Plural Gender: Behavioral evidence for plural as a value of Cushitic gender with reference to Konso
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CHAPTER 5

5. Bound gender-marked morphemes are selected competitively: evidence from simple picture naming tasks in Konso

A version of this chapter is in preparation for publication as:

Tsegaye, M. T., Mous, M., & Schiller, N. O. (in preparation). *Bound gender-marked morphemes are selected competitively: evidence from simple picture naming tasks in Konso (East Cushitic).*

Abstract

In two experiments in Konso, we examined whether selecting bound gender-marked morphemes involve competitive processing mechanisms. Participants named pictures of one or two objects by producing a single-reference or a multiple-reference gender-marked utterance and a bare noun (control experiment). In Konso single-reference and multiple-reference utterances, bound gender-marked morphemes converge for nouns of plural gender and diverge for nouns of masculine and feminine gender. We found gender by number interactions in gender-marked utterances but not in bare noun productions. The results also showed a cost effect for multiple-reference trials when single-reference and multiple-reference gender-marked suffixes differ. This was the case when the occurrence of bound gender-marked morphemes was equally often (Experiment 1a). When the proportion of responses with the converging forms increased to two thirds of the trials, this cost effect disappeared and turned into a benefit effect for multiple-reference trials that have identical suffixes in single-reference and multiple-reference utterances (Experiments 2a & 2b). These patterns of results suggest that bound gender-marked morphemes in Konso are selected in a competitive fashion.

5.1. Introduction

How do people select bound morphemes (such as gender-marked suffixes) during speech production? The selection mechanism of bound gender-marked morphemes has been a main issue of debate in recent works of speech production (Jescheniak, Schriefers, & Lemhöfer, 2014; Janssen, Schiller, & Alario, 2014). There are two competing models that account for the selection mechanism of bound gender-marked morphemes in speech production. First, the *competitive selection model*, in which case a competitive processing mechanism may play a role in selecting bound gender-marked morphemes similarly to freestanding gender-marked morphemes (Schrefers, 1993; Schriefers, Jescheniak, & Hantsch, 2005; Lemhöfer, Schriefers, & Jescheniak, 2006; Bordag & Pechmann, 2008; Jescheniak et al., 2014). The basic assumption of the competitive model is that activating a target utterance also activates competitors, and the activation of these competitors prolongs the selection time of the target utterance (Jescheniak et al., 2014). Second, the *noncompetitive selection model*, in which a competitive processing mechanism may not play a role during the selection of bound gender-marked morphemes unlike freestanding morphemes, which are subjected to competitive processes (Schiller & Caramazza, 2003; Costa, Kovacis, Fedorenko, & Caramazza, 2003; Schiller & Costa, 2006). Janssen et al. (2014) further propose a noncompetitive selection mechanism for all closed class items including freestanding morphemes and bound morphemes. The noncompetitive model assumes that the selection times of a target utterance rely only on the activation level of the target itself, and not the activation level of other competitors (Janssen et al., 2014). The present study investigated which of these contending models accounts for the production of gender-marked suffixes in Konso, a Cushitic language of Ethiopia.

The above-mentioned two models are based mainly on studies that employed the picture-word interference (PWI) paradigm (Schriefers, 1993; Schiller & Caramazza, 2003; Costa et al., 2003; Schiller & Costa, 2006; Bordag & Pechmann, 2008) and the simple picture naming task (Schriefers, Jescheniak, & Hantsch, 2005; Lemhöfer et al., 2006; Jescheniak et al., 2014; Janssen et al., 2014). In the picture-word interference (PWI) task, participants name a picture while disregarding a distractor word, which accompanied the target picture. PWI studies stresses on the gender congruency effect: naming latencies should be faster when a distractor word and a target picture name match in gender compared to when they do not match. Schriefers (1993) revealed the gender congruency effect for the first time in his study on Dutch noun phrase (NP) naming. Schriefers also examined whether the processing of bound gender-marked morphemes follows a competitive manner. He obtained a gender congruency effect in naming noun phrases that consisted of an adjective with a gender-marked suffix and a noun (e.g. *rode*$_{\text{COM}}$ *tafel*$_{\text{COM}}$ ‘red table’; *rood*$_{\text{N}}$ *huis*$_{\text{N}}$ ‘red house’, Experiment 2). Schriefers interpreted this result as an indication of lexical competition that contained the naming of bound gender-marked morphemes (in this case adjective suffixes). In other words, the effect resulted from competition in selecting bound gender-marked morphemes. Target noun and distractor noun activate one and the same adjective-suffix form when they match in gender whereas they activate different forms when they do not match in gender. As a result, naming latencies in the later condition are prolonged since the selection between two different gender-marked adjective-suffix forms demands additional time. Bordag and Pechmann's (2008) study on Czech speakers reported a gender congruency effect in a gender-marked ordinal number (a bound morpheme) and noun production as well. This result provides further evidence for involving competition in selecting bound gender-marked morphemes.

Schiller and Caramazza (2003), however, did not observe a congruency effect in the naming of bound morphemes either in Dutch or in German. Note that Schiller and Caramazza obtained a congruency effect in the naming of freestanding morphemes (a gender-marked determiner in DET + N or DET + ADJ + N format) both in Dutch and in German (for similar findings see Costa et al., 2003, in Croatian; Schiller & Costa, 2006, in German). The absence of a gender congruency effect involving bound morphemes in these studies indicates that selecting bound morphemes may follow a non-competitive manner (Schiller & Caramazza, 2003; Costa et al., 2003; Schiller & Costa, 2006). The contrasting evidence regarding the selection of gender-marked bound morphemes entails the need for a more direct and focused study.

In this regard, Schriefers et al. (2005) applied the so-called simple picture naming (SPN) task in German to examine if selecting bound morphemes follows competitive processing. The SPN task is a naming task of one or two identical pictures without involving distractor words (Schriefers et al., 2002). According to Schriefers et al. (2002), there are two main advantages for employing this task over the picture-word interference (PWI) task that involve the to be ignored distractor word. First, no distractor related comprehension processes is involved since it is a pure speech production task. Second, no assumption is needed with respect to the activation of the distractor noun's gender nodes as well as the activation of the respective gender-marked elements and the relation of these elements with the retrieval processes of the target. Critically, in the SPN task, the relevant contrasts involve between-item comparisons since different nouns with different gender classes or pictures representing one versus two objects have to be used. To control this constraint, Schriefers et al. included a bare noun naming experiment in which participants named the same set of stimuli by producing single-reference or multiple-reference (plural number) bare nouns instead of gender-marked utterances4. The logic was if gender-marked elements are subject to competition, there should be gender by number interaction in gender-marked utterances but not in the bare noun naming. Thus the presence or absence of gender by number interaction is critical in SPN studies.

