Phonological Features of Saudi Arabian Anthroponyms

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Abstract
Beyond its traditional function, phonology has been demonstrated to play a significant role in the gender marking of given names in some Germanic languages. However, this significance has not been investigated for Semitic languages, including Arabic. Therefore, irrespective of the classical gender-identification approaches (i.e., familiarity, morphology, semantics, and pragmatics), the present study examines whether the phonological structures of Saudi first names may solely reveal the gender of that name. The first names of Saudi males (N= 237) and Saudi females (N=419) drawn from the registrar of a Saudi university in Riyadh were analyzed according to various phonological variables, including the number of phonemes, the number of syllables, the distinction between open vs closed syllables, the manner of articulation of name-initial and name-final sounds, stress position, in addition to the state of the glottis. The quantitative study finds that compared to male names, female names have fewer phonemes, tend to begin with an open syllable, are more likely to be stressed in the second position, are more likely to end with a vowel or a voiceless consonant, are more likely, to begin with, a glottal stop and a trill, and are more likely to end with a vowel or a glottal fricative.

Keywords: manner of articulation, phonemes and syllables, phonological features, Saudi Arabian Anthroponyms, stress position

Introduction

Traditionally, familiarity, morphology, semantics, and pragmatics offer insight into differentiating masculine names from feminine names. However, research on some Germanic languages proves that phonology can also play a reliable role in the gender identification of names (See section two below). Unfortunately, there is a lack of studies on whether this phonological approach works for Arabic, which constitutes a gap in the literature that the present study attempts to bridge.

Proper nouns or proper names are typically names of people, animals, products, locations and fictional characters (Mojapelo, 2009). Among these categories, the names of persons have received much research concern (e.g., Anderson, 1994). In addition, the linguistic features of personal names (e.g., morphological and semantic), non-linguistic elements (e.g., familiarity), and pragmatic cues have all been thoroughly studied for different languages (See Rodina, 2007 for a review). Such studies typically suggest that in a given socio-cultural community, the gender associated with personal names can be inferred from their morphology, semantics, familiarity (e.g., Alford, 1988), and some pragmatic cues in communication (Garnham, Oakhill, & Reynolds, 2002, Al- Zumor, 2009).

Whorf (1956), for example, claimed that many languages contain subliminal yet provable and culturally relevant categories. He elaborates that English names, such as Fred, George, Mary, and Isabel, lack a gender morphological marker, like the Latin -us or -a, but they are still easily recognizable by English speakers who immediately associate them with the appropriate gender. He clarifies that familiarity and experience with these names are the reason for this association. Similarly, if a native Arabic speaker is asked to identify the gender of any Arabic personal names, e.g., خالد (kālid; /kəlid/), ماجد (mājd; /maːjd/), or كريم (kārim; /kārɪm/), they will on such basis immediately and correctly recognize them as masculine names.

Intriguingly, however, research suggests that the phonological structure of first names may serve as a gender indicator independent of morphology, semantics, pragmatics, and familiarity. Unfortunately, as most of this research focuses on English and other western names, we do not know if this hypothesis holds for eastern names such as Arabic. The present study attempts to fill this lacuna in the literature.

The topic is best studied in ‘traditional names’ (e.g., Whissell, 2001). As the Saudi variety of Arabic presumably preserves traditional names more frequently than the other varieties of Arabic, Saudi names have been chosen as the subject of this study, which investigates whether there are phonological structures in Saudi first names that suggest their gender. The study is a quantitative and contrastive analysis of Saudi first names according to a set of phonological variables, including the number of phonemes, the number of syllables, open vs closed syllables, the manner of articulation of name-initial and name-final sounds, stress position and glottal status. It would be interesting to know whether the gender of Saudi first names can be determined phonologically.
**Review of Related Literature**

In contrast to traditional male names, traditional female names tend to contain a more significant number of sounds and syllables, end in a vowel or sonorant, and exhibit non-initial stress, according to phonological studies on English-given names (Slater & Feinman, 1985; Cutler, McQueen, & Robinson, 1990; Barry & Harper, 1995; Cassidy, Kelly, & Sharoni, 1999; Whissell, 2001; Ackermann & Zimmer, 2021). Similarly, according to a popular name book, the most elegant names for newborn girls typically feature multiple syllables, many vowels, and rhythmic patterns (Rosenkrantz & Satran, 2014).

