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Consonantality of conative animal calls | Vocalicity of interjections. Accidental or motivated? The case of Gorwaa

Abstract: This article studies the potential motivation (or, on the contrary, accidentality) of the consonantal nature of conative animal calls (CACs) as contrasted with the vocalic nature of interjections. The authors examine this issue by drawing on data from Gorwaa and locating them within a broader typological context. The evidence presented suggests that Gorwaa CACs exhibit a markedly consonantal character, manifested through a set of more specific phonetic properties, which stands in stark contrast with the vocalic character of interjections; and both correlations are not accidental. The close relationship of interjections with vocalicity and that of CACs with consonantality stems from the more general distinct tendencies of the two categories towards sonority. Such opposite sonority tendencies are, in turn, motivated: in the case of interjections, by the similarity of more sonorous phones with emotive cries; and in the case of CACs, by the acoustic suitability of less sonorous phones for alerting, drawing attention, and chasing away interlocutors and the mimicry (or morphism) of noises made by animals (the less sonorous properties of which stem in turn from their own acoustic suitability and an animal's physio-anatomy).

1 Introduction

The present study is dedicated to two categories of the interactive domain of language (see Heine, Kuteva and Kaltenböck 2014; Heine, Kuteva and Long 2020; Heine et al. 2021; Heine 2023), namely, conative animal calls (CACs) and interjections. CACs are operationally defined as "lexicalized constructions […] bestowed with phonic substance […] that are […] addressed to non-human animal species, entertain a directive function […] and apart from [enjoying the status of] words or word-like constructions, can be used holophrastically as self-standing and non-elliptical utterances" (Andrason and Matutu, in press, p. 5, drawing on Andrason and Karani (2021) and Heine (2023)). Interjections are, in turn, lexicalized "construction[s] that express […] feelings, i.e., emotions and physical sensations experienced by the speaker and can be used [both lexically and] holophrastically" just as CACs mentioned above (Andrason and Harvey 2024: 4, citing Andrason, Harvey and Griscom (2023), who in turn drew on Ameka (1992, 2006), Nübling (2001, 2004), Stange and Nübling (2014), and Heine (2023)).

Specifically, we examine the potential motivation (non-randomness) or accidentality (randomness) of the distinct phonetic substance of the CAC and interjective categories: consonantal nature in the case of CACs and vocalic nature in the case of interjections. To confront this issue, we analyze data from Gorwaa, locate them within a broader typological context, and answer the following research questions: is the consonantality and vocality associated in scholarship with (the prototypes of) CACs and interjections respectively, motivated and, should this be the case, what are the reasons of such radically distinct phonetic profiles of (the prototypes of) these two interactive categories? To respond to these questions, we first verify whether Gorwaa CACs and interjections – in particular, the *primary* members of these two categories – indeed exhibit consonantal and vocalic profiles, correspondingly, and what the exact manifestations (or exponents) of such consonantality and vocality are.[1]

The choice of Gorwaa as the language illustrating (the solution to) the problem at hand is deliberate. To begin with, we wanted to disrupt centering the Global North in linguistic theory – especially the few hegemonic Indo-European languages – and bring to the debate an under-researched, minority, and vulnerable variety from the Global South. Gorwaa meets these criteria. Gorwaa – catalogued with ISO 639-3 [gow] and glottocode [goro1270] – is an Afroasiatic language, member of the Cushitic family, specifically the Iraqwoid cluster of the West-Rift group of the Southern Cushitic branch (Kießling and Mous 2003; Harvey 2019); it is spoken by no more than 130,000 people in and around Babati district in Tanzania and exhibits a threatened or shifting vitality status (Harvey 2019) corresponding to levels 6b and 7 of the Expanded Graded Intergenerational Disruption Scale (cf. Lewis and Simons 2010); and, despite recent advances, has attracted the minimal attention of scholars and still necessitates more documenting activities (regarding the history of research on the Gorwaa language and the references to the most relevant publications consult Harvey (2018, 2019)).

Additionally, any meaningful discussion of the consonantality/vocality of CACs and interjections requires access to comprehensive data revealing the formal profiles of these categories (and thus the detailed analyses of both interactive classes) in a single language. As far as we know, Xhosa and Arusa Maasai are the only languages in which the forms of *both* CACs *and* interjections have been studied in detail and the consonantality and/or vocality of these categories determined explicitly. In the remaining languages in which interjections and/or CACs have received scholarly analysis, if the issue of their consonantality and vocality has been addressed, this concerned either CACs or interjections only, rather than the two categories together (see Section 2 for references to such studies). Nevertheless, even in Xhosa and Arusa Maasai, the analysis of the consonantality/vocality of CACs/interjections has important shortcomings. The study of interjections in Xhosa (see Andrason and Dlali 2020) followed, in our view, the currently outdated taxonomy (cf. Ameka 1992), where interjections proper (i.e., emotive interjections in the older terminology) were conflated with attention signals, directives, response elicitors, response signals, and social formulae (i.e., conative and phatic interjections in the older terminology).

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[1] The concept of a primary CAC/interjection (as well as its 'opposite' – a secondary CAC/interjection) will be explained in Section 2.

Furthermore – and contrary to what is necessary to respond to our research question – the consonantality of Xhosa CACs and the vocalicity of Xhosa interjections were not examined for primary and secondary lexemes separately. Similarly in Arusa Maasai (Andrason and Karani 2021, 2023), the contribution of consonants and vowels to the forms of CACs and interjections was not analyzed in primary lexemes independently from what typifies secondary ones (see Section 2 for a more detailed presentation of Xhosa and Arusa Maasai evidence). The use of Gorwaa data will allow us to avoid the above shortcomings. Indeed, Gorwaa interjections (in Heine's 2023 sense of this term) have recently received a comprehensive assessment, which also included a thorough analysis of the vocality of the primary interjective lexemes (Andrason and Harvey 2024).[2] In the present article we will contrast the results of that study with new data related to CACs, focusing, again, on the formal, especially phonetic aspects of the primary members of this category.

Following many other studies devoted to interactive grammar (Nübling 2004; Stange 2016; Heine 2023) and in consonance with our own earlier work on Gorwaa and African languages (see inter alia Andrason and Dlali 2020; Andrason and Karani 2021, 2023; Andrason, Harvey and Griscom 2023), the present research embraces a prototype approach to linguistic categorization (Croft 2003, 2020; Taylor 2003; Croft and Cruse 2004; Evans and Green 2006; Janda 2015; Hamawand 2016). The phonetic properties of CACs and interjections themselves are described in a non-formalist manner typical of functional theories of language – a method which is pervasive in language documentation and typological studies (cf. Croft 1995, 2003; Dryer 2006; Dixon 2010) as well as cognitive linguistics (cf. Croft and Cruse 2004; Evans and Green 2006), from where our prototype approach originates. In the analysis of phonetic evidence, we will however refer to the (more complex and abstract) concept of sonority and sonority scale as proposed by Nathan (1989), Clements (1990), Kenstowicz (1994), Parker (2002, 2008, 2011, 2015), de Lacy (2006), Harbert (2007), Gordon et al. (2012) and Miller (2012).

The article is organized in the following manner: Section 2 provides the background of the issue at hand (that is, we explain the claims made thus far with regard to the consonantality and vocalicity of (the prototypes of) CACs and interjections in different languages) and familiarizes the reader with the conceptual framework of our study. Section 3 introduces original data related to CACs in Gorwaa. Section 4 evaluates the evidence provided, contrasting it with the phonetic profile of Gorwaa interjections that we observed in our previous work (Andrason and Harvey 2024) and responds to the research question(s). Section 5 concludes the article and suggests possible future research avenues.

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[2] The study of interjections in Gorwaa was, however, primarily dedicated to the so-called mutability or variability of interjections (see Andrason and Harvey 2024).

2 Background

2.1 Literature review: Consonantality of CACs and vocalicity of interjections

As mentioned in Section 1, scholarly literature associates the prototypes of CACs and interjections with their respective consonantal and vocalic characters. Indeed, one of the features of a prototypical CAC is its "consonantal nature" (Andrason and Karani 2021: 34). This prominence of consonantal material in CACs, especially when compared with their vocalic material, has overtly been identified in Akan, Arusa Maasai, Babanki, Bum, Ewe, Macha Oromo, Teŋukan Dogon, Tjwao, and Xhosa (see, *inter alia*, Andrason and Karani 2021; Andrason 2022; Andrason and Phiri 2023; Andrason and Sagara 2024), and is also evident in Berber (Bynon 1976), Slavonic languages (e.g., Polish, Serbian, and Russian; Siatkowska 1976; Dakovič 2006), Matses (Fleck 2003), and Zargulla (Amha 2013). Such marked consonantality is even more noticeable in the dispersal class of CACs – i.e., constructions used to drive away animals and/or repel them – as demonstrated in a study that drew on the sample of 79 languages from diverse language phyla, ecologies, and geographies (Andrason 2023). The consonantal nature of CACs is, of course, a complex idea that transpires through a number of more specific properties typifying CACs across languages. These include: (a) the common attestation of CACs that are entirely made of consonants and the inverse absence or scarcity of CACs made up entirely of vowels; (b) a preference to host consonantal onsets and an inverse reluctance towards zero onsets; (c) the presence of consonantal codas in CACs in languages that favor open syllables; (d) the compatibility of CACs with consonantal clusters of much greater variety and complexity than is the case of the other parts of the hosting language; (e) and the particular visibility of consonants among all extra-systematic sounds found in CACs.