Using the SPN task, Schriefers et al. (2005) tested the naming of noun phrases with gender-marked size adjectives in German (Experiment 3). In German, there is a convergence for nouns of feminine gender and divergence for nouns of masculine and neuter gender. The inflectional morpheme *–e* is used for adjectives in single-reference with feminine gender and for all gender classes in multiple-reference. The inflectional morpheme *–er* is used for single-reference adjectives with masculine gender and *–es* for single-reference adjectives with neuter gender. Schriefers et al. obtained a gender by number interaction in the naming of noun phrases containing a gender-marked adjective and a noun but not in the bare

4 Janssen et al. (2014) provide a new approach to partial out idiosyncratic item effect, which is analyzing the number (single-reference vs. multiple-reference) by format (NP vs. bare noun) interactions for each gender class separately.

noun naming. This may suggest that bound morphemes are selected competitively. The authors observed a significant multiple-reference gain of 19 ms for feminine nouns, while the effect was -2 for masculine and it was 8 ms for neuter nouns (both of these effects were not significant). A multiple-reference gain for feminine nouns may be due to the fact that the single-reference noun and its multiple-reference form result in converging activation to the same multiple-reference form, leading to an easier selection of the appropriate determiner (Schriefers et al., 2005). Lemhöfer et al. (2006) replicated Schriefers' et al. finding in Dutch, in which they tested the naming of a gender-marked adjective and a noun. The effects were a significant multiple-reference gain of 26 ms for common gender and an insignificant 1 ms difference in the other direction for neuter gender. Note that, in Dutch, the single-reference and multiple-reference inflectional suffixes of common gender have identical form, which is *–e*. However, the single-reference inflectional suffix of neuter gender differs from the multiple-reference inflectional suffix, i.e. the null morpheme for single-reference and suffix *–e* for multiple-reference. We examined whether this gender by number interaction in gender-marked bound morpheme production could be replicated in Konso, a language where gender information is solely provided by a suffix (a bound morpheme).

However, deciding between the competitive and noncompetitive model requires further analyses on the shape of gender by number interactions (Janssen et al., 2014). This is because both models can account for the effect depending on the shapes of interactions. In other words, competitive and noncompetitive models predict different types of gender by number interactions in the production of utterances with bound gender-marked morphemes. A competitive model predicts a gender by number interaction with an extra cost in the production of multiple-reference trials for divergent forms in the single-reference and multiple-reference, i.e. a cost-type interaction (Janssen et al. 2014). A noncompetitive model, by contrast, predicts a gender by number interaction with a benefit in the production of multiple-reference trials for converging forms in the single-reference and multiple-reference, i.e. a benefit-type interaction (Janssen et al. 2014).

Therefore, the most important point regarding a competitive selection mechanism has to do with the presence or the absence of a cost effect in multiple-reference trials when the single-reference and multiple-reference gender-marked items have divergent forms (Jescheniak et al., 2014). The existing results, however, do not always show a multiple-reference cost effect when single-reference and multiple-reference gender-marked forms differ. For instance, in the Schriefers et al. (2005) study, there was a multiple-reference benefit for adjective plus noun naming (Experiment 3) with feminine nouns but no multiple-reference costs for the corresponding noun phrases with neuter and masculine nouns. Similarly, in Lemhöfer et al. (2006), there was a multiple-reference benefit for adjective plus noun naming with common gender nouns but no multiple-reference costs for the corresponding noun phrases with neuter nouns.

Jescheniak et al. (2014) argue that the presence or absence of a clear cost term might depend on the proportion with which the different gender-marked morphemes have to be used in the experiment. Besides, the visual distinction between single-reference and multiple-reference stimuli should be less noticeable. Thus, there would be multiple-reference costs for diverging single-reference and multiple-reference gender-marked forms when the proportion of gender-marked morphemes is at least balanced in the experiment. For instance, keeping the proportion of determiners equal, Schriefers et al. (2002) observed a multiple-reference cost in the naming of neuter gender nouns and a marginally significant multiple-reference cost in the naming of masculine nouns in German freestanding morpheme production (Experiment 1). Moreover, the naming latency difference between multiple-reference and single-reference trials was not significant for feminine nouns, for which single-reference and multiple-reference gender-marking morphemes are identical. In contrast, when the proportion of a gender-marked form (i.e. the form that is also used in multiple-reference utterances) is very high, there would be a multiple-reference gain for converging single-reference and multiple-reference gender-marked forms, and a reduced or no multiple-reference costs in the diverging forms. This was the case in Dutch NP production, when 75% of trials required the convergence form “de”, that is the determiner for common gender in the single-reference and for both common and neuter genders in multiple-reference trials (Lemhöfer et al., 2006). In the present study, we also examined whether varying the occurrence of the percentage of bound gender-marked morphemes could affect the shape of gender by number interaction.

Konso is a Lowland East Cushitic language and is spoken in the Southwest of Ethiopia by 250,000 people. Based on the subject agreement on the verb, Konso distinguishes three gender classes; namely masculine, feminine and “plural” gender (Orkaydo, 2013). Note that Konso and some other related Cushitic languages of East Africa have an interesting property that the value of the third gender category, in addition to masculine and feminine, is “plural”. The motivation to use the term plural as a value of gender in these languages comes from the fact that nouns in this class require plural agreement form even when they refer to single entities. In other words, nouns in the plural gender class behave as though they were plural by requiring a plural agreement form and hence this category is often named *plural gender* in many studies on Cushitic languages (e.g. Hayward, 1979, for Bayso, but see also Corbett & Hayward, 1987; Pillinger & Galboran, 1999, for Rendille; Savà, 2005, for Ts'amakko; Mous, 1993, 2008, for Iraqw; Orkaydo, 2013, for Konso). 5

Bound gender-marked morphemes in Konso are *–siʔ* and *–siniʔ* on definite nouns, and *–t*, *–ay* and *–n* on verbs. In Konso, the gender-marked suffix associated with plural gender nouns plays a similar role as the feminine gender in German and as the common gender in Dutch. German and Dutch are languages in which the relevant studies have been conducted (e.g. Schriefers et al., 2005; Lemhöfer et al., 2006). Konso's gender-inflected definite markers on nouns and gender markers on verbs are identical for one gender class in the single-reference and multiple-reference, but differ for the other gender classes. Thus, Konso has two different definite markers in the single-reference definite nouns (*–siniʔ* for plural gender, and *–siʔ* for non-plural gender). By contrast, there is only one form for all multiple-reference definite nouns (i.e., *–siniʔ*), which corresponds to the form of plural gender in the single-reference definite nouns. In the subject agreement on the verb, Konso has three different gender-

5 To avoid confusion with the use of plural as a value of gender, we will consistently use the terms 'single-reference' to refer to the number values representing single reference nouns (singular number) and 'multiple-reference' to refer to the number values representing multiple reference nouns (plural number), following Hayward (1981, 2004) and Mous (2008).

marking suffixes in the single-reference: *–t* for feminine, *–ay* for masculine, and *–n* for plural gender. However, there is only one verb ending (*–n*) for all in the multiple-reference trials, which corresponds with that of plural gender of the single-reference. The present research investigates whether bound gender-marked morphemes are processed competitively in Konso.