Wright and Hay (2002) revealed a significant difference between the ending segments of male and female names (masculine names were much more likely to end with an obstruent), but not for the initial name segments. The researchers also found the number of syllables in male and female names the most prominent phonological bias. Similarly, Slater and Feinman (1985) concluded that English male and female favourite names gravitate toward a possibly “perfect” pattern consisting of a monosyllable ending in a consonant. In addition, the rate of change for female-preferred names was considerably less pronounced than that for male-preferred names. Other studies explored phonology and the gender of names through the rules of ordering names (binomials), which generally place the man’s name first in pairs. Linguists have identified two possible explanations for why men’s names are typically placed before women’s names- name phonology and name popularity. Cooper and Ross (1975) contend that in binomial pairs, words with initial sonorants precede words with initial obstruents, whereas words with final obstruents precede words with final sonorants. Based on Cooper and Ross’ (1975) phonological constraints, Wright and Hay (2002) examined popular names in American English. They established that male names are marked by “First Position Phonology” (i.e., phonological characteristics that lend them to be preferable in first position), whereas Second Position Phonology specifies female names. It has been hypothesized that phonological distinctions between male and female English names are a cause (Wright, Hay, & Bent, 2005), a result (Cutler et al., 1990) of the propensity to address males before females.

Experiments have been conducted to determine the relevance of purely phonological characteristics in distinguishing the traditional gender of a name. For example, Wright (2006) presented the test participants with forty fictitious names to determine whether or not they naturally assigned gender to these names. The subjects categorized one-syllable and consonant-final names as male names and two-syllable and vowel-final names as female names. Similarly, Cassidy et al. (1999) reported that names were classified as male or female more rapidly and precisely when they possessed phonological characteristics that they claimed were typical of a gendered name.

Ackermann and Zimmer (2021) examined a sample of popular first names from thirteen countries and concluded with language/cultural overreaching correlations and language–culture-specific correlations between the names used for the same gender. Finally, Aloufi (2022) investigated the phonetic symbolism of names and concluded that voiceless obstruents are more
prevalent in male names than in female names, whereas sonorant consonants are more prevalent in female names than in male names.

To our knowledge, it is still unknown whether these results accurately apply to languages other than English. However, we are aware of only one study, conducted by Wierzbicka (1992) on Polish given names, which concludes, with numerous exceptions, that Polish feminine names tend to end in –a, and Polish masculine names tend to end in a consonant, thus providing some support to the findings above. Reference to Arabic in a few studies is sporadic and does not provide clear patterns and tendencies.

A thorough examination of the existing literature reveals the lack of comprehensive studies on the capability of Arabic phonology to indicate gender. Therefore, this study analyses Saudi Arabian names to determine if these phonological characteristics apply to Saudi names.

Method

The study relies solely on phonological variables to determine whether Saudi Arabian first names are gender-differentiated. Other traditional factors, such as semantics, pragmatics, and familiarity, are beyond the scope of this study.

Data Collection

The names were extracted from the registrar of a private Saudi university in Riyadh, Saudi Arabia, to form the data set. By filtering the names by nationality, only Saudi Arabian first names were considered. In addition, a jury of Saudis double-checked the list to ensure that the names were Saudi first names, such as مشاعل (mishāʿil; /muʃaːil/), فهد (fahad; /faḥad/). Less traditional or contemporary Arabic names, such as أمل (ʾamal; /ʔaˈmāl/), فادي (faːˈdiː; /fa diː/), were also included, whereas foreign or ‘loan’ names, such as Cynthia, Toleen, were excluded.