In contrast to a prototypical CAC, the prototype of an interjection is vocalic in nature (Nübling 2001: 24, 2004: 24-26; Andrason and Dlali 2020: 166; Andrason, Harvey and Griscom 2023: 293). This has been identified in German (Nübling 2001, 2004) as well as Arusa Maasai, Hadza, Hebrew, Tjwao, Xhosa (see, *inter alia*, Andrason, Hornea & Joubert 2020; Andrason and Karani 2023; Andrason, Harvey and Griscom 2023). As was the case of CACs, this general property transpires through a series of more specific features. The most important include the following: (a) interjections "exhibit a rich variety of vowels, both as far as their quality and quantity is concerned" (Andrason, Hornea & Joubert 2020: 14-15) while (b) the repertoire of consonants found in interjections is quite limited especially in comparison with the other parts of the hosting language; (c) interjections tend to exhibit V(:(:)) and/or AV(:(:)) structures; this means that (d) interjections are typically built around vowels or, alternatively, vowels, approximants – especially gutturals such as [h] and [ɦ] (or other *h*-types sounds, should a language fail to contain the glottal ones, as is the case of Polish where velar gutturals predominate) as well as [j] and [w]) and consonantoids (i.e., consonants that exhibit a less genuine consonantal character but rather some "affinity with vowels and approximants", e.g., [ʔ]; Andrason, Harvey and Griscom 2023: 298); that interjections are typically onset-less or make use of onsets that are

approximants/consonantoids; and that overall the most common elements other that canonical vowels attested in interjections are such approximant and consonantoid phones; (e) inversely, vowel-less interjections as well as interjections with genuine consonantal onsets are significantly rarer.[3]

2.2 Conceptual framework: Prototype approach and (morpho-)phonetic apparatus

As is evident from our research question(s) and the discussion above, the present study is developed within a prototype approach to linguistic categories (Croft 2003, 2020; Taylor 2003; Croft and Cruse 2004; Evans and Green 2006; Janda 2015; Hamawand 2016). This means that the categories of CACs and interjections are understood to be radial categories (cf. Taylor 2003; Croft and Cruse 2004; Evans and Green 2006; Janda 2015) organized around idealized prototypes that exhibit (or are defined as exhibiting) a number of specific proprieties (the so-called prototypical features): semantic, pragmatic, syntactic, morphological, and phonetic, as well as ecolinguistic.[4] All such properties can be consulted in previous works of ours and other scholars (see especially Bynon 1976; Amha 2013; Andrason and Karani 2021; and Andrason and Sagara 2024 for CACs and Ameka 1992; Nübling 2004; Stange 2016; Andrason and Dlali 2020; Andrason, Harvey and Griscom 2023; and Heine 2023 for interjections). As we explained in Section 2.1 above, the respective consonantal and vocalic characters of CACs and interjections – the features that constitute the very reason of our article – are some of such properties associated with the prototypes of these two categories (see *inter alia* Nübling 2001, 2004; Andrason and Karani 2021).

While the prototypes establish the conceptual nuclei of the CAC/interjective categorial networks and determine their topography, they do not define the two categories, nor do they exhaust their internal richness and complexity. Indeed, the categories of CACs and interjections are significantly more diverse than their prototypes and include not only exemplars that match the prototype fully (i.e., canonical members), but also those that do so partially (i.e., semi-canonical members) and minimally (i.e., non-canonical members). This means that the properties associated with the CAC and interjective prototypes (including their consonantality/vocalicity) can be violated without relegating the transgressing constructions outside of the respective categories. Overall, the coherence of the category of CACs and that of interjections reside in family resemblance that connects all categorial members to the prototype and to each other, rather than in an invariant property or set of properties (some common denominator), including those captured by the prototype (regarding the concept of family resemblance see Rosch 1973, 1975; Rosch and Mervis 1975; Croft and Cruse 2004; Evans and Green 2006). In fact, certain classes of exemplars

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[3] As the correlation of consonantality with CACs and vocalicity with interjections concerns the prototypes of both categories, the proposed regularities can and indeed are violated across languages. The most regular exceptions are secondary CACs and interjections. However, even primary members of the CAC and interjective categories may transgress their respective consonantal and vocalic profiles postulated above. All this is in conformity with the prototype approach, which we explain in the next section.
[4] Ecolinguistics studies how certain ecosystemic properties – especially, the natural and socio-cultural habitat – condition the structure of (a) language (Steffensen and Fill 2014; Mufwene and Vigouroux 2017; Fill 2018).

tend to attest to well-motivated and relatively fixed violations. For instance, secondary CACs and interjections regularly violate the formal facet of their prototypes, specifically that pertaining to morphology and, critical for our research, phonetics. (Hence, we do not include them in our study.) Secondary exemplars are those constructions that, despite often being used as CACs and interjections, derive from other lexical classes, especially those of sentence grammar, e.g., nouns, verbs, and pronouns and, crucially, this derivational link remains patent. In contrast, primary exemplars are those constructions that either have been used as CACs and interjections since their grammatical birth or the process of their conversion into CACs and interjections is so profound that any relationship linking them to their non-CAC and non-interjective sources is no longer recoverable (see, *inter alia*, Ameka 1992; Nübling 2001; Andrason and Dlali 2020; Andrason and Karani 2021; Heine 2023).

Given that our intellectual linguistic "homes" are documentary, typological, and cognitive linguistics – the idea of a prototype exposed above being one of the most evident exponents of this – and in compliance with our previous work on interactives, the grammatical profiles of Gorwaa interjections and CACs will be couched within a functionally oriented approach to language description (see, e.g., Croft 1995, 2003; Croft and Cruse 2004; Dryer 2006; Goldberg 2003; Dixon 2010). This means that we will avoid excessively formal descriptive tools, e.g., deep structures, 'invisible' movements, and elements that exist (with)in (a particular) theory only.

Nevertheless, as far as phonetics are concerned, we will make use of the somewhat more complex and abstract idea of sonority and sonority scale. Sonority scale models the varying sonority of different types of phones. This scale, the coarse-grained outline of which has widely been accepted in scholarship, represents the increase of sonority of consonants, approximants (glides), and vowels in the following order: consonants (obstruents) > approximants (glides) > vowels (Clements 1990; Kenstowicz 1994; Parker 2002, 2008, 2011, 2015; de Lacy 2006; Harbert 2007). The more fine-grained scale – some details of which are still debated and/or argued to be partially language specific – reveals the following hierarchy: voiceless stops > voiceless affricates > voiceless fricatives > voiced stops > voiced affricates > voiced fricatives > nasals > liquids (and within liquids: laterals > trills or inversely trills > laterals) > approximants (glides) > high vowels (alternatively, approximants/glides and high vowels occupy the same position) > low vowels (Harbert 2007; Parker 2002, 2008). Within genuine vowels, the scale reveals the following increase in sonority: high interior vowels (ɨ) > mid interior vowels (ə) > high peripheral vowels (i, u) > mid peripheral vowels (e, o) > low vowels (æ, a) (Parker 2008: 60; Gordon et al. 2012: 221). The sonority scale posited for Gorwaa is highly similar and runs from [-] to [+] sonority in the following order: ejective voiceless stops > voiceless stops > voiced stops > ejective affricates > affricates > voiceless fricatives > voiced fricatives > lateral fricatives > laterals > [h] > nasals > approximants (Harvey 2020).

Overall, vowels are more sonorous than other phones, and among vowels, A-type vowels – during the production of which the tongue is located lowest in the mouth and the mouth is open widest – are the most sonorous ones. In contrast, consonants, especially voiceless ones, and among them the stops [p, t, k] are the least sonorous. As a result, under its radical interpretation, this scale

model allows one to see all the phones as a continuum that is comprised between the lowest and highest degrees of sonority. Consonants, approximates (glides) and vowels would thus transmute in a gradient and fuzzy manner from one to another rather than forming three disconnected and discrete categories.

Sonority itself is a composite phenomenon. It draws on five more specific features: voicing (i.e., vocal cords/folds vibration), *Svara* (or musicality, i.e., ability to be sung), loudness (i.e., the (subjective perception) of sound pressure level), prolongability (or duration), and openness (i.e., jaw opening) (Nathan 1989: 60-64). The most sonorous sounds are the most voiced, musical, prolongable, and noisy (i.e., the loudest) and that additionally attests to a "maximal jaw opening" (Nathan 1989: 61). In certain studies, some of such formative features are modeled as scalar hierarchies. In one of these approaches, relevant to our research, two principal clines are distinguished: that of openness (or aperture) ranging from minimal to maximal "impedance of the airflow" (Miller 2012: 261); and that of source (of voicing) ranging from absence of sound source (i.e., "a negligible level of sound exhibiting no systematic pattern" or "virtual silence") to modal voice (i.e., "the periodic […] movement of the vocal folds", through turbulence and breathy voice (Miller 2012: 259).

The subsequent part of the article is dedicated to the principled verification of the relationship of CACs with consonantality and that of interjections with vocality, on Gorwaa material. We start with a detailed analysis of the original data related to the CACs, contrasting it later with what we already know about Gorwaa interjections (cf. Andrason and Harvey 2024). In doing do, we test the claims made for the prototypes of interjections and/or CACs in scholarship and offer their explanation.[5]

3 Data

3.1 Data collection

As in our previous research on Gorwaa, the evidence discussed in the present article was gathered in Tanzania in 2023. Five speakers of Gorwaa participated in our fieldwork activities. Their details are captured in Table 1:[6]

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[5] This strategy conversely means that our paper is *not* crosslinguistic *sensu stricto*. Rather, it *systematically* verifies the correlations proposed in scholarship within a single language and explains the motivation of the tendencies observed.

[6] This table is identical to our previous study on Gorwaa (Andrason and Harvey 2024: 6). Harvey's fieldwork activities were supported by the Endangered Languages Documentation Programme as well as the Firebird Foundation for Anthropological Research and constitute part of a larger research agenda dedicated to documenting languages of the Rift (Gorwaa, Hadza, Ihanzu).

