

A parallel corpus-based exploration of deflected agreement in Arabic varieties

Connor Caston Rouillier*

Abstract. Agreement in modern Arabic varieties exhibits much variation despite sharing similar features, such as feminine singular (deflected) agreement with plural controllers. The presence of deflected agreement has been attributed both to retention (Bettega and DAnna, 2022) and to a process of loss and reborrowing from Modern Standard Arabic (Al-Sharkawi 2014; Versteegh 1984). Using evidence from a multi-dialectal parallel corpus, I argue that neither of these accounts adequately explains the variation present in the dialects. This study highlights the need to understand the language-specific changes in modern Arabic varieties and the utility of parallel corpora for exploring morphosemantic variation.

Keywords. agreement; Arabic; parallel corpus

1. Introduction. Several factors determine subject-verb agreement in Modern Arabic varieties (MAV). Across MAV, agreement with singular nouns is straightforward: the form of the verb is singular and matches the gender of the noun; see (1) and (2) from Modern Standard Arabic (MSA) and constructed based on sentences from the Multi-Arabic Dialect Applications and Resources (MADAR) corpus (Bouamor et al. 2018).¹

- (1) al-mud^fiif-**at**-u **ta**-taħaddaθ-u al-yaabaaniyy-at-a.
DEF-stewardess-F.SG-NOM F.SG-speak-DECL DEF-Japanese-F.SG-ACC
'The stewardess speaks Japanese.'
- (2) al-yaabaan-**iiy**-u laa **yu**-yayyir-u waḏ^fiif-at-a-hu.
DEF-Japanese-M.SG-NOM NEG 3-change.M.SG-DECL job-F.SG-ACC-POSS.3.M.SG
'The Japanese man is not changing his job.'

In (1), the feminine singular noun appears with a feminine singular verb, and in (2), the masculine singular noun appears with a masculine singular verb. However, when the nouns are plural, the story is more complicated.

When the noun is plural, verbs become sensitive to human-ness in MSA. With plural human nouns, the verb form still depends on the number and gender of the noun, see (3) and (4) from the MADAR corpus (Bouamor et al. 2018).²

- (3) al-mud^fiif-**aat**-u **ya**-taħaddaθ-**na** al-yaabaaniyy-at-a.
DEF-stewardess-F.PL-NOM 3-speak-F.PL DEF-Japanese-F.SG-ACC
'The stewardesses speak Japanese.'

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¹ Grammatical abbreviations used: 3 - third person; ACC - accusative; CNSTR - construct form; DECL - declarative; DEF - definite; F - feminine; GEN - genitive; M - masculine; NEG - negation; NOM - nominative; PASS - passive; PL - plural; POSS - possessor; PRTCP - participle; SG - singular.

² In MSA, agreement is sensitive to the word order of the sentence. What I describe here holds for SVO sentences; however, in VSO sentences, the verb matches the noun in gender and is always singular.

- (4) al-yaabaaniyy-**uun** laa yu-yayyir-**uuna** wað^ʕaaʔif-a-hum yaaliban.
 DEF-Japanese-**M.PL**-NOM NEG **3**-change-**M.PL**.DECL job.PL-ACC-POSS.3.M.PL often
 ‘The Japanese do not change their jobs often.’

If the noun refers to a non-human entity, agreement changes in MSA, see (6) and (5) modified from the MADAR corpus (Bouamor et al. 2018).

- (5) raqm-u al-mabiiʔ-aat-i ya-rtafiʔ-u.
 number.**M.SG**-NOM.CNSTR DEF-sales-F.PL-GEN **3**-increase.**M.SG**-DECL
 ‘The number of sales is up.’
- (6) ʔarqaam-u al-mabiiʔ-aat-i ta-rtafiʔ-u.
 number.**M.PL**-NOM.CNSTR DEF-sales-F.PL-GEN **F.SG**-increase-DECL
 ‘Sales numbers are up.’

In (6), although the subject noun is masculine plural, the agreement morpheme looks like the feminine singular morpheme in (1). The alternation between a gendered plural verb like in (3) and (4) and a feminine singular verb like in (6) has been observed in Arabic since the earliest Quranic manuscripts (c. 650 CE) (Bettega & D’Anna 2022). As such, Ferguson (1989) coined the term deflected agreement (dAgr) to refer to the form of the verb in (6). By contrast, verbs that appear in the same gender and number as the subject are said to show strict agreement (sAgr).³ In summary, in MSA, non-human plural nouns appear with verbs in dAgr. Human nouns, by contrast, appear with verbs in sAgr, matching the gender of the noun. Compared to MSA, the usage of dAgr in MAV is less understood. Agreement forms differ when meaning is held constant although there are differences in semantic nuance seen in lexical choice; see (7)-(10) from the MADAR corpus (Bouamor et al. 2018).

(7) MSA

al-ʔasʔaar-u l-yawm l-xaas^ʕs^ʕ-**at**-u **tu**-ʔt^ʕaa hunaa.
 DEF-price.**M.PL**-NOM DEF-day DEF-particular-**F.SG**-NOM **F.SG**-give.PASS here
 ‘Today’s specials are given here.’