We expect to replicate the results reported in Schriefers et al. (2005) and Lemhöfer et al. (2006) with a different experimental setting in a different language. The aim of the present study, therefore, was to investigate whether the proposal made by Schriefers et al. (2005) and Lemhöfer et al. (2006) on bound gender-marked production is replicable beyond West Germanic languages. To this end, we conducted two experiments involving native Konso participants in their home area. In Experiment 1a, definite noun naming, participants responded to pictures by producing single-reference and multiple-reference definite nouns. We also had a control experiment, a bare noun naming (Experiment 1b), using the same material as Experiment 1a. In Experiment 2a, overt subject sentence naming, participants responded to pictures by producing single-reference and multiple-reference sentences with overt subjects. In Experiment 2b, null subject sentence naming, participants responded to pictures by producing single-reference and multiple-reference sentences with null subjects (only gender-marked verbs). Experiment 2c, bare noun naming, served as a control experiment for Experiments 2a and 2b.

In the present study, the frequency of occurrences of gender-marked suffixes is varied between Experiments 1 and 2. In Experiment 1a, the percentage of bound gender-marking morphemes were kept equal (50% of trials require *–siʔ* and the other 50% require

–siniʔ), which led to higher percentage of single-reference trials (66.67%). However, in Experiments 2a and 2b, the percentage of single-reference and multiple-reference trials is kept equal (50% each), which led to higher percentage (66.67%) of trials with a converging form in single-reference and multiple-reference condition, that is trials that require *–n* morpheme, the suffix for plural gender and for all trials in the multiple-reference.

In our Experiment 1a, where the proportion of gender-marked definite forms is balanced, we predicted a gender by number interaction with multiple-reference costs for diverging gender-marked forms in single-reference and multiple-reference trials, which corresponds to the form of non-plural gender. By contrast, in our Experiments 2a and 2b, where the proportion of trials with *–n* morpheme is higher, there should be a gain in the multiple-reference utterances for the plural gender but a reduced or no cost for masculine and feminine genders. Such results would go with the prediction of the competitive selection model rather than the noncompetitive model.

5.2. Experiment 1a: Definite noun naming

In Experiment 1a, participants named one or two target objects by producing either a single-reference definite noun or a multiple-reference definite noun. In Konso, single-reference definite nouns are gender-marked (e.g., *furaa-siniʔ* /key.P-DEF.P/ 'The key' vs. *kuta-siʔ* /dog.M-DEF.M/F/ 'The dog'), but not multiple-reference definite nouns. All multiple-reference definite nouns take *–siniʔ*, which corresponds to the single-reference definite suffix for nouns of plural gender, (e.g. *furaa-ɗɗaa-siniʔ* /key.P-MULT-DEF.P/ 'The keys' vs. *kuta-ɗɗaa-siniʔ* /dog.M- MULT-DEF.P/ 'The dogs').

Method

Participants

Twenty-one students, native speakers of Konso from Karat High School, Konso, Ethiopia, participated in the experiment. In all experiments described in the present study, participants were paid in exchange for their participation in the experiment. They had no known hearing deficit, and they had normal vision.

Materials

Sixteen pictures corresponding to non-derived Konso nouns were selected for naming. A single instance of a picture was presented during single-reference picture naming condition whereas two instances of a picture were presented side by side during multiple-reference picture naming condition. For instance, following the presentation of a single "key" in one trial (single-reference picture naming condition), participants instructed to produce *furasiniʔ* 'the key' but they should produce *furaddasiniʔ* 'the keys' when two pictures of a key were presented side by side in another trial (multiple-reference picture naming condition). The complete list of target pictures can be found in Appendix A. Pictures were simple black line drawings of everyday objects presented on a white background.

Each experimental picture occurred once in the single-reference and once in the multiple-reference picture naming condition, producing the following distribution of definite suffixes: eight occurrences of *–siʔ*, and 24 occurrences of *–siniʔ* (eight occurrences of *–siniʔ* from single-reference definite noun with plural gender and 16 occurrences of *–siniʔ* from all multiple-reference definite nouns). To equate the probability of occurrence for the two definite suffixes, we added another eight filler items with names of non-plural gender that require *–siʔ* as their definite suffix. Each of these filler items occurred twice in single-reference picture naming condition. As a result, both definite suffixes occurred equally often for the whole set of items, which is 24 times each.

Design

There were two crossed variables: the two-level variable gender (plural vs. non-plural gender) and the two-level variable number (single-reference vs. multiple-reference). Both variables were tested within participants. Gender was tested between items, and number was tested within items. Each participant received each of the 16 experimental pictures exactly once in the single-reference and once in the multiple-reference picture naming condition, resulting in 32 experimental trials. The 32 experimental trials were intermixed with the filler trials. The trials were pseudo-randomized so that there were no more than three successive items from the same gender and number classes, and no subsequent items were related semantically or phonologically.

Procedure

Each participant was tested individually. The visual stimuli were presented centered on a 15.6-in. laptop computer. Viewing distance was approximately 60 cm. On each trial, a fixation point (a plus sign) appeared for 500 ms followed by the picture. Participants were informed to focus at the fixation point and to name the target picture as quickly and as accurately as possible with the appropriate definite noun in Konso. Pictures disappeared from the screen soon after a response was provided and the voice key was triggered. Then, the next trial was started instantaneously. When no response was recorded within two seconds, the next trial was also started immediately. The response was counted as erroneous when the voice key was triggered unintentionally, when an incorrect gender-marked suffix or incorrect picture name was used, or when the response contained a speech error or it exceeded the deadline of two seconds. Erroneous responses were not included in the statistical tests of naming latencies. The E-prime software package was used for designing and presentation of trial sequences, and a voice key, which was connected to the computer via a serial response box, was used to measure the naming latencies from the onset of the picture to the first utterance. Before the main experimental session started, participants previewed and studied each picture with their intended names.