Table 1: Biographical information of the participants

Name	Gender	Year of birth	Place of birth	Place(s) of former residence	Place of current residence	Place of Interview
Bu'ú' Saqwaré [B.S.]	M	1954	Endarqadat	Endamaqay (Duru)	Yerotoni	Yerotoni
Maria Hheke [M.H.]	F	1960	Endagwe	Endagwe	Yerotoni	Yerotoni
Darbo Hheke [D.H.]	F	1955	Endagwe	Endagwe	Yerotoni	Yerotoni
Clara Tlaqasi [C.T]	F	1969	Seendó	Endagile	Endagile	Mamiire
Hezekiah Kodi [H.K.]	M	1949	Endagwe	Endagwe, Riroda, Bonga	Bonga	Bonga

Because of our aim to record CACs Gorwaa speakers actually used (rather than those which they perceived to be used by others), each participant was first informally interviewed about the kinds of interactions they have or had with different types of animals throughout their lives. Questions were then tailored from a larger list to include only those interactions reported by the speakers. For example, none of the speakers above had ever kept guineafowl, and as such, any questions about CACs used with guineafowl were excluded from the elicitation. Further, Bu'ú' Saqwaré and Darbo Hheke had never operated a cart pulled by donkeys; Maria Hheke had never operated a cart pulled by donkeys or oxen; and Clara Tlaqasi had never interacted with donkeys at all. In such cases, the questions related to the above-mentioned animals and/or actions were removed from their respective elicitation lists. All our data were gathered through one-on-one interviews. The interviewer, Harvey, would describe a situation from an elicitation list to the interviewee (1.a), who would be requested to provide an appropriate CAC construction (1.b). The questions and prompts were produced in Swahili (1.a). The responses were given in Gorwaa (1.b).

(1)   a.   Harvey [Swahili]
                tukitaka   *kufukuza*   *paka*   *tutatumia*   *sauti*
                SM1stPl.COND.want   15.chase.away   cat   SM1stPl.FUT.use   sound
                gani
                which
                'If we want to chase a cat away, what sound will we use?'
      b.   Clara Tlaqasi [Gorwaa]
                pít
                CAC
                '**[pít]**'

The sessions were recorded with a Zoom H5 audio device. The .wav files were next examined, and all CACs transcribed in the ELAN software (Sloetjes and Wittenburg 2008) using a working Gorwaa orthography (see Harvey 2018:75-78). The resultant CACs were subsequently introduced into a database spreadsheet. This spreadsheet contained the corpus tag of each CAC, contextualized and glossed examples of their use (e.g., as part of a larger sentence or sequence of utterances), the name of the speaker who provided a specific CAC (and its example of use), IPA transcriptions, and descriptions of the meaning of each CAC in terms of the animal addressed to and the action/behavior requested and expected to occur. We also classified the semantics of CACs into four main types (i.e., summonses (used to call animals), dispersals (used to chase them away), directionals (used to modify their motion), and unrelated to motion (e.g., silencing); see Bynon 1976; Amha 2013; Andrason and Karani 2021), annotated phonetic peculiarities (i.e., extra-systematic sounds, phonotactics, tonal patterns, and phonation types) and captured information related to language contact and borrowing.[7]

In total, we collected 181 CACs or constructions that, at least to some extent, complied with the operationalized definition introduced at the beginning of the article. After disregarding all secondary CACs that are formally identical to verbs, vocative nouns, and proper names, as well as after discarding CACs borrowed from other languages (especially those that are identical to imperative verbs in Swahili – a language generally known by Gorwaa people), and after grouping similar variants of the remaining primary CACs into clusters, we have reduced this large number of tokens to an essential 40 of 'lexical entries'. Table 2 captures all of these primary CACs.[8] The Appendices explain how to locate them in the audio files that we made available online.

Table 2: Primary CACs in Gorwaa

token	variants	IPA	animal	action
[kiss teeth]		[↓B']	cow	calm it before milking
[whistle-1]		[{$_p$S::$_p$}]	cow	calm it before milking or while connecting it to the plough
[whistle-2]		[S::↘]	cow	start moving when pulling an oxcart
[whistle-3]		[{$_v$S::$_v$}]	cow	stop pulling an oxcart

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[7] It should be noted that our analysis centers the phonetics of Gorwaa rather than phonology. For instance, the IPA transcriptions presented in Table 2 and elsewhere are phonetic ([…]) instead of phonological (/…/).

[8] The first two columns contain tokens and their variants in a tentative Gorwaa orthography. The third column provides the IPA transliterations of all the CAC variants (or forms attested). The last two columns specify the meanings of CACs: the animal that is addressed and the action ordered/intended to be performed. The symbol R stands for 'replication'. Should there be variants of a CACs, the form in the first column is a 'compromise'. It suggests possible realizations and, if tonal patterns vary, does not carry specific tones.

[whistle-4]		[Š(.)Š(.)Š(.)Š↘(.)Š↘]	cow	start pulling the plough; pull faster an oxcart
[whistle-5]		[Sʎ(..)Sʎ(..)Sʎ]	dog	call to come
/ak(i)	/ák	[ʕák (R)]	goat	chase away
	/áki	[ʕáki]		
	/aki	[ʕaki (R)]		
(/)a(ˤ)kwa(/ˤ('))	/akwa/	[ʕakʷaʕ (R)][9]	male goat	call to come; chase away
	/akwa'	[ʕakʷaʔ (R)]		
	áˤkwáˤ'	[áˤkʷáˤʔ (R)]		
	/akwakwa'	[ʕakʷakʷaʔ]		
	áˤkwaˤkwaˤ	[áˤkʷaˤkʷaˤ (R)]		
/ari(')	/ắrĭ́	[ʕắrĭ́ (R)]	donkey	chase away
	/árí	[ʕárí (R)]		
	/ari'	[ʕariʔ]		
/ariya'	/ariya'	[ʕarijaʔ (R)]	sheep	chase away
	/áriyá'	[ʕárijáʔ (R)]		
	/ariyá'	[ʕarijáʔ (R)]		
/awa'		[ʕawaʔ]	raptor	chase away
/áyá'		[ʕájáʔ (R)]	goat	call to come
(/)e(ˤ)ya(ˤ('))	/eya'	[ʕejaʔ (R)]	goat	call to come
	éˤyáˤ'	[éˤjáˤʔ (R)]		
	éˤyáˤ	[éˤjáˤ (R)]	ram	
(/)(ˤ)uriya(/)'	/uriya'	[ʕurijaʔ (R)]	sheep	chase away
	uˤriya/'	[uˤrijaʕʔ (R)]		
eéˤ'		[é:ˤʔ (R)]	sheep	call to come
ha(a)y(a)	hay	[haj (R)]	cow	calm it before milking

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[9] In some tokens there is a difference in transcription between a superscript and a non-superscripted voiced pharyngeal. The superscript one is not rendered in the orthography contrary to the non-superscripted one. The superscripted voiced pharyngeal indicates pharyngealization of a vowel, whereas the non-superscripted voiced pharyngeal is a full consonant/consonantoid (still exerting some pharyngealizing effect on the vowel).

	haáy	[há:j (R)]		
	haya	[haja]		
	háya	[hája (R)]		calm it before milking or while joining it to the plough
haya(')-1	hǎyǎ-1	[hǎjǎ (R)]	dog	encourage to chase something
	háyá'	[hájáʔ]		
ha(ˤ)ya(ˤ)-2	hǎyǎ-2	[hǎjǎ (R)]	goat; sheep; monkey; raptor	chase away
	hǎˤyǎˤ	[hǎˤjǎˤ]	bird	chase away
	háyá	[hájá (R)]	monkey; baboon	chase away
hándó		[hándó (R)]	male donkey	call to come
kű		[kű (R)]	chicken	call to come
kűk		[kűk (R)]	duck; chicken	call to come
kűt(í)	kűt	[kűt (R)]	puppy	call to come
	kűtí	[kűtí (R)]		
ma(a(a)ˤ('))	máááˤ	[má::ˤ (R)]	sheep	call to come
	mááˤ	[má:ˤ (R)]		
	mááˤ'	[má:ˤʔ (R)]		
	máˤ	[máˤ (R)]		
mǐ(mǐ)w	mǐw	[mǐw (R)]	cat	call to come
	mǐmǐw	[mǐ(R)mǐw]	cat	
nyǎw		[ɲǎw (R)]	cat	call to come
pit(a(/)('))	pít	[pít]	cat; dog	chase away
	pǐt	[pǐt (R)]		
	pitá'	[pitáʔ]		
	píta/'	[pítaʕʔ]		
sh(sh)t	shsht	[ʃ:t]	bird (incl. chicken)	chase away
	sht	[ʃt]		
sh		[ʃ]	bird (esp. duck)	chase away

shạ'ạạ		[ʃạʔạ:]	bird	chase away
shwéhh		[ʃʷéħ (R)]	bird	chase away
siga/		[sigaʕ (R)]	chicken (esp. rooster)	chase away
sika'	sika'	[sikaʔ]	chicken	chase away
	siká'	[sikáʔ]		
	síká'	[síkáʔ]		
táki		[táki]	cow	start pulling the plough
tii		[ti: (R)]	dog	encourage to chase something
úúúˤ'		[úˤ::ʔ]	ram	call to come
wě(ˤ)wě(ˤ)(ě))	wěwě	[wěwě (R)]	bird (incl. raptor)	chase away
	wěwěě	[wěwě:]		
	wěwěěě	[wěwě::]		
	wěˤwěˤ	[wěˤwěˤ (R)]		
yere(')	yéré	[jéré (R)]	donkey	call to come
	yěrě'	[jěrěʔ (R)]		
	yéré'	[jéréʔ (R)]		
ǀ		[ǀ (R)]	cat	call to come
ǁ		[ǁ (R)]	cow	calm it milking or while joining it to the plough
Ɵ		[Ɵ (R)]	duck	call to come