(8) Cairo

il-at^ʕbaaq il-xaas^ʕ-**a** mawguud-**a** hinaa.
 DEF-dish.**M.PL** DEF-particular-**F.SG** found.PASS.PRTCP-**F.SG** here
 ‘Today’s specials are given here.’

(9) Beirut

il-mumayyiz-**iin** il-yoom inʔat^ʕ-**uu** hoon.
 DEF-special-**M.PL** DEF-day give.PASS-**M.PL** here
 ‘Today’s specials are given here.’

(10) Doha

³ I use dAgr to refer to these verb forms without taking a stance on the synchronic features present on the verb (Kramer & Winchester 2017; Rouillier 2023).

s-sbifalz l-yoom maħt^ʕuut^ʕ-iīn hni.
 DEF-special.M.PL DEF-day put.PASS.PTCP-M.PL here

‘Today’s specials are given here.’

In these examples, we can see that some varieties (MSA and Cairo) use dAgr for this sentence in this environment while other varieties (Beirut and Doha) use sAgr for it. This split prompts us to ask why and how agreement differs across varieties.

Al-Sharkawi (2014) claims that these differences stem from the loss of agreement during the spread of Arabic (7th to 8th century), while Bettega & D’Anna (2022) claim that dAgr is caused by individuation information and was retained from Old Arabic which was spoken on the Peninsula before the conquests. The literature has more frequently addressed the question of why agreement exhibits variation, leaving aside the question of how these variations are manifested in different MAVs. Variation could manifest in multiple ways. For example, different MAVs could use different features to trigger dAgr. Another possibility is that some varieties shift to MSA-like agreement systems more than others.

This paper utilizes a multidialectal parallel corpus to examine the patterns of agreement system variation across six Arabic varieties: MSA, Lebanese Arabic (Beirut), Egyptian Arabic (Cairo), Gulf Arabic (Doha), Tunisian Arabic (Tunis), Moroccan Arabic (Rabat). By analyzing deflected agreement in these varieties, the study aims to identify the underlying factors contributing to dAgr and move beyond viewing it through a diachronic lens alone. In other words, this study attempts to explore the synchronic usage of dAgr and understand the present differences between MAV. I will argue that parallel corpora are key to understanding these differences.

2. Accounts of the development of agreement in MAV. The difference in agreement systems between MAV and Modern Standard Arabic (MSA) has sparked two explanations for the language’s current state. One hypothesis suggests an initial simplification during the Arab conquests followed by the subsequent reintroduction of lost agreement forms through interaction with MSA (Al-Sharkawi 2014; Versteegh 1984). The other hypothesis claims that the diverse patterns in contemporary Arabic agreement systems reflect gradual linguistic shifts over time (Bettega & D’Anna 2022). Central to these interpretations is the question of whether a simplification bottleneck occurred before the intricate complexities emerged. In what follows, I will present these accounts of the development of agreement and discuss the predictions that they make.

2.1. LOSS AND BORROWING. According to Al-Sharkawi (2014) and Versteegh (1984), Arabic was simplified on the Arabian Peninsula before spreading out of it. However, they disagree about where the simplification originated. Al-Sharkawi believes that language change spread along the trade routes in Western Arabia in the centuries leading up to the spread of Arabic around the 8th century. This trade route-based explanation implies that the varieties remained complex away from these trade routes (i.e., in the eastern regions of the Peninsula). On the other hand, Versteegh argues that a military koine existed along the borders of Arabia, where the tribes conquered and came into contact. While Versteegh acknowledges the existence of this koine, he separates it from the colloquial language spoken on the Peninsula at that time, which he believes is the classical language and remained spoken by the Bedouins.

Versteegh (1984) reconstructs many features of the MAV varieties to this koine. This variety was analytic, contrasting with the synthetic Classical variety (Versteegh 1984:19).⁴ While Versteegh believes in a pre-Islamic koine, he admits that this koine alone cannot account for the features present in New Arabic.⁵

Instead, Al-Sharkawi (2010) and Versteegh (1984) argue that this spoken variety arose due to the mass acquisition of Arabic by non-Arabs in urban centers. These early Arabic learners had no organized teaching, and due to the pressing need for communication, they acquired a simplified version of the language, which he calls a pidgin (Versteegh 1984:52). Eventually, this pidgin was acquired by non-Arabs as a first language, becoming a creole. Due to the permeation of every sector of Islamic society by non-Arabs, features of this creole spread to the Arabs (Versteegh 1984:69). He claims that the Arabs who left the Peninsula eventually lost their native dialects and became speakers of New Arabic, and diglossia developed between the Classical and this new creolized language. Put simply, Al-Sharkawi (2010) and Versteegh (1984) believe that the similarities of MAV arose due to the acquisition of foreigner talk by non-Arabs. Foreigner talk, here, is the notion that speakers tend to simplify their speech when they believe that hearers do not have full access to their language (Ferguson 1981). Al-Sharkawi (2010) and Versteegh (1984) believe that the use of foreigner talk was so prevalent that non-Arabs in conquered regions acquired this simplified register when they learned Arabic to communicate.