Results and discussion

Erroneous observations were discarded from the following reaction time analyses. Recall that observations were considered as erroneous when a picture was named using another label or when a non-speech sound preceded the target utterance that triggered the voice key or when a dysfluency was made or an utterance was mended. Observations with naming latencies smaller than 350 ms and longer than 1,500 ms were counted as outliers and discarded from the analyses of naming latencies. According to these criteria, 75 observations (11.2%) were marked as erroneous and 33 observations (4.9%) as outliers.

Averaged naming latencies were analyzed using analyses of variance (ANOVAs), which involved the variable number (single-reference vs. multiple-reference) and gender (plural vs. non-plural). Two separate analyses were carried out; one for participants (F1) and the other for items (F2).

Table 25 displays mean naming latencies and error rates for the experimental trials, categorized by number and gender class. Multiple-reference definite nouns were produced slower than single-reference definite nouns (922 ms vs. 900 ms). This 22 ms difference, however, was not significant (both *F*s < 2). Plural gender definite nouns were named faster than non-plural gender definite nouns (895 vs. 928 ms) and this 33 ms difference was reliable in the participant analysis of naming latencies, $F_1(1, 20) = 4.76$, $p < .04$; $F_2(1, 14) = 2.39$, $p < .14$.

Most important, in the analysis of naming latencies, the gender by number interaction was reliable, $F_1(1, 20) = 4.76$, p $< .04$; $F_2(1, 14) = 10.74$, $p < .006$. *T* tests revealed that the 81-ms naming latency difference between multiple-reference and single-reference for nouns of non-plural gender was significant in the item analysis and was marginally significant in the subject analysis, $t_1(20) = 1.92$, $p < .07$; $t_2(7) = 2.96$, $p < .02$. By contrast, the 36 ms difference in the opposite direction for nouns of plural gender was not significant (both *t*s < 2).

Table 25 Mean naming latencies (RTs) in ms and error rates in percentage (%e) by number and gender for definite noun naming

Number	Non-Plural		Plural		Mean	
	RTs	%e	RTs	%e	RTs	%e
Single-reference	854	4.5	946	6.8	900	5.7
Multiple-reference	936	7.7	910	3.3	922	5.5
Difference	81	3.3	-36	-3.6	22	-0.1

The significant gender by number interaction reveals that competition processes between gender-marked definite suffixes are involved in Konso. This result may support the view that the selection of gender-marked suffixes follows a competitive mechanism (Schriefers et al., 2005; Lemhöfer et al., 2006; Jescheniak et al., 2014). Before we arrive at this conclusion, we must first establish that the shape of results is certainly caused by competition between gender-marked definite suffixes and not by other differences between the items. This is because gender comparisons are between-item comparisons. To determine this, we conducted a control experiment using the same material as Experiment 1a, in which we compared the production of bare single-reference nouns with the production of bare multiple-reference nouns. Note that this experiment does not require the selection of gender-marked suffixes. If the observed gender by number interaction in Experiment 1a resulted from competition between gender-marked definite suffixes, this effect should not be present in the bare noun production experiment.

5.3. Experiment 1b: bare noun naming

Experiment 1b compared the production of bare single-reference nouns with the production of bare multiple-reference nouns, using the same materials and the same procedure as Experiment 1a. The aim of this experiment was to decide the source of the gender by number interaction obtained in Experiment 1a. In other words, there should be no gender by number interaction in Experiment 1b if the effect in Experiment 1a was due to competition between gender-marked definite suffixes. Note that no definite suffix selection was required in Experiment 1b.

Method

Participants

Twenty-one students from Karat High School took part in the experiment.

Materials

The materials were identical to those used in Experiment 1a.

Design

The design was identical to the one used in Experiment 1a.

Procedure

The procedure was the same as the one used in Experiment 1a, with the only exception being that in this experiment participants were instructed to produce single-reference bare nouns when only one of the objects was presented, and to produce multiple-reference bare nouns when two identical objects were presented side by side.

Results and discussion

The raw data were treated as in Experiment 1a. According to these criteria, 102 observations (13.5%) were marked as erroneous and 42 observations (5.5%) as outliers.

Table 26 displays mean naming latencies and error rates for the experimental trials, categorized by number and gender class. Multiple-reference nouns were produced significantly slower than single-reference nouns (942 vs. 828 ms), $F_1(1, 20) = 9.71$, $p < .005$; $F_2(1, 14) = 26.27$, $p < .0001$. The factor gender, however, was not significant (both Fs < 2). Most important, in contrast to Experiment 1a, there was no gender by number interaction, (both Fs < 1).

Table 26 Mean naming latencies (RTs) in ms and error rates in percentage (%e) by number and gender for bare noun naming

Number	Non-Plural		Plural		Mean	
	RTs	%e	RTs	%e	RTs	%e
Single-reference	810	13.7	847	13.2	828	13.5
Multiple-reference	939	12.2	945	14.7	942	13.5
Difference	129	-1.5	98	1.5	114	0.0

The absence of gender by number interaction in Experiment 1b may indicate that the corresponding interaction effect in Experiment 1a was due to competition between the two definite suffixes. However, recall that Jescheniak et al. (2014) argue that the most crucial point for a competitive selection mechanism is the presence or the absence of multiple-reference costs in situations where single-reference and multiple-reference gender-marked items have divergent forms. In Experiment 1a, we observed a benefit of 36 ms in multiple-reference for the definite nouns with plural gender and multiple-reference cost of 81 ms for the corresponding definite noun naming with non-plural gender nouns. The multiple-reference benefit for the definite nouns with plural gender was not significant. Crucially, however, the multiple-reference cost for definite noun naming with non-plural gender was significant. Jescheniak et al. (2014) also propose that the presence or absence of a clear cost term might depend on the proportion with which the different gender-marked morphemes have to be used in the experiment. They predict that multiple-reference costs for diverging forms in single-reference and multiple-reference trials when the proportion of gender-marked forms is at least balanced in the experiment. In support of this prediction, with equal percentage of bound morphemes in Experiment 1a, we found gender by number interaction with multiple-reference costs for non-plural gender definite nouns. In non-plural gender definite nouns, *–siʔ* in the single-reference and *–siniʔ* in the multiple-reference were used as definite suffixes.