Although all the above CACs can currently be regarded as primary, a few of them may have had non-primary origin. To begin with, two CACs exhibit some formal similarity to Swahili words: *pit(a(/)('))* approximates *pita* 'pass' and *wě(ˤ)wě(ˤ)(ě(ě))* approximates the 2ⁿᵈ sg. person pronoun *wewe* 'you'. We think that these similarities are coincidental and the actual transfer from Swahili to Gorwaa quite doubtful. Contrary to all the other unquestionable Swahili loanwords (e.g., *simama* < Sw. *simama* 'stop, stand'; *toka* < Sw. *toka* 'go out'; and *towa* < Sw. *toa* 'put out'), these two CACs offer variants with extra-systematic tonal patterns, glottalization, and pharyngealization, as well as the apocope of the ultimate vowel. Even more important is the problematic semantic relationship between the CACs *pit(a(/)('))* and *wě(ˤ)wě(ˤ)(ě(ě))*, on the one hand, and the Swahili forms on the other. Again, this radically contrasts with what typifies all the CACs borrowed from Swahili where this relationship is evident. Lastly, *pit(a(/)('))*, which is used

to chase away cats and dogs, exhibits formal properties that are typical of (primary) dispersals across languages (cf. Andrason 2023). It draws on a CVC syllable structure (the most canonical syllable type in dispersals) and contains an I-type vowel (the most common vowel in dispersals) and a voiceless plosive (the most common consonant type in dispersals, taking apart sibilants). This means that the form such as [pit] complies to a considerable extent with crosslinguistic tendencies operating in dispersing CACs (see further below; see also Section 4). It is also possible that *pit(a(/)(′))* is imitative of the spitting – an oral gesture used to scare cats or dogs and chase them away.

Additionally, a few CACs may be areal/phylogenetic phenomena and not only attest to borrowing but also derive from older forms, potentially non-CAC inputs. First, */ak(i)* used to chase away goats is found in another Cushitic language, Borana Oromo (Leus 1995: 148), where it is directed to donkeys with the meaning 'go! run!'. *(/)a(ˤ)kwa(/ˤ(′))* used to both disperse and summon male goat may also be related to */ak(i)*. In Oromo, the conjugation of a verb in the present, affirmative, main clause, is *-ti* for feminine gender, and *-a* for masculine gender. The *-i* / *-wa* variation attested in the Gorwaa CACs */ak(i)* and *(/)a(ˤ)kwa(/ˤ(′))* could reflect these Cushitic gendered suffixes. Second, *ariya′* used to disperse sheep may be related to Borana Oromo [aria] (Leus 1995: 47) – a call employed "when herding sheep" (the same possibly applies to */ari(′)* used to disperse donkeys). Third, *yere′* used to summon donkeys potentially derives from the East Cushitic root **ħarr-* 'donkey' which is widespread throughout East Africa and attested in many East Cushitic and Omotic languages (Blench 2000; van Lier in press). The CAC *yere′* would thus be linked to a common word for 'donkey' employed across Ethiopia and in Kenya; see for example, [arree] and [harree] in the geographically closest variety of Oromo, i.e., Orma (Stroomer 2001: 7, 34). Blench (2000: 347-348) argues that, because of the prevalence of **ħarr-* in Cushitic and Omotic branches, "it is probably a […] loanword and should not be reconstructed to proto-Cushitic".[10] In his view, the form most likely derives from a word for 'zebra', which gradually replaced the older Cushitic root for 'wild ass' – *kuur*.[11] All these relationships are no longer transparent and available to speakers, which warrants the inclusion of these CACs in our list of primary tokens.

3.2 Data analysis

Gorwaa CACs draw on vocalic, consonantal, and "transitory", i.e., partly vocalic and partly consonantal material. Indeed, nearly a half of CACs (19 tokens, which equals 48%) are phonetically "mixed" and contain canonical consonants apart from vowels and any other phones:

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[10] CACs addressed to donkey that exhibit similar forms are also attested in Dogon (e.g., *uri* [úrí] used to accelerate motion of donkeys and horses; Andrason and Sagara 2024) and in some Berber varieties (e.g., *(r)″a* and *rra-y-a* used to make donkeys advance; Bynon 1976: 45). This may suggest some primary, perhaps onomatopoeic origin of these CACs.

[11] See *kir kir* used in Somali to chase away donkeys and *kurkurkur* [kʊrkʊrkʊr] used in Macha Oromo to summon donkeys.

/ak(i), (/)a(ˤ)kwa(/ˤ(')), /ari('), /ariya', (/)(ˤ)uriya(/)', hándó, kǔ, kǔk, kǔt(ǐ), ma(a(a)ˤ('), mǐ(mǐ)w, nyǎw, pit(a(/)(')), shạ'ạạ, shwéhh, siga/, sika', táki, tii, and *yere(').*

While such a mixed vocalic-consonantal character transpires in the largest group of CACs, six lexemes (15%) are entirely built around consonants and thus fail to make use of any vowels and vowel-like material. These lexemes can be grouped into three classes. Three CACs are clicks, specifically, dental [ǀ], lateral [ǁ], and labial [ʘ]. As is typical of all non-click languages, to which Gorwaa belongs (see further below), the clicks used in these CACs do not combine with any other phones, whether consonants, vowels, or approximants such that each click equivales to a CAC lexeme itself. Two CACs consist of sibilants: *sh(sh)t* [ʃ(:)t] and *sh* [ʃ]. Non-vocalic CACs with sibilant nuclei are common across languages, especially in a dispersing function, i.e., to chase away or repel animals (Andrason 2023), exactly as is the case in Gorwaa. Lastly, one CAC is a kiss-like sound represented in scholarship with the complex symbol [↓B'] (see further below).

By contrast, no CACs are exclusively built around vowels. Nevertheless, the extent of this dearth of vocalic material should be nuanced by the following observation: the phonetic substance of several CACs is only provided by vowels and phones that are not genuine consonants. To be exact, three CACs draw on vowels and approximants, i.e., [w] and [y], as well as [h], which is analyzed as both fricative and approximant (see Ladefoged and Maddieson 1996; Blevins 2018): *wě(ˤ)wě((ˤ)(ě))* [we(ˤ)we(ˤ(:))], *ha(a)y(a)* [ha(:)j(a)], and *haya(ˤ)-2* [haˤjaˤ].[12] Two CACs draw on vowels and a glottal stop: *eéˤ'* [é:ˤʔ] and *úúúˤ'* [úˤ::ʔ]. As we explained in our study on Hadza (Andrason, Harvey and Griscom 2023) and will further discuss in Section 4 below, while [ʔ] is traditionally classified as a consonant, it is some type of a consonantoid – an obstruction-less and place-less phone characterized by a [-consonantal] feature (cf. Hall 2007; Backley 2011). A further four CACs contain vowels, approximants, and an optional glottal stop (*haya(')-1* [haja(ʔ)]) as well as pharyngeal approximants, either compulsory (*/awa'* [ʕawaʔ] and *shwéhh* [ʃʷéħ]) or facultative (*(/)e(ˤ)ya(ˤ('))* [(ʕ)é(ˤ)já(ˤ(ʔ))]). Again, although the pharyngeals [ʕ] and [ħ] have often been classified as fricatives, more accurately they are consonantoids at best, i.e., "frictionless continuants" (Backley 2011: 86) "similar to approximants" like [h] (and [ɦ]) mentioned above (Andrason, Harvey and Griscom 2023: 299; see Section 4 for further discussion).

Overall, with regard to the consonants used – including those that, in some approaches, are regarded as approximants and/or consonantoids – a considerable variety of them is attested in Gorwaa CACs. The table below lists all these phones and specifies the number of lexemes in which they are featured:[13]

Table 3: Consonants used in Gorwaa CACs

consonant	tokens
ʔ	15

ʕ	10
k	7
t	5
h	4
r	4
m	2
s	2
ʃ	2
d	1
g	1
ħ	1
n	1
ɲ	1
p	1
ǀ	1
ǁ	1
ʘ	1
[↓ʙ']	1

Overall, 18 different consonants are attested in CACs. The consonants that belong to the phonetic repertoire of Gorwaa but are absent in CACs, are [b], [f], [ŋ], [q'], [χ], [ɬ], [ts'], and [tɬ']¹⁴ (as well as the (marginal) consonants [tʃ] and [dʒ]). Even more significant is the qualitative diversity of the consonants featuring in CACs. Indeed, the collected CACs contain voiceless stops (i.e., [k], [t], [p]), voiced stops ([g] and [d]), voiceless fricatives ([s] and [ʃ]), nasals ([m], [n], [ɲ]), a trill ([r]), fricative-approximants ([h], [ħ] and [ʕ]), and clicks ([ǀ], [ǁ], and [ʘ]).

   Taking into consideration the frequencies presented in Table 3, [ʔ] and [ʕ] are the most common. However, this view should again be nuanced given a few observations. While [ʔ] features in 15 CACs, its presence is optional in 7 cases. This means that [ʔ] is regular in only 8 tokens: */ariya', /awa', /áyá', (/)(ʕ)uriya(/)', eéˤ', shạ'ạ̱, sika', úúúˤ'*. Similarly, in 4 cases, the use of [ʕ] in a CAC is non-compulsory. Therefore, the final number of CACs containing [ʕ] could be lowered to the obligatory 6. In addition, three of the CACs in which [h] is featured (the fourth most common phone in Table 3) belong to the *HAYA* cluster of CACs, i.e., *ha(a)y(a), haya(')-1, ha(ʕ)ya(ʕ)-2*. As these CACs may be related, the number of CACs containing [h] could be reduced to 3 in total. Consequently, the velar voiceless stop [k] would be attested in the second largest number of CACs (almost as common as [ʔ]) while its dental counterpart [t] would be the fourth most frequent consonant in CACs.

¹⁴ Some these consonants may also appear as labialized, i.e., [ŋʷ], [q'ʷ], and [χʷ], as well as [kʷ] and [gʷ]. In the CACs two labialized consonants are attested: [kʷ] and [ʃʷ].