Two things are important to highlight in this argument in terms of agreement. Firstly, Versteegh (1984) argues that the language exported from the Arabian Peninsula was already simplified in certain ways since it is related to the military koine. Notably, he claims that Old Arabic only had gender agreement (Versteegh 1984:21). Secondly, he argues that further simplification of the dialects arose due to foreigner talk. Al-Sharkawi (2014) claims that there are three types of dialects in terms of agreement and that these groupings arose due to access to foreigner talk. In particular, he argues that Bedouin dialects (i.e., dialects with fewer non-native speakers) maintain agreement systems that are more similar to Classical Arabic, while urban spoken varieties do not. Al-Sharkawi's third grouping includes dialects descended from Bedouin dialects directly, as opposed to the urban dialects which descended from this simplified koine he proposes. However, Dashti's (2013) exploration of foreigner talk in Kuwait found that the agreement system was completely lost when Arabs directed their speech toward their foreign workers.⁶ In particular, the number system was completely lost in nouns and adjectives (Dashti 2013:80). Given Dashti's findings and the complexity of the agreement system, I would predict that the agreement system would be completely lost in foreign talk situations, not just become simplified as Al-Sharkawi

⁴ I interpret Versteegh (1984) as using the terms 'analytic' and 'synthetic' to refer to the morphological type of the language. While I reject that any language sits entirely in one of the categories, an analytic language is defined as one for which each word consists of a single morpheme. In contrast, in a synthetic language, words are composed of multiple meaningful morphemes. Given that Versteegh argues that the simplification results from contact, he believes that this language was a creole, which are often viewed as more analytic than their source languages, and in the Arabic context, the analytic label likely refers to the loss of case and some non-concatenative morphology (like the internal passive).

⁵ New Arabic refers to all post-conquest colloquial varieties of Arabic, and I understand it more specifically to refer to the ancestor of MAV. While the term is sometimes used temporally to contrast with Old Arabic, it is more often used as a typological distinction separating the MAVs from Classical Arabic. This is especially true of descriptions that want to have a clear distinction between two, as in Versteegh (1984).

⁶ It is important to note that Al-Sharkawi (2014) would label Kuwaiti Arabic as a Bedouin variety in his system, so we must acknowledge a difference between Kuwaiti foreigner talk and the foreigner talk of "simpler" varieties.

(2010) and Versteegh (1984) propose.

Putting together this information from Kuwait and Al-Sharkawi (2010) and Versteegh's (1984) assertion that a simpler variety was what left the Peninsula, we can make certain predictions about agreement. First, their account predicts the loss of gender and animacy agreement in the plural. Al-Sharkawi explicitly argues that the dialects outside of the Peninsula began from a starting point without certain agreement forms, and given Dashti (2013), we can predict that agreement would simplify further, losing dAgr as well. Secondly, we might expect an areal diffusion of agreement, with dialects closer to the Peninsula having more features of agreement and dialects further away having less. As Al-Sharkawi (2010) admits, the situation of early varieties was maintained by the influx of Arabs from the Peninsula. It seems reasonable that the further from the Peninsula a variety was, the fewer Arabs from the Peninsula would participate in this maintenance, expediting the loss of features.

Third, given this account and its predictions, it follows that varieties outside the Peninsula which have more features of agreement or use dAgr must be, at some level, borrowing the usage from MSA. Herin & Al-Wer (2013) have observed that young speakers of Salti Arabic are abandoning their traditional agreement system in favor of an MSA-like system. Owens & Bani-Yasin (1987) also found interference from MSA in agreement, although in this study, they find it to be lexically based. These studies suggest one possible path MAV could have taken to become MSA-like, but they do not require that this is the only path there.

This account stems from the assumption that there was a simplification that occurred, separating the ancestor of MAVs from the ancestor of MSA. However, this assumption can and has been challenged. Challenging this assumption leads to different predictions.

2.2. RETENTION. In contrast to the simplification account proposed by Al-Sharkawi and Versteegh, Bettega & D'Anna (2022) argue that MAV have maintained dAgr, independently from MSA. Their claim is that while some MAV have lost dAgr, this development is due to recent urbanization. As such, many varieties still have vestiges of this prior system for dAgr.

The old system of dAgr seems to be a system of individuation, as has been suggested by many authors, including Belnap (1991), Brustad (2000), and Bettega & D'Anna (2022). Belnap (1991) used statistical methods to explore the usage of agreement in Cairene Arabic. In his study, he explores many factors that could lead to agreement in the variety, including distance between the noun and verb, specificity, quantification, and others. His results pointed to what Brustad (2000) calls individuation. Individuation relates to the property of how groups are perceived. When a group is individuated, it is viewed as being made of different individuals, while a non-individuated group is seen as a group above the individuals. In Arabic, agreement has been reported as conveying this information, with dAgr being used for non-individuated groups (Brustad 2000).

Bettega & D'Anna (2022) believe that this individuation system is still present in most dialects and, thus, refute the assumption that there was a historical simplification. Rather, they claim that the loss of dAgr is a modern phenomenon. They argue that individuation is a useful distinction to make for people living in a rural or nomadic lifestyle. As speakers moved to urban centers, this distinction became less useful and was used more infrequently. Therefore, due to the migration to urban centers in the twentieth century, children are hearing the system in use less and, thus, are acquiring it imperfectly or not at all.

