For each potential nursery term, the participant was asked: ‘Can you picture yourself or anyone else using this term to refer to their parent?’ If they responded ‘yes,’ the second question would be displayed: ‘Would you associate this word with a parent who is: (you can select multiple) female, male, non-binary/third gender, other.’ The goal was to determine which of the

constraints had an impact on the yes/no judgment for the word and the judgement of what social gender was possible.

The main bulk of my analysis was done with all participants, included the judgements about whether a word sounded parental using all individual judgements (309 participants x 29 terms = 8961 judgements), and the gender judgements only looking at words that had been judged as parental. The result of this is that the analysis using the parental judgements will tell us what constraints make a word more or less likely to sound parental. Once terms deemed non-parental are excluded, the gender judgments tell us what separates the female terms from the terms that sound like male or non-binary/third gender terms. These gender judgements might contradict some of our expectations for what makes words sound parental in general, because we have taken out all of the judgements that say that a word does *not* sound parental to compare the genders together. Realizing that this may be less useful to parents wanting to select a certain term based on it sounding like a non-binary parental term or a female parental term (etc.), I redid the gender analysis with all the judgements included, including the ones that say a term does not sound parental. The results provide statistics that tell us which constraints are correlated to these genders while still accounting for what makes a word sound parental in general. In the following sections I present the original analysis and note if the inclusion of all judgements for the gender analyses makes a significant difference on which constraints define that category of words. I will also separately present findings when the participant pool is broken into monolingual English speakers and multilingual speakers, as well as when it is broken into participants who said at least one term could be used for a non-binary/third gender person and those who did not.

## 5. Results and Initial Analysis

### 5.1. Participant Demographics

All demographic information was self-reported. Participants were asked what languages they spoke with their parents (referenced here as L1 or first languages), as well as what, if any, other languages they speak (referenced here as L2 or second languages). It is important to note that these abbreviations of L1 and L2 are an oversimplification, as L1 languages are not necessarily synonymous with the languages one speaks with their parents. In the following tallies there were participants who reported multiple L1 languages and multiple L2 languages.

Out of the 309 participants, 296 were first language (L1) speakers of English, 12 were first language speakers of Spanish, 6 were first language speakers of Mandarin, 6 were first language speakers of German, 3 were first language speakers of Hebrew, 3 were first language speakers of French, 2 were first language speakers of Danish, 2 were first language speakers of Hindi, 2 did not respond or gave numerical answers, and there were nine languages that had one participant each who identified as an L1 speaker for that language; those languages are: Dutch, Henan dialect, Vietnamese, Portuguese, Yiddish, Bosnian, Cantonese, Patois Jamaican, and Bengali.

The L2 languages and the number of people who spoke them present in the sample were as follows: Spanish-97, French-58, German-24, American Sign Language-14, Italian-13, English-13, Hebrew-7, Japanese-6, Arabic-5, Yiddish-4, Mandarin-4, Portuguese-4, Russian-3, Latin-3, Korean-2, Norwegian-2, Swedish-2, Ukranian-1, Swahili-1, Malay-1, Patois-1, Chickasaw-1, Indonesian-1, Greek-1, Turkish-1, Hindi-1, Icelandic-1, Ixil-1, Taiwanese-1, Hokkien-1. Sixty-two percent of participants reported knowing two or more languages. These are summarized in Table 17.

I also collected self-reported data on gender, race/ethnicity, and age. 218 (or 71%) of the participants identified as female, 31 (or 10%) as non-binary/other, 53 (or 17%) as male, and 7 (or 2%) did not respond. 246 (of 80%) of the participants reported themselves to be white, 39 (or 13%) as mixed race, 13 (or 4%) as Asian, 5 (or 2%) as Latinx or Hispanic, 1 (or .3%) as Black or African American, and 6 (or 2%) did not report. 45 (or 15%) of the participants were between the ages of 18-20, 47 (or 15%) were 21-25, 22 (or 7%) were 26-30, 12 (or 4%) were 31-35, 14 (or 5%) were 36-40, 60 (or 19%) were 41-50, 73 (or 24%) were 51-60, and 36 (or 12%) were 61 years old or older. For more detailed demographic information, see Figure 16, Table 16, and Figure 18 in the appendix.

#### 5.1.1. Participant Parental Terms

Most participants called their female parent *mom/mama/mommy/mum* or another derivative, and their male parent *dad/daddy/papa* or another derivative. However, there were other parental terms that were reported including: *amma, ima, maman, maremare, omi, miu miu, appa, abba, ba, aba, bashi*, and *tata*, among others. More detailed information can be found in Table 18. Participants were also asked to report the parental terms they had chosen for themselves if they had kids. The results included: *mom/mommy/mama* or derivatives, *daddy/papa/dad* or derivatives, *ima, mapa, ama, appa, ahmee, noma, inki, ba, padre*, and *aba*, among others. More information can be found in Table 19.

## 5.2. General trends

	Parental	Male	Female	Nonbinary	Articulation	Vowel 1	Vowel 2	Reduplication	Real/Potential
<i>bab</i>	45	26.5	20.4	27.8	stop	<a>	NA	semi	Potential
<i>sis</i>	8.4	0.6	6.5	4.2	fricative	<i>	NA	semi	Potential
<i>nana</i>	49.8	1.9	48.9	14.9	nasal	<a>	<a>	full	Potential
<i>dad</i>	100	99.0	3.2	35.9	stop	<a>	NA	semi	Real
<i>vati</i>	49.8	33.3	27.5	24.9	fricative	<a>	<i>	non	Real
<i>mimi</i>	70.2	1.6	69.6	24.3	nasal	<i>	<i>	full	Potential
<i>tata</i>	57	32.7	38.5	27.5	stop	<a>	<a>	full	Potential
<i>mam</i>	82.2	0.3	81.9	23.6	nasal	<a>	NA	semi	Real
<i>vivi</i>	34.3	8.1	29.4	21.7	fricative	<i>	<i>	full	Potential
<i>omma</i>	75.4	3.6	74.1	27.8	vowel	<o>	<a>	non	Real
<i>pita</i>	27.8	19.4	11.3	15.9	stop	<i>	<a>	non	Real
<i>papa</i>	98.1	97.1	2.3	32.0	stop	<a>	<a>	full	Real
<i>appa</i>	80.3	70.9	14.9	36.2	vowel	<a>	<a>	non	Real
<i>shasha</i>	31.1	12.3	23.9	22.3	fricative	<a>	<a>	full	Potential
<i>mim</i>	46.6	4.5	41.1	27.5	nasal	<i>	NA	semi	Potential
<i>nin</i>	23	8.7	14.2	19.4	nasal	<i>	NA	semi	Potential
<i>did</i>	14.6	12.9	1.9	8.7	stop	<i>	NA	semi	Potential
<i>far</i>	14.6	13.3	2.3	6.5	fricative	<a>	NA	non	Real
<i>nan</i>	50.8	3.2	48.9	21.7	nasal	<a>	NA	semi	Potential
<i>titi</i>	43	12.3	37.2	24.6	stop	<i>	<i>	full	Potential
<i>mama</i>	99.4	1.0	99.4	31.4	nasal	<a>	<a>	full	Real
<i>mutti</i>	50.2	7.4	44.7	23.6	nasal	<u>	<i>	non	Real
<i>fifi</i>	30.4	12.9	22.7	20.7	fricative	<i>	<i>	full	Potential
<i>thi</i>	12.9	8.4	6.8	11.0	fricative	<i>	NA	non	Potential
<i>nini</i>	37.2	9.4	33.0	23.6	nasal	<i>	<i>	full	Potential
<i>mor</i>	21.4	6.1	17.2	11.3	nasal	<o>	NA	non	Real
<i>bibi</i>	49.5	35.6	23.0	32.4	stop	<i>	<i>	full	Potential
<i>zaza</i>	45	26.9	27.5	33.0	fricative	<a>	<a>	full	Potential
<i>inay</i>	16.5	9.4	12.3	13.6	vowel	<i>	<a>	non	Real

*Table 8: Percentages of parental, male, female, and nonbinary judgements for each word as well as the constraint categories of each word.*

In Table 8, each potential parental term has a percentage for how much of the sample said ‘Yes’ for the word sounding parental and how often it was judged ‘female,’ ‘male,’ or ‘non-binary/third gender.’ The data was manually combed through for results that were inputted in the ‘other’ textboxes and categorized to reflect either a specific judgement about gender or left as the ‘other’ category if there was no gender associated. The remaining analyses were done in RStudio. In the data, each ‘yes’ and ‘no’ judgement was tabulated for the parental term judgements, and each set of gender judgements was sorted into a ‘yes’ and ‘no’ for each gender

category within each word. There was a brief window during the study where participants were able to skip questions, that was quickly rectified. However, there were nine participants who skipped at least one question for if a word sounded parental. Given the small number of questions that were skipped, a 0 or 'no' was inputted in the space of the blank answer. *Mama* and *papa* do not have 100%, but *dad* does. *Mama* not being 100% is likely a mistake, since the one person who left it blank (said no) said they called their parent *mama*. A similar situation is likely to be the case with *papa*.

The percentage of 'Yes' judgments was taken for each word. The top four terms, in terms of percentage, for being judged parental are either examples from English (*mama*, *papa*, *dad*) or sound like them (*mam*). *Mam* specifically reads as a common American pronunciation of the word *mom* which is why I have included it in the category of real parental terms for the analysis. Numbers five and six on the list were the Korean names (*omma*, *appa*). The terms that were judged parental over 50% of the time began with either a nasal or a stop, besides the Korean parental names. While the English and Korean terms ranked very high, the Danish parental terms ranked low, 24th and 27th out of 29, which I will comment more on later.

The bottom 8 terms of the list aren't reduplicative which aligns with the hypothesis that reduplicative terms are more likely to be judged parental than non-reduplicative terms. The top 6 terms are all terms with initial vowel <a> sounds. The lowest term in the term list was *sis* with 8.4% of judgments being 'yes.' This may be because of its use as a nickname for *sister*, but may in part be due to being non-reduplicative, starting with a fricative, and having an initial <i> vowel. The avoidance of judging some terms as sounding parental because they sound like another term that has its own use is potentially influential on other terms like *nana* which is often used as a grandparental term.

There is no benchmark percentage for how many people need to judge a word as sounding parental for it to be considered a parental term. Thus, in this section I will look at judgements that were statistically significant, while keeping in mind that a potential parental term can be whatever works best for that parent and family. A chi-squared test was used to determine the statistical significance of the parental judgements. The test showed that the individual terms were a significant condition in the ‘yes’/‘no’ parental judgements (X-squared = 2497.67, df = 28, p-value = 0). This means we can assume that different words are considered more or less parental and that those judgements are not random. Based on the Pearson residuals (stdres) from this test, we can say there are 8 terms that have a positive significance (stdres > 2) for sounding parental, in other words the number of judgements make those words significantly parental sounding. Those terms are *appa* (stdres = 11.8), *dad* (stdres = 19.0), *mam* (stdres = 12.6), *mama* (stdres = 18.8), *mimi* (stdres = 8.3), *omma* (stdres = 10.2), *papa* (stdres = 18.4), and *tata* (stdres = 3.6). The terms that had significantly low frequencies of ‘yes’ parental judgements (stdres < -2) were *did* (stdres = -11.6), *far* (stdres = -11.7), *inay* (stdres = -10.9), *mor* (stdres = -9.2), *nin* (stdres = -8.6), *nini* (stdres = -3.5), *pita* (stdres = -6.9), *shasha* (stdres = -5.7), *sis* (stdres = -13.9), *thi* (stdres = -12.2), and *vivi* (stdres = -4.6). This means that those terms had a significant lack of judgements that said that they sounded parental. This data and the terms that were significant in each gender category are presented in §6.3 and in Table 14.

One final note on general findings: there were six different participants who at least once commented that they believed a word sounded more like a grandparental term instead of a parental term. This was a common reaction to the topic of this paper in general, likely because there is a lot more variety within the terms that people use for their grandparents since many people have more than one male or female grandparents. Here are the terms that participants

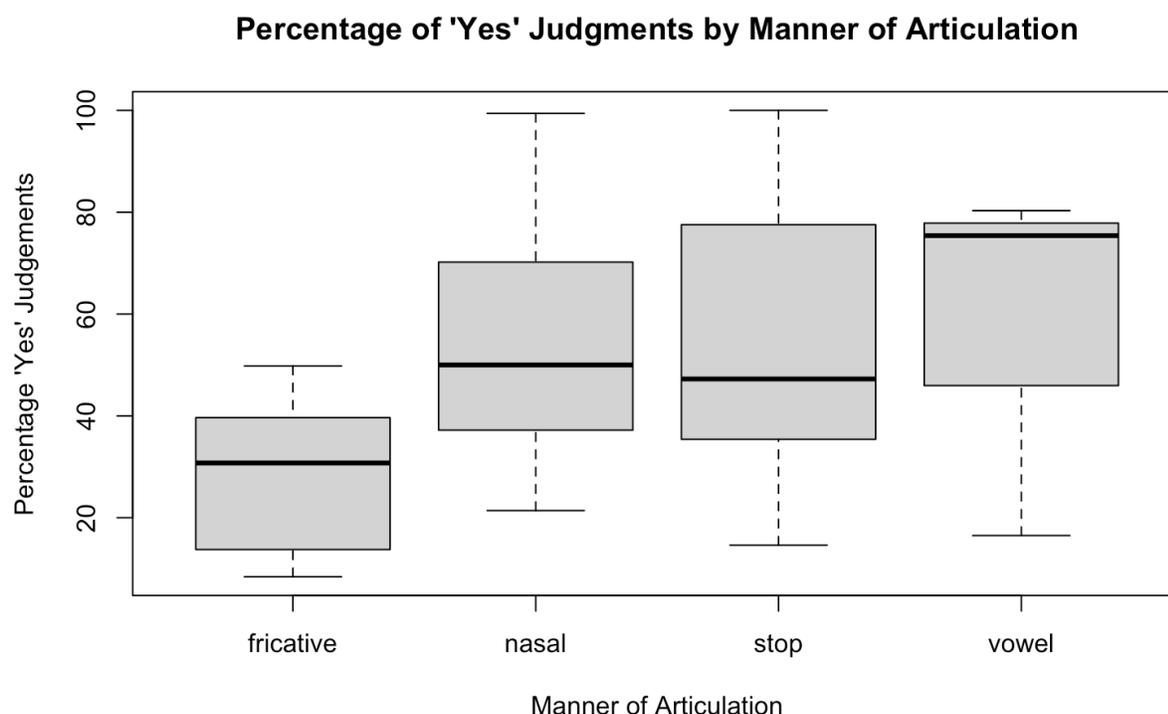
noted as sounding grandparental: *zaza, nana, mimi, tata, mam, appa, titi*, and *mutti*. Some people noted specific genders for the grandparental terms; *vivi, omma, nan*, and *nini* were listed as being usable as grandmother terms, and *papa* as a grandfather term.

### 5.3. Trends in the data relating to articulation

All Participants								
Which judgements included	Conditions	Judgement type	p-value	X <sup>2</sup> value (statistic)	Parameter	Result	Positive significant Pearson residuals	Negative significant Pearson residuals
all	articulation	Parental	1.23E-105	488.87		3 related	stop (8.5), nasal (8.3), vowel (6.7)	fricative (-22.0)
only parental	articulation	male	1.34E-321	1484.52		3 related	stop (31.1), fricative (5.6), vowel (3.0)	nasal (-36)
all	articulation	male	1.72E-278	1285.87		3 related	vowel(6.3), stop(31.9)	fricative (-7.8), nasal(-26.7)
only parental	articulation	female	6.88E-276	1273.87		3 related	nasals (31.5)	stops (-31.1), vowel (-3.2)
all	articulation	female	1.29E-198	917.68		3 related	vowel(2.3), nasal (28.7)	fricative (-15.3), stop(-16.8)
only parental	articulation	non-binary	3.89E-22	102.79		3 related	fricative (9.7)	nasal (-6.1)
all	articulation	non-binary	2.51E-10	47.7		3 related	vowel (2.7), stop (4.5)	fricative(-6.0)

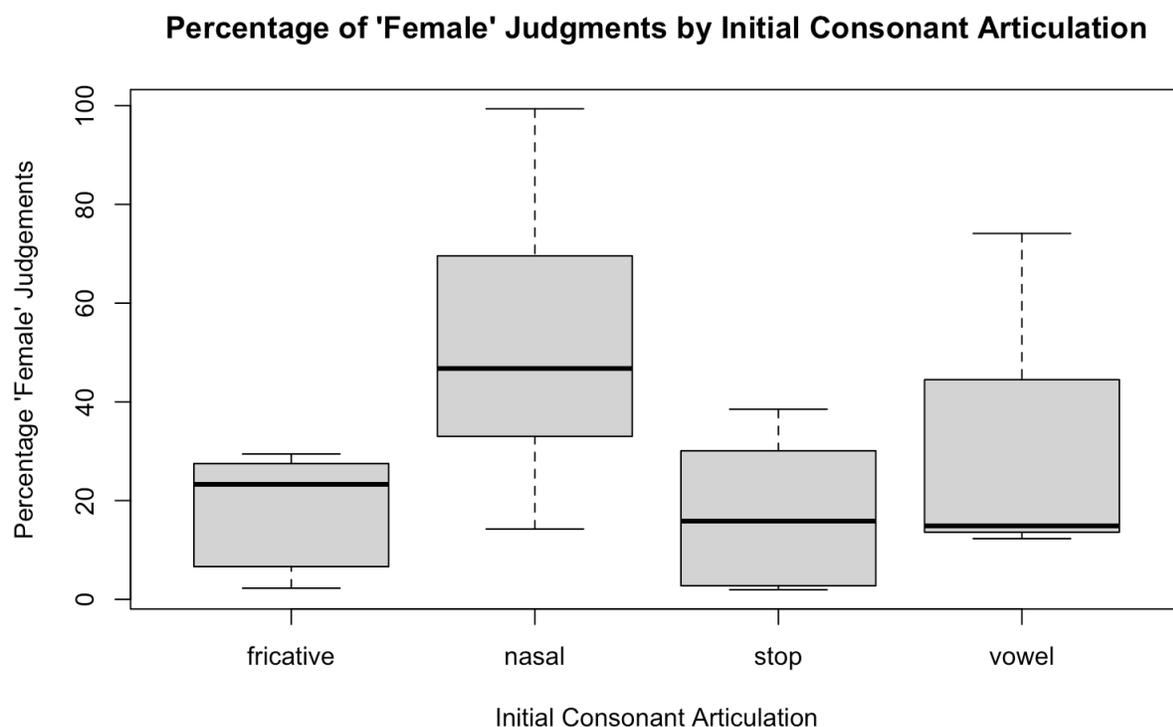
*Table 9: The results of a chi-squared test applied to each type of judgement with regards to the manner of articulation of the first consonant. The threshold used to determine if the constraint and judgement were related was a p-value of less than .05. The “only parental” judgements exclude the judgements that said a word does not sound parental.*

The options in this data for manner of articulation of the first consonant are stops, nasals, and fricatives, with vowels as a category for the terms that did not begin with a consonant. The tests that result in a significant finding for the terms that start with vowels should be treated with caution. The only terms starting with a vowel are 3 of the existing cross-linguistic terms in this data set. This has a potential to significantly skew the results towards parental terms starting with vowels. That being said, the results from the analysis of the cross-linguistic parental term data in §3 show that roughly 21% of the terms began with a vowel, so that might be a significant condition that plays into whether a word sounds parental or not.