The class of approximants attested in Gorwaa CACs includes [j] and [w], as well as [h], [ħ] and [ʕ] (which, as we explained above, can be viewed as fricative-approximants). While [j] may seem more common than [w], 3 cases of [j] are found in the *HAYA* lexemes and further two, i.e., */ariya* and */uriya*, seem related to each other, as well. This would lower the number of CACs containing [j] to 4 tokens and thus fewer than [w]. (Regarding the counting of [ʕ] and [h] see above.)

Table 4: Approximants used in Gorwaa CACs

ʕ	10
j	8
w	6
h	5
ħ	1

The five vowels that form part of the standard phonetic repertoire of Gorwaa, i.e., [i], [e], [a], [o], and [u], are all attested in CACs. This is hardly surprising as the size of the vocalic system in Gorwaa is quite limited (i.e., it only includes 5 vocalic qualities). The rates of occurrences of the vowels across the CAC lexemes are captured in Table 5 below. The [a] and [i] vowels feature in the largest number of CACs – although, given the presence of [a] in the three *HAYA* lexemes, the quantitative difference between these two vowels may be less radical. The other vowels, i.e., [e], [u], and [o] feature much less abundantly. It should be noted that in 8 tokens, vowels (specifically, [a], [e], and [u]) are pharyngealized. One could regard vowel pharyngealization as a way to make a vowel more consonantal. That is, as one pharyngealizes, they make a small pharyngeal cavity and inversely emphasize the oral cavity.

Table 5: Vowels used in Gorwaa CACs

a	18
i	10
e	5
u	3
o	1

CACs exhibit some preference to host consonantal onsets and an inverse reluctance towards zero onsets. Indeed, 13 CACs (33%) start with a genuine consonantal onset. This onset consonant may be a plosive, i.e., [k] (*kű, kűk, kűt(ǐ*)), [#p-] (*pit(a(/)(')*)), and [t] (*táki* and *tii*); a fricative, i.e., [s] (*siga/, sika'*) and [ʃ] (*shạ'ạạ, shwéhh*); and a nasal, i.e., [m] (*ma(a(a)ʕ(')* and *mĭ(mĭ)w*) and [n] (*nyắw*). A further 11 CACs (28%) start with an approximant or a fricative-approximant, namely: [ʕ] (*/ak(i), /ari('), /ariya', /awa', /áyá'*), [h] (*ha(ʕ)ya(ʕ)-2, ha(a)y(a), haya(')-1, hándó*), [w]

(*wě(ˤ)wě(ˤ)(ě̃)*)), and [j] (*yere(')*)). In contrast, only two CACs (5%) start with a 'bare' vowel and are thus onset-less: *eéˤ'* and *úúúˤ'*. In three cases (8%), the use of an onset is optional. This noncompulsory onset consonant is invariably [ʕ]: */)akwa(/('))*, *(/)e(ˤ)ya(ˤ('))*, *(/)(ˤ)uriya(/)'*.

CACs also seem to favor word-final codas instead of coda-less structures. This is, however, less marked than the consonantality of onsets discussed in the previous paragraph. Specifically, 12 CACs (30%) attest to some types of final codas. Such coda phones may be genuine consonants, i.e., [k] (*kű̃k*); approximants, i.e., [w] (*mǐ(mǐ)w* and *nyǎ̃w*); fricative-approximants, i.e., [ħ] (*shwéhh*) and [ʕ] (*siga/*); as well as, with particularly often, the consonantoid [ʔ] (*/ariya'*, */awa'*, */áyá'*, *(/)(ˤ)uriya(/)'*, *eéˤ'*, *sika'*, *úúúˤ'*). In 10 CACs (25%), coda elements are optional. The phones used in such codas are similar to those discussed above. That is, genuine consonants ([k] – */ak(i)* and [t] – *kű̃t(ǐ)*), approximants ([j] – *ha(a)y(a)*), fricative-approximants ([ʕ] – *(/)a(ˤ)kwa(/ˤ('))* and *pit(a(/)('))*, and [ʔ] – *(/)a(ˤ)kwa(/ˤ('))*, */ari(')*, *(/)e(ˤ)ya(ˤ('))*, *haya(')-1I*, *ma(a(a)ˤ(')*, *pit(a(/)('))*, *yere(')*). Only in 7 instances (18%), a CAC is regularly coda-less and its syllable open: *ha(ˤ)ya(ˤ)-2*, *hándó*, *kű̃*, *shạ'ạạ*, *táki*, *tii*, and *wě(ˤ)wě(ˤ)(ě̃))*.

CACs seem to tolerate consonant clusters somewhat better than the other lexical classes in Gorwaa, especially those that belong to the so-called sentence grammar (verbs, nouns, pronouns, adjectives, adverbs, etc.). The syllables found in Gorwaa sentence grammar are either CV(:), CV(:)C, or CV(:)NC. This means that except for NC structures found in codas, homosyllabic consonant clusters are disallowed (Harvey 2018: 79). Contrary to this rule, a few CACs contain non-nasal CC clusters. See *píta/'* [pítaʕʔ] and *uˤriya/'* [uˤrijaʕʔ)] in which [ʕʔ] appears in the final coda and *shsht* [ʃ:t] and *sht* [ʃt], which entirely consists of the cluster [ʃ(:)t].

The relevance of the consonantal material also transpires through the particular visibility of consonants among all extra-systematic sounds found in Gorwaa CACs. Three genuine consonants present in CACs are absent in the phonetic inventory of the sentence grammar of Gorwaa (cf. Harvey 2018). These phones are three clicks, dental [ǀ], lateral [ǁ], and bilabial [ʘ].[15] Two further consonants attested in CACs are present in the Gorwaa inventory only marginally: the palatal nasal [ɲ] and the voiceless postalveolar fricative [ʃ]. There is also an extra-systematic fricative-approximant [ɦ], which is absent in the lexical classes of sentence grammar. In contrast, there is only one extra-systematic vowel attested in CACs. In fact, the quality of that vocalic phone is not extra-systematic *per se*; it is rather its whispered and thus voiceless realization as [ḁ] that is highly marked from the perspective of the standard phonetic system of Gorwaa.

Among the various sounds found in Gorwaa CACs, there is one that exploits a kiss-like mechanism. This sound is non-pulmonic ['], ingressive [↓], and labial ([B]), jointly represented as [↓B']. The use of this and similar kiss sounds is highly common in CACs – the so-called Conative Kisses or ConKisses – across languages (Andrason 2024). As is typical of such ConKisses, the production of [↓B'] in Gorwaa begins with two seals (or closures) made in the oral cavity and the mouth. One is labial while the other is (dorso)velar. When the body of the tongue is lowered, the air "pocket" expands and, as a result, the air pressure within it decreases. Once the mouth opens

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[15] Further extra-systematic consonants are found in borrowed CACs. This includes [v] (*vúta*) and [ʤ] (*kúnja*).

and the pocket bursts, this pressure difference causes the air to be sucked "from a higher-pressure area (outside of the mouth) to a lower-pressure area (inside the mouth)", creating a "screechy, squeaking, and high in pitch/frequency" sound (Andrason 2024: 116; see also Poyatos 1993, 2002; Andrason and Karani 2021). As is true for ConKisses in general (Andrason 2024), the [↓ʙ'] CAC found in Gorwaa has a consonantal rather than vocalic character. Indeed, the production of ConKisses – both in Gorwaa and elsewhere – approximates the manner of realization of click consonants, especially their labial variant, i.e., [ʘ]. Similar to [↓ʙ'], the click [ʘ] is non-pulmonic, ingressive, and "exploit[s] a two-seal […] pressure-building/pressure-release mechanism": one being velar/uvular and the other being labial (Andrason 2024: 116; see also Ladefoged and Disner 2012; Maddieson and Sands 2019; Sands 2020). Overall, the sound [↓ʙ'] found in CACs is classified across languages as a type of an obstruent, usually an affricate, although also plosive should the friction be short(er). That is, [↓ʙ'] is "a non-pulmonic ingressive equivalent of [p/b] or a non-pulmonic ingressive equivalent of [p͡ɸ/b͡β]" characterized by a strong protrusion and an endolabial realization (Andrason 2024: 117; see also Poyatos 1993: 87).

In addition to CACs containing consonants, vowels, transitory consonantal-vocalic phones, and the kiss sound, Gorwaa CACs exploit whistling mechanisms. This use of whistles is not odd from a typological perspective. On the contrary, the presence of whistles in human-to-animal communication for directive purposes is highly widespread (Bynon 1976; Andrason and Karani 2021). In fact, except for Dogon (Andrason and Sagara 2024), any given language usually contains more CAC whistles than CAC kisses. This tendency is corroborated by our data: there are five whistles in Gorwaa CACs, which are repeated in Table 6 for convenience (compare with a single CAC kiss described in the previous paragraph). {whistle-1} is a soft, long, and continuous (uninterrupted) whistle, generally monotonous although slightly falling at the very end. We represent it with [{$_p$S::$_p$}] where S stands for whistle (cf. Poyatos 1993, 2002) and {$_p$} for "quiet(er)" speech" (IPA 2015). {whistle-2} is also long and continuous (uninterrupted). Its tonal pattern is, however, falling throughout its realization, i.e., from the beginning ([S::↘]). {whistle-3) is another long whistle. In contrast to {whistle-1} and {whistle-2}, it is realized with a type of vibrato (annotated with {$_v$}). That is, the whistle vibrates with extra-short almost unnoticeable pauses ([{$_v$S::$_v$}]). {whistle-4} constitutes a series of five (or more) short whistles separated by equally short pauses annotated with (.) (cf. IPA 2015). Although it is monotonous throughout the large part of its realization, the tone of the last segment (or the last two segments) is lower than the tone of the preceding ones ([Š(.)Š(.)Š(.)Š↘(.)Š↘]). Finally, {whistle-5} is a series of 3 loud and rising whistles. Each whistled segment is longer than the segments found in {whistle-4}. In further contrast with {whistle-4}, the formative segments of {whistle-5} are separated by well audible pauses annotated with (..). In total, we represent {whistle-5} as [Sʎ..Sʎ..Sʎ].