This account makes one major claim about synchronic MAVs: dAgr should still show the ef-

fects of an individuation system. While MSA uses dAgr to mark non-human plurals, they trace this usage to the nineteenth century and argue that it was not followed in speech. The individuation system, however, is proposed to affect all nouns, both human and non-human. Therefore, we can posit that the usage of dAgr should be found both with human plurals and with non-human plurals as a remnant of the old system.

In the next section, I introduce the corpus used in this study, discuss how I cleaned the data, and examine whether this data is consistent with these accounts. In the simplification account, varieties simplified due to contact with non-Arabic speakers during the conquests, and then they complexified due to contact with MSA. This account yields a prediction that dialects further away from Arabia should utilize the fewest factors in selecting agreement. Further, it also predicts that when the systems are complex, they should mirror MSA. In the context of this study, we would predict that Doha's variety would rely on the most factors in selecting an agreement form since it is in Arabia and would have less pressure due to contact with non-Arabic speakers. By contrast, varieties from Rabat and Tunis might be expected to rely on the fewest factors due to their extensive history of contact. Since the account expects modern varieties to mirror MSA, we should expect that when dAgr arises, it should only appear with a non-human plural subject or collectives. The retention account would predict that agreement in the modern varieties is more complex than agreement in MSA. The prediction is that modern systems likely would still show some effects of the individuation system proposed by Bettega & D'Anna (2022). In particular, dAgr should appear with both human and non-human subjects. Further, we would not expect to find an areal-based effect of agreement as was predicted in the simplification account.

3. A corpus study of Arabic agreement. This study uses a multi-dialectal parallel corpus in order to explore agreement variations in MSA as well as in the varieties spoken in five cities: Beirut, Cairo, Doha, Rabat, and Tunis. By keeping meanings constant, this corpus can allow us to understand how the agreement systems found in different varieties differ in similar environments.

3.1. METHODS. To evaluate these accounts, I annotated third-person verbal sentences from the MADAR parallel corpus-6 from Bouamor et al. (2018) for information relevant to agreement.⁷ MADAR parallel corpus-6 includes 12,000 sentences each from five dialects (Beirut, Cairo, Doha, Rabat, Tunis) and MSA. To create this corpus, Bouamor et al. asked translators to translate English or French sentences into their native dialect. They took these sentences from the Basic Traveling Expression Corpus (Takezawa et al. 2007). Translators were explicitly asked to avoid code-switching and to represent the meaning of the source sentence precisely. MSA was not used as a starting point to avoid influence from this variety (Bouamor et al. 2018).

The MSA data was cleaned to remove sentences which were not well suited to the present study. Namely, sentences were removed if they were not third-person, did not contain a subject noun, or did not contain a verb. Nine hundred thirty-one sentences remained in the MSA data. These sentences were used to make subsets of the dialect data, which were cleaned in the same way as the MSA data. I removed sentences with singular subjects because they verbs were reliably determined based on the nominal gender of the subject. Table 1 shows the total number of sentences in each variety.

These remaining sentences were coded for nominal and verbal gender and number, as well

⁷ The MADAR corpus also includes corpus-26 with 25 dialects and MSA. However, there are fewer sentences for each dialect. After removing sentences which were not suited to the present study, too few sentences remained. Thus, MADAR corpus-6, with fewer dialects but more sentences, was used.

Variety	Number of Sentences
MSA	81
Beirut	77
Cairo	86
Doha	82
Rabat	81
Tunis	74

Table 1. The number of plural sentences in the final analysis for each variety.

as whether the noun was human. Verbal gender and number were easily identified by their morphology. Nominal features were more difficult, especially in the dialects. Where possible, nominal morphology was used to determine the features. However, especially with borrowings, using nominal morphology was not always possible. In these cases, dictionaries were consulted (Lane & Lane-Poole 1955; Wehr 1979). If the dictionaries did not contain the word, the last case scenario was to use the internet to find the word being used by native speakers, normally on Twitter. Unlike the other nominal features, humanity was determined based on the noun's meaning. Other features such as sentence order (SVO, VSO), verbal tense/aspect (present, past), and plural morphology type (broken, sound) were also recorded, but these factors did not play a major role in the final analysis.

3.2. MSA EXHIBITS DAGR. DAGr is best understood in MSA. In MSA, dAgr occurs when the subject is non-human. The data shows that this rule is strongly found in MSA. Because it is clearly seen in MSA, we can use MSA as a baseline against which we can compare the other MAVs.

In Figure 1, the left column displays the features of the noun. Namely, it shows whether the noun referred to a human or not. The right column provides the verbal features, both number and gender. The alluvia (i.e., the distinct streams flowing between the left and right columns) show the relationship between those two columns. To put it another way, the alluvia show which nouns appeared with which type of verb. The alluvia are colored to show the gender of the noun.