*Figure 2: The percent of parental judgements of each word categorized by the manner of articulation of the first consonant of each word.*

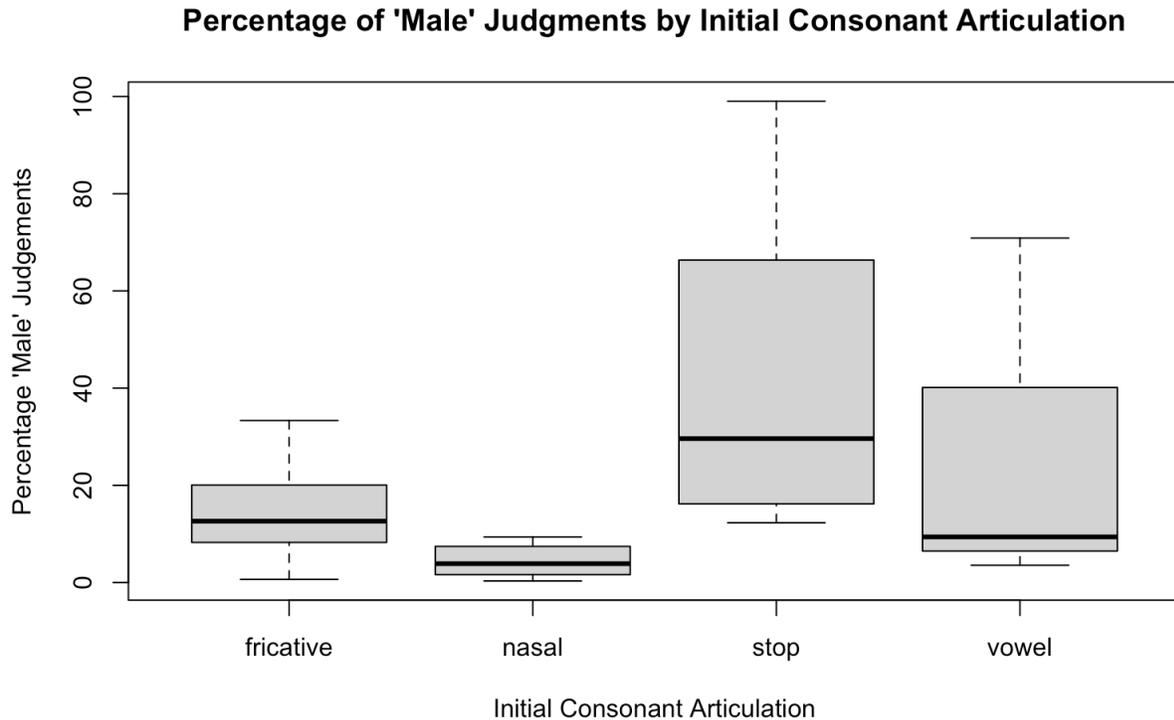
First, I will compare the initial consonant’s manner of articulation and the yes/no parental judgements. The percentage of yes judgements, categorized by manner of articulation can be seen in Figure 2. The nasals and stops are judged as sounding parental significantly more often than fricatives. These results were verified with a chi-squared test of the manner of articulation and the yes/no judgements, which showed that stops (stdres = 8.5), nasals (stdres = 8.3), and vowels (stdres = 6.7) had significant positive Pearson residuals, and that fricatives (stdres = -22.0) had a significant negative Pearson residual (X-squared = 488.87, df = 3, p-value = 1.75e-156). This is consistent with our expectations, from both Murdock’s (1959) analysis, and our analysis of Nevins’ (2017) data, that fricatives are less common in parental terms.



*Figure 3: The percent of female judgements for each word grouped by the manner of articulation of the initial consonant of the word.*

Second is a comparison between the initial consonant manner of articulation and the percentage of time the word was judged as being able to be used for someone who identifies as female. The results are shown in Figure 3. The words that were judged as female were overwhelmingly words that began with nasals, with stops being less often. This follows our expectation that nasals are the type of consonants that are the most often to be found in female parental terms. This was verified with a chi-squared test which showed that these categories had a statistically significant effect on whether the terms were judged as female ( $\chi^2 = 1273.87$ ,  $df = 3$ ,  $p\text{-value} = 6.88e-276$ ), and that the nasals were significantly high in frequency, and that stops were significantly low in frequency. Interestingly the Pearson residual for fricatives was not significant for the test that compared the genders, but it was significant for the test that included all the judgements ( $stdres = -15.3$ ). In other words, fricatives make a word

sound less like a female parental term but within the set of words that do sound parental, a fricative won't make a word more or less likely to be applicable to someone who is female. More of the significant Pearson residuals can be found in Table 9.



*Figure 4: The percent of male judgements for each word grouped by the initial consonant manner of articulation of the test word.*

Third is the comparison between the word being judged as male and the manner of articulation. The results are shown in Figure 4. The stops were overwhelmingly judged the most male, while nasals were judged male very rarely. This follows the expectations from §2.2 and §3 that stops are most often associated with male parental terms. The conditions of manner of articulation were again shown to be statistically significant on the male judgements (X-squared = 1484.52, df = 3, p-value = 1.34e-321). As expected, the Pearson residuals were significantly negative for the nasals (stdres = -36.0). Interestingly, when comparing the genders to each other, the Pearson residuals were significantly positive for stops (stdres = 31.1) and fricatives (stdres =

5.6) (and vowels). However, when all the judgements were considered, fricatives had a negative residual instead of a positive one (stdres = -7.8). The result is that within the set of words that sound parental, a fricative will make a word sound more male than female for instance, but generally a fricative will make a word sound less like a male parental term. Again, more of the Pearson residuals can be found in Table 9.

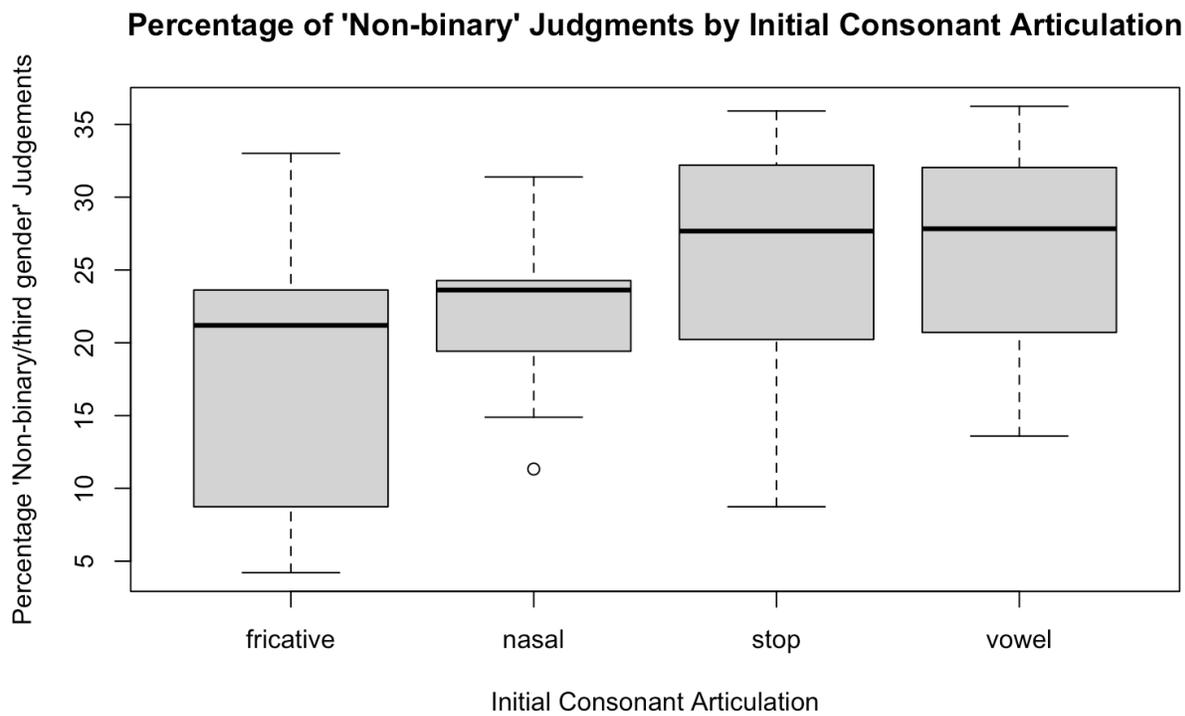


Figure 5: The percent of non-binary judgements for each word grouped by the manner of articulation of the first consonant of the word.

The final comparison for the manner of articulation categories is with words that were judged as possible for parents who identify as nonbinary or a third gender. The percentages for all three categories are relatively low as can be seen in Figure 5, however there are still statistically significant results. This is the comparison that we have no previous expectations for, since both Murdock's (1959) data and Nevins' (2017) data only account for male and female parental terms. A chi-squared test shows that articulation is still a significant factor in whether

words were judged as non-binary/third gender (X-squared = 102.8, df = 3, p-value = 3.98e-22). Against our general expectations that fricatives sound parental less frequently, fricatives are the only category with a positive significant Pearson residual (stdres = 9.79) when comparing non-binary to the other gender categories. Nasals are negatively significant with stdres = -6.1, and the other two categories are non-significant. When all the judgements are considered, the Pearson residuals were positive for vowels (stdres = 2.7) and stops (4.5) but negative for fricatives (stdres = -6.0). The low percentage of non-binary judgements is likely the cause of such a dramatic flip between the two tests. However, it gives us interesting information that non-binary parental terms follow the general pattern that fricatives sound less parental, but that non-binary parental terms are more likely to begin with a fricative than female parental terms.

Our findings for the first consonant manner of articulation are that fricatives generally sound less parental than the other manners of articulation in alignment with our expectations, but that the categories had varying, more intricate influences on the gender judgements.

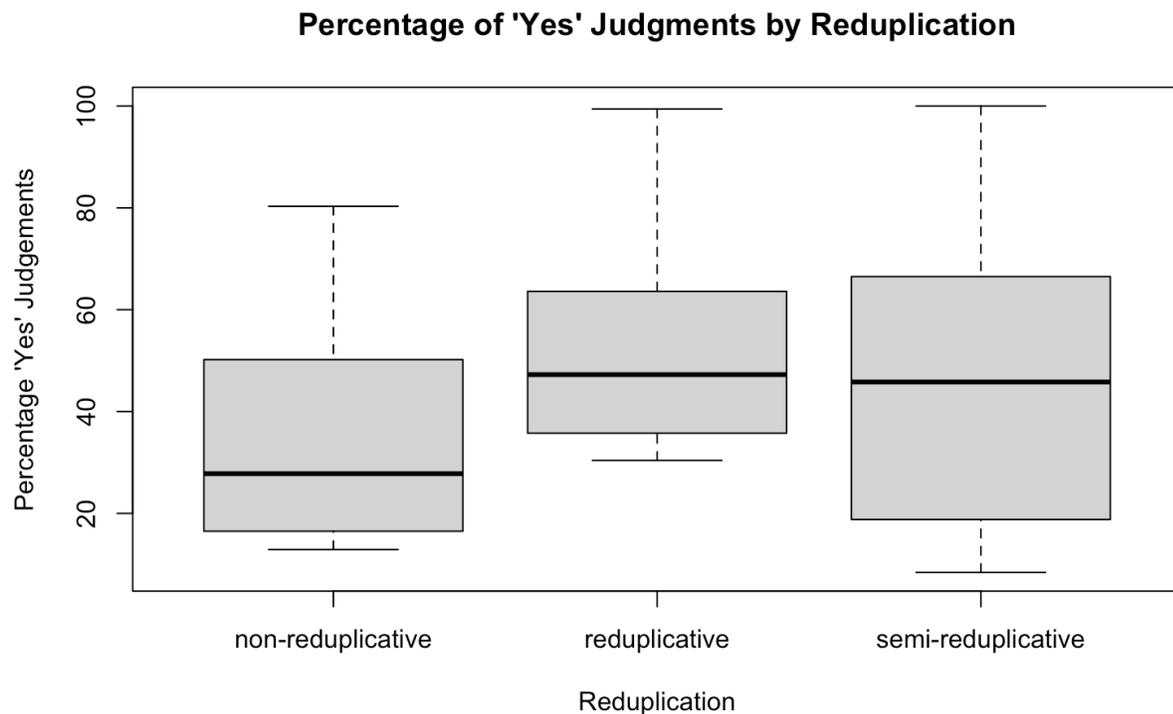
#### 5.4. Reduplication trends

Which judgements included	Conditions	Judgement type	All Participants				Positive significant Pearson residuals	Negative significant Pearson residuals
			p-value	X <sup>2</sup> value (statistic)	Parameter	Result		
all	reduplication	Parental	7.72E-32	143.28		2 related	full (10.6)	non(-10.5)
only parental	reduplication	male	1.33E-07	31.66		2 related	non (5.4)	full (-4.4)
all	reduplication	male	1.38E-01	3.96		2 not-related	NA	NA
only parental	reduplication	female	1.70E-12	54.2		2 related	full(7.3)	non(-3.3), semi(-5.0)
all	reduplication	female	4.70E-38	171.9		2 related	full(12.8)	non(-9.7), semi(-4.1)
only parental	reduplication	non-binary	2.50E-01	2.76		2 not-related	NA	NA
all	reduplication	non-binary	3.98E-10	43.29		2 related	full(6.3)	non(-5.1)

*Table 10: The results of a chi-squared test applied to each type of judgement with regards to the level of reduplication of the word. The threshold used to determine if the constraint and judgement were related was a p-value of less than .05. The “only parental” judgements exclude the judgements that said a word does not sound parental.*

The second area of analysis is the impact that reduplication has on the parental and gender judgements. As previously mentioned, fully reduplicative terms are defined here as terms that consist of one syllable repeated exactly twice to comprise the entirety of the word. The semi-

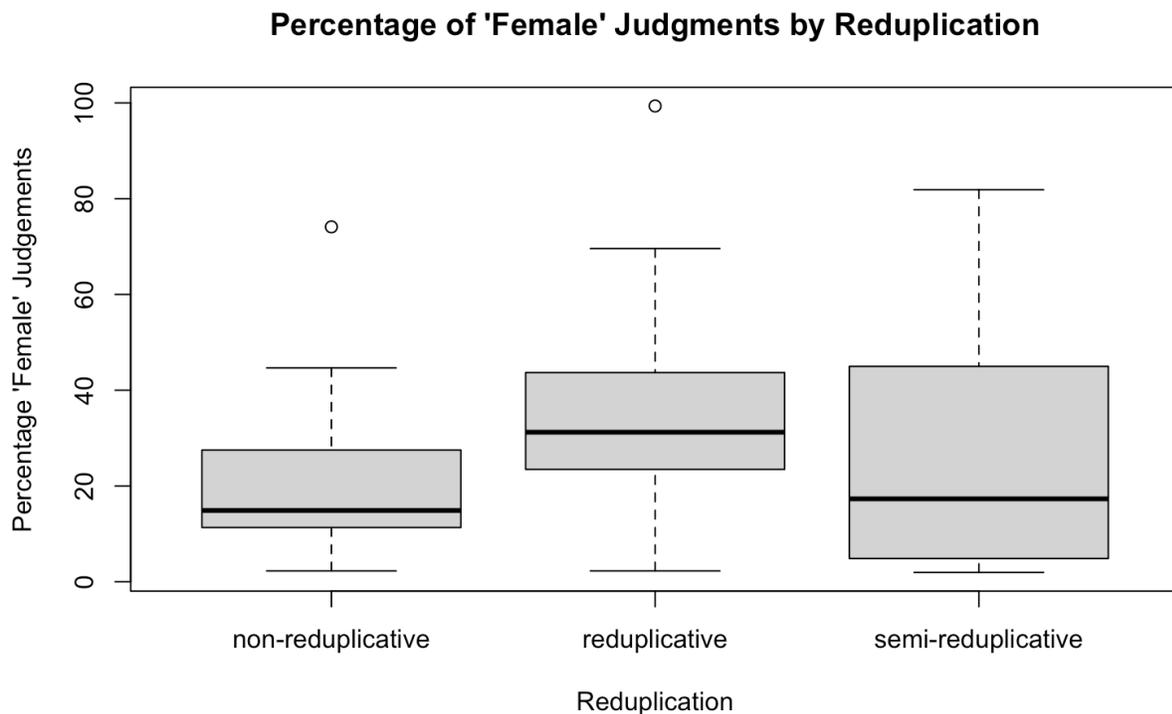
reduplicative terms consist of partial reduplication of the first syllable. The non-reduplicative term category makes up the remaining terms. The observations made by Jakobson (1960), that reduplicative terms were common in Murdock's (1959) cross-linguistic parental terms, leads us to believe that full reduplication should have a positive influence on words being judged as parental. However, as we can see in our data from §3, this does not necessarily mean that reduplicative terms are more common. In this section I will present the ways in which these constraints impact the judgements that were made by the survey participants. All terms were categorized into one of the above categories, as seen in Table 8.