Table 6: Whistles in Gorwaa

CAC	meaning	transcription
[whistle-1]	calming cows before milking	[{ₚS∷ₚ}]
[whistle-2]	calming cows before milking or while connecting oxen to the plough	[S∷�‿]
[whistle-3]	make oxen start moving when pulling an oxcart	[{ᵥS∷ᵥ}]
[whistle-4]	make oxen stop pulling an oxcart	[Š[Š(.)Š(.)Š(.)Š↘(.)Š↘]
[whistle-5]	calling dogs to come	[SΛ(..)SΛ(..)SΛ]

The relationship of whistles to consonants and vowels is not a straightforward matter, especially due to the scarcity of works on whistles used in the communication of humans with non-human animals and even among humans themselves (for the latter type, especially the so-called whistled languages, consult Rialland 2005; Meyer 2008, 2015, 2021). Nevertheless, given the reasons provided below, we think that whistles can be viewed as transitory phonic elements, i.e., semi-consonantal and semi-vocalic. Like consonants, whistles (a) tend to be voiceless; (b) are formed in a manner similar to fricatives, that is, by obstructing the air flow, in particular, by means of the lips as is the case of canonical labial consonants; (c) whistles produce noise associated with the front cavity in the region where F2 normally occurs (see Section 4). Therefore, overall, they are similar to [f] and [ɸ]. However, like vowels, whistles carry tones and syllables and can be sung.[16] As a result, whistles are able to substitute language (i.e., language *sensu stricto*) and yield so-called whistled languages (Rialland 2005; Meyer 2008, 2015, 2021; see also Sebeok and Umiker-Sebeok 1976; Sicoli 2016; Ridouane, Turco and Meyer 2019).

Lastly, CACs seem to be quite flexible with regard to tones and, inversely, fail to be characterized by any pervasive tonal patterns. To begin with, three types of tones are featured in CACs: low and high, which are widely attested in sentence grammar, as well as extra-high, which is limited to interactives. In line with the tonal flexibility mentioned above, different types of tones often exist for a single lexeme. For instance, *pit(a(/)('))* can be realized as ˦ [pít] and ˥ [pít̋]; *yere(')* as ˦˦ [jéréʔ] and ˥˥ [jéré̋ʔ]; *sika'* as ˨˨ [sikaʔ], ˨˦ [sikáʔ], and ˥˥ [síkáʔ]; and */ariya'* as ˨˨˨ [ʕarijaʔ], ˥˨˨ [ʕárijáʔ], and ˨˨˨ [ʕarijáʔ]. However, for monosyllabic CACs, high ([ʕák], [éːʕʔ], [háːj], [má(ː)ʕ(ʔ)], [pít], [ʃʷéħ], [úʕːʔ]) and extra-high tones ([kű], [kűk], [kűt], [míw], [ɲǎw], [pít̋]) are significantly more common than low tone ([tiː] and [haj]). In CACs, both the harmony and variation/fluctuation of tones is attested. The harmonious patterns may involve extra-high tones ([ʕárí̋]), high tones ([áʕkʷáʕʔ]), and low tones ([ʕariʔ] and [ʕurijaʔ]). The varying/fluctuating tones may be ascending, i.e., low and high in consecutive syllables (e.g., [pitáʔ] and [sikáʔ]) and decreasing, i.e., high and low (e.g., [ʕáki] and [táki]). Other types of varying/fluctuating tones are ˥˨˨ [ʕárijáʔ] and ˨˨˨ [ʕarijáʔ]. No examples of tonal variation/fluctuation involving extra-high

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[16] See, however, that sonorant consonants such as [m, n, r, l] may carry tone, be syllabic, and be sung.

tones are attested in our data. As mentioned above, the extra-high tone is extra-systematic from a sentence-grammar perspective. This means that any pattern that includes extra-high tone at least in one of the syllables is extra-systematic as well. This is especially evident in the case of the relatively common ˥˥.˥ structure: [wé̋wé̋], [jéré̋ʔ], [mí̋(R)mí̋w], [kűtí̋], [há̋já̋], [ʕá̋rí̋]. Furthermore, while high tone is not extra-systematic in Gorwaa, a sequence of two high tones and thus a ˥.˥ pattern is. This pattern is also relatively common in CACs, in fact occurring more often than the ˥˥.˥ sequence: [áˤkʷáˤʔ], [ʕárí], [ʕájáʔ], [éˤjáˤʔ], [éˤjáˤ], [hájáʔ], [hájá], [hándó], [síkáʔ], [jéré], [jéréʔ].[17]

4 Evaluation

4.1 Consonantality of CACs versus vocalicity of interjections in Gorwaa

The data presented in Section 3 demonstrate a markedly consonantal character of CACs in Gorwaa. CACs manifest this consonantality through the following more specific properties:

(a) While no CACs exclusively draw on vowels (although some lexemes *are* built around vowels and phones that are not genuine consonants), several CACs consist of consonants only.

(b) The set of consonants present in CACs is considerable both quantitatively and qualitatively, with the attested phones representing all consonantal classes or categories found in the language. The phones [k] and [t], which are some of the most canonical consonants in human language, are also some of the most common non-vowels attested in CACs.

(c) Overall, the frontal part of mouth seems highly relevant in the production of CACs. This may be inferred from the presence and/or prominence of dental and labial consonants, the front vowel [i] (see point (g) below), the kiss-sound, and several whistles.

(d) CACs favor consonantal onsets over zero onsets as well as, although to a lesser extent, word-final codas over coda-less structures.

(e) CACs tolerate consonant clusters considerably better than the other lexical classes.

(f) Consonantal material predominates among all extra-systematic sounds found in CACs, both those that are included in the IPA (e.g., clicks) and those that extend beyond it (i.e., [↓B']).

(g) However, all vowels attested in Gorwaa are present in CACs as well; among them, [a] and [i] are significantly more common than the remaining vocalic phones. Nevertheless, in several tokens, such vowels are pharyngealized – possibly, the first step towards their "consonant-ization".

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[17] Further extra-systematic tonal patterns are attested in CACs borrowings, e.g., ˧.˥.˧ in *fereji* [feréʤi] (from Swahili *mfereji* 'ditch, trench') and ˥.˧ in *kwenda* [kwénda] (from Swahili *kwenda* 'go away').

The prominence of consonantal material in Gorwaa CACs becomes even more evident if the above observations are contextualized and compared with the phonetic profile exhibited by interjections. Indeed, the nature of interjections is vocalic in Gorwaa and this interjective vocalicity, reported in our earlier article (Andrason and Harvey 2024), manifests through the following properties:

(a) Interjections tend to consist of genuine vowels and/or 'quasi-vocalic' phones. This latter set of sounds includes approximants ([j], [h], and [ɦ]) and phones that are "strongly related to approximants and vowels" ([ħ], [ʕ], [ʔ]; Andrason and Harvey 2024: 11). Out of 25 panlectal interjective lexemes, only one is entirely made of consonants; further one (attested in four variants) is found among 66 idiolectal lexemes (Andrason and Harvey 2024: 9, 15).

(b) In interjections, genuine consonants are rare, and their overall diversity is highly limited. The only phones of this type attested in panlectal lexemes are [t] (although found in a single interjective cluster) and [l] (similarly, found in one token; Andrason and Harvey 2024: 9).

(c) The "back part" of the mouth (i.e., positioning the highest point of the tongue back in the mouth for vowels and resorting to pharyngeal and glottal constrictions for consonants) seems the most prominent in interjections. This transpires through the preference for the [a] vowel (see point (g) below) and the gutturality of phones expanding beyond genuine vowels (i.e., consonant(oid)s and approximants). In light of this, interjections are viewed as characterized by the |A| place of articulation or the |A| feature element (Andrason and Harvey 2024: 21-22).

(d) Interjections tend to exhibit onsets which are almost invariably approximants and/or non-canonical consonants, with the most common being [ʔ]; they also favor open syllables and thus coda-less structures over closed syllables and consonantal codas (Andrason and Harvey 2024: 8, 10, 12-15).

(e) In interjections, consonantal clusters are extremely rare (Andrason and Harvey 2024).

(f) As was the case of CACs, among the extra-systematic phones attested in interjections, consonantal material is more visible than vocalic material. This visibility is nevertheless lower than that observed in CACs, with fewer extra-systematic consonants being attested (e.g., only one click is found in interjections while two are found in CACs) and the kiss sound [↓B'] being absent.

(g) Similar to CACs, interjections exploit the full set of Gorwaa vowels. In contrast to CACs, however, only [a] stands out of the vowels as far as its frequency is concerned, being significantly more common than the remaining vocalic phones (Andrason and Harvey 2024: 9, 15, 17, 22). Furthermore, contrary to CACs, vowels in interjections are not markedly pharyngealized.

A few further properties differentiate CACs from interjections in Gorwaa. CACs are quite flexible with regard to tones although, for monosyllabic lexemes, high and extra-high tones predominate. In contrast, interjections are highly uniform in their tonal structure: they tend to carry high or extra-

high tone on the first vowel and exhibit a decreasing tonal pattern (Andrason and Harvey 2024: 17, 21). The visibility of the approximants [j] and [w] is roughly similar in CACs, although in interjections, [j] is more common than [w] (Andrason and Harvey 2024: 21). CACs include non-IPA extra-systematic sounds, i.e., the kiss-sound CAC and whistles. Interjections do not make use of these types of sounds (see points (f) in both lists above).[18]

Consequently, the above results corroborate the correlations with regard to the CAC and interjective prototypes, reported in the initial sections of this article: the consonantality of CACs and the vocalicity of interjections. In light of the prevalence of these two tendencies in several other languages (see Section 2), systematically confirmed in Gorwaa, we are convinced that these correlations cannot be accidental but must have an explanation. This is especially likely given the cognitive view of grammar (to which we subscribe), whereby language, its grammar included, reflects our 'bodily' interactions with external reality (see the embodiment principle in Kövecses 2005; Evans and Green 2006; and Janda 2015). In the remaining part of the article, we identify the most plausible motivations for the correlations identified above.