Furthermore, names were not counted multiple times during statistical analysis. For instance, the most common Saudi female names in the data were سارة (nūrah; /nuːrəh/) and سارة (sārah; /saːrah/), with 240 and 188 students bearing these names, respectively. محمد (muḥammad; /muhammad/) and عبد الله (ʿabd allah; /ʕabdallah/) were the most famous names, with 220 and 182 students bearing these names, respectively. However, these four names were counted only once in the analyzed data set.

After filtration, validation, and inclusion of only a single occurrence of each name, the population of the present study comprised 419 female names and 237 male names.

Data Analysis

All names were phonemically transcribed and analyzed according to seven phonological variables, including:

a) The average number of phonemes and syllables;
b) Whether each syllable was closed or open;
c) Stress position;
d) Whether the initial and final consonants were voiced or voiceless;
e) The breakdown of the word’s initial vowels and consonants; and
The manner of articulation of the initial and final consonant

The quantitative analysis averaged the number of male and female names containing each of the variables above. In addition, the variables with significant frequency differences between male and female names were identified and graphed. The examples of names appear throughout the discussion in both transliteration and phonemic transcription.

Results

Average Syllables and Average Phonemes

![Figure 1. Average phonemes: Males Vs. female names](image)

Closed vs Open Syllables

<table>
<thead>
<tr>
<th>Variable Description</th>
<th>Female</th>
<th></th>
<th>Male</th>
<th></th>
<th>( p )-value</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Begin with open</td>
<td>259</td>
<td>61.8%</td>
<td>130</td>
<td>54.9%</td>
<td>0.0814</td>
<td>No</td>
</tr>
<tr>
<td>closed + open</td>
<td>32</td>
<td>7.6%</td>
<td>5</td>
<td>2.1%</td>
<td>0.0032</td>
<td>Yes</td>
</tr>
<tr>
<td>open + open + open</td>
<td>15</td>
<td>3.6%</td>
<td>1</td>
<td>0.4%</td>
<td>0.0118</td>
<td>Yes</td>
</tr>
<tr>
<td>open + closed</td>
<td>138</td>
<td>32.9%</td>
<td>104</td>
<td>43.9%</td>
<td>0.0052</td>
<td>Yes</td>
</tr>
<tr>
<td>open + open</td>
<td>57</td>
<td>13.6%</td>
<td>13</td>
<td>5.5%</td>
<td>0.0012</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Phonological Features of Saudi Arabian Anthroponyms

**Figure 2.** Beginning Syllable: Open vs Closed

**Stress Position**

<table>
<thead>
<tr>
<th></th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Proportion</td>
</tr>
<tr>
<td>Mono</td>
<td>32</td>
<td>7.6%</td>
</tr>
<tr>
<td>Second</td>
<td>196</td>
<td>46.8%</td>
</tr>
<tr>
<td>Third</td>
<td>17</td>
<td>4.1%</td>
</tr>
</tbody>
</table>

**Figure 3.** Stress Position (Women)
Phonological Features of Saudi Arabian Anthroponyms

Al Tamimi & Smith

Figure 4. Stress Position (Men)

Table 3. Stress and gender dependence

<table>
<thead>
<tr>
<th></th>
<th>Mono</th>
<th>First</th>
<th>Second</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>32</td>
<td>174</td>
<td>196</td>
<td>17</td>
</tr>
<tr>
<td>Male</td>
<td>17</td>
<td>93</td>
<td>93</td>
<td>34</td>
</tr>
</tbody>
</table>

Initial and Final Consonant: Voiced/less

Figure 5. Final Consonant: Voiced/less (Women)
Phonological Features of Saudi Arabian Anthroponyms

Figure 6. Final Consonant: Voiced/less (Men)

Table 4. Female vs male names (voiced/less)