Note that in Experiment 1a, the proportion with which the gender-marked definite suffixes used was kept equal (50% each). This was done to examine the prediction that there would be multiple-reference costs for diverging single-reference and multiple-reference gender-marked forms when the percentage of gender-marked morphemes is at least kept equal in the experiment (Jescheniak et al., 2014). With the addition of filler trials, each definite suffix occurred equally often, i.e. 24 times. The addition of filler trials to balance the frequency of occurrence of the two definite suffixes presumably affected the balance of the occurrence of single-reference and multiple-reference definite nouns. The resulting distribution of occurrence within the main and the filler trials were 66.67% for single-reference and the remaining 33.33% for multiple-reference trials. This may lead one to argue that the observed results in Experiment 1a were due to the predominance of single-reference trials. Noticeably, it is not possible to counterbalance the occurrence of gender-marked forms with that of the occurrence of single-reference and multiple-reference trials within a single experiment. As a result, we conducted Experiment 2 that controlled the proportion of single-reference and multiple-reference trials rather than the proportion of different gender-marked suffixes.

5.4. Experiment 2a: Overt subject sentence naming

In Experiment 2a, participants named one or two target objects by producing either single-reference or multiple-reference sentences with overt subject. As stated earlier, in overt subject single-reference sentences, Konso marks the three gender classes (feminine, masculine and plural gender) in the subject inflection on the verb (Orkaydo, 2013). Accordingly, feminine nouns require the same agreement form as the third person female subject, marked by the suffix *–t* (e.g. *lafta-siʔ i=akk-am-t-i* /bone-DEF.M/F 3=show-PAS-3F-PF/ ‘The bone was shown’). Masculine nouns require the same agreement form as the third person male subject, marked by the suffix *–ay* (e.g. *ɗoyra-siʔ i=akk-am-**ay*** /tree-DEF.M/F 3=show-PAS-PF.3M/ 'The tree was shown'). Plural gender nouns require the same agreement form as the third person multiple-reference subject, marked by the suffix *–n* (e.g. *kosaa-siniʔ i=akk-am-i-**n*** /granary-DEF.P 3=show-PAS-PF-3**P**/ 'The granary was shown'). In Konso, all multiple-reference sentences require the suffix *–n* on the verb, which corresponds to the plural gender suffix in single-reference sentences (e.g. *kuta-ɗɗaa-siniʔ i=akk-am-i-**n*** /dog.M-MULT-DEF.P 3=show-PAS-PF-3**P** / 'The dogs were shown').

Method

Participants

Twenty native speakers of Konso, students from Karat High School, took part in the experiment.

Materials

We used line drawings of 21 different objects that each one has unambiguous name, and an equal number of line drawings of objects that have names with masculine, feminine, and plural gender. The complete list of target pictures can be found in Appendix B.

Every picture appeared once in the single-reference and once in the multiple-reference picture naming condition, which produces 7 appearances of *–t*, 7 appearances of *–ay*, and 28 appearances of *–n* (7 appearances of *–n* from single-reference picture naming condition with plural gender nouns and 21 of *–n* from the multiple-reference picture naming condition of all).

Design

There were two crossed variables: the three-level variable gender (feminine vs. masculine vs. plural gender) and the two-level variable number (single-reference vs. multiple-reference). Both variables were tested within participants. Gender was tested between items, and number was tested within items. Each participant received each of the 21 experimental pictures exactly once in the single-reference picture naming condition and once in the multiple-reference picture naming condition, resulting in 42 experimental trials. Moreover, successive repetitions of an object were avoided by intervening trials; semantically or phonologically related objects did not appear in continuous trials; and no more than three trials from the same gender or number class appeared in a row.

Procedure

The procedure was the same as the one used in Experiment 1a with the exception of utterance format. In Experiment 2a, participants were instructed to respond to a picture by producing a sentence with overt subject (subject [name of the picture] + a verb with a gender-marked suffix [*iakkam*-M/F/P suffix] 'was/were shown'). For example, participants would produce *irrootasiʔ iakkamti* 'The mountain was shown' when a picture of a mountain appears on the screen in the single-reference picture naming condition. However, they would produce *irrootadɗasiniʔ iakkamin* 'The mountains were shown' when two identical pictures of a mountain were presented side by side in the multiple-reference picture naming condition.

Results and discussion

To analyze the raw data, similar criteria as the one used in Experiment 1a were employed. Thus, 155 observations (18.4%) were marked as erroneous, and 12 observations (1.4%) were marked as outliers in Experiment 2a.

Table 27 displays mean naming latencies and error rates, categorized by number and gender. Participants were faster in the multiple-reference condition (869 ms) than in the single-reference condition (893 ms). This effect of number on naming latencies did not reach significance, $F_1(1, 19) = .69$, $p < .42$; $F_2(1, 18) = 3.08$, $p < .096$. However, the single-reference condition (7.9%) yielded a significantly higher error rate than did the multiple-reference condition (4.4%), $F_1(1, 19) = 21.81$, $p < .0001$; $F_2(1, 18) = 9.45$, $p < .007$. The effect of gender class on naming latencies was significance, $F_1(2, 38) = 7.74$, $p < .002$; $F_2(2, 18) = 12.24$, $p < .0001$. The effect of gender class on error rates was significant in the participant analysis, $F_1(2, 38) = 11.03$, $p < .0001$ but not significant in the item analysis, $F_2(2, 18) = 1.66$, $p < .22$. Most important, as in Experiment 1a, the gender by number interaction was significant both in the analyses of naming latencies, $F_1(2, 38) = 7.06$, $p < .002$; $F_2(2, 18) = 15.32$, $p < .0001$; and in the analyses of error rates, $F_1(2, 38) = 14.15$, $p < .0001$; $F_2(2, 18) = 4.15$, $p < .033$. *T* tests were computed to further analyze these interactions. For plural gender nouns, the 131 ms decrease in the multiple-reference was reliable, $t_1(19) = -3.11$, $p < .006$; $t_2(6) = -4.51$, $p < .004$. In the error rate analyses, the 7.9% decrease in the multiple-reference was also reliable $t_1(19) = -6.77$, $p < .0001$; $t_2(6) = -3.31$, $p < .016$. None of the other effects were reliable.