*Figure 6: The percentage of yes judgements for whether a word sounded parental grouped by the level of reduplication of the word.*

The first comparison in the reduplication category is with the yes/no parental judgements. The percent of participants who made 'yes' judgements, categorized by the level of reduplication of the word can be seen in Figure 6. Our expectation was that reduplicative terms would be

judged parental more often than semi- or non-reduplicative terms. The type of reduplication as a condition on whether a word sounds parental is statistically significant according to a chi-squared test ( $X\text{-squared} = 244.85$ ,  $df = 2$ ,  $p\text{-value} = 6.79e\text{-}54$ ). The significant positive Pearson residuals include full (stdres = 10.6) and semi-reduplication (stdres = 5.1). Additionally, there is a negative significant Pearson value for the non-reduplicative category (stdres = -15.6). So, this category follows our expectation that reduplicative terms are more common in parental terms than non-reduplicative, with the extra piece of information that semi-reduplication has a positive impact on whether a word wounds parental.



*Figure 7: The percentage of female judgements for each word categorized by the level of reduplication of the word.*

The reduplication category was also statistically significant when compared to the female judgements with a chi-squared test ( $X\text{-squared} = 55.41$ ,  $df = 2$ ,  $p\text{-value} = 9.27e\text{-}13$ ). The category with a significant positive Pearson residual is full reduplication (stdres = 7.3). The

significantly negative categories include the non-reduplicative (stdres = -3.0) and semi-reduplicative (stdres = - 5.3) categories. Those constraints were in the same negative and positive categories when tested with all the judgements. A visualization for the percentage data can be found in Table 8 and Figure 7. The fact that full reduplication was positively significant and non-reduplication was negatively significant follows our expectations based on the assumption that reduplication is more common in parental terms. However, the semi-reduplicative had a more significant (negative) impact of the judgments of terms sounding like female parental terms which differs from our findings about the general parental judgements.

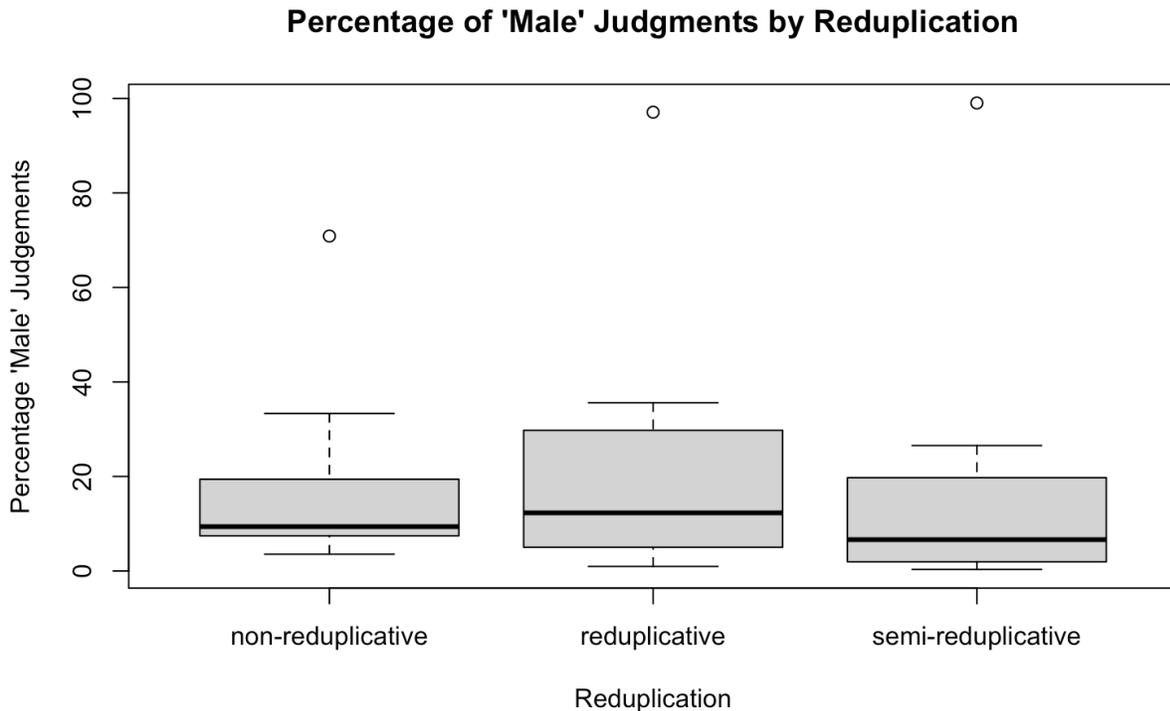


Figure 8: The percent of male judgements for each word grouped by the level of reduplication of the word.

The third point of comparison is between the male judgements and the reduplicative categories. These two categories are statistically significant with a chi-squared test ( $X^2 = 26.97$ ,  $df = 2$ ,  $p\text{-value} = 1.39e-06$ ). However, they go against our expectations based on

Jakobson's (1960) observations in that the Pearson residual is significantly positive for non-reduplication ( $\text{stdres} = 4.8$ ) and negatively significant for full reduplication ( $\text{stdres} = -4.4$ ). That being said, it does follow our data from §3 that full reduplication is less common than non-reduplication. More data can be found in Figure 8. Interestingly, while the comparison between male judgements and the other categories is statistically significant, the reduplication categories do not have a significant correlation when looking at all of the judgements for if the terms are male parental terms ( $X\text{-squared} = 3.96$ ,  $df = 2$ ,  $p\text{-value} = 1.38e-01$ ).

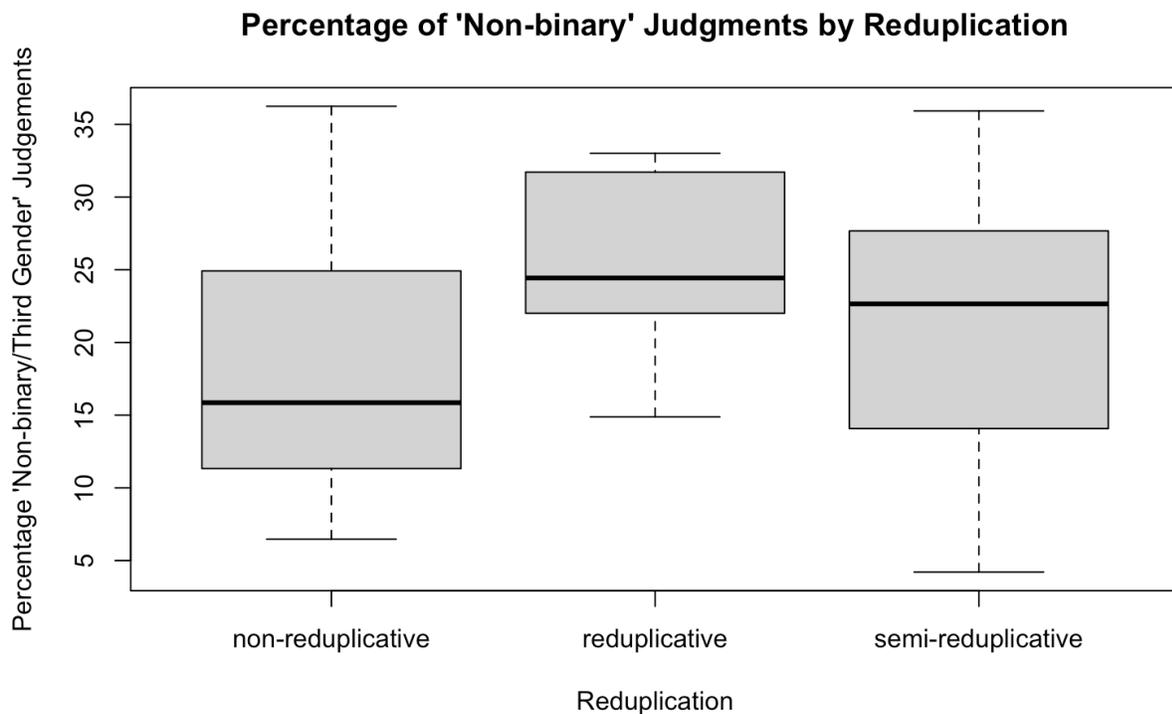


Figure 9: The percent of non-binary/third gender judgements for each word categorized by the level of reduplication of each word.

The final category is again the non-binary or third gender judgements against the reduplication categories. The results are shown in Figure 9. A chi-squared test determines that the type of reduplication did not have a statistically significant impact on whether the terms were judged as non-binary or not ( $X\text{-squared} = 2.76$ ,  $df = 2$ ,  $p\text{-value} = 2.50e-01$ ). This is perhaps

because there were a limited number of times that words were judged as non-binary. When we include all the judgements, however, the results were statistically significant with a chi-squared test ( $X^2 = 43.29$ ,  $df = 2$ ,  $p\text{-value} = 3.98e-10$ ). The results of this test were a positive residual for full reduplication ( $stdres = 6.3$ ) and a negative residual for non-reduplication ( $stdres = -5.1$ ). This means that full reduplication in a term was more likely to be correlated to that word being considered a non-binary parental term, and non-reduplication was more likely to not be a non-binary parental term. For parental terms in general, full reduplication had a positive impact of the word sounding parental and non-reduplication had a negative impact. The one test that went significantly against our expectations was what set male terms apart from the other gender categories. Reduplication as a constraint had fewer categories that were statistically significant than the other types of constraints, so it is perhaps a less important factor in parental terms, although it is still statistically significant.

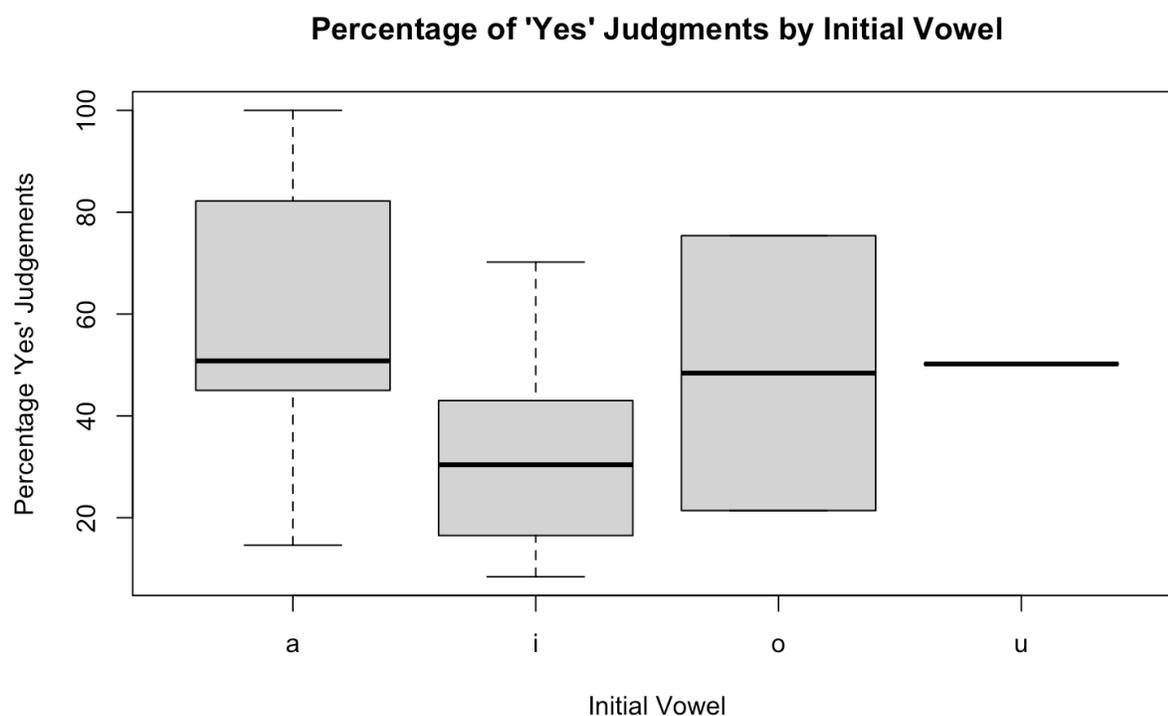
### 5.5. Vowel trends

Which judgements included	Conditions	Judgement type	All Participants				Positive significant Pearson residuals	Negative significant Pearson residuals
			p-value	X <sup>2</sup> value (statistic)	Parameter	Result		
all	vowel 1	Parental	1.75E-156	723.42		3 related	<a>(25.2)	<i>(-26.0)
only parental	vowel 1	male	6.66E-65	300.81		3 related	<a>(14.9)	<i>(-6.4), <o>(-11.9), <u>(-7.1)
all	vowel 1	male	5.02E-149	689.03		3 related	<a>(26.0)	<i>(-18.9), <o>(-9.8), <u>(-5.6)
only parental	vowel 1	female	5.65E-70	324.24		3 related	<o>(11.0), <u>(6.4), <i>(9.1)	<a>(-16.7)
all	vowel 1	female	3.15E-43	200.58		3 related	<a>(6.2), <o>(8.4), <u>(5.4)	<i>(-12.5)
only parental	vowel 1	non-binary	1.05E-25	119.39		3 related	<i>(10.8)	<a>(-8.7), <o>(-2.7)
all	vowel 1	non-binary	1.25E-12	58.46		3 related	<a>(7.4)	<i>(-6.7)
all	all vowels	parental	9.24E-157	724.7		3 related	<a>(26.0)	<i>(-26.2)
only parental	all vowels	male	1.28E-74	345.69		3 related	<a>(16.2)	<i>(-9.7), <o>(-11.7), <u>(-7.0)
all	all vowels	male	1.05E-165	765.94		3 related	<a>(27.2)	<i>(-21.6), <o>(-10.0), <u>(-5.8)
only parental	all vowels	female	1.07E-90	419.91		3 related	<i>(13.8), <o>(10.4), <u>(6.1)	<a>(-19.4)
all	all vowels	female	5.32E-28	130.03		3 related	<a>(5.1), <o>(7.1), <u>(4.6)	<i>(-9.3)
only parental	all vowels	non-binary	2.48E-29	136.21		3 related	<i>(11.6)	<a>(-10.1), <o>(-2.6)
all	all vowels	non-binary	5.87E-10	45.93		3 related	<a>(6.6)	<i>(-5.7), <o>(-2.3)

Table 11: The results of a chi-squared test applied to each type of judgement with regards to the first vowel and subsequently all vowels of the word. The threshold used to determine if the

*constraint and judgement were related was a p-value of less than .05. The “only parental” judgements exclude the judgements that said a word does not sound parental.*

Recall that in §2.2 Jakobson (1960) and Murdock (1959) found that <a> vowels were overrepresented in parental terms. That trend was also true for the real parental terms data (Nevins, 2017a) presented in §3. I analyzed the survey data for the impact of different vowels on the parental and gender judgements made by the participants. For the analysis of vowels in these terms I will present the first vowel in each word and then subsequently all present vowels. The vowels included in this data set are <a>, <i>, <o>, and <u>. The vowel <i> here can be interpreted as [ɪ] and [i] phonologically, and <a> can be read as [ɑ] and [æ] since one was not specified over the other and both are possible in English. There are also other possibilities for the reading of those two vowels, but I believe those are the most likely in this participant pool. Similar variation can occur within all the vowels included in this data set.



*Figure 10: The percentage of parental judgements for each word grouped by the first vowel in the word.*

The first comparison in this set of analyses is the initial vowel and the yes/no judgments. A chi-squared test verified that the first vowel had a significant influence on whether the word was judged to sound parental ( $X^2 = 723.42$ ,  $df = 3$ ,  $p\text{-value} = 1.75e-156$ ). The only significant positive Pearson residual was the <a> ( $stdres = 25.2$ ) vowels, and the only significant negative residual was <i> ( $stdres = -26.0$ ). The full data is available in the Figure 10. As expected, <a> is more common in words that sound parental in this data set than <i> as predicted by Murdock's (1959) data as well as Nevins' (2017) data.