<table>
<thead>
<tr>
<th></th>
<th>Female</th>
<th>Male</th>
<th>p – value</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial voiced</td>
<td>239</td>
<td>150</td>
<td>0.1176</td>
<td>No</td>
</tr>
<tr>
<td>Initial voiceless</td>
<td>163</td>
<td>86</td>
<td>0.5074</td>
<td>No</td>
</tr>
<tr>
<td>Final voiced</td>
<td>282</td>
<td>200</td>
<td>0.0000</td>
<td>Yes</td>
</tr>
<tr>
<td>Final voiceless</td>
<td>137</td>
<td>37</td>
<td>0.0000</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Word Initial Vowel and Consonant Breakdown

Figure 7. Name -Initial Vowel and Consonant

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Table 5. Female vs male names (word-initial)

<table>
<thead>
<tr>
<th></th>
<th>Female</th>
<th></th>
<th></th>
<th>Male</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Proportion</td>
<td>Number</td>
<td>Proportion</td>
<td>p-value</td>
<td>Significance</td>
</tr>
<tr>
<td>/R/</td>
<td>40</td>
<td>9.5%</td>
<td>14</td>
<td>5.9%</td>
<td>0.1034</td>
<td>No</td>
</tr>
<tr>
<td>/r/</td>
<td>44</td>
<td>10.5%</td>
<td>11</td>
<td>4.6%</td>
<td>0.0092</td>
<td>Yes</td>
</tr>
<tr>
<td>/m/</td>
<td>31</td>
<td>7.4%</td>
<td>38</td>
<td>16.0%</td>
<td>6 × 10^{-4}</td>
<td>Yes</td>
</tr>
<tr>
<td>/s/</td>
<td>25</td>
<td>6%</td>
<td>41</td>
<td>17.3%</td>
<td>0.0000</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Manner of Articulation of Initial and Final Consonant

![Manner of Articulation of Initial and Final Consonant](chart)

Figure 8. Manner of Articulation of Initial Consonants

Table 6. Female vs male names (manner of articulation of initial consonant)

<table>
<thead>
<tr>
<th></th>
<th>Female</th>
<th></th>
<th></th>
<th>Male</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Proportion</td>
<td>Number</td>
<td>Proportion</td>
<td>p-value</td>
<td>Significance</td>
</tr>
<tr>
<td>Trill’ r’</td>
<td>46</td>
<td>11.0%</td>
<td>11</td>
<td>4.6%</td>
<td>0.0056</td>
<td>Yes</td>
</tr>
<tr>
<td>Glottal stop</td>
<td>44</td>
<td>10.5%</td>
<td>14</td>
<td>5.9%</td>
<td>0.0464</td>
<td>Yes</td>
</tr>
<tr>
<td>Liquid</td>
<td>19</td>
<td>4.5%</td>
<td>2</td>
<td>0.8%</td>
<td>0.0098</td>
<td>Yes</td>
</tr>
<tr>
<td>Fricative</td>
<td>139</td>
<td>33.2%</td>
<td>103</td>
<td>43.5%</td>
<td>0.0088</td>
<td>Yes</td>
</tr>
<tr>
<td>Nasal</td>
<td>67</td>
<td>16.0%</td>
<td>53</td>
<td>22.4%</td>
<td>0.0426</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Figure 9. Manner of Articulation of Final Consonants

Table.7. Female vs male names (articulation of final consonant)

<table>
<thead>
<tr>
<th></th>
<th>Female</th>
<th>Male</th>
<th>p-value</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>Proportion</td>
<td>Number</td>
<td>Proportion</td>
<td></td>
</tr>
<tr>
<td>Fricative</td>
<td>89</td>
<td>21.2%</td>
<td>7</td>
<td>3.0%</td>
</tr>
<tr>
<td>Nasal</td>
<td>112</td>
<td>26.7%</td>
<td>26</td>
<td>11.0%</td>
</tr>
<tr>
<td>Vowel</td>
<td>49</td>
<td>11.7%</td>
<td>67</td>
<td>28.3%</td>
</tr>
<tr>
<td>Stop</td>
<td>70</td>
<td>16.7%</td>
<td>67</td>
<td>23.6%</td>
</tr>
<tr>
<td>Trill ‘r’</td>
<td>28</td>
<td>6.7%</td>
<td>34</td>
<td>14.3%</td>
</tr>
</tbody>
</table>