The big upward “swoop” from non-human nouns to feminine singular verbs represents dAgr. Remember that MSA's prescriptive rule requires that non-human plural nouns appear with dAgr. This data exemplifies this rule. We can see that most of the plural non-human nouns participate in this pattern (n=38; 86.4% of non-human nouns). The human nouns, by contrast, appear with plural verbs of their gender (n=20; 54.1% of human nouns). We can see a large portion of masculine human nouns appearing with masculine singular verbs (n=13; 40.6% of masculine human nouns); however, this pattern can be explained by another rule in MSA,⁸ so I ignore it here. Given the prescriptive rules of MSA, these results are as expected. Almost all non-human nouns appear with feminine singular verbs (n=38; 86.4% of non-human nouns), while human nouns appear with verbs that match them in gender (n=34; 91.9% of human nouns). While there are nouns that appear with unexpected verb forms, such as feminine plural nouns appearing with masculine sin-

⁸ This rule in MSA relates to the order of arguments in the sentence. If the verb precedes the noun, then the number of the verb is always singular despite the number of the noun. Hence, the human masculine plural nouns appear with masculine singular verbs. This rule could also explain the human, feminine plural nouns appearing with feminine singular verbs.

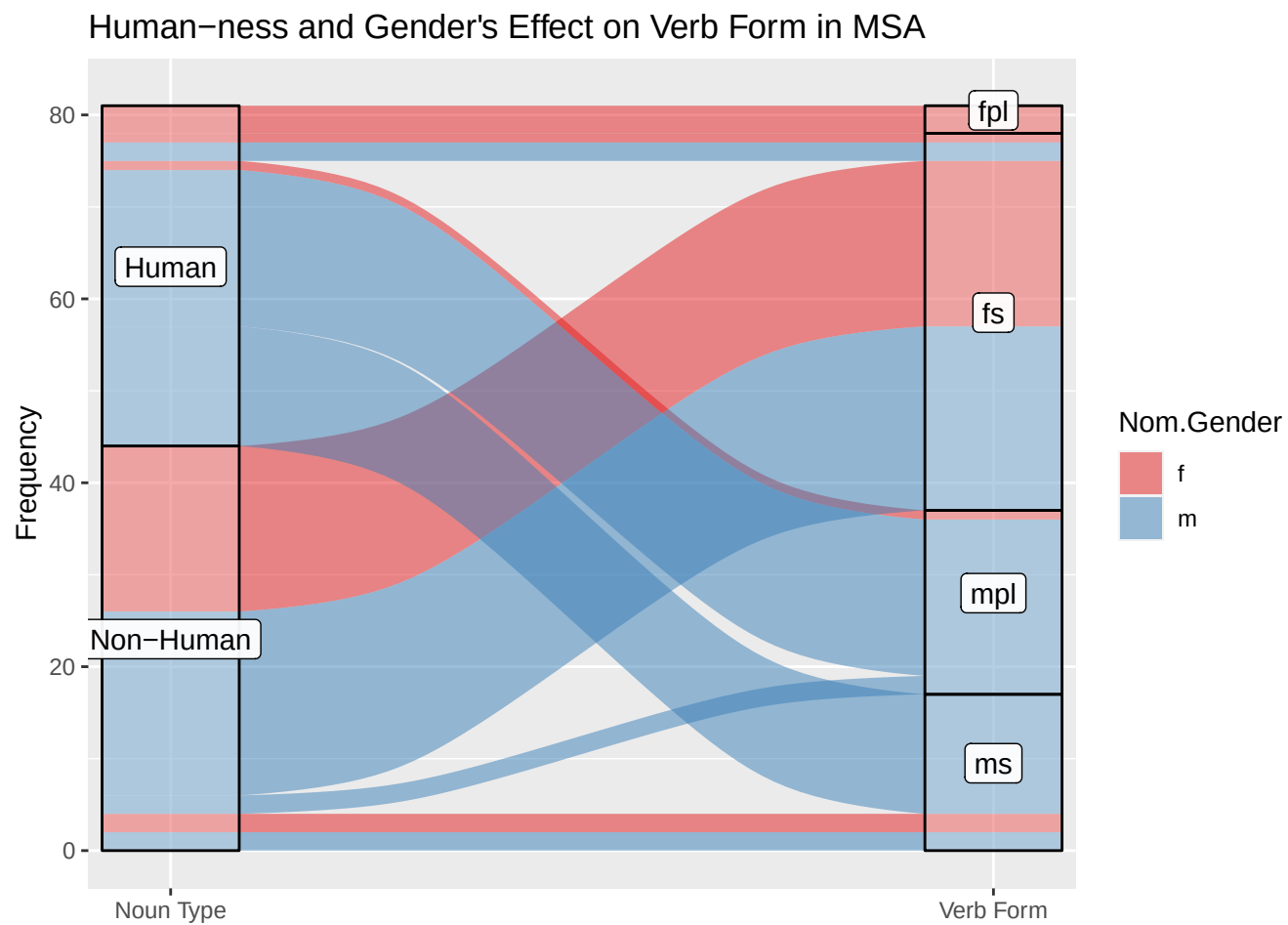


Figure 1. MSA Data for Plural Nouns.

Varieties being compared	Number of Sentences Compared	χ^2 (df, N)	p (sig. < 0.00333)
MSA & Beirut	67	27.89 (1, 134)	< 0.00001*
MSA & Cairo	73	2.53 (1, 146)	0.11176
MSA & Doha	70	16.23 (1, 140)	0.00006*
MSA & Rabat	69	41.24 (1, 138)	<0.00001*
MSA & Tunis	66	47.32 (1, 132)	< 0.00001*

Table 2. Results from chi-squared tests testing for independence of varieties and MSA.

gular verbs and human feminine plural nouns appearing with masculine plural verbs, these are in the minority (n=9; 11% of nouns).