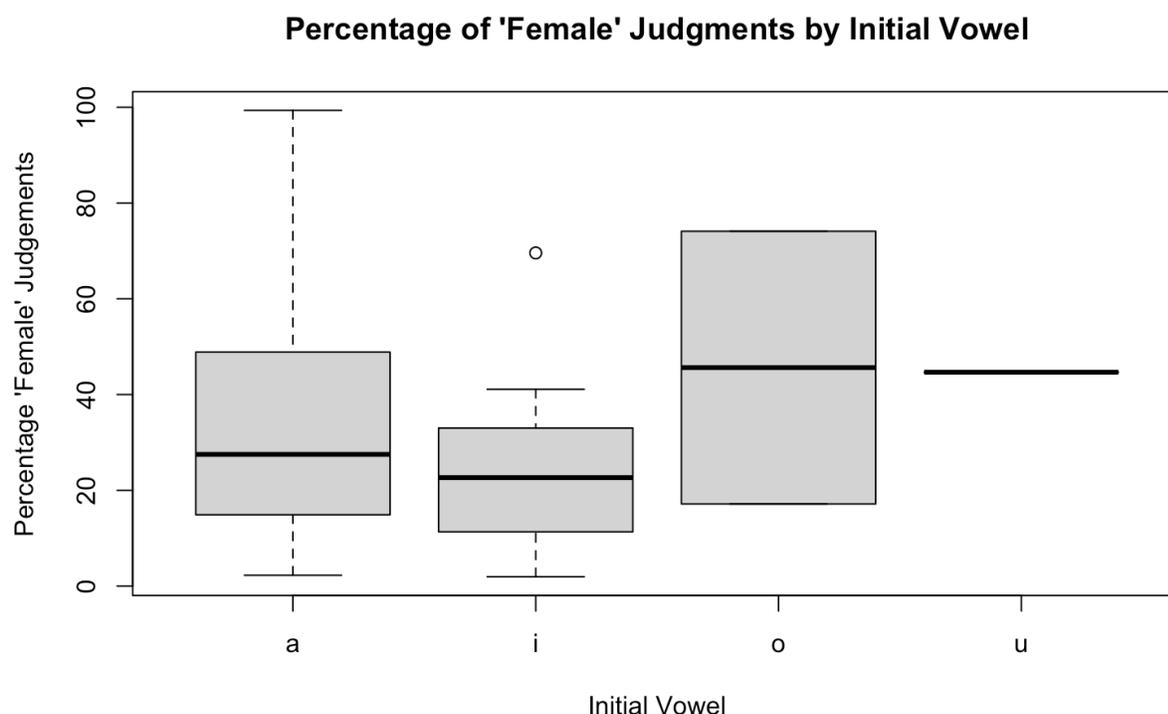


Figure 11: The percentage of female judgements for each word grouped by the initial vowel of the word.

The second area for analysis is female parental term judgements versus the initial vowel. This condition is also statistically significant for female judgements, as found by a chi-squared test ( $X^2 = 324.24$ ,  $df = 3$ ,  $p\text{-value} = 5.65e-70$ ). Interestingly the positive Pearson residuals when compared to the other gender judgements were <o> (stdres = 11.0), <u> (stdres = 6.4), and <i> (stdres = 9.1). Additionally, <a> had a significant negative residual of -16.7. These findings go against our assumptions based on the findings in the previous sections. However, the Pearson residuals when comparing all the judgements were positive for <a> (stdres = 6.2), <o> (stdres = 8.4), and <u> (stdres = 5.4) while the <i> had a negative residual (stdres = -12.5). This means that when we are looking at female judgements in the scope of all the judgements, at what makes a word sound like a female parental term, we find the same constraints as our expectations. There is a box plot of this data available in Figure 11.

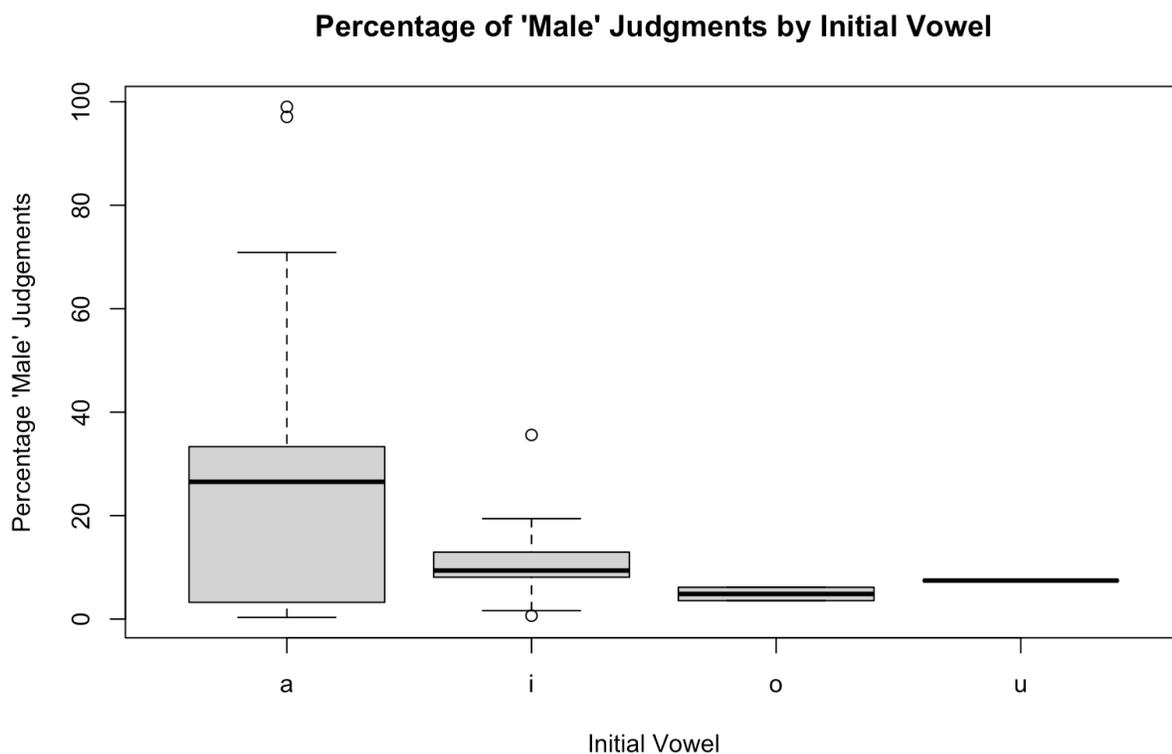


Figure 12: The percentage of male judgements for each word categorized by the first vowel of each word.

The third comparison is male judgements versus the initial vowel. This category was statistically significant with a chi-squared test ( $X^2 = 300.81$ ,  $df = 3$ ,  $p\text{-value} = 6.66e-65$ ). The first vowels had a significant influence on whether the word was judged as male, with <a> having a positive influence ( $stdres = 14.9$ ), and negative Pearson residuals for <i> ( $stdres = -6.4$ ), <o> ( $stdres = -11.9$ ), and <u> ( $stdres = -7.1$ ). These categories were the same when looking at all the judgements. A box plot is available in Figure 12. This category does have the expected pair of <a> being more common than <i>, with the addition that <o> and <u> did not make a word more likely to sound like a male parental term.

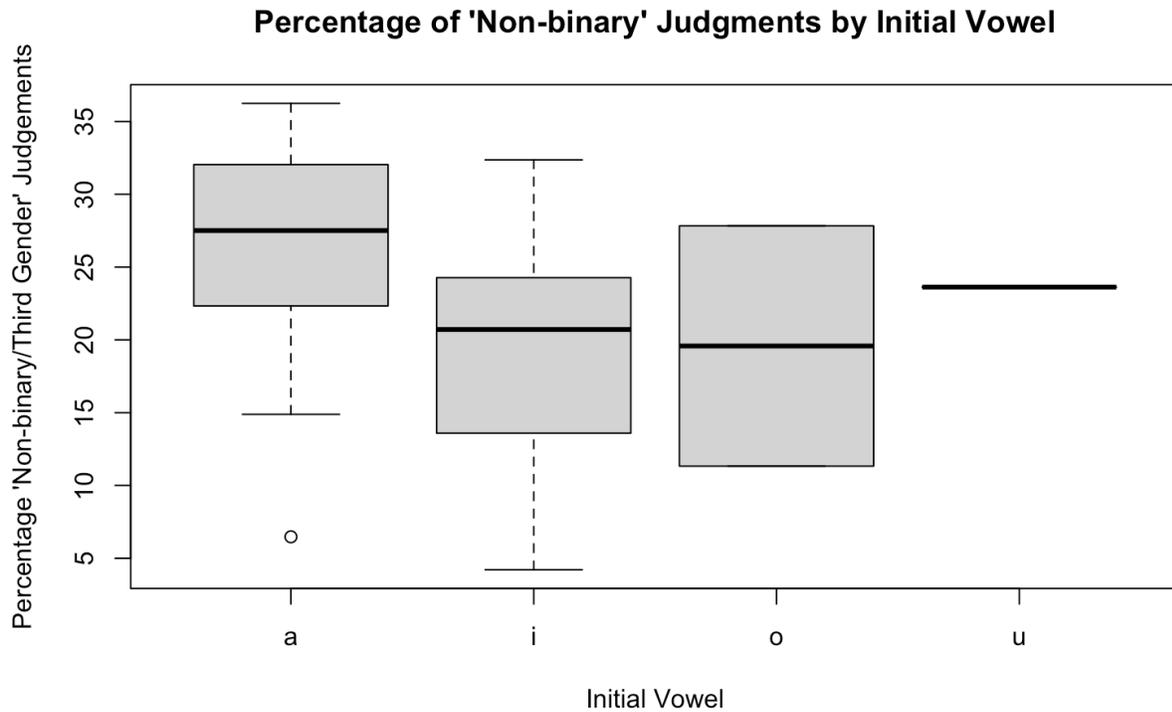


Figure 13: The percentage of non-binary/third gender judgements for each word grouped by the first vowel in each word.

The final initial vowel comparison is with nonbinary or third gender judgements. This category is also statistically significant using a chi-squared test ( $X^2 = 119.39$ ,  $df = 3$ ,  $p\text{-value} = 1.05e-25$ ). The results are shown in Figure 13. Unexpectedly, when comparing non-binary/third gender judgments to the other gender categories, <i> had a positive Pearson residual of 10.8 meaning it had a positive influence on the word being judged as sounding non-binary. Additionally, the vowels with negative Pearson residuals were <o> ( $stdres = -2.7$ ) and <a> ( $stdres = -8.7$ ). Both results go against our general assumptions about parental terms and vowels. However, this is the gender category where we have no real term data so it is entirely reasonable that assumptions from terms in the gender binary might not necessarily hold true here as well. Additionally, when looking at all the judgements, <a> had a positive Pearson residual ( $stdres = 7.4$ ) and <i> had a negative Pearson residual ( $stdres = -6.7$ ). This result aligns more with our

expectation and tells us that generally a term that sounds like a non-binary parental term is more likely to have an <a> vowel than a <i> vowel.

The inclusion of all vowels in all the words largely does not affect how each vowel type affects the judgements on the words. All the categories are still statistically significant as can be seen in Table 11. When including all the judgments, the only residual that changes <o> goes from being not statistically significant for non-binary parental terms to being negatively statistically significant (stdres= -2.3). There are no changes to the residuals when comparing the gender categories to each other.

In summary, the terms that were judged in this survey as sounding parental were more likely to have <a> vowels than <i> vowels as we expected. That being said, there were differences between the gender categories, and the other vowels, <o> and <u>, also varied between the gender categories.

### 5.6. Real parental terms versus potential terms

Which judgements included	Conditions	Judgement type	All Participants				Positive significant Pearson residuals	Negative significant Pearson residuals
			p-value	X <sup>2</sup> value (statistic)	Parameter	Result		
all	real/non-real	Parental	1.30E-89	402.88	1 related	real(20.1)	not real(-20.1)	

Table 12: The results of a chi-squared test applied to each type of judgement with regards to whether the word was a real or potential term. The threshold used to determine if the constraint and judgement were related was a p-value of less than .05.

The condition of real words versus potential terms was the most difficult to sort words into. There are the 10 words that I purposely chose because they are real parental terms, however there are a few that sound like English terms, or are real English terms including *dad* and *mam*. I decided to include both in the “real terms” category because they phonologically match real parental terms in English, so they are very likely to be judged as being parental by English speakers even though neither are nursery form parental terms.

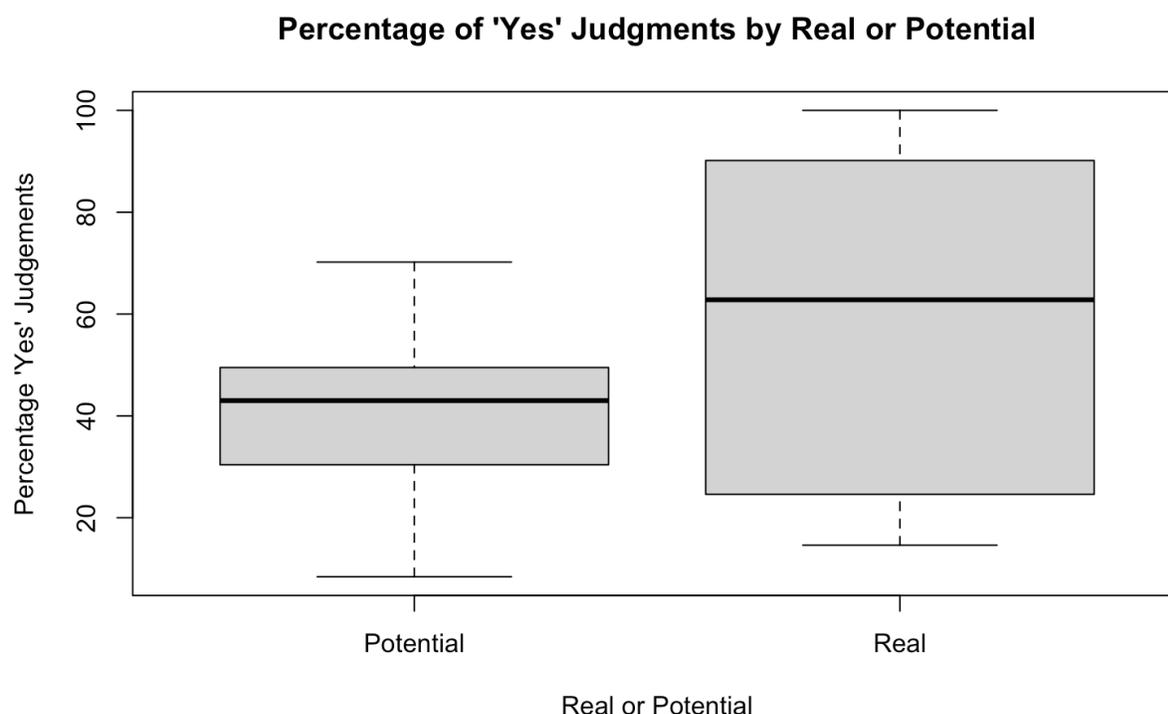


Figure 14: The percentage of parental judgements for each word grouped by whether the word was a real or potential parental term.

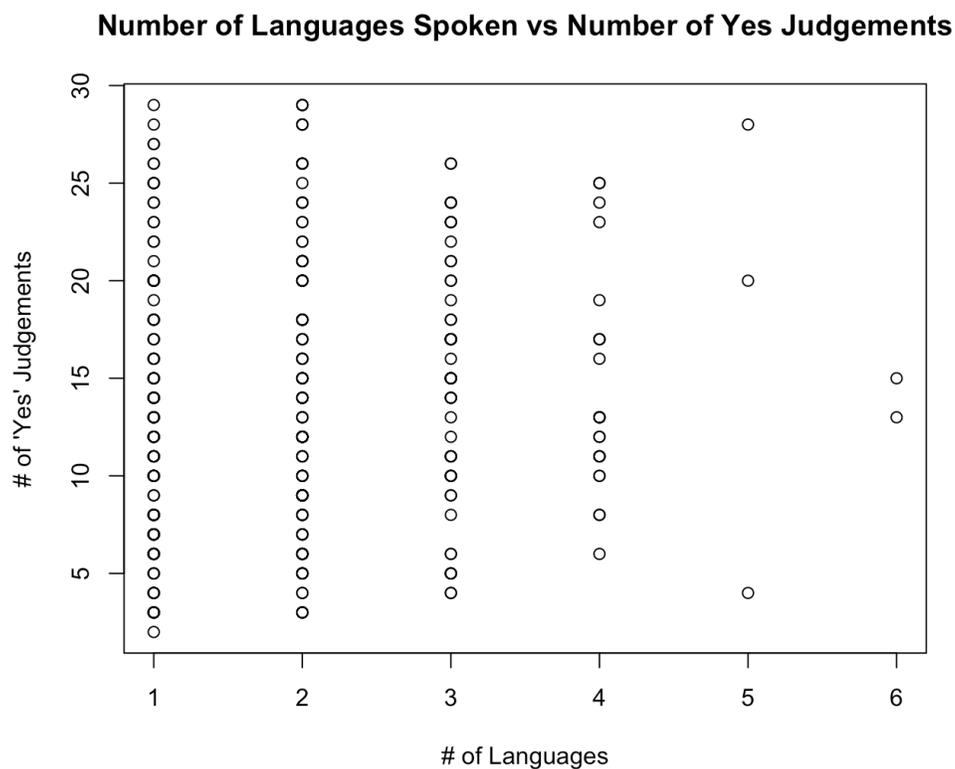
For this analysis I focused only on the parental judgements to see if the participant judgements lined up at all with which terms were existing parental terms. I did not do an analysis of the real and potential terms against the gender judgments since that seemed to be a relatively arbitrary connection. The significant words in each category will be discussed in §6.3. A chi-squared test showed that whether a term was a real or potential term had a statistically significant correlation to whether a term was judged as parental or not ( $X^2 = 402.88$ ,  $df = 1$ ,  $p\text{-value} = 1.30e-89$ ). Additionally, the real terms had a positively significant effect ( $stdres = 20.1$ ) and the potential terms had a negative effect ( $stdres = -20.1$ ). More info can be found in Table 12 and Figure 14.