Discussion

Average Syllables and Average Phoneme

As demonstrated in Figure One, the average number of syllables in the sample’s male and female names showed little difference (2.23 vs 2.14, respectively). To determine whether the true averages differ significantly, we tested the hypotheses where the null was $H_0$: “the true means are equal”, and the alternative was $H_1$: “the true means are not equal”. Since the resulting p-value of this t test was 0.1001, which is greater than the significance level $\alpha = 0.05$, we could reject $H_0$ and conclude that the difference between the true means was not statistically significant.

However, the average number of phonemes in male names was 12.69% higher than in female names (6.04 vs 5.36), as shown in Figure One. Again, a similar t-test was conducted to determine whether this difference was statistically significant. The test’s p-value was p-value =
3.84510 (-6). Since it was less than the significance level, we rejected the null hypothesis and concluded that the average number of phonemes in female and male names differs significantly.

**Closed vs Open Syllables**

As stated in section three above, each name was analyzed based on its pattern of open and closed syllables. Open syllables are, by definition, syllables that end with a vowel, e.g., the first and second syllables in موضي (mū.ḍī; /muː.dːiː/), and closed syllables end with a consonant, e.g., the first, second and fourth syllables in عبدالعزيز (‘ab.dul.ʿa. ziːz; /ʕa'b. dul.ʔa. ziːz/). Many patterns found in this respect for both genders were surprisingly similar; however, a few patterns exhibited an apparent tendency toward male or female names, as seen in Table One above.

The most prominent pattern was whether or not the name started with an open or closed syllable. As shown in Table One and represented in Figure Two, women’s names tended to have a higher tendency, to begin with an open syllable than men’s names (61.8% vs 54.9%, respectively). However, the -z test used could not reject the null hypothesis that the true proportions were equal; thus, the tendency is not very significant.

There is a dearth of research comparing open vs closed syllable patterns in first names, particularly in the manner described above, which impedes appropriate comparison. However, based on our findings, we can conclude that Saudi women’s names do not tend to begin with an open syllable more frequently than men’s names. In contrast, the difference between male names and female names is notable in the other four patterns in Table Two.

**Stress Position**

Male and female names seemed to have a similar likelihood of being monosyllabic (7.2% vs 7.6%, respectively). In the data, سعد (saʿad; /saʕad/) and لين (liːn; /liːn/) are examples of typical monosyllabic male and female names, respectively. Moreover, the likelihood of the stress position being in the first syllable was not significantly different between male and female names. The stress position can be seen in the first position in the names شادي (ʃaːdī; /ʃaːd iː/) and ديم (dimā; /diː.māː/), male and female names, respectively.

However, the probability of the primary stress falling on the second or third position varied significantly. Female disyllabic names, such as رنيم (ranīm; /ranɪm/) are more likely to place the primary stress on the second syllable (46.8%) than male disyllabic names (39.2%). In contrast, male multisyllabic names, such as عبدالرحمن (‘abdulrahmān; /ʔabdulrahmaːn/), are more likely to place stress on the third syllable (12.2%), whereas only 4.1% of female multisyllabic names do so. This variation can be seen by comparing Figures Three and Four above.

Z-tests were conducted to determine whether these statistics accurately represented the true proportions; the results are summarised in Table Two. All p-values are below the significance threshold. In all three cases, we can conclude that the ratio of female names differs significantly from that of male names. This result is consistent with what was revealed for English names in
A chi-square test ($\chi^2$) was used to check whether the stress position depends on or is independent of the name gender. Table Three demonstrates that the null hypothesis is $H_0$: “the stress position is gender-independent”, whereas the alternative hypothesis is $H_1$: “the stress position is not gender-independent”. The calculated test statistics is $\chi^2 = 22.802$. There are three degrees of freedom, and the associated p-value for the test statistic is $p-value = 4.441 \times 10^{-5}$. Therefore, we reject the null hypothesis and conclude that the stress position is gender-dependent.