3.3. CONTACT CANNOT BE THE SOLE FACTOR CAUSING DAGR. Remember, under borrowing accounts like Versteegh (1984) and Al-Sharkawi (2014), the prediction is that MAV usage of dAgr will mimic the agreement system of MSA because it was borrowed from MSA. They had, at some point in the past, lost dAgr. With increased education and contact with the formal language, speakers began to borrow dAgr into their language from MSA. Therefore, we should expect that dAgr would be used only with non-human nouns as it is in MSA. We can answer the question of similarity to MSA statistically.

Using a chi-squared test, I tested each variety for similarity to MSA and each other. Due to the assumptions of the test, I further reduced the number of sentences in the test so that the corpus was truly parallel. In these tests, I compared the usage of dAgr and masculine sAgr between varieties. In order to explore these forms, I was required to remove all sentences with singular subjects, resulting in the final number of sentences for each dialect shown in Table 1. The masculine singular and feminine plural forms were also dropped because their occurrences were too few to satisfy the assumptions of the test. Because of variation in translation, the dropping of singular subjects made the data unparallel, with some varieties having more plural subject sentences than others. To remedy this, I dropped sentences from each pair to parallelize the data and to ensure that the assumptions of the chi-squared test were satisfied. Significance was determined using a Bonferroni correction for the number of independent tests (n=15). The results from these tests for similarity to MSA are shown in Table 2.

The significant results in Table 2 show us which varieties are significantly different from each other. Thus, we can see that MSA is significantly different from all MAVs other than Cairo's.

Cairo's similarity to MSA is surprising because it conflicts with prior findings. Belnap (1991) found that Cairene Arabic relied on a system of individuation to determine the usage of dAgr. Yet, the distribution of agreement forms is not statistically different from MSA with a dAgr rule based on animacy. Remember that the retention account predicted that humans should also appear with dAgr. This was not seen in MSA, and Cairo displayed a similar distribution of agreement forms. While Grimm (2018) argues that individuation and animacy are related, we should be cautious about assuming that this relationship has remained constant over time. Based on Bettega & D'Anna (2022), dAgr was predicted to be used with human nouns as a part of an individuation system, and the similarity between MSA and Cairo does not support this prediction. However, the two accounts discussed here are not necessarily disjunctive, so we need to explore the loss-and-borrowing accounts. Versteegh (1984) and Al-Sharkawi (2014) believe that the MAVs should be wholly different from a language descended from Classical Arabic as opposed to their

Varieties being compared	χ^2 (df, N)	p (sig. < 0.00333)
Cairo & Beirut	17.08 (1, 158)	0.00004*
Cairo & Doha	7.48 (1, 164)	0.00625
Cairo & Rabat	28.64 (1, 163)	< 0.00001*
Cairo & Tunis	34.36 (1, 157)	< 0.00001*

Table 3. Results from chi-squared tests testing for independence of varieties and Cairo

proposed pidgin.⁹ Because they are wholly different and descended from a language with a simplified agreement system, then any use of dAgr must, in this case, stem from contact with MSA. Under this approach, this data is expected and might be able to support the loss-and-reborrowing account.

However, we should not be too quick to accept the account of Versteegh (1984) and Al-Sharkawi (2014). Their account predicts that there should be a distinction between varieties with dAgr and dialects without. This distinction would owe either to the source of the variety (foreigner talk or non-foreigner talk) or whether the variety borrows from MSA. The last set of statistical tests found a distinction that separates Cairo and MSA from the other MAVs. If this distinction supports their accounts, then Cairo should be different from the other MAVs either because only it borrows heavily from MSA or due to its origins. To test this claim, we can explore the other MAVs' similarity to Cairo. The results from these tests are shown in Table 3.

The significant results in Table 3 show us which varieties are significantly different from each other. Thus, we can see that Cairo is not significantly different from Doha's. Given that (a) no significant difference was detected between MSA and Cairo, (b) no significant difference was detected between Doha and Cairo, but (c) Doha is significantly different from MSA, we need a more nuanced explanation of the factors leading to dAgr in MAVs. While Doha's similarity to Cairo may be due to the influence of MSA, this contact cannot be the sole factor at play in the agreement system.

4. Discussion and conclusion. The above data suggests that we need to explore nuanced differences between MAVs. While it is clear that MSA uses human-ness as a key factor when determining agreement, this rule cannot explain all of the systems explored in this study. Cairo's system was not significantly different from MSA, and looking at Figure 2, we can see that it also relies on human-ness when determining agreement. In Cairo, we can see a system with a strong human-ness distinction. Non-human plurals almost always appear with dAgr, while human plurals almost always appear with sAgr. Again, this aligns with the rules of MSA very closely.

However, Doha's system was significantly different from MSA but not from Cairo's; see the data in Figure 3. In this diagram, we can see that very few human nouns appear with dAgr, but that dAgr mostly appears with non-human nouns. While Doha's use of agreement is different from MSA, the fact that dAgr appears only in the context of non-human plurals could suggest influence.