## 5.7. Other analysis

In this final section, I present a few other isolated points of analysis, so I group them here for convenience. I considered the possibility that the number of languages a participant spoke might affect the number of terms they judged as acceptable, with my hypothesis being that the more languages a participant spoke, the more terms they might be able to imagine being usable as parental terms. The total number of languages spoken were summed for each participant along with the number of the ‘yes’ judgements. However, as we can see in Figure 15, there is no correlation between those two sums in my data. This was further confirmed by an analysis of variance (ANOVA) test which showed that the correlation was not statistically significant (X-squared = .918, df = 5, p-value = .469).

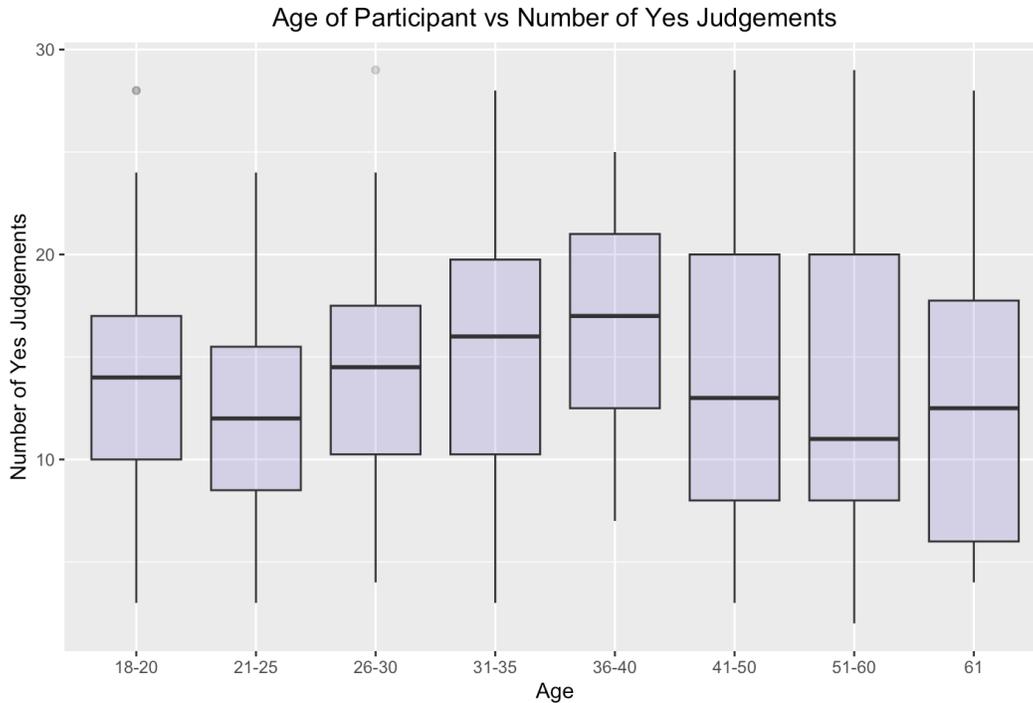
Conditions	Judgement type	p-value	X <sup>2</sup> value (statistic)	Parameter	Result
# of Langs	# of Parental judgements	0.469	0.918	5	not related
age of participant	# of Parental judgements	0.429	1.004	7	not related
age of participant	# of nb judgements	0.0555	2	7	not related
gender of participant	# of Parental judgements	0.82	0.385	4	not related
gender of participant	# of nb judgements	0.324	1.17	4	not related
gender of participant	# of nb judgements	0.0994	2.73	1	not related

*Table 13: Results of the statistics test of demographic information against the number of parental or non-binary/third gender judgements that each participant had.*



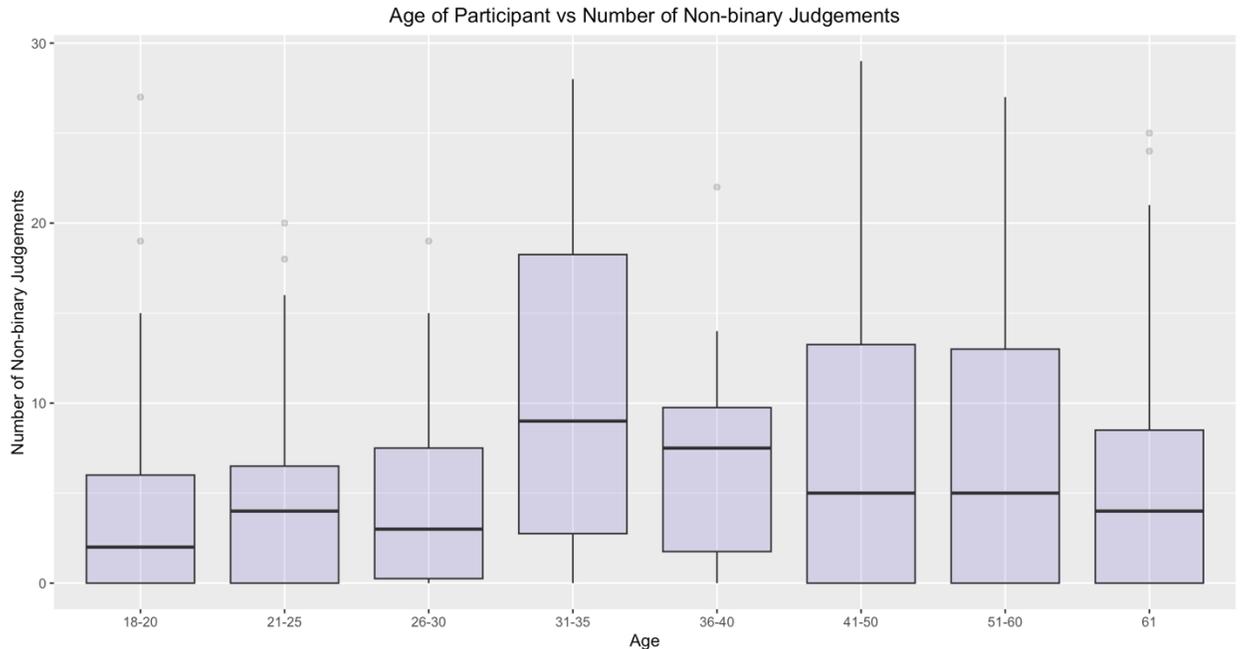
*Figure 15: A scatterplot of the number of languages a participant spoke with the number of yes parental judgements they made.*

I also considered the possibility that the age of the participant might correlate with the percentage of terms they judged as being parental. As we can see in Figure 16, there is no correlation between the number of terms judged as parental and the age of the participant in my data. Again, this was confirmed with an ANOVA test which showed there was no statistical correlation (X-squared = 1.004, df = 7, p-value = .429).



*Figure 16: A box plot of the number of yes judgements each participant made based on their age group.*

I also tested if participant gender affected the number of yes judgements. As a final set of demographic tests I tested if the age or gender of the participant affected the number of non-binary judgements. All the above tests were found to be not statistically significant through an ANOVA test, the results of which can be found in Table 13. The one test that was close to being statistically significant was the age of the participant and the number of non-binary judgements which has a p-value of .056. Based on the standard of a p-value needing to be more than .05, we cannot say for certain that these categories are related, but there is likely some correlation. However, when we look at a graph of this data in Figure 17 we see that this is not a linear correlation meaning that there wasn't a significant difference between the older and younger participants.



*Figure 17: Boxplot of the number of non-binary judgements each participant made by age group.*

I redid the analyses in §5.2 through §5.5 with the participant pool separated into two groups. One group consisted of participants who judged at least one term as being useable for a non-binary/third gender parent, and the second group consisted of participants who had none of those judgements. The no non-binary judgements group had 87 participants, and the group with at least one had 222 participants. The results were p-values and Pearson residuals that looked very similar to the statistical tests done on the total participant pool with a few exceptions in the results that told us which words were significant. More detailed results for these tests can be found in Table 21 and Table 22.

I also completed a similar process with the participants in two groups which were monolingual English speakers and participants who spoke more than one language. The monolingual English speaker group had 113 participants, and the multilingual group had 196 participants. The goal was to see if exposure to more than just English impacted the judgements that speakers made about the acceptability of different words as parental terms. Again, the

significant relations are all the same with a few small differences in the residuals. In the multilingual speaker group, <u> vowels also had a positive significant impact ( $stdres = 2.1$ ) on words sounding parental. Vowels were no longer significant as the first sound of the word for non-binary parental terms, and <o> was no longer significant for all vowels in non-binary parental terms. The monolingual English speaker group also had a few small changes between which constraints were significant. However, it did have one large change which was that all the reduplication categories were significant. If you recall, the complete participant pool tests resulted in one male reduplication test that was non-significant and one non-binary reduplication test that was non-significant. The results of these tests can be found in full in Table 23 and Table 24 in the appendix.

## **6. Discussion and Future Directions**

### **6.1. Threshold for Use**

Jakobson's (1960) states that "Nursery coinages are accepted for a wider circulation in the child-adult verbal intercourse if they meet the infant's linguistic requirements." He used this to describe how the patterns he saw became words that were incorporated into their respective languages. As discussed by Frank et al. (2019) whether a word is recognizable as being a parental term is an important factor in its adoption as a parental term by individual families. So, when does a word count as a parental term? As I mentioned in §5.2, there is no numeric threshold of what percentage of a population needs to accept a term for it to become a usable parental term. In this section I will discuss why the concept of a threshold for parentality is important, what alternatives there are to a numeric threshold, and how I am using the data in this paper to address the threshold.

To get a sense of how other linguists have categorized acceptability judgements, I turned to two papers reporting on acceptability judgement research. The first is a study on acceptability judgements about Philippine English by Filipino-Americans who speak American English by Leah et al. (2025), and the second is acceptability judgements of sentences with varying structural complexity by Danish speakers by Christensen & Nyvad (2024). The first paper used a Likert scale with 1 being not intelligible, 2 being barely intelligible, 3 being intelligible, and 4 being completely intelligible. This scale was given both to the participants as options for their individual acceptability judgements but also used to interpret the total results for each word into some category of acceptability for a final result. The second paper used a 7-point Likert scale without specifically named endpoints and used the result to test different constraints. Both of these papers used scales to account for the fact that acceptability and usage of different words or sentence structures vary throughout the population, that there is no definitive threshold for a word/phrase to be acceptable or not or to be usable. While the survey in this paper did not give participants a scale for their acceptability judgements, a similar 4-point scale to (Leah et al., 2025) can be used to provide a general interpretation of the percentage judgements provided in Table 8. The scale would be as follows: 0-25% being not understandable as a parental term, 26-50% being somewhat understandable as a parental term, 51%-75% being understandable as a parental term, and 76%-100% being very understandable as a parental term. These categories are relatively arbitrary but provide a general sense of how the percentages of judgements might correlate to a general ability to understand the terms.

Perhaps more important than arbitrary categories for term acceptability based on participant judgements is the recognition and usage of new terms in the public domain. Can the inclusion of a term in a dictionary be the threshold for common usage? Dictionaries are regarded

as containing definitions for the most important and most used words, and in the case of large dictionaries, almost all words in a given language. So what is the requirement for a word to be added to a dictionary, and is that a good measure for parental terms? Sheidlower (1995) reviews the considerations made when adding new words to college dictionaries. These include “How much evidence, and of what sort, is there for the term? How useful will inclusion be to the users of the dictionary? On a different level, how much mileage can the marketing department get out of these words? How many of the competing dictionaries already have a particular neologism?” (Sheidlower, 1995). While these considerations make sense for determining new dictionary entries, they are largely subjective and do not provide a quantitative threshold. They are also subject not only to conditions surrounding the words themselves, but to what will be engaging and profitable. Merriam-Webster (*How Does a Word Get Into the Dictionary?* | Merriam-Webster, n.d.) uses a more quantitative process that includes a database of citations of in-context uses for different words to determine the addition of new words. However, they still depend on a conceptual framework to determine what should be included in a dictionary. “We search through other databases that include millions of words in the form of complete articles, books, and speech. We’re looking for three criteria: frequent use, widespread use, and meaningful use...Widespread usually means that the word is used by people across industries or regions, in other words that an average adult is likely to encounter the word and need to know what it means” (Merriam-Webster, n.d.). They also acknowledge that just because a word has not yet made it into a dictionary does not mean that it is not a valid word (Merriam-Webster, n.d.). Because of their dependence on frequent and widespread use, dictionaries have the potential to be used as a threshold to mark the widespread use of different words, but does that mean they can be a threshold for all words? When it comes to English parental terms, many varieties of

parental terms are included in the Merriam-Webster dictionary for example, including *mama*, *mom*, *mother*, *ma*, *momma*, *mommy*, *dad*, *daddy*, *papa*, *pa*, *father*, and *pop*. However, *dada*, which is a common nursery form, is not. A dictionary may give us a sense of what parental terms have been traditionally used, but currently only defines those terms with respect to binary gender and does not give us a sense of what terms are commonly used in queer spaces.

Perhaps a better measure for the entrance of a word into the public sphere is its use in pop culture such as movies, tv shows, picture books, etc. One example of research that has been done to document the representation of queer parental terms in children's picture books is Sunderland & McGlashan (2012). The 25 books in this study used a variety of terms including *mama/mommy/mom/mum* derivatives as well as *mama* \_\_\_\_\_ (name), just their names, and *meema* and *marmee* for the two-mom couples, and *dad/daddy/papa* or their names for the two-dad books. Most of those terms line up with examples we saw from participant couples in other research (Bower-Brown, 2022; Colonna, 2013; Frank et al., 2019; Mason Bergen et al., 2006; Padavic & Butterfield, 2011; Reed, 2018). This piece of research maps one way in which queer parental terms have begun to emerge into popular culture. As queer families and queer stories come more into mainstream pop culture the impacts of this representation may begin to show a concrete effect on the trends in queer parental naming practices.

Novotný & Dvořáček (2025) investigate how slang words, specifically verbs, become incorporated into the English lexicon. The factors they determined as being relevant are “frequency of use, widespread societal adoption, media influence, and grammatical adaptability”. Their research maps a common pathway towards full integration of four new verbs into the English lexicon. The pattern they find starts with the creation of a word on social media in niche communities that moves to more frequent use and is eventually included in journalism and then

recognized by academic and linguistic validation. “The final stage of lexical standardization often involves institutional validation, particularly through dictionaries, style guides, and academic publications,” (Novotný & Dvořáček, 2025). One of the conditions of successful integration that showed up in their data was linguistic necessity. If the larger English-speaking world decides there is significant enough need for new parental terms, it is possible that new parental terms will begin to be incorporated into the standard English lexicon. A second important factor was cultural relevance for the term to spread beyond niche communities. Grandparent terms are already widely regarded as flexible so there is already some amount of flexibility in English kinship terminology. In terms of the steps that were described by Novotný & Dvořáček (2025), possible queer parental terms already exist in small community reddit forums (*Names for Two : R/Queerception*, n.d.), community oriented media outlets (Rudolph, 2024), and documented in academic papers (Bower-Brown, 2022; Colonna, 2013; Frank et al., 2019; Mason Bergen et al., 2006; Padavic & Butterfield, 2011). In my research I was unable to find these terms in national media outlets or in dictionaries. The set of terms that have been included in pop culture and articles includes a large dataset of possible terms. Since the terms are aimed to help parents find a term that works for them individually, it follows that one term has not been selected above the rest. As a result, the propagation of these terms has not been as high since the frequency of each term is smaller than it would be if there was one single term that was being incorporated into the English lexicon. This is not inherently a good or bad thing. Further research might show if a select few terms are being used more regularly and if and how those terms propagate more broadly within the lexicon of parental terms.

In this paper I am focusing my analysis on what words and conditions are statistically significant in the results from this participant pool. These results have limitations, as will be

discussed in §6.4. As such, they should be used as inspiration for parental terms and as information about what components make words sound parental rather than as definitive rules for what makes parental terms acceptable.

## 6.2. Conclusions

### 6.2.1. Patterns in Agreement with Expectations

This study aimed to test current judgements about parental terms in comparison with the expectations set by Murdock (1959), Jakobson (1960), and Nevins' (2017a) data. I will begin by discussing which results agreed with those expectations.

In terms of how articulation affected the parental and gender association judgements, generally fricatives were negatively significant and stops, nasals, and vowels were positively significant for a word sounding parental. This follows the assumptions based on the previous literature. When looking just at the judgements that said a word sounded parental, nasals made the words sound female more than male or non-binary. When looking at all judgements, the words that sounded like male parental terms significantly consisted of vowels and stops but not fricatives or nasals. The female parental terms consisted of vowels and nasals but not fricatives or stops. The non-binary parental terms consisted of vowels and stops but not fricatives.

The general trends for reduplication also aligned with our expectations. Generally, terms with full reduplication were more parental and terms with no reduplication were less parental. Female parental terms, and female terms in comparison to the other gender categories, were more often fully reduplicative and less often non- or semi-reduplicative. The non-binary/third gender parental terms were also more likely to be full reduplication and less likely to be non-reduplicative.