Table 27 Mean naming latencies (RTs) in ms and error rates in percentage (%e) by number and gender for overt subject sentence naming

Number	Feminine		Masculine		Plural		Mean	
	RTs	%e	RTs	%e	RTs	%e	RTs	%e
Single-reference	829	7.6	850	3.8	1001	12.1	893	7.9
Multiple-reference	872	5.7	865	3.3	870	4.3	869	4.4
Difference	43	-1.9	16	-0.5	-131	-7.9	-24	-3.4

Thus, having a higher proportion of responses with the suffix *–n* led to a multiple-reference gain for converging form and no multiple-reference costs in the diverging single-reference and multiple-reference gender-marked forms. There was a significant 131 ms gain and 7.9% fewer errors in the multiple-reference trials with the converging form, *–n* morpheme, which corresponds to the plural gender class. There were insignificant costs in the multiple-reference trials for the diverging single-reference and multiple-reference forms (*–ay* for masculine single-reference trials, *–t* for feminine single-reference trials and *–n* for all multiple-reference trials). Compared to the significant 81 ms multiple-reference cost for diverging forms in Experiment 1a, multiple-reference cost in Experiment 2a was reduced by 52 ms on average. The results of Experiment 2a confirm the prediction that with a higher proportion of gender-marked forms (the form that is also used in multiple-reference utterances), there would be a multiple-reference gain for converging gender-marked form, and a reduced multiple-reference cost in the diverging single-reference and multiple-reference forms (Jescheniak et al., 2014).

5.5. Experiment 2b: Null subject sentence naming

Experiment 2b was a replication of Experiment 2a with a different utterance format. In Experiment 2b, native Konso participants were asked to name a picture by producing sentence with null subject (only a verb with gender-marked suffixes [*iakkam*-M/F/P suffix] ‘was/were shown’). In Konso, omitting the overt subject is allowed and it can be understood from the gender agreement markers on the verb (Orkaydo, 2013, p. 60). For example, *i=akk-am-**t**-i* /3=show-PAS-3F-PF/ 'She was shown'; *i=akk-am-**ay*** /3=show-PAS-PF.3M/ 'he was shown'; *i=akk-am-i-**n*** /3=show-PAS-PF-3**P**/ 'They were shown'. As mentioned above, all multiple-reference sentences require the suffix *–n* on the verb, which corresponds to the plural gender suffix in single-reference sentences (e.g. *i=akk-am-i-**n*** /3=show-PAS-PF-3**P**/ 'They were shown'). Similar to the previous experiments, pictures could either appear as a single object (single-reference condition) or as two identical objects (multiple-reference condition).

Method

Participants

Eighteen students from the Karat High School took part in the experiment.

Materials and design

The materials and the design were identical to those used in Experiment 2a.

Procedure

The procedure were similar to those used in Experiment 2a with the exception of utterance format. In Experiment 2b, participants were requested to name pictures by producing a sentence with null subject rather than by producing a sentence with overt subject. For example, participants would produce *iakkam**ay*** 'He was shown' in response to the presentation of a picture of a single dog. However, they would produce *iakkami**n*** 'They were shown' when two identical pictures of a dog were presented on a different trial.

Results and discussion

The raw data were treated the same as in Experiment 1a. According to these criteria, 118 observations (15.6%) were marked as erroneous and all observations were between the naming latencies of 350 ms and 1,500 ms.

Table 28 displays mean naming latencies and error rates, categorized by number and gender class. Participants were faster in the multiple-reference condition (747 ms) than in the single-reference condition (766 ms). This effect of number on naming latencies did not reach significance ($F_1(1, 17) = 1.39$, $p < .26$; $F_2(1, 18) = 3.60$, $p < .07$). However, the single-reference condition (7.4%) yielded a significantly higher error rate than did the multiple-reference condition (3.0%), $F_1(1, 17) = 26.50$, $p < .0001$; $F_2(1, 18) = 17.82$, $p < .001$. This could be due to the fact that selecting between three suffixes in the single-reference trials might induce more errors than in the multiple-reference trials, which required only one suffix for all utterances. The effect of gender class on naming latencies was significant only in the item analysis, $F_1(2, 34) = .92$, $p < .41$; $F_2(2, 18) = 5.04$, $p < .02$. The effect of gender class on error rates was significance, $F_1(2, 34) = 24.80$, $p < .0001$; $F_2(2, 18) = 8.22$, $p < .003$. Most important, as in Experiment 2a, the gender by number interaction effect was significant both in the analyses of naming latencies, $F_1(2, 34) = 10.44$, $p < .0001$; $F_1(2, 18) = 17.08$, $p < .0001$; and in the analyses of error rates, $F_1(2, 34) = 22.79$, $p < .0001$; $F_2(2, 18) = 21.60$, $p < .001$. *T* tests were computed to further analyze these interactions. For plural gender trials, the 100 ms decrease in the multiple-reference was reliable, $t_1(17) = -3.12$, $p < .006$; $t_2(6) = -3.68$, $p < .010$. In the error rate analyses, the 14.0%

decrease in the multiple-reference was also reliable, $t_1(17) = -6.20$, $p < .0001$; $t_2(6) = -6.96$, $p < .0001$. For masculine nouns, the 33 ms increase in the multiple-reference was reliable, $t_1(17) = 2.31$, $p < .03$; $t_2(6) = 3.37$, $p < .02$. None of the other effects were reliable.

Table 28 Mean naming latencies (RTs) in ms and error rates in percentage (%e) by number and gender for null subject sentence naming.

Number	Feminine		Masculine		Plural		Mean	
	RTs	%e	RTs	%e	RTs	%e	RTs	%e
Single-reference	742	4.5	733	2.1	825	15.6	766	7.4
Multiple-reference	750	6.1	766	1.3	725	1.6	747	3.0
Difference	8	1.6	33	-0.8	-100	-14.0	-20	-4.4

Similar to the results of Experiment 2a, having a large percentage of responses with the suffix –*n* led to a multiple-reference gain for converging form. There was a significant 100 ms gain in the multiple-reference trials with the converging form in single-reference and multiple-reference trials, –*n* morpheme, corresponds to the plural gender class. Unlike Experiment 2a, however, there was a significant multiple-reference cost for only one of the diverging forms in single-reference and multiple-reference, namely for masculine gender trials. Still, multiple-reference cost for diverging forms in Experiment 2b were reduced by 61 ms on average compared to the significant 81 ms multiple-reference cost in Experiment 1a. Once again, the results of Experiment 2b support the prediction that there may be a multiple-reference gain for converging gender-marked form and a reduced multiple-reference cost for diverging forms in single-reference and multiple-reference trails when there is higher percentage of a form that is also used in multiple-reference trials (Jescheniak et al., 2014). Hence, results of Experiment 2b demonstrated that the effects observed in Experiment 2a were replicable even when picture name was not uttered. Thus, these results showed the robustness of the effect in different utterance formats.