The results that suggest Cairo's system is not significantly different from MSA go against Bettenga & D'Anna (2022) and Belnap (1991)'s explanations. Meanwhile, the gradience exhibited by Doha makes it hard to explain the modern systems solely in terms of borrowing, like Versteegh (1984) and Al-Sharkawi (2014). Asking questions about the development of agreement in

⁹ The descent of MSA from Classical Arabic is also a contested notion but outside the scope of this project.

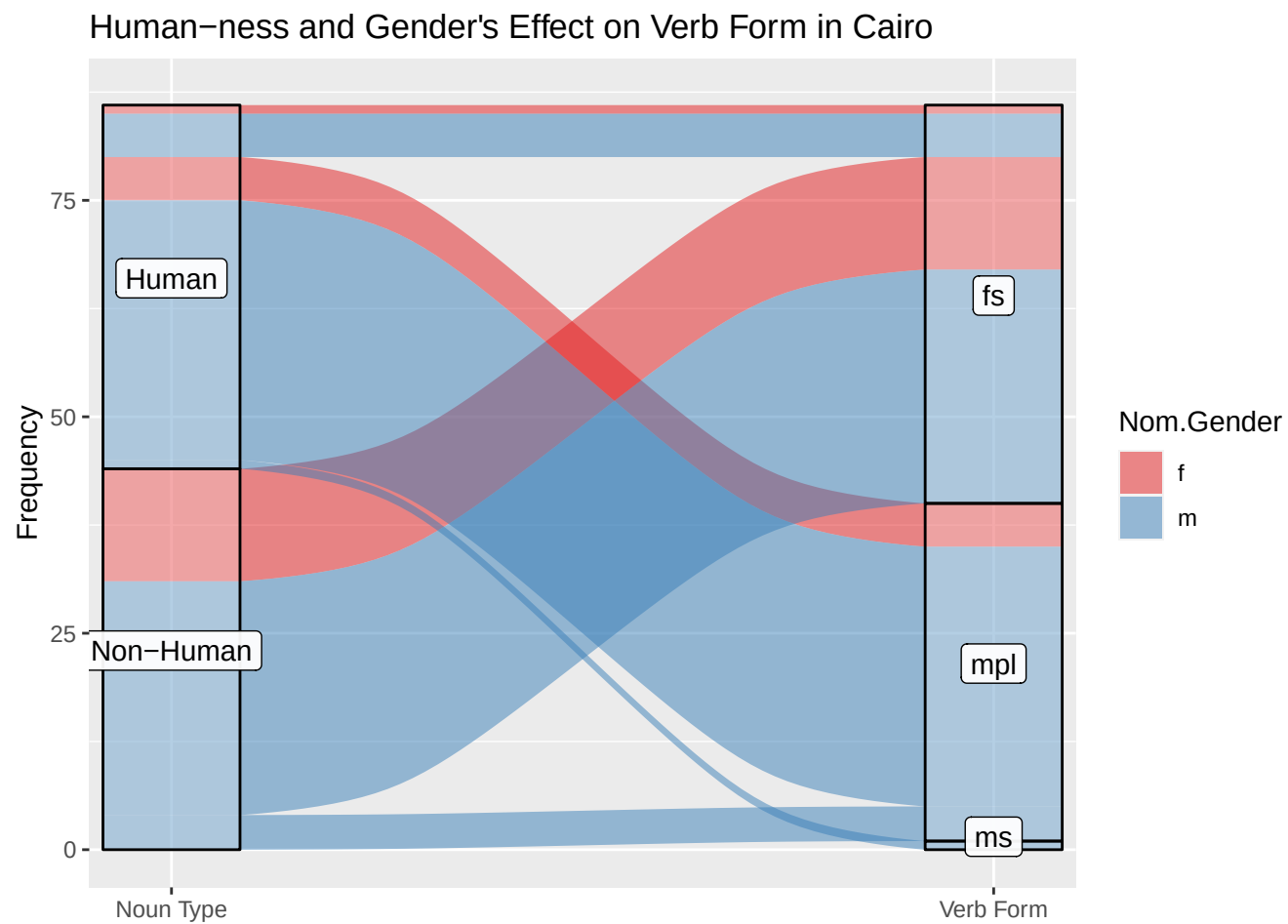


Figure 2. Cairo Data for Plural Nouns.