The vowel trends also generally align with our expectations based on cross-linguistic data. For parental judgements, <a> vowels were more common to sound parental and <i> vowels were more likely to not sound parental. For male parental terms, and in comparison with the other genders, <a> sounded more parental and <i> sounded less parental, across the first vowels and all vowels. Female parental terms and non-binary/third gender parental terms are also more likely to have an <a> vowel and less likely to have an <i> vowel, across both first and all vowels.

The cross-linguistic, or “real,” parental terms were judged significantly positive, and the constructed terms were judged significantly less parental. The one main exception to our expectations did agree with some of our expectations based on the phonological factors that make a word sound parental. The two Danish terms, *mor* and *far* were not judged frequently as sounding parental, 21.4% and 14.6% respectively. As discussed earlier, research has been done (Wehberg et al., 2007) that shows that Danish parental terms are acquired much later than parental terms in English and Italian, which correlates to their additional difficulty of articulation, based on the complexity of the vowel structure.

#### 6.2.2. Patterns That Break Expectations

Most of the results of this survey agreed with the expectations set by cross-linguistic trends with a few exceptions which I will now review. I will again begin with the articulation results. We had no specific expectations for the non-binary/third gender terms since there was no data for those terms in our cross-linguistic analysis. However, we did expect them to follow the general trend that fricatives are less likely to be parental. In comparison to the other gender judgements, non-binary terms were more likely to start with a fricative and less likely to start with a nasal. However, the rest of the results for articulation, including non-binary parental terms in general, did follow our expectations.

The main area that deviated from expectations in terms of reduplication was the male terms. In comparison to the other genders, the male terms were more likely to be non-reduplicative and less likely to be fully reduplicative which is against our expectation. Perhaps more peculiar is that male parental terms (when we look at all judgements) had no significant correlation to reduplication tests ( $p\text{-value} > .05$ ). Non-binary in comparison to the other gender categories also had no significant correlation to reduplication categories. The biggest takeaway here is that generally the judgements in the study showed that reduplicative terms sounded more parental than semi- or non-reduplicative terms but that there was a less significant impact than the other constraints.

The final deviations from the expectations that I will discuss are the vowels. When looking at the first vowel and comparing the gender judgements, both female and non-binary terms have <i> as being more common and <a> as being less common. The same is true when doing an analysis for all the vowels. However, those same categories when taking into account all the judgements, including the non-parental judgements, did follow the expected pattern for vowels.

The deviations from our expectations were generally small but indicate the variation between gender judgements and the flexibility of the constraints. None of the conditions are hard-set requirements for a word to sound parental. As discussed in §6.1, there are varying conditions for a word to pick up in popularity and become frequently used. The acceptability judgments presented in this study are the result of participants' exposure to popular parental terms, personal experience of the participants, and a wide range of imaginations.

### 6.3. Words that were significant

Parental terms	Female parental terms	Male parental terms	Non-binary parental terms
<i>appa, dad, mam, mama, mimi, omma, papa, tata</i>	<i>mam, mama, mim, mimi, mutti, nan, nana, omma, tata, titi</i>	<i>appa, bab, bibi, dad, did, far, inay, papa, pita, tata, thi, vati, zaza</i>	<i>bab, bibi, fifi, inay, mim, nin, nini, shasha, thi, titi, vivi, zaza, appa, dad, mama, omma, papa, tata</i>

Table 14: The words that were significant in each category including for parental terms and for each gender category.

Table 14 includes words that had significant positive Pearson residual categories for parental terms, female terms, male terms, and non-binary/third gender terms. The table includes the sum of the gender terms that were judged as significantly positive for that gender in comparison with the other genders and overall, as a parental term for someone who identifies with that gender. In other words, they include all the terms that show up in both types of the gender analyses. This table attempts to condense how different constraints and words were judged in this study. The words listed could be used as parental terms or as inspiration for new terms.

One particularly interesting response that was submitted by a participant was for the term *papa*: “i could imagine this for non-binary/third gender with a small effort of imagination. i know it as a word for father, but it is somehow less ‘masculine’, just a connotation of closeness. I should admit it is hard for me to imagine non-binary parental terms, because of little exposure to these relationships. But people can use all sorts of words, so that part is easy to imagine. I can imagine much variety, as long as the word doesn’t have an already established conflicting meaning (like ‘sis’!)” This participant acknowledges their general lack of familiarity with non-binary parental terms which, since they are not yet a part of the standard lexicon of English parental terms, seems likely to be the case for a lot of participants. It is interesting that this participant views *papa* as being less strictly male than other male parental terms. This highlights

a pattern that showed up across the data, that the “real” parental terms had high percentages of non-binary judgements. This shows a trend of “real” terms being acceptable for usage outside of the gender binary, and that they are susceptible to flexibility with respect to gender norms.

#### 6.4. Limitations

We must recognize that while all languages have parental terms, not all cultures define or view parents in the same way. As explained by Honkola and Jordan (2023), “Even the most ‘fundamental’ kin categories have different definitions in different cultures. For example, in Nayar of southern India, father is not always the biological father of the child, but the man that mother marries (Gough, 1959: 25). Biological mothers are not socially recognized as mothers if they are unwed in Central Sulawesi (Schrauwers, 1999: 315-316)” (Honkola & Jordan, 2023). The American definition of parenthood is by no means universal, so using it as a categorial status does not fully reflect the relationships between parental terms and parenthood in all languages and cultures. This may also have an effect on how many parental terms there are within a language and their significance.

The population in this study is not representative of the demographics in the United States or globally. The study participants are primarily white and primarily female as shown in the demographics section. There was also a majority of participants who were over the age of 41. The population in this study is mainly from the United States with a few participants from other countries. Thus, the perspective demonstrated in this study is primarily that of older white female Americans.

Due to the snowball method of recruitment for this survey, participants are likely to know me or my family. This is significant in that one of my mothers uses the parental term *appa* which is not a very common parental term in the United States and is often used as a male parental term

since it means “father” in Korean. Because of this, participants may be more likely to say that *appa* sounds parental and perhaps judge it female more often because of the exposure to my family using it as a female parental term than they would have if they were recruited randomly.

This study does not look at what terms are currently being used by queer people and families but instead at possible terms viewed through a linguistic analysis. Because of this, the terms may not correlate with those being used in a real context by real people.

This analysis also uses non-binary and third gender as one third category for gender which does not fully represent the broad spectrum of gender identities that those terms are generally used as umbrella terms for. For the purpose of analysis, these terms were made into a third category for gender along with male and female. While this was helpful in being able to compare constraints, it is an oversimplification of those identities, so it must be kept in mind that there will be variation within that category which is likely to affect the terms that feel fitting to different people who use those labels.

The judgments made in this survey, by a primarily white American participant pool, do not necessarily reflect the existence or non-existence of these terms in everyday usage. I discussed in §5.2 that Danish parental terms were judged as sounding parental very infrequently by the participants in this study. Danish is a language with a few million speakers, so these terms are in active use by a significant number of people. As another example, I personally know people who use *titi* as a female parental term, so even though only 43% of the participants thought it sounded parental, it is actively being used by at least one family. This means that the findings of this study, particularly in regards to the individual terms, should not be viewed as the only possible sets of parental terms and non-parental terms. All the terms included in this survey are potential parental terms, regardless of the significance found in the participant judgements.

The more important part of these findings is the trends found around the components of the words to be used as tools for parents to create their own parental terms.

#### 6.5. Impacts for Queer families

As demonstrated by many authors presented in §2.8 (Bower-Brown, 2022; Colonna, 2013; Frank et al., 2019; Mason Bergen et al., 2006; Padavic & Butterfield, 2011), the selection of parental terms in queer families or by queer people is a very personal decision. Already being situated outside of the norms of the parental term lexicon can offer a large amount of freedom and opportunity for individual expression. The findings of this paper are not meant to limit or invalidate that opportunity for creativity and the parental terms that come out of it. As Colonna (2013) discussed, there is value in having options that are commonly used and used by many people. Having recognizable terms can signal the importance of the parental relationship without having to explain that relationship.

The goal of this paper is to provide insight on what might make certain terms recognizable as referring to a parent. This can be seen as a guide for any parent for whom *mama*, *papa*, *dad*, or *mom* don't feel right, to help build new terms or assess potential terms. Creating new parental names can't solve the larger societal issues of gendered assumptions and heteronormative assumptions around parenthood. However, recognizing what phonologically defines the words deemed parental gives us the opportunity to navigate existing assumptions or at least be aware of them.

#### 6.6. Future directions

If I was to run this study again, there are other constraints and types of words that I would like to test for. I would like to include more terms that began with vowels to see if that category does make a significant difference as compared to the other manner of articulation categories. I

would also like to include a category for analysis that included inversion of a syllable like the term *appa* since the sounds reduplicate but it does not follow either of the reduplication strategies as presented in this analysis. That being said, part of the ability to get a large participant pool was the brevity of this survey, thus the addition of more terms would need to balance the addition of potential terms with the accessibility of the survey. I might also include recordings of possible readings or of the reading I am intending to ensure the connection between the written and phonological term components, to have a more exact phonological analysis. I would also be interested in asking about what age groups the participants could see using the words to refer to parents. This would aim to gauge whether participants saw the terms as being more of a nursery form or a formal form and if those distinctions align with the potential (or actual) use of a term.

Further research in the field of parental terms and queer parental term selection could document more of the existing terms used in the queer community and creative terms used outside of the queer community. For instance, a survey of cross-linguistic parental term borrowings or a mass study of queer parental term pairings would both provide useful insight into the possibilities for parental terms and their current usage. More sociologically focused research might investigate what sociological factors impact the acceptability judgements of new parental terms and how that impacts queer parents in different geographic areas.

These areas of further exploration will help us better understand the continual evolution of parental terms and the ways in which parental terms can meet the needs of individual identity expression while being recognizable at parental terms. Parental terms can be used as an important tool for societal recognition of parents and families as gender roles and family structures continue to evolve.

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## Appendix

### 1. Crosslinguistic data (Nevins, 2017a)

Language/Language Group	Voc: Male Parent	Term: Vocative Female Parent
Afrikaans	paps	moeks
	papa	mams
	pa	moekie
		mama
		ma
Arabic	yaba	immi
	aboy	['ma:ma]:
	['bo:bo]	
Basque	aitatjo	[ama]
	/ai'ta/	
Belep	caja	ɲaɲa
Bengali [Bangla]	['baba]	[ma]
	['babi]	
	['bapi]	
Cantonese	lou5 dau6	ma21 ma55
	de1 di4	aa3 ma55
	aa33 pa21	
	pa21 pa55	
Chamacoco	pejɬe	mama
	dija	ote (archaic)
	di:	pati
	papa	
Czech	[ta:to]	[mami]
	[tati]	[ma:mo]
Danish	['fa:]	['moε]
Dutch	[pa]	['mam]
	['papa]	[ma]
	['pɑp]	['mɑma]
English	[papa]	[mʌm],
	[pap]	[mɑm]
	[dæd]	['mʌmi]
	['dædi]	[mami]
		['mɑmə]
Finnish	['faijɑ] recent loanword	['mʉtsi] (recent loanword)
	['isukki]	['æiskæ]
	['iska]	['æippæ]
	['isi]	['æiti]
French	[pa.'pa]	[ma]
	[pa]	[ma.'ma]
German	['fa:ti]	['muti]
	['fa:tε]	['mʉtε]
	['papa]	['mama]
	['papi]	[mami]
Greek (modern)	ba'bas	ma.'ma
Hebrew (Modern)	['a.ba]	['i.ma]
Hmong	[tsi 24]	[nia 21]
Hungarian	['pɒpɒ]	['ɒɲuko]
	['ɒpu]	['ɒɲu]
		mama
Igbo	[mpa]	[mama]
	[nna]	[mma]
	[papa]	[nne]

Irish	[ˈdʲad̪ˠiː]	mam
Italian	[papa] [babːo]	[mamːa]
Japanese	Toochan	kaachan
Khasi	Pa	mei
Khmer [Cambodian]	/ʔəw/ /puk/ /paː/	/maʔ/ /mae/
Korean	[apa]	[əmma]
Latvian	paps	mamma
Lithuanian	tėte	mama
Malay (Terengganu)	[baˈpə]	[mama]
Malayalam	Acchan	Ammai
Mandarin dialects	[pa55pa51] [a55pa51] ba4	[ma55ma51] [ma] level tone
Murui (Witotoan, Northwest Amazonia)	Moo	kei ei
Mussau-Emira	təmɔyi	ktɔɔyi
Occitan	papa	maman
Portuguese	[ˈpai] [paiˈziɲu] [meuˈpai] [pai] [ˈpa.pai] [pɐˈpa]	[ˈmɛ] [mɛɾˈziɲɐ] [miɲɐˈmɛɾ] [mɛɪ] [mɛmɛɪ]
Quechuan languages	Tata	Mama
Raga, North Vanuatu group		mua
Romanian	[ˈtatiː] [tate]	[ˈmamiː] [ˈmamə]
Russian	[ˈpapə]	[ˈmamə]
Sami	/ahtʃiː/	eadni
Serbian	tāta tā:ta	mā:ma
Setswana [Tswana]	rra papa	mama mma
Sicilian	papa'	mamma
Sinhalese	ʈaːtə	amma
Slovak	otʃko tatko	mamka mama
Spanish	[paˈpa] [pa] [ˈpa pi]	[maˈma] [ma] [ˈma mi]
Tagalog	tay itay	inay
Tamil	appaa	ammaa
Thai (Central) [Siamese]	[pʰɔː]	[mɛː]
Tibetan	apʰa 'adʒa	[ama]
Tlingit	ʔiː]	ʔaˈtʰiː'
Turkish	/ˈbaba/ /anne/	/ˈana/ /anne/
Vietnamese	bố	mẹ
Western Juxtlahuaca Mixtec	tata (taˈtaʔ)	naña (naˈnaʔ)

Table 15: Cross-linguistic Data (Nevins, 2017a)

2. Format of the survey

**SWARTHMORE**

What language(s) do you speak with your parents?

What other languages do you know/speak?

How do you address your parents/what do you call them? If you call them by their first names write 'their name' but do not write their actual first name.

	What you call them	Their gender identity (female, male, non-binary, third gender, or other)
Parent 1	<input type="text"/>	<input type="text"/>
Parent 2	<input type="text"/>	<input type="text"/>
Parent 3	<input type="text"/>	<input type="text"/>

If you have other people you consider your parents, include the information about what you call them and their gender identity below.

If you have kids, what do they call you?

How old are you?

18-20

21-25

26-30

31-35

36-40

41-50

51-60

61+

What is your gender identity?

Male

Female

Non-binary / third gender

Prefer not to say

What is your race/ethnicity? (select all that apply)

Black or African American

White

Native American or Alaska Native

Asian

Native Hawaiian or Pacific Islander

Latinx or Hispanic

Other

Prefer not to answer

An example of the questions for each word:

Can you picture yourself or anyone else using this term to refer to their parent?