However, we have not yet established that the shape of results in Experiments 2a and 2b is indeed due to competition between gender-marked suffixes and not just due to other differences between trials with feminine, masculine, and plural gender. To this end, in Experiment 2c, using the same materials and the same procedures as Experiments 2a and 2b, we compared the production of bare single-reference nouns with the production of bare multiple-reference nouns.

5.6. Experiment 2c: bare noun naming

In Experiment 2c, participants were instructed to respond to pictures by producing either bare single-reference nouns or bare multiple-reference nouns. The same materials and the same procedure as Experiments 2a and 2b were used. In this experiment, no gender-marked suffix selection was required. Hence, the aim was to test whether the gender by number interactions obtained in Experiments 2a and 2b was due to competition between gender-marked suffixes.

Method

Participants

Twenty-one students from Karat High School took part in the experiment.

Materials

The materials were identical to those used in Experiments 2a and 2b.

Design

The design was identical to the one used in Experiments 2a and 2b.

Procedure

The procedure was the same as the one used in Experiments 2a and 2b, with the only exception being that in Experiment 2c, participants were instructed to produce single-reference bare nouns when only one of the objects was presented and to produce multiple-reference bare nouns when two identical objects were presented side by side.

Results and discussion

The raw data were treated as in Experiment 1a. According to these criteria, 120 observations (12.8%) were marked as erroneous and 62 observations (6.4%) as outliers.

Table 29 displays mean naming latencies and error rates for the experimental trials, categorized by number and gender class. Multiple-reference nouns were produced significantly slower than single-reference nouns (955 vs. 849 ms), $F1(1, 20) = 9.16$, $p < .007$; $F2(1, 18) = 33.93$, $p < .0001$. The factor Gender, however, was not significant (both Fs < 2). Most important, in contrast to Experiments 2a and 2b, there was no gender by number interaction, (both Fs < 1).

Table 29 Mean naming latencies (RTs) in ms and error rates in percentage (%e) by number and gender for bare-noun naming.

Number	Masculine		Feminine		Plural		Mean	
	RTs	%e	RTs	%e	RTs	%e	RTs	%e
Single-reference	846	10.9	862	14.3	839	10.7	849	12.0
Multiple-reference	944	12.2	978	10.1	944	16.1	955	12.8
Difference	98	1.3	116	-4.2	105	5.4	106	0.8

The absence of a gender by number interaction in Experiment 2c indicates that the corresponding interactions in Experiments 2a and 2b were due to gender-marked suffix competition.

5.7. General discussion

This study examined how bound gender-marked morphemes (such as gender-marked suffixes) are processed during speech production. As we have noted in the introduction that the literature on the selection processes of bound gender-marked morphemes is small in number (involving only a few European languages, mainly German and Dutch) and even these few studies provide contradictory evidence. Most of the evidence comes from picture-word interference (PWI) paradigm that focuses on gender congruency effect and simple picture naming (SPN) tasks that focus on a gender by number interaction. In the present study, we employed the SPN task to address the question whether bound gender-marked morphemes are selected competitively in Konso, a Cushitic language of Ethiopia for which most of gender-marked elements are bound morphemes.

In Experiment 1a, definite noun naming (noun + gender-marked definite suffix), we found gender by number interaction and this effect was absent in the corresponding bare noun naming (Experiment 1b), serving as an independent control experiment. Similarly, gender by number interaction was observed in Experiment 2a, in overt subject sentence naming (subject [name of the picture] + a verb with a gender-marked suffix [*iakkam*-M/F/P suffix] 'was/were shown'), and in Experiment 2b, null subject sentence naming (only a verb with a gender-marked suffix [*iakkam*-M/F/P suffix] 'was/were shown'). This interaction effect was absent in Experiment 2c, the control bare noun naming experiment. Moreover, the type of interaction was a cost-type for diverging gender-marked forms in Experiment 1 whereas it was a benefit-type for the converging single-reference and multiple-reference forms in Experiment 2. Note that the percentages of occurrences of gender-marked bound morphemes were equal in Experiment 1 while there were a higher percentage (66.67%) of trials for converging forms in Experiment 2.

The types of interaction observed in both experiments was crucial for determining whether the naming of bound gender-marked morphemes involve competitive processing mechanism (Jescheniak et al., 2014). In Experiment 1a, when the occurrence of the proportion of gender-marked morphemes was equally 50%, we observed gender by number interaction with multiple-reference costs of 81 ms for diverging gender-marked forms in single-reference and multiple-reference trials. These diverging forms correspond to the non-plural gender class, where *-siʔ* was used in the single-reference and *-siniʔ* was used in the multiple-reference trials. In the multiple-reference non-plural gender definite noun naming, increased competition was produced during bound morpheme selection due to the activation of different gender-marked definite suffixes (i.e. *–siʔ* vs, *–siniʔ*) and hence a cost effect was observed in this condition.

In Experiments 2a and 2b, where a higher percentage (66.67%) of responses required the converging form in the single-reference and multiple-reference trials, there were multiple-reference benefits for this converging form (131 ms in Experiment 2a and 100 ms in Experiment 2b). This converging form, *–n* morpheme, corresponds to the plural gender class in the single-reference trials. The benefit in the multiple-reference trials for plural gender may be due to the fact that the single-reference trial and its multiple-reference form gave combined activation to the same multiple-reference gender-marked form, which made selecting the correct gender suffix simpler. This benefit effect was not observed in Experiment 1a, where the proportion of occurrence of converging forms in single-reference and multiple-reference trial was 50%. Thus, increasing the proportion of the converging form in single-reference and multiple-reference trials to 66.67% in Experiments 2a and 2b may lead to increasing the activation of this suffix. This increased activation in turn could weaken the competition of other single-reference suffixes with this suffix in the multiple-reference trials, which decreased the multiple-reference cost. By contrast, the convergence of the single-reference suffix with this suffix led to a benefit effect for trials with plural gender.

In summary, the results of our study showed a cost effect for multiple-reference trials when single-reference and multiple-reference gender-marked suffixes differ. This was the case when the occurrence of the proportion of gender-marked morphemes was balanced. When responses with the converging forms in the single-reference and multiple-reference trials increased to two thirds of the trials, this cost effect inclined to reduce and replaced by a benefit effect for multiple-reference trials for which single-reference and multiple-reference suffixes are identical. These patterns of results suggest that bound gender-marked morphemes in Konso are selected in a competitive fashion. This is in accordance with theories of language production that assume gender-marked elements are selected following a competitive mechanism (Schriefers, 1993; Schriefers et al., 2005; Lemhöfer et al., 2006; Bordag & Pechmann, 2008; Jescheniak et al., 2014).