4.2 Motivations for the consonantality of CACs and the vocalicity of interjections

To begin with, the close relationship of interjections with vocalicity and that of CACs with consonantality seem to reflect the more general, distinct predispositions of the two categories towards sonority. When expressing one's emotion (regardless of whether any interlocutors are present or not, and what their exact nature is), humans tend to employ more sonorous articulation(s); in contrast, when giving orders to non-human animals, humans prefer to use less sonorous articulation(s).

As far as Gorwaa interjections are concerned, a tendency towards greater sonority not only explains their vocalic rather than consonantal nature but also elucidates the types of consonants and vowels typically used in interjective lexemes. As far as all non-vowels are concerned, approximants and consonantoids, (i.e., phones that although not genuine vowels are the most "vowel-like" and less "consonant-like") clearly predominate (see Section 4.1 above). Almost all of such sounds are located in the highest section of the sonority scale for non-vowels. This especially pertains to [h] and [ɦ], which in feature theory are defined as [–consonants] and [+vocoids] and like vowels "exhibit the features of [+] sonorant, [−] constricted glottis, and [+] spread glottis" (Andrason, Harvey and Griscom 2023: 300 drawing on Blevins (2018) and Keating (1988)). Therefore, laryngeals are ambivalent with regard to sonority and pattern with both obstruents and sonorants (Hume and Odden 1996; Clements and Osu 2002; Miller 2012). This reflects their intermediate position on the sonority scale as well as on the aperture and source scales, i.e., higher (or "unranked") than all consonants and lower than (modal) vowels (Miller

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[18] Crosslinguistically, however, kiss-like sounds exploiting [↓ʙ'] realizations are not restricted to CACs. They feature in other types of interactives, e.g., onomatopoeias, phatic markers, and interjections (Andrason 2024: 119). The presence of whistles outside of CACs is also attested across languages. Nevertheless, their use in interjections is infrequent. As far as we know, the only instances of this seem to be "cognitive interjections" expressing surprise (perhaps mixed with admiration), as for instance in Polish.

2012: 281). The consonantoid [ʔ] – similar to [h] and [ɦ], highly common in interjections – also exhibits certain vowel like properties: it is "defined as [–consonantal] and, similar to vowels and approximants, it is produced without 'obstruction in the midsagittal region of the vocal tract' (Hall 2007: 314)" (Andrason, Harvey and Griscom 2023: 299). Overall, the position of [ʔ] on the sonority scale is problematic and, depending on a language, approach and/or scholar, ranges from higher to lower. In some languages, [ʔ] seems to approximate obstruents, while in others it patterns with sonorants and may paradoxically "have simultaneously high and low sonority" (Miller 2012: 282). As far as vowels are concerned, the [a] vowel, which largely predominates in interjections – is one of the most sonorous among all vowels found in human language. The |A| feature and place articulation characterizing Gorwaa interjections visible in the predominance of *a* vowel and guttural consonant(oid)s – the most sonorous of all the features and articulation places – would be the ultimate and more general exponent of this marked tendency towards sonority.

Conversely, the tendency of CACs not to be sonorous (i.e., their lesser sonority) explains their consonantal rather than vocalic nature as well as the types of consonants and vowels that are (the most) common in CACs in Gorwaa. As far as non-vowels are concerned, the phones attested cover the entire length of the sonority scale available to consonantal and 'consonantoid' phones. This includes voiceless stops (i.e., [k], [t], [p]), clicks ([ǀ], [ǁ], and [ʘ]), and voiceless fricatives ([s] and [ʃ]), which all occupy the lowest position of the sonority scale; voiced stops ([g] and [d]), nasals ([m], [n], [ɲ]) and trill ([r]), which are located slightly higher up; and, lastly, much higher on the scale, fricative-approximants ([ħ], [ʕ], and [h]). Significantly, voiceless stops constitute the class of consonantal phones that feature in a particularly large number of CACs, namely 13x (33% of all the lexemes). For all stops envisaged jointly, the ratio ascends to 15x (38%) and, for voiceless stops and fricatives, to 17x (43%). For vowels, the five phones that are attested also cover the nearly entire length of the sonority scale available to vowels: from high vowels [i] and [u] (13x in total) located lower on the sonority scale, to mid peripheral vowels [e] and [o] (6x in total) occupying the middle section of the scale, and ultimately to the low vowel [a] (18/15x), which as explained above, exhibits the highest sonority value. Crucially, the two most prominent vowels found in CACs, i.e., [i] and [a] are located at the opposite edges of the scale: [i] being the least sonorous while [a] being the most sonorous. This demonstrates "negatively" that CAC vowels are not correlated with sonority (or its higher degree) but are equally compatible with its lesser degree. Overall, the facts that Gorwaa CACs are not characterized by the |A| feature but on the contrary, make a prominent use of the frontal part of mouth are further exponents of their lesser sonority and/or avoidance thereof.

While the vocalicity of interjections and the consonantality of CACs result from the respective greater and lesser sonority of the two interactive categories, this opposite relationships towards sonority can be further motivated. It is at this point that reality and embodiment intervene shaping the grammar of human language.

We propose that the reason why interjections tend to be sonorous may be recovered if one relates the phenomena formative of sonority to the function (pragma-semantics) of interjections and their imitative (onomatopoeic) abilities. As we explained in Section 2, sonority is a composite

phenomenon that draws on (source of) voicing, *Svara*, loudness, prolongability, and openness (aperture). The most periodically voiced, musical, prolongable, noisy, and open phones are overall the most sonorous (Nathan 1989; Miller 2012). Spontaneous cry-like vocalizations produced when experiencing strong emotions, e.g., joy/euphoria, pain, irritation/anger/fury, disgust/repugnance are inherently – in fact, instinctively – periodically voiced, musical, prolonged, loud, and produced with a widely open jaw, and thus highly sonorous. When such vocalizations used to convey emotions are linguistically harnessed and packaged into stabilized lexical forms or interjections, their closest linguistic (or IPA) equivalents are the most sonorous phones. As a result, interjections would be imitative of cries and this mimicry would transpire, among others, through their high sonority.

As far as CACs are concerned, motivation for their lesser sonority seems more complex because it involves not only human speakers but also their non-human "interlocutors". Nonetheless, similar to interjections, functional reasons (i.e., acoustic properties of determined sounds suitable for the particular function of a lexeme) and imitative reasons (more specifically, their morphic subtype) are crucial factors motivating the lack or avoidance of sonority in CACs.

First, phones with the lowest degree of sonority – such as the consonants [p], [t], and [k] – produce "sharp onsets" (Rendall and Owren 2008: 183). Therefore they "naturally conjure […] semantic constructs [that are] harsh/fractured" and tend to be "matched to jagged objects preferentially" (Rendall and Owren 2008: 183). This reflects the fact that from the sonority's perspective, they are the shortest (i.e., the least prolongable) and the least open. In contrast, the consonants located higher in the sonority scale – especially, voiced plosives, nasals, and liquids – are characterized by "smoother onsets" (Rendall and Owren 2008: 183). They thus "conjure smooth/connected […] semantic constructs" and are "matched to rounded objects" (Rendall and Owren 2008: 183). Approximants and vowels – which are the most prolongable and open and, overall, the most sonorous – are, in turn, the least sharp and the 'smoothest'. Consequently, the lesser sonority of phones such as [p, t, k] would be correlated with sound effects that are the most penetrating and discernable: harsh, piercing, and excruciating. It would thus be particularly efficient in drawing attention of an animal, alerting it, and/or chasing it away. In other words, "to capture attention and increase motor activity" of animals, humans, for instance, "pastoral herders and domestic animal handlers", preferably employ "rapidly repeated pulses of signals with abrupt onsets" (Rendall and Owren 2008: 178). These would include "tongue clicks", "lip smacks", as well as voiceless stops and affricates (Rendall and Owren 2008: 178) – exactly as is the case of CACs in Gorwaa.

This harshness and, related to it, perceived or assumed unpleasantness may particularly be relevant for dispersals, which as we mentioned above, are employed to repel animals. Indeed, dispersals are the class of CACs that attests to the highest degree of consonantality among all CAC types. In the sample of dispersals from 79 languages, non-vocalic syllables constitute nearly 20% of all syllable types used and syllables with both consonantal onsets and codas are the most common structures attested (Andrason 2023). Among the consonants used, two types predominate: voiceless sibilants (especially [s] and [ʃ] as well as their affricated variants) and voiceless plosives

[p, t, k] – all of which occupy the lowest position on the sonority scale. A prototypical dispersal has a KVS/SVK form (K – voiceless stop [p, t, k]; S – sibilant; V – vowel), especially of a [kI/Uʃ] type (Andrason 2023: 88-91, 95-96). This pattern is also attested in Gorwaa where *sh*, *sh(sh)t*, *shwéhh*, and *sika'* are used to chase away birds. Following the argument made in the previous paragraph, the prominent presence of the least sonorous phones (voiceless stops, affricates, and fricatives) may be attributed to the sharpness and harshness, and overall discernibility of such sounds. This reason also pertains to sibilants as the preferred voiceless fricatives. Indeed, as argued by Andrason (2023: 100), the presence of sibilants in dispersals likely stems from the fact that these consonants "stand out from other sounds even in non-speech contexts" (Ladefoged and Maddieson 1996: 168). They do so because they exhibit "a greater intensity" (Ladefoged and Maddieson 1996: 157) and "have more acoustic energy" than any other fricatives (Ladefoged and Maddieson 1996: 168). Therefore, they lend themselves better than any other fricatives to be discerned and convey a repelling function.