**bab**

Yes

No

Would you associate this word with a parent who is: (you can select multiple)

**bab**

female

male

non-binary/third gender

other:

### 3. Demographics

#### a. Race

Race	Count
Asian	13
Black/African American	4
Black/African American and Lantinx/Hispanic	2
Black/African American and White	6
Latinx/Hispanic	5
Native American/Alaska Native and Lantinx/Hispanic	2
White	246
Whita and Asian	5
White and Latinx/Hispanic	12
White and Native American/Alaska Native	1
White and Other	5
Other	3
Prefer not to answer	5

Table 16: Race demographics of participants.

b. Age

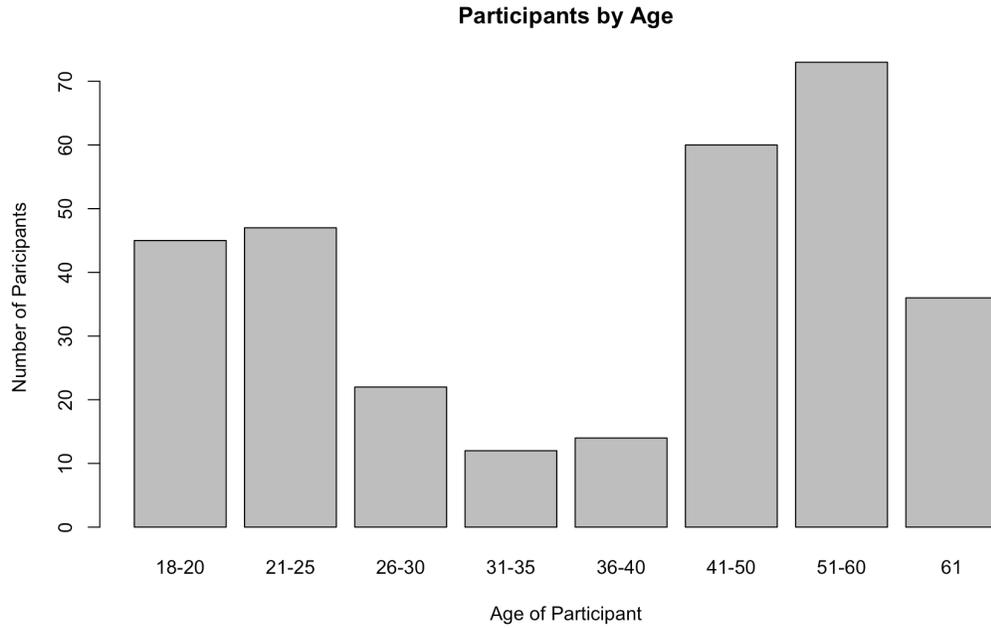


Figure 18: A chart of the number of participants in each age category.

c. Gender

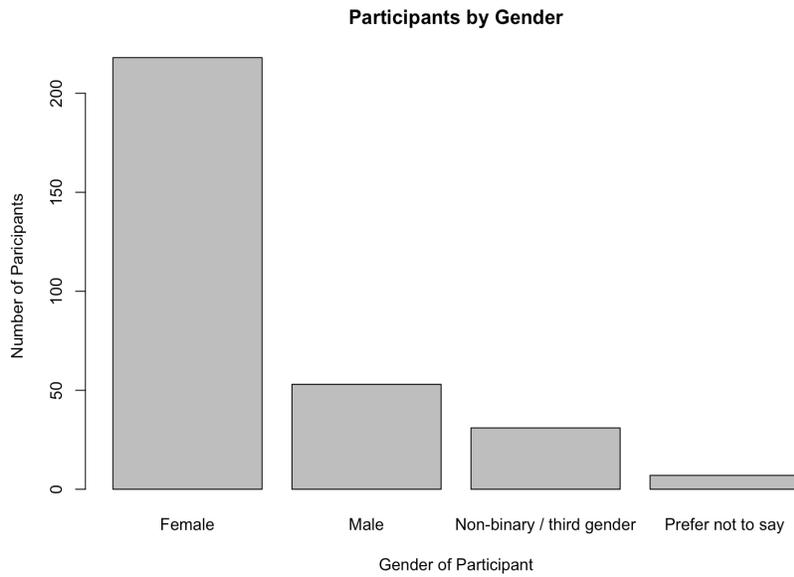


Figure 19: A chart of the number of participants by gender identity

d. Languages spoken

L1 Languages (not paired with English)	# of Participants	L1 Languages (paired with English)	# of Participants
Spanish	3	German	6
Mandarin	2	Danish	1
Dutch	1	Spanish	9
Henan dialect	1	Hebrew	3
French	1	Yiddish	1
Vietnamese	1	Chinese	4
Portuguese	1	Bosnian	1
Danish	1	French	2
		Cantonese	1
		Patois Jamaican	1
		Bengali	1
		Hindi	2
L2 languages	# of Participants		
Spanish	97		
German	24		
Italian	13		
French	58		
Yiddish	4		
Mandarin Chinese	4		
Ukranian	1		
Hebrew	8		
Arabic	5		
Japanese	6		
Korean	2		
Swahili	1		
American Sign Language (ASL)	14		
English	13		
Malay	1		
Russian	3		
Patois	1		
Norwegian	2		
Portuguese	4		
Chickasaw	1		
Indonesian	1		
Swedish	2		
Greek	1		
Latin	3		
Turkish	1		
Hindi	1		
Icelandic	1		
Isil	1		
Taiwanese	1		
Hokkien	1		

*Table 17: Languages spoken by participants categorized by L1 languages, divided by if the participant also had English as an L1, and L2 languages.*

e. What participants call their parents

Parental name	Count	Gender	Parental name	Count	Gender		
Mom	217	F	Abba	2	M	No answer	12
Ma	9	F	Ba	3	M	Can't remember	1
Mama	26	F	Dad	225	M		
mamma	3	F	Daddy	28	M		
Mother	7	F	Pop	3	M		
Momma	6	F	His name	8	M		
Mommy	17	F	Padre	1	M		
Amma	1	F	Pa	2	M		
Her name	10	F	Pap	1	M		
Her name [step]	1	F	Papa	14	M		
Ima	3	F	Papai	1	M		
mamá	3	F	Father	3	M		
Mami	3	F	Aba	2	M		
Maman	2	F	bashi	1	M		
Maremare	1	F	Da	1	M		
Bobbi (mybe their name?)	1	F	Grampy	1	M		
Mother person	1	F	Father person	1	M		
Mum	14	F	Dado	1	M		
Mummy	3	F	Dude	1	M		
Omi	1	F	Snuggle	1	M		
妈妈 (Mama)	1	F	papá	2	M		
Mamasita	1	F	Papa Joe	1	M		
Mẹ	1	F	Papi	2	M		
Miu miu	1	F	Pops	2	M		
Appa	2	F/M	Tata	2	M		
			爸爸 (Baba)	1	M		

Table 18: What participants reported calling their parents.

f. What participants use as their parental terms

Parental term	Gender of Participant	Number of Participants
mum	female	5
mom	female	51
mommy	female	22
momma	female	5
tommy	female	1
mama	female	35
mamá	female	2
ima (Hebrew for mom)	female	3
her name	female	10
mapa	female	1
mother	female	4
mummy	female	1
ama	female	1
appa	female	1
ahmee	female	1
ma	female	3
mama + first initial	female	1
mama + first name	female	1
momma + first name	female	1
dad	female	1
mamá	female	1

Parental term	Gender of Participant	Number of Participants
abba	non-binary/third gender	1
their name	non-binary/third gender	2
noma	non-binary/third gender	1
mum	non-binary/third gender	1
mama	non-binary/third gender	4
mom	non-binary/third gender	2
inki (father in Chikasaw)	non-binary/third gender	1
papa	non-binary/third gender	1
appa	non-binary/third gender	1
ima (Hebrew for mom)	non-binary/third gender	1
mum	Prefer not to say	1
dad	Prefer not to say	1
mama	Prefer not to say	1

Parental term	Gender of Participant	Number of Participants
ba	male	1
daddy	male	4
padre	male	1
papa	male	3
dad	male	11
his name	male	1
pop	male	1
mama	male	1
poppy	male	1
aba	male	1
padre	male	1
dadda	male	1

*Table 19: Parental terms that participants reported choosing to use as their parental name with the participant gender and the number of participants.*

#### 4. Other Statistical Tests

##### a. Significant words using all participants

Which judgements included	Conditions	Judgement type	All Participants				Positive significant Pearson residuals	Negative significant Pearson residuals
			p-value	X <sup>2</sup> value (statistic)	Parameter	Result		
all	words	Parental	0	2497.67	28	related	appa(11.9),dad(19.0), mam(12.6),mama(18.8), mimi(8.3), omma(10.2), papa(18.4), tata(3.6)	did(-11.6), far(-11.7), fifi(-6.0), inay(-10.9), mor(-9.2),nin(-8.6), nini(-3.5), pita(-6.9), shasha(-5.7), sis(-13.9), thi(-12.2), vivi(-4.6)
only parental	words	male	0.00E+00	2310.79	28	related	appa(15.0), bab(4.3), bibi(7.7), dad(20.5), did(6.5), far(6.8), inay(2.3), papa(20.3), pita(5.2), tata(4.2), thi(3.1), vati(6.5), zaza(4.1)	mam(-14.2), mama(-15.5), mim(-8.1), mimi(-12.4), mor(-2.1), mutti(-7.1), nan(-9.4), nana(-9.9), nini(-3.8), omma(-12.2), sis(-3.2), titi(-3.3), vivi(-3.9)
all	words	male	0.00E+00	3673.33	28	related	appa(22.7), bab(3.2), bibi(4.0), dad(34.9), papa(34.1), tata(5.8), vati(6.2), zaza(3.0)	did(-3.1), far(-3.0), fifi(-3.2), inay(-4.7), mam(-8.9), mama(-8.6), mim(-6.9), mimi(-8.2), mor(-6.2), mutti(-5.6), nan(-7.5), nana(-8.0), nin(-5.0), nini(-4.7), omma(-7.5), shasha(-3.2), sis(-8.6), thi(-5.2), titi(-3.4), vivi(-5.3)
only parental	words	female	6.69E-174	911.63	28	related	mam(12.1), mama(19.7), mutti(3.6), nan(2.8), nana(3.64), omma(9.8)	appa(-2.5), bab(-2.5), bibi(-2.5), dad(-4.2), did(-4.5), far(-4.5), fifi(-3.2), inay(-3.4), nin(-3.9), papa(-4.2), pita(-3.7), shasha(-2.5), sis(-3.9), thi(-4.5), vivi(-2.5), zaza(-2.5)
all	words	female	0.00E+00	2577	28	related	mam(19.7), mama(26.6), mim(4.1), mimi(15.1), mutti(5.4), nan(7.3), nana(7.1), omma(16.8), tata(3.1), titi(2.6)	appa(-6.0), bab(-3.7), bibi(-2.8), dad(-10.7), did(-11.1), far(-11.0), fifi(-3.1), inay(-7.1), mor(-5.2), nin(-6.3), papa(-11.1), pita(-7.5), shasha(-2.3), sis(-9.3), thi(-9.2)
only parental	words	non-binary	3.27E-70	413.65	28	related	bab(3.6), bibi(4.6), fifi(4.1), inay(5.2), mim(2.8), nin(6.4), nini(3.5), shasha(4.9), thi(5.0), titi(2.3), vivi(3.3), zaza(6.2)	dad(-4.5), mam(-6.4), mama(-5.9), mimi(-4.0), nana(-4.5), omma(-3.5), papa(-5.6),
all	words	non-binary	3.50E-61	369.12	28	related	appa(6.1), bab(2.5), bibi(4.3), dad(5.6), mama(3.9), mim(2.2), omma(2.2), papa(4.0), tata(2.2), zaza(4.5)	did(-5.8), far(-6.8), inay(-3.7), mor(-4.7), nana(-3.2), pita(-2.8), sis(-7.7), thi(-4.9)

Table 20: The results of a chi-squared test applied to each type of judgement with regards to the individual terms. The threshold used to determine if the constraint and judgement were related was a p-value of less than .05. The “only parental” judgements exclude the judgements that said a word does not sound parental.

##### b. Stats tests with the participants who had non-binary/third gender judgements

Only participants who said at least one term could be for a non-binary/thirdgender parent								
Which judgements included	Conditions	Judgement type	p-value	X <sup>2</sup> value (statistic)	Parameter	Result	Positive significant Pearson residuals	Negative significant Pearson residuals
all	articulation	Parental	3.67E-72	334.34		3 related	vowel (5.5), nasal (7.2), stop (6.8)	fricative(-18.2)
parental	articulation	male	3.50E-234	1081.64		3 related	fricative (5.1), stop (26.1), vowel (2.8)	nasal (-30.8)
all	articulation	male	3.94E-199	920.06		3 related	vowel(5.5), stop(26.7)	fricative(-5.6), nasal(-23.3)
parental	articulation	female	9.68E-195	899.82		3 related	nasal (26.2)	vowel (-3.2), stop (-26.1)
all	articulation	female	1.85E-140	649.52		3 related	nasal(24.3)	fricative(-12.1), nasal(24.3)
parental	articulation	non-binary	7.75E-16	73.46		3 related	fricative (7.7)	nasal(-6.3)
all	articulation	non-binary	1.05E-11	54.14		3 related	vowel(2.9), stop(4.8)	fricative(-6.4)
all	reduplication	Parental	7.09E-30	134.24		2 related	full (10.5)	non (-9.9)
parental	reduplication	male	1.77E-07	31.1		2 related	non (5.5)	full(-3.6)
all	reduplication	male	0.055	5.8		2 not related	NA	NA
parental	reduplication	female	1.22E-10	45.65		2 related	full (6.7)	non(-3.4), semi(-4.3)
all	reduplication	female	5.97E-35	157.61		2 related	full(12.2)	non(-9.22), semi (-3.9)
parental	reduplication	non-binary	3.10E-01	2.32		2 not related	NA	NA
all	reduplication	non-binary	2.30E-11	48.99		2 related	full(6.7)	non(-5.4)
all	vowel 1	Parental	4.79E-100	463.07		3 related	<a> (20.3)	<i> (-20.6)
parental	vowel 1	male	2.44E-45	210.35		3 related	<a>(12.2)	<i> (-5.0), <o>(-10.2), <u>(5.7)
all	vowel 1	male	2.00E-97	450.98		3 related	<a>(20.9)	<i>(-14.7), <o>(-8.7), <u>(-4.6)
parental	vowel 1	female	7.34E-48	222.02		3 related	<i>(7.3), <o> (9.2), <u>(5.2)	<a>(-13.6)
all	vowel 1	female	1.13E-25	119.24		3 related	<a>(4.4), <o>(6.7), <u>(4.4)	<i>(-9.4)
parental	vowel 1	non-binary	1.07E-14	68.14		3 related	<i>(8.1)	<a>(-6.5), <o>(-2.5)
all	vowel 1	non-binary	2.59E-14	66.34		3 related	<a>(7.9)	<i>(-7.2)
all	words	Parental	0	1728.9		28 related	appa (10.5), bibi (2.7), dad (14.2), mam (10.5), mama (14.1), mimi (7.3), omma (8.6), papa (13.8), tata(2.7)	did(-10.9), far (-10.6), fifi (-4.2), inay(-9.9), mor(-8.5), nin(-6.8), pita(-6.2), shasha(-4.3), sis (-13.2), thi(-11.0), vivi(-3.0)
parental	words	male	0	1749.66		28 related	appa(13.2), bab(3.6), bibi(7.5), dad(17.2), did(5.8), far(6.4), inay(2.4), papa(17.1), pita(4.6), tata(3.8), thi(2.8), vati(5.8), zaza(3.9)	mam(-12.5), mama(-13.1), mim(-7.3), mimi(-10.9), mutti(-5.7), nan(-8.3), nana(-8.9), nini(-3.4), omma(-10.8), sis(-2.8), titi(-2.7), vivi(-3.8)
all	words	male	0.00E+00	2493.66		28 related	appa (19.8), bab(3.3), bibi(8.3), dad(27.2), papa(26.8), tata(4.9), vati(5.9), zaza(3.6)	did(-2.7), far(-2.2), inay(-3.8), mam(-8.2), mama(-7.9), mim(-5.9), mimi(-7.4), mor(-5.3), mutti(-4.7), nan(-6.6), nana(-7.4), nin(-3.8), nini(-3.7), omma(-6.9), shasha(-2.4), sis(-7.9), thi(-4.3), titi(-2.4), vivi(-4.5)
parental	words	female	0.00E+00	1748.356		28 related	mam(9.9), mama(10.8), mim(4.9), mimi(9.3), mor(2.1), mutti(5.2), nan(7.4), nana(7.8), nini(5.0), omma(9.2), shasha(2.7), titi(4.6), vivi(4.4)	appa(-14.1), bab(-4.3), bibi(-4.9), dad(-20.6), did(-6.5), far(-6.5), papa(-20.9), pita(-4.0)
all	words	female	0.00E+00	1868.78		28 related	mam(16.3), mama(20.3), mim(4.2), mimi(20.3), mutti(4.4), nan(6.8), nana(6.2), nini(2.1), omma(14.1), tata(3.1), titi(3.2)	appa(-5.5), bab(-2.9), dad(-10.0), did(-10.3), far(-10.2), inay(-6.3), mor(-4.9), nin(-5.2), papa(-10.4), pita(-6.6), sis(-8.6), thi(-8.2)
parental	words	non-binary	1.76e-47	300.73		28 related	bab(3.1), bibi(3.4), fifi(2.8), inay(4.8), mim(2.2), nin(5.0), nini(2.4), shasha(4.1), thi(4.2), vivi(2.2), zaza(5.8)	dad(-2.9), mam(-6.3), mama(-4.6), mimi(-4.1), nana(-4.9), omma(-3.3), papa(-4.3)
all	words	non-binary	5.89E-71	417.3		28 related	appa(6.4), bab(2.6), bibi(4.5), dad(6.0), mama(-4.2), mim(2.3), omma(2.4), papa(4.3), tata(2.4), zaza(4.8)	did(-6.2), far(-7.2), inay(-3.9), mor(-5.0), nana(-3.4), pita(-3.0), sis(-8.2), thi(-5.2)

Table 21: The results of a chi-squared tests in the participant pool where participants had at least one non-binary/third gender judgement. The threshold used to determine if the constraint and judgement were related was a p-value of less than .05. The “only parental” judgements exclude the judgements that said a word does not sound parental. Tests that had different results from the total participant pool are highlighted in pink.