**Initial and Final Consonant: Voiced/less**

The initial consonant in male names was voiced 63.3% of the time, whereas it was voiced 57.0% in female names. In contrast, the initial consonant in male names was voiceless 36.3% of the time, while it was voiceless 38.9% of the time in female names.

Examining the final consonant in male and female names revealed significant differences. As seen by comparing Figures Five and Six, the final consonant was voiced in female names 41.8% of the time and in male names 83.5% (roughly double). In female names, the final consonant was voiced (being a vowel) 25.5% of the time, but only 0.8% in male names (almost never). هنأ (hanā; /hanā/) is one example of a female name in this category. The final consonant was voiceless 32.7% of the time in female names and 15.6% in male names (roughly half). These differences can also be seen by comparing the same figures above.

The statistical inference confirmed the sample’s conclusions; see Table Four. Furthermore, the p-values for the z-tests regarding the voiced/voiceless initial consonant were greater than the significance level, so the null hypothesis could not be rejected. Therefore, we conclude no significant differences between male and female names regarding the voiced/voiceless initial consonant.

Most literature did not focus on whether initial or final consonants were voiced or voiceless but rather on whether names began with a sonorant or an obstruent, which will be discussed in greater detail below.

**Word Initial Vowel and Consonant Breakdown**

Analyses were conducted on the frequency with which names began with a particular phoneme. There was a slight variation in frequency between female and male names for many phonemes. These are the most notable exceptions:

/w/ and /r/ began female names more frequently than male names (as in أروى (ʾarwā; /ʔrwa:/ and رماح (rimāḥ; /rimaːh/, respectively). Specifically, the /w/ began in 9.5% of the female names as opposed to only 5.9% of the male names; similarly, /r/ began in 10.5% of all female names as opposed to 4.6% of male names.

/m/ and /s/ began male names much more frequently than female names (as in مالك (mālik; /maːlik/) and عبد الإله (ʿabdulʾilāh; /ʔabdulʔilaːh/, respectively). Specifically, /m/ began with 16% of
male names compared to 7.4% of female names. Similarly, /s/ began 17.3% of male names compared to 6% of female names. This comparison revealed the largest difference between any two phonemes. The most notable comparisons between female and male names can be seen in Figure Seven.

The results of the statistical inference are summarised in Table Five. There is no difference between the proportions of male and female names starting with /ʔ/; however, the proportions are significantly different in the names beginning with /r/, /m/, or /ʕ/. This finding is difficult to relate to the existing literature, which focused on whether English first names began with sonorants or obstruents. In their study on English binomials, Cooper & Ross (1975) suggest that male names tend to start with a sonorant, whereas female names with an obstruent. However, our research could not reach a general conclusion, as specific phonemes tended to initiate male or female names, as described above.

**Manner of Articulation of Initial and Final Consonant**

The most notable differences in the manner of articulation of initial consonants, as demonstrated in Figure Eight above:

Trill ‘r’, glottal stop, and liquid tend to characterize the initial consonant of female names. Specifically, trill ‘r’ begins in 11% of female names compared to 4.6% of male names; glottal stops begin in 10.5% of female names compared to 5.9% of male names; and liquids begin in 4.5% of female names compared to 0.8% of male names. رماح (rimāḥ; /rɪmɑːħ/), أنوار (ʾanwār; /ʔaːnwar/), and ليال (layāl; /laːjɑːl/) are examples of female names whose initial consonants can be described in terms of the manner of articulation as trill ‘r’, glottal stop, and liquid, respectively.