Producing clear signals to capture the attention of the animal is also visible in the vocalic material used predominantly in CACs. Again, the dispersals illustrate the point most clearly. Across languages, I-, A-, and U-type vowels predominate in dispersals (Andrason 2023). Rather than sonority (as is the case of interjections), the prevalence of these vowels seems to stem from their sharp distinctiveness, evident through their placement at the extreme edges of the phonetic triangle. This distinctiveness could itself be related to the so-called hyperarticulation principle. Hyperarticulation is a perceived necessity for the use of "clear signal[s]" in communication with addressees whose cognitive and linguistic capacities are viewed as more limited – as is exactly the case of animals (Marklund and Gustavsson 2020: 2; see also Burnham, Kitamura and Vollmer-Conna 2002 and Xu et al. 2013). The marked presence of [a] and [i] in CACs in Gorwaa would be consistent with this phenomenon.

The other reason for the lesser sonority of CACs is imitative (onomatopoeic) or, more specifically, morphic. Across languages, some types of CACs have an onomatopoeic foundation and imitate the sounds produced by the non-human species that are being addressed (Bynon 1976; Poyatos 2002; Andrason and Karani 2021; Andrason and Sagara 2024). By doing so, humans adjust "the modes of address" from those that are conventionally practiced between them to those that are "supposedly relevant to [the animal's] ecology" (Mondémé 2018: 15; see also Schötz 2020: 345; Harjunpää 2022). Humans adapt their language to their non-human "interlocutors" and speak in a way that approximates the most (in a person's view) the communicative systems of a particular animal species. Simply put, we speak some type of cat-ish, dog-ish, donkey-ish – or animal-ish (varieties) more generally.

This onomatopoeic foundation is especially pervasive in summonses. In many languages, various CACs that are used to draw animals' attention and call them to come imitate sounds made by those animals. Often, these CACs coincide formally with onomatopoeias mimicking the cries produced by the respective animals (see *inter alia* Berber, Dogon, Babanki, and Bum; Bynon 1976; Andrason and Sagara 2024; Andrason and Akumbu 2024). This imitative nature of some CACs in turn explains the common use of certain consonants (whether more sonorous or less sonorous),

which humans associate with a given animal and their communication mode. This for example concerns [k]-type consonants in summonses directed to poultry (see *kɔkɔkɔ* in Babanki and Mokpe, *kúkukúku* in Arusa Maasai, *kúkú*(*kú*) in Fante, and *k'-k'-k'* in Oroko); [m]-type consonants in summonses directed to goats (see *meee* in Kihunde, *mɛmɛmɛ* in Dogon, *mɛ̀ɛ́ʔ* in Babanki and Bum, *méɛ́* in Fante, and *mee(e)* in Ewe); [b] and [m]-type consonants in summonses directed to sheep (see *beee-beee* in Kihunde and *bee* in Polish); and the various classes of nasals in summonses directed to cats (see, *ɲáːu* in Arusa Maasai, *mew* in Macha Oromo, *mɪ́jăw* in Mokpe and Oroko, *mìjáw*(*ù*) in Kihunde). Gorwaa summonses comply with these tendencies as illustrated by *kű*/*kűk*, *ma(a)(a)ˤ(')*, and *mɪ́(mɪ́)w*/*nyắw* employed to summon chickens, sheep, and cats, respectively.[19] Overall, the presence of some consonants in CACs would stem from the presence of similar phones in animal communication – or sounds that humans 'translate' into their phonetic system as consonants – rather than sonority degree *per se*. To an extent, one could argue that the consonantality and lesser sonority of CACs would be an (accidental) epiphenomenon of this. The presence of nasals in CACs directed to cats constitutes a case in point. The so-called "friendly and affiliative vocalizations" of cats – when they approach each other or humans – are typically realized with "a gradually opening and then closing mouth" (Schötz 2020: 325). This articulation results "in a sound […] beginning with a labial consonant resembling an [m]" (Schötz 2020: 325). This sound would reappear in more or less tamed and adapted manner in human languages in 'friendly' summoning CACs as a nasal consonant, preferably a bilabial ([m]) but also dental ([n]) or palatal ([ɲ] and [ŋ]) – phones that are located higher up on the sonority scale of consonants than one would expect from CACs.

This onomatopoeic motivation of some consonants in CACs may be detected in dispersals as well, where it does motivate the lesser sonority of this class of CAC constructions. That is, while the presence of voiceless stops, affricates, and sibilant fricatives attested in dispersals is likely conditioned by their acoustic properties discussed above, it may also derive from mimicking animals' vocalizations. Humans would thus imitate so-called agonistic animal sounds and exploit them to scare animals and, by extension, repel them – similar to what animals do themselves. Cats illustrate this phenomenon once again. The agonistic sounds made by cats involve hissing sounds (e.g., [hː], [çː], [ʃː], [ɧː] and [ʂː]) and – if the communication is more intense – spitting sounds exhibiting plosive/affricate onsets ([t͡ʂː], [k͡hː] or [k͡ʃː]) (Schötz 2020: 323). This presence of 'hissers' (sibilants) and 'spitters' (plosives/affricates) in cats' communication would coincide with the most common consonants used in dispersals (see above; cf. Andrason 2023). The common use of sibilants in dispersals may also be related to the fact that sibilants are commonly used as onomatopoeias mimicking snakes' hiss, which is indeed "the most common mechanism of sound production in snakes" (Young 1997: 39; see Andrason 2023). Humans would arguably coopt a snake hiss – onomatopoeically adjusted to our language – to scare animals and use it in a directive function, i.e., as a CAC.

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[19] The CACs *úúúˤ'* and *eéˤ'* used to call rams and sheep have also onomatopoeic foundations in Gorwaa.

Overall, the presence of determined consonants in some (types of) CACs – as well as that of other phones – would reflect the fact that such phones imitate most closely sounds made by animals themselves. The fact that animal communication extensively draws on percussion, stridulation, and click mechanisms (Pika et al. 2018: 6) could further contribute to the visibility of short, harsh, phones the closest equivalents of which in human language are consonants, especially those located lowest on the sonority scale.[20]

Given the commonality of certain "noises" of lesser sonority degree in animal-to-animal communication (see the use of hissers by cats and snakes), the presence of such sounds in animal "languages" (which humans interpret as less sonorous consonants and onomatopoeically exploit in CAC) may likely be motivated. Two reasons seem the most likely. First, the use of "short [and] abrupt-onset" sounds – similar to less sonorous consonants – by several animals (e.g., mammals and birds) in alarm calls may once again stem from the fact that such a "design" […] make[s] them stand out against background noise and make them easy to localize" (Rendall and Owren 2008: 179). As a result, the animal listener, e.g., a bird, immediately directs its attention in the direction of the sound and "couple[s it] with reflexive movements preparatory to flight" (Rendall and Owren 2008: 179). Accordingly, the structure of call used by an animal could be linked to the "acoustic effect" it exerts on the listener, i.e. another animal (Rendall and Owren 2008: 179), generally coinciding with the acoustic properties of less sonorous phones discussed above.[21] Second, the noises made by animals – and next reinterpreted by humans in CACs as less sonorous consonants – reflect the properties of the physio-anatomical apparatus available to most animals with whom humans interact. For instance, as mentioned above, several animals communicate only, mostly or extensively by means of percussion, stridulation, and click mechanisms (see Pika et al. 2018). This generates noises that correspond to sounds located very low in sonority scale. Another example pertains to the location of larynx. Although some mammals can lower their larynx and enlarge their laryngeal cavity – as it typical of humans – most animals do not have a large pharyngeal/oral cavity ratio. As a result, they cannot produce sounds that are highly sonorous; instead, their sound range is limited to less sonorous noises (see Fitch 2002, 2005). Emphasizing the oral cavity over the pharyngeal one in CACs and ultimately lesser sonority of CACs may result from imitating the larynx apparatus and its capacities characteristic of many animal species.

To conclude, two main routes in the production of CACs explaining the motivations for their lesser sonority can be distinguished in light of the above observations: (1) humans exploit acoustic effects that their language can exert on animal interlocutors (e.g., *pst* to silence animals); (2) humans imitate with their language sounds made by animals (e.g., *sss* to chase cats and birds) (In some of such cases, e.g., *miaw*, the sonority avoidance could be violated given the mimicry of the cry made by the animal.) This lesser sonority present in animal communication, which human

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[20] This same explanation may apply to whistles which are another common manner of sounds production in animal communication (Rendall and Owren 2008) and perhaps therefore appear abundantly in CACs. Importantly, however, whistles are "signals with dramatic frequency upsweeps" and therefore particularly suitable to alert and/or draw attention (Rendall and Owren 2008: 178).

[21] Of course, other modalities (e.g., gestures, eye contact, and scents) are also involved in communication and affect both its meaning and success.

mimic in CACs, may also be motived. That is, (2.1) the animal produces a given sound by drawing on iconic properties of some acoustic signals (e.g., agonistic hissing sounds made by cats) or (2.2) the sound made by an animal is conditioned by the physio-anatomical properties of its communicative apparatus available. Figure 1 schematically represents the motivation for the lower sonority degree of CAC. (In both cases – whether the call originates in an animal or a human – the production of directive sounds is necessarily embodied and conditioned by the way in which its producer (the "locutor") can first perceive and next generate acoustic signals – it is thus influenced by the perceptual stereotypes that speakers (and perhaps animals too) tend to have vis-à-vis hearers.). All such routes are not mutually exclusive but may coincide for particular CACs.[22]

acoustic effect   CAC

physio-anatomy

acoustic effect   animal sound   imitation

animal   human