c. Stats tests with participants with no non-binary/third gender judgements

Participants with only male or female judgements								
Which judgements included	Conditions	Judgement type	p-value	X <sup>2</sup> value (statistic)	Parameter	Result	Positive significant Pearson residuals	Negative significant Pearson residuals
all	articulation	Parental	2.30E-39	182.71	3 related		vowel(4.1), nasal (4.5), stop(5.8)	fricatives (-13.4)
only parental	articulation	male	2.63E-90	418.12	3 related		fricative(2.3), stop(17.5)	nasal(-19.1)
all	articulation	male	1.17E-88	410.51	3 related		vowel(3.4), stop(18.6)	fricative(-6.5), nasal(-13.5)
only parental	articulation	female	1.27E-84	391.88	3 related		nasal (18.3)	stop (-17.1)
all	articulation	female	1.74E-68	317.36	3 related		vowel(2.3), nasal(16.5)	fricative(-10.4), stop(-8.8)
all	reduplication	Parental	4.15E-05	20.18	2 related		full(3.5)	non(-4.2)
only parental	reduplication	male	2.10E-02	7.73	2 related		semi(2.3)	full(-2.6)
all	reduplication	male	6.90E-02	5.34	2 not related		NA	NA
only parental	reduplication	female	1.01E-02	9.2	2 related		full(2.8)	semi(-2.5)
all	reduplication	female	1.91E-05	21.73	2 related		full(4.5)	non(-3.5)
all	vowel 1	Parental	1.12E-67	313.6	3 related		<a>(16.2)	<i>(-17.3)
only parental	vowel 1	male	1.93E-22	104.21	3 related		<a>(9.8)	<i>(-5.1), <o>(-6.2), <u>(-4.4)
all	vowel 1	male	6.46E-61	282.38	3 related		<a>(16.8)	<i>(-13.2), <o>(-4.6), <u>(-3.3)
only parental	vowel 1	female	7.47E-22	101.48	3 related		<i>(5.2), <o>(6.2), <u>(3.9)	<a>(-9.7)
all	vowel 1	female	6.77E-23	106.33	3 related		<a>(5.2), <o>(5.6), <u>(3.6)	<i>(-9.4)
all	words	Parental	3.78E-195	1012.19	28 related		appa(6.2), dad(14.2), mam(7.6), mama(14.0), mimi(4.3), omma(5.9), papa(13.5), tata(2.6)	bab(-2.1), bibi(-3.0), did(-4.9), far(-5.4), fifi(-4.9), inay(-5.2), mor(-4.0), nin(-5.8), nini(-4.0), pita(-3.3), shasha(-4.2), sis(-5.6), thi(-5.8), titi(-2.8), vivi(-4.2), zaza(-2.3)
only parental	words	male	3.23E-104	578.95	28 related		appa(7.2), bab(2.6), dad(11.4), did(2.9), far(2.4), papa(11.2), pita(2.6), vati(2.9)	mam(-6.8), mama(-8.3), mim(-3.7), mimi(-5.9), mor(-2.1), mutti(-4.4), nan(-4.4), nana(-4.4), nini(-2.1), omma(-5.8), titi(-2.3)
all	words	male	0.00E+00	2492.66	28 related		appa(19.8), bab(3.3), bibi(8.3), dad(27.2), papa(26.8), tata(4.9), vati(5.9), zaza(3.6)	did(-2.7), far(-2.2), inay(-3.8), mam(-8.2), mama(-7.9), mim(-5.9), mimi(-7.4), mor(-5.3), mutti(-4.6), nan(-6.6), nana(-7.4), nin(-3.8), nini(-3.7), omma(-6.9), shasha(-2.4), sis(-7.9), thi(-4.3), titi(-2.4), vivi(-4.5)
only parental	words	female	1.02E-102	571.72	28 related		mam(6.6), mama(8.1), mim(3.6), mimi(5.7), mutti(3.9), nan(4.3), nana(4.2), omma(5.8), titi(2.7)	appa(-7.1), dad(-11.8), did(-3.0), far(-2.4), papa(-11.6), pita(-2.7), vati(-2.2)
all	words	female	6.69E-174	911.63	28 related		mam(12.1), mama(19.7), mimi(8.1), mutti(3.6), nan(2.8), nana(3.6), omma(9.8)	appa(-2.5), bab(-2.5), bibi(-2.5), dad(-4.2), did(-4.5), far(-4.5), fifi(-3.1), inay(-3.4), nin(-3.9), papa(-4.2), pita(-3.7), shasha(-2.5), sis(-3.9), thi(-4.5), vivi(-2.5), zaza(-2.5)

Table 22: The results of a chi-squared tests in the participant pool where participants had no non-binary/third gender judgements. The threshold used to determine if the constraint and judgement were related was a p-value of less than .05. The “only parental” judgements exclude the judgements that said a word does not sound parental. Tests that had different results from the total participant pool are highlighted in pink.

d. Stats test with monolingual English speakers

Only monolingual English speakers								
Which judgements included	Conditions	Judgement type	p-value	X <sup>2</sup> value	Parameter	Result	Positive significant Pearson residuals	Negative significant Pearson residuals
all	articulation	Parental	3.32E-40	186.59		3 related	vowel(3.3), nasal(5.5), stop(5.5)	fricative(-13.6)
only parental	articulation	male	6.24E-115	531.76		3 related	stop(19.6)	nasal(-21.0)
all	articulation	male	1.15E-105	489.01		3 related	vowel(2.8), stop(20.4)	fricative(-5.9), nasal(-15.4)
only parental	articulation	female	3.09E-98	454.72		3 related	nasal(18.3)	vowel(-2.1), stop(-19.1)
all	articulation	female	5.05E-66	305.98		3 related	nasal(16.7)	fricative(-9.1), stop(-9.3)
only parental	articulation	non-binary	2.76E-10	47.47		3 related	fricative(6.1)	nasal(-5.1)
all	articulation	non-binary	3.42E-05	23.35		3 related	vowel(2.2), stop(3.4)	fricative(-3.7)
all	reduplication	Parental	3.83E-21	94.02		2 related	full(8.1)	non(-9.0)
only parental	reduplication	male	3.84E-03	11.12		2 related	non(2.7)	full(-3.1)
all	reduplication	male	2.56E-02	7.33		2 related	NA	non(-2.7)
only parental	reduplication	female	6.77E-07	28.41		2 related	full(5.0)	semi(-4.4)
all	reduplication	female	2.13E-21	95.2		2 related	full(9.4)	non(-7.4), semi(-2.7)
only parental	reduplication	non-binary	8.66E-03	9.5		2 related	non(3.1)	NA
all	reduplication	non-binary	1.97E-03	12.46		2 related	full(3.3)	non(-2.8)
all	vowel 1	Parental	1.88E-54	252.51		3 related	<a>(15.5)	<i>(-14.6)
only parental	vowel 1	male	8.22E-21	96.63		3 related	<a>(8.6)	<i>(-4.1), <o>(-6.4), <u>(-4.2)
all	vowel 1	male	2.49E-52	242.69		3 related	<a>(15.4)	<i>(-11.0), <o>(-5.7), <u>(-3.9)
only parental	vowel 1	female	4.96E-29	134.81		3 related	<i>(7.4), <o>(6.0), <u>(3.6)	<a>(-11.2)
all	vowel 1	female	1.96E-09	43.47		3 related	<a>(4.1), <o>(3.3)	<i>(-6.3)
only parental	vowel 1	non-binary	1.20E-07	35.03		3 related	<i>(5.4)	<a>(-5.1)
all	vowel 1	non-binary	1.62E-05	24.9		3 related	<a>(4.7)	<i>(-4.3)
all	all vowels	parental	6.33E-55	254.69		3 related	<a>(15.8)	<i>(-14.9)
only parental	all vowels	male	9.43E-26	119.59		3 related	<a>(9.9)	<i>(-6.6), <o>(-6.2), <u>(-4.0)
all	all vowels	male	2.98E-60	279.32		3 related	<a>(16.4)	<i>(-13.0), <o>(-5.8), <u>(-3.9)
only parental	all vowels	female	6.10E-41	190		3 related	<i>(10.7), <o>(5.7), <u>(3.4)	<a>(-13.5)
all	all vowels	female	4.94E-05	22.58		3 related	<a>(3.1), <o>(2.5)	<i>(-4.4)
only parental	all vowels	non-binary	3.99E-09	42		3 related	<i>(6.0)	<a>(-5.9)
all	all vowels	non-binary	2.01E-04	19.64		3 related	<a>(4.2)	<i>(-3.7)
all	words	Parental	3.53E-184	960.31		28 related	appa(7.1), dad(12.1), mam(7.1)mama(12.1), mimi(6.3), nana(2.3), omma(5.1), papa(11.5)	did(-7.3), far(-7.9), fifi(-3.7), inay(-6.8), mor(-6.3), nin(-4.8), pita(-5.0), shasha(-3.1), sis(-7.7), thi(-7.0)
only parental	words	male	8.65E-156	825.65		28 related	appa(7.9), bab(2.2), bibi(4.0), dad(13.2), did(4.1), far(3.6), papa(12.7), pita(3.0), tata(3.7), thi(2.8), vati(2.6)	mam(-8.1), mama(-9.2), mim(-4.6), mimi(-7.6), mutti(-4.2), nan(-5.6), nana(-6.0), nini(-2.4), omma(-7.3), titi(-2.1), vivi(-2.2)
all	words	male	6.91E-279	1406.35		28 related	appa(12.5), bab(2.3), bibi(4.0), dad(22.9), papa(21.8), tata(4.1)	did(-2.1), far(-2.9), fifi(-2.1), inay(-2.9), mam(-5.1), mama(-5.1), mim(-4.1), mimi(-4.9), mor(-3.1), mutti(-3.9), nan(-4.3), nana(-4.4), nin(-2.4), nini(-2.9), omma(-4.8), shasha(-2.1), sis(-4.6), thi(-2.4), titi(-2.1), vivi(-2.6)
only parental	words	female	1.66E-160	848.07		28 related	mam(6.5), mama(7.4), mim(3.4), mimi(6.1), mutti(3.6), nan(5.1), nana(4.9), nini(3.3), omma(5.8), shasha(2.1), titi(4.3), vivi(3.0)	appa(-9.0), bab(-3.9), dad(-15.3), did(-3.3), far(-3.7), papa(-15.6), pita(-2.4)
all	words	female	2.56E-173	908.86		28 related	mam(10.9), mama(16.3), mimi(9.9), nan(4.6), nana(5.3), omma(8.5), titi(2.2)	appa(-2.6), bab(-2.2), dad(-6.1), did(-6.5), far(-6.9), inay(-4.5), mor(-4.0), papa(-6.7), pita(-4.9), sis(-5.9), thi(-5.1)
only parental	words	non-binary	1.60E-22	171.29		28 related	bab(2.5), bibi(3.1), fifi(2.0), inay(3.7), mor(2.0), nin(3.4), shasha(2.8), thi(3.0), zaza(3.7)	dad(-2.3), mam(-3.9), mama(-4.0), mimi(-3.5), nan(-2.2), nana(-3.3), omma(-2.2), papa(-3.1)
all	words	non-binary	2.88E-19	153.49		28 related	appa(5.1), bab(2.5), bibi(3.2), dad(4.2), mama(2.1), papa(2.8), zaza(2.1)	did(-3.3), far(-4.6), inay(-2.2), mor(-2.6), pita(-2.2), sis(-4.1), thi(-2.7)

*Table 23: The results of a chi-squared tests in the participant pool of only monolingual English speakers. The threshold used to determine if the constraint and judgement were related was a p-value of less than .05. The “only parental” judgements exclude the judgements that said a word does not sound parental. Tests that had different results from the total participant pool are highlighted in pink.*

- e. Stats test with multilingual speakers

Multilingual participants								
Which judgements included	Conditions	Judgement type	p-value	X <sup>2</sup> value	Parameter	Result	Positive significant Pearson residuals	Negative significant Pearson residuals
all	articulation	Parental	1.03E-65	304.55		3 related	vowel(6.0), nasal(6.3), stop(6.5)	fricative(-17.3)
only parental	articulation	male	3.17E-207	957.38		3 related	fricative(5.5), vowel (2.8), stop(24.2)	nasa(-29.2)
all	articulation	male	3.07E-174	805.3		3 related	vowel(5.8), stop(24.7)	fricative(-5.4), nasal(-21.8)
only parental	articulation	female	8.50E-179	826.31		3 related	nasal(25.7)	vowel(-2.5), stop(-24.7)
all	articulation	female	1.41E-132	613.16		3 related	vowel(2.2), nasal(23.4)	fricative(-12.3), stop(-14.0)
only parental	articulation	non-binary	8.93E-13	15.15		3 related	fricative(7.5)	nasal(-3.8)
all	articulation	non-binary	7.94E-06	26.38		3 related	stop(3.1)	fricative(-4.8)
all	reduplication	Parental	7.67E-14	60.4		2 related	full(7.2)	non(-6.4)
only parental	reduplication	male	2.23E-05	21.42		2 related	non(4.6)	full(-3.1)
all	reduplication	male	2.30E-01	2.94		2 not related	NA	NA
only parental	reduplication	female	7.57E-07	28.19		2 related	full(5.3)	non(-3.0), semi(-3.0)
all	reduplication	female	1.36E-18	82.27		2 related	full(8.9)	non(-6.5), semi(-3.0)
only parental	reduplication	non-binary	3.34E-01	2.19		2 not related	NA	NA
all	reduplication	non-binary	1.79E-07	31.07		2 related	full(5.4)	non(-4.3)
all	vowel 1	Parental	1.24E-103	479.64		3 related	<a>(19.9), <u>(2.1)	<i>(-21.5)
only parental	vowel 1	male	1.69E-44	206.47		3 related	<a>(12.3)	<i>(-4.9), <o>(-10.1), <u>(-5.8)
all	vowel 1	male	8.93E-97	447.98		3 related	<a>(20.9)	<i>(-15.4), <o>(-8.0), <u>(-4.1)
only parental	vowel 1	female	1.13E-42	198.01		3 related	<i>(6.0), <o>(9.2), <u>(5.4)	<a>(-12.6)
all	vowel 1	female	5.05E-36	167.23		3 related	<a>(4.7), <o>(8.0), <u>(5.6)	<i>(-10.8)
only parental	vowel 1	non-binary	1.47E-19	90.81		3 related	<i>(9.5)	<a>(-7.0), <o>(-2.5)
all	vowel 1	non-binary	1.56E-07	34.5		3 related	<a>(5.8)	<i>(-5.2)
all	all vowels	parental	2.36E-103	478.34		3 related	<a>(20.7)	<i>(-21.5)
only parental	all vowels	male	1.65E-49	229.66		3 related	<a>(12.9)	<i>(-7.2), <o>(-10.0), <u>(-5.8)
all	all vowels	male	1.08E-105	489.13		3 related	<a>(21.7)	<i>(-17.3), <o>(-8.2), <u>(-4.4)
only parental	all vowels	female	1.53E-52	243.67		3 related	<i>(9.5), <o>(8.8), <u>(5.2)	<a>(-14.4)
all	all vowels	female	2.34E-25	117.76		3 related	<a>(4.1), <o>(7.0), <u>(5.0)	<i>(8.4)
only parental	all vowels	non-binary	1.42E-21	100.18		3 related	<i>(10.0)	<a>(-8.2), <o>(-2.4)
all	all vowels	non-binary	5.55E-06	27.12		3 related	<a>(5.2)	<i>(-4.4)
all	words	Parental	2.80e-314	1572.23		28 related	appa(9.5), dad(14.6), mam(10.4), mama(14.5), mimi(5.6), mutti(2.1), omma(9.0), papa(14.3), tata(3.4)	did(-9.1), far(-8.6), fifi(-4.7), inay(-8.6), mor(6.8), nin(-7.1), nini(-3.0), pita(-4.9), shasha(-4.9), sis(-11.7), thi(-10.1), vivi(-4.4)
only parental	words	male	2.13E-299	1502.53		28 related	appa(12.9), bab(3.8), bibi(6.7), dad(15.8), did(5.1), far(5.8), papa(15.9), pita(4.3), tata(2.5), vati(6.0), zaza(3.6)	mam(-11.7), mama(-12.5), mim(-6.7), mimi(-9.7), mor(-2.8), mutti(-5.8), nan(-7.5), nana(-7.9), nini(-2.9), sis(-2.5), vivi(-3.2)
all	words	male	0.00E+00	2302.99		28 related	appa(19.0), bab(2.2), bibi(5.8), dad(26.6), papa(26.5), tata(4.2), vati(6.5), zaza(3.1)	did(-2.4), fifi(-2.4), inay(-3.7), mam(-7.3), mama(-6.9), mim(-5.5), mimi(-6.6), mor(-5.4), mutti(-4.1), nan(-6.1), nana(-6.8), nin(-4.4), nini(-3.8), omma(-5.7), shasha(-2.4), sis(-7.3), thi(-4.6), titi(-2.7), vivi(-4.6)
only parental	words	female	4.73E-297	1491.53		28 related	mam(9.8), mama(10.9), mim(4.9), mimi(8.9), mor(2.3), mutti(5.4), nan(6.8), nana(7.3), nini(4.4), omma(9.2), shasha(2.2), sis(2.9), titi(3.5), vivi(3.5)	appa(-13.1), bab(-2.9), bibi(-4.8), dad(-18.6), did(-6.3), far(-5.6), papa(-18.5), pita(-3.9), vati(-2.4)
all	words	female	0.00E+00	1690.52		28 related	mam(16.5), mama(21.0), mim(3.8), mimi(11.4), mutti(5.6), nan(5.6), nana(4.8), omma(14.6), tata(2.7)	appa(-5.5), bab(-3.0), bib(-3.3), dad(-8.8), did(-9.0), far(-8.5), fifi(-2.5), inay(-5.5), mor(-3.5), nin(-5.3), papa(-8.8), pita(-5.7), shasha(-2.1), sis(-7.2), thi(-7.7)
only parental	words	non-binary	1.62E-40	265.43		28 related	bab(2.7), bibi(3.4), fifi(3.6), inay(3.8), mim(2.4), nin(5.5), nini(3.6), shasha(4.0), thi(4.0), titi(2.2), vivi(2.8), zaza(5.0)	dad(-3.9), mam(-5.1), mama(-4.4), mimi(-2.3), nana(-3.0), omma(-2.8), papa(-4.6)
all	words	non-binary	6.94E-34	231.35		28 related	appa(3.8), bibi(2.9), dad(4.0), mama(3.3), mim(2.1), omma(2.2), papa(2.9), tata(2.1), zaza(4.1)	did(-4.7), far(-5.1), inay(-3.0), mor(-3.9), nana(-2.7), sis(-6.6), thi(-4.1)

*Table 24: The results of a chi-squared tests in the participant pool of multilingual participants. The threshold used to determine if the constraint and judgement were related was a p-value of less than .05. The “only parental” judgements exclude the judgements that said a word does not sound parental. Tests that had different results from the total participant pool are highlighted in pink.*