In the present study, we considered two major models that account for the selection mechanism of gender-marked morpheme during speech production: competitive and noncompetitive selection models. The major assumption of the noncompetitive model is that the selection times of a target utterance depend only on the activation level of the target itself, and the activation of other competitors plays no role (Janssen et al., 2014). The competitive model, on the other hand, assumes that the activation of target utterances also activates competitors, and the activation of these competitors affects the selection times of the target utterance (Jescheniak et al., 2014). Accordingly, competitive and noncompetitive models predict different types of gender by number interactions in the production of utterances with gender-marked morphemes in SPN tasks. The noncompetitive model predicts a gender by number interaction with a benefit in the production of multiple-reference trials with converging forms in the single-reference and multiple-reference, i.e. a benefit-type interaction (Janssen et al., 2014). The competitive model predicts a gender by number interaction with an additional cost in the production of multiple-reference trials with divergent forms in the single-reference and multiple-reference (i.e. a cost-type interaction) when the proportion of gender-marked morphemes is at least balanced in the experiment (Jescheniak et al., 2014). The finding of multiple-reference costs for diverging single-reference and multiple-reference gender-marked definite nouns in our Experiment 1a fits the prediction of competitive model but not the noncompetitive model.

Moreover, the results of the present study do not contradict studies that examined the production of bound gender-marked morphemes in SPN tasks such as Schriefers et al. (2005) in German and Lemhöfer et al. (2006) in Dutch. Schriefers et al. (2005) and Lemhöfer et al. (2006) reported gender by number interactions of the benefit-types during bound morpheme production with a higher percentage (66% in Schriefers et al., 2005; 75% in Lemhöfer et al., 2006) of responses with the converging form in the single-reference and multiple-reference trials. This corresponds with a benefit effect we observed in Experiments 2a and 2b, where two thirds of the responses required the converging form in the single-reference and multiple-reference trials. The new finding in the present study was that keeping the proportion of bound gender-marked morphemes equal resulted in a cost effect for multiple-reference trials when single-reference and multiple-reference gender-marked suffixes differ. This is new empirical evidence for the competitive model that predict a cost-type interaction when the proportion of gender-marked morphemes is at least balanced in the experiment (Jescheniak et al., 2014).

To the best of our knowledge, the empirical basis of most studies that propose a noncompetitive processing mechanism for bound gender-marked morphemes is the gender congruency effect in PWI tasks (Costa et al., 2003; Schiller & Caramazza, 2003; Schiller & Costa, 2006). These studies reported an absence of gender congruency effect in bound morpheme production. Note, however, that there is also counter evidence against such position (Schriefers, 1993; Bordag & Pechmann, 2008). Moreover, there is a growing consensus among researchers in the field that the gender congruency effect in PWI tasks may not provide a direct evidence to resolve between competitive and noncompetitive models since both models can account for this effect (Jescheniak et al., 2014; Janssen et al., 2014). Thus, according to competitive model, competition between different gender-marked forms in the gender-incongruent condition may cause prolonged naming latencies in this condition (Jescheniak et al., 2014). According to the noncompetitive model, however, coinciding between convergent gender-marked forms in the gender-congruent condition may produce faster naming latencies in this condition (Janssen et al., 2014).

Besides, it is also possible that the observed effect in Konso bound morpheme production might be due to language-specific properties. Konso is presumably different from Dutch and German, languages investigated in the relevant studies. These differences may be indicated in terms of the function of gender suffixes on nouns and verbs, the nature of bound gender-marked morphemes, and the function of gender agreement and its intricate relation with number agreement. The experiments reported in the present chapter made use of the definite suffixes *–siʔ*$_{M/F}$ and *–siniʔ*$_{P}$, and the verb inflections –*ay*$_{M}$, *–t*$_{F}$ and *–n*$_{P}$, which are bound morphemes in Konso. For instance, no independent word can come between *–siʔ*$_{M/F}$/*–siniʔ*$_{P}$ and the noun; and they cannot be used as freestanding morphemes. Moreover, in contrast to the Dutch adjectival inflection *–e*, the definite suffixes *–siʔ*$_{M/F}$ and *–siniʔ*$_{P}$ in Konso are not pure (automatic) agreement features; rather they express value (definiteness) and they are not obligatory. The verb endings *–ay*$_{M}$, *–t*$_{F}$ and *–n*$_{P}$ are inflectional agreements when there is an explicit subject but when there is no explicit subject, there is no agreement because Konso is a pro-drop language.

Taken together, our study not only replicated the finding of gender by number interactions in bound morpheme naming (Schriefers et al., 2005; Lemhöfer et al., 2006) but also offered new empirical evidence in support of the view that the production of bound gender-marked morphemes is subject to competitive processes. The present study, therefore, extended the findings by Schriefers et al. (2005) and Lemhöfer et al. (2006) to a geographically and genetically distinct language, Konso. This provides additional cross-linguistic data on the processing mechanism of bound gender-marked morphemes.

Table 30 Appendix A: Experiment 1: definite noun naming

Target picture name	Meaning	Gender
akataa	sugar cane	plural
filaa	comb	plural
furaa	key	plural
kiʔsaa	cricket	plural
rika	a tooth brush	plural
siinnaa	nose	plural
ukukkaa	egg	plural
uwwaa	dress	plural
kuta	dog	non-plural
mottooɗɗaa	car	non-plural
parʄuma	stool/chair	non-plural
ɗupitta	finger	non-plural
karma	lion	non-plural
farta	horse	non-plural
oχinta	fence	non-plural
tika	house	non-plural

Table 31 Appendix B: Experiments 2a and 2b: Sentence naming

Target picture name	Meaning	Gender
akataa	sugar cane	plural
filaa	comb	plural
furaa	key	plural
kiʔsaa	cricket	plural
siinnaa	nose	plural
ukukkaa	egg	plural
uwwaa	dress	plural
arpa	elephant	masculine
karma	lion	masculine
kuta	dog	masculine
mottooɗɗaa	car	masculine
parʄuma	stool/chair	masculine
tuuma	onion	masculine
tuyyuuraa	air plane	masculine
farta	horse	feminine
irroota	mountain	feminine
kaawwata	glass	feminine
kaharta	ewe	feminine
lafta	bone	feminine
oχinta	fence	feminine
tika	house	feminine