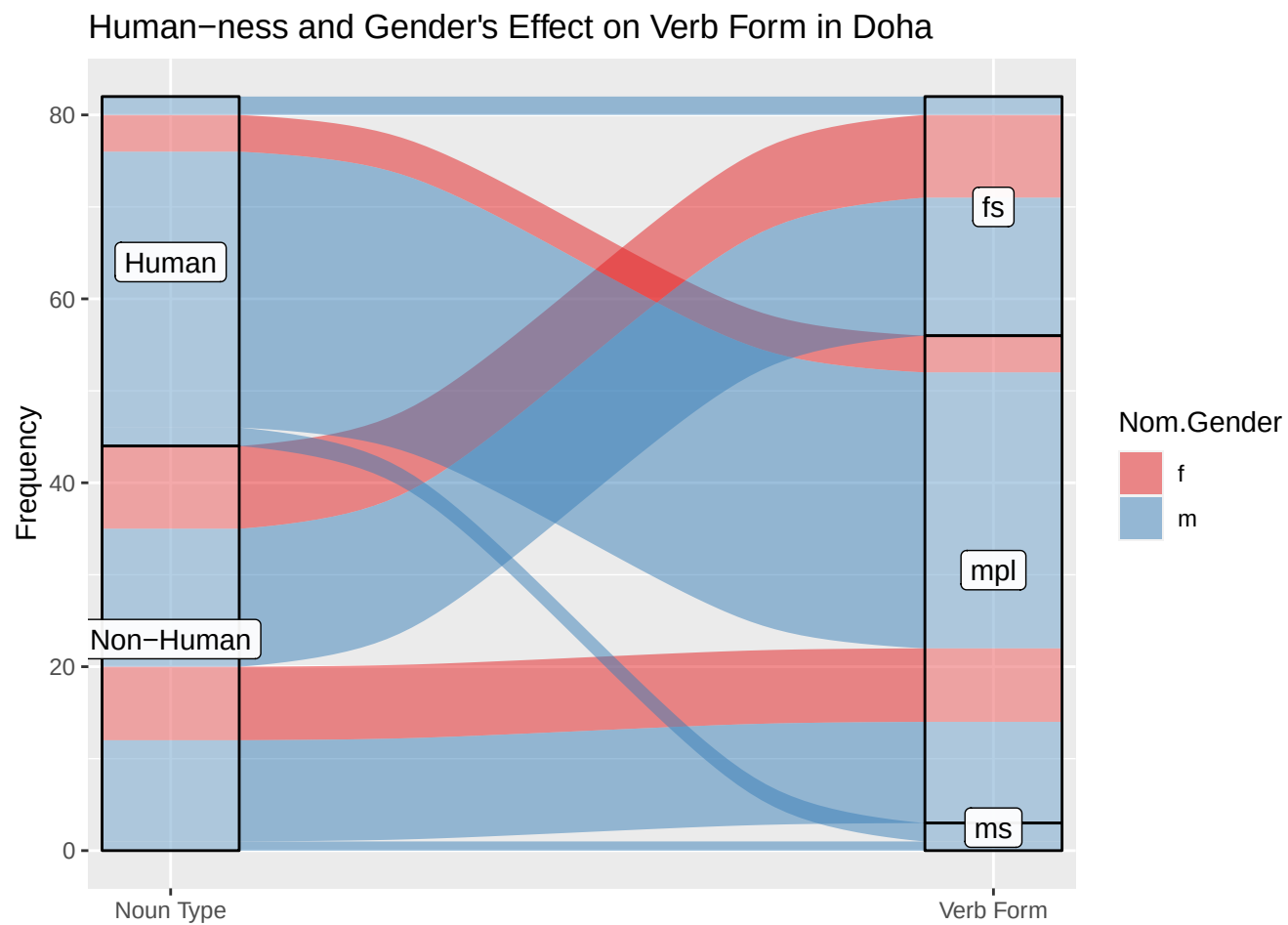


Figure 3. Doha Data for Plural Nouns.

MAVs is unfeasible because we do not understand what factors are actually at play in the MAVs. While Doha was found to be different from MSA, the present methods did not suggest how they differ. Finer-grained analyses would help explore this difference.

This paper used a parallel translation-based corpus to explore agreement variation in MAVs. Parallel corpora are extremely useful in exploring agreement systems because they let us compare data in the same concrete context rather than through abstract descriptions (Wälchi & Cysouw 2012). Abstract grammatical descriptions of MAVs may obscure agreement data because, as we see in this study, the factors affecting agreement are nuanced and context-dependent. This nuance can be explored in parallel corpora because they hold the context constant.

Some scholars like McEnery & Xiao (1999) have criticized the use of translation-based corpora because they do not represent the same kind of data as natively produced language. McEnery & Xiao (1999) found that a translated corpus and a native corpus were different in how they used aspect markers. Le Bruyn et al. (2022) have argued that this difference is more of an effect of corpus size than the nature of the corpus, and while they may not be exactly identical to native language, Wälchi & Cysouw (2012) argue that translation-based corpora are useful for comparison because they force the meaning to remain constant across varieties. While production tasks like storytelling are useful, they can interfere with comparison due to the grammatical and semantic variation introduced by the subjects.

Parallel translation-based corpora are useful for the study of MAVs for a few reasons. Because of diglossia, few texts are written in MAVs as MSA is used for writing official texts. This situation makes it hard to compare grammatical features like agreement because primary language data must be elicited, as opposed to a language that is written and can be obtained more naturally.

Future work can proceed in multiple directions. Firstly, the corpus used in this study was not ideal because of the sparse usable data from a few dialects. As Le Bruyn et al. (2022) note, the size of the corpus affects its reliability. A better parallel corpus could be created focusing on agreement forms, providing more usable data from more dialects. This expansion would help us to understand variation across dialects better. Second, questions are still open about what factors play a role in certain dialects, like Doha. Under this banner, we need to explore the variation that exists within the dialects. For each dialect, we can explore proposed rules for agreement and test whether they predict the data. Regardless of the approach, agreement in MAVs offers a fertile ground for future research, and parallel corpora can help facilitate it.

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