Comparatively, fricative and nasal sounds tend to more frequently characterize the initial consonant of male names, e.g., فارس (fāris; /faːris/) and حسن (ḥasan; /hasan/, respectively). Specifically, fricatives begin in 43.5% of male names compared to 33.2% of female names, and nasals begin in 22.4% of male names compared to 16% of female names.

All tests conducted on hypotheses yielded p-values smaller than the confidence level. Consequently, as shown in Table Six, the respective proportions of female and male names differ significantly.

As shown in Figure Nine, male names tend to end with the glottal fricative ‘h’, e.g., سارة (sārah; /sɑːrah/) and نوره (nūrah; /nuː rah/), or with a vowel typically the long vowel ‘a’ if the ‘h’ was dropped name- finally, e.g., سارا (sārā; /sɑːra/) and نورا (nūrā; /nuːra/). Statistically, female names end with ‘h’ 21.2% of the time, compared to only 3% with male names. Similarly, female names end with a vowel 26.7% of the time, compared to 11% with male names.

The figure also shows that male names are more likely to end with a stop, nasal, or trill ‘r’ (28.3%, 23.6%, and 14.3%, respectively) as in يزيد (yazīd; /jaziːd/), سلطان (sulṭān; /sulṭɑːn/), and منصور (mānsūr; /mansuːr/, respectively. It is worth noting that the same manners tend to characterize initial female names, as in دانه (dānah; /daːnah/), موضي (mūḍī; /muːdɪː/, respectively.)
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However, female names less frequently end with this manner (11.7%, 16.7%, and 6.7%, respectively), as in شهيد (shahd; /ʃaːhdid/), رنيم (ranīm; /ranīːm/), and منار (manār; /manaːr/).

Hypotheses tests produced p-values smaller than the confidence level. Therefore, as shown in Table Seven, the respective proportions of female and male names are all significantly different.

Again, our findings matched the literature only partially. Our finding that female names tend to begin with the glottal fricative and male names with a nasal is the only finding that matches the literature on English names that claim that male names tend to begin with a sonorant, while female names tend to begin with an obstruent (Cooper & Ross, 1975) and that male names tend to end with obstruents (Wright & Hay, 2002). Our findings that female names begin with a trill ‘r’ and a liquid and that male names begin with a fricative do not align with the existing literature. Similarly, our findings that female names tend to end with a vowel and male names tend to end with a consonant are the only ones that correspond to the existing literature. Our additional findings that female names tend to end with glottal fricative and male names with a nasal do not align with previous research, such as that of Wright (2006) and Cassidy et al. (1999, 2005).

Conclusion

This study examined male and female Saudi names to determine whether their gender could be deduced from phonological variables. Multiple variables indicate a tendency for Saudi first names to be male or female to varying degrees. In particular, it was found that female names tend to have fewer phonemes and a higher tendency to begin with an open syllable than male names. Similarly, female names tend to place stress on the second syllable more frequently than male names, which tend to place stress on the third syllable more regularly than female names. No significant differences existed between male and female names regarding whether the initial consonant was typically voiced or voiceless. However, the final consonant was significantly more likely to be voiced in male names than in female names, where it was significantly more likely to be voiceless or voiced (being a vowel). The glottal stop ‘ʔ’ and the trill ‘r’ began female names more frequently than male names. The nasal ‘m’ and the pharyngeal ‘ʕ’ were much more likely to begin male names than female names. The Trill ‘r’, the glottal stop ‘ʔ’, and the liquid ‘l’ are more likely the manners of articulation to begin female names, whereas fricatives and nasals are more likely to begin male names. Finally, female names are much more likely to end with the glottal fricative ‘h’ or with a vowel, typically the short vowel ‘a’, while male names are more likely to end with a stop, nasal, or trill ‘r’ (features that often began female names). It would be difficult to conclude that a single phonological variable could determine the gender of a Saudi name. However, the combination of the variables in question could conceivably account for the ability to identify the gender of a Saudi name correctly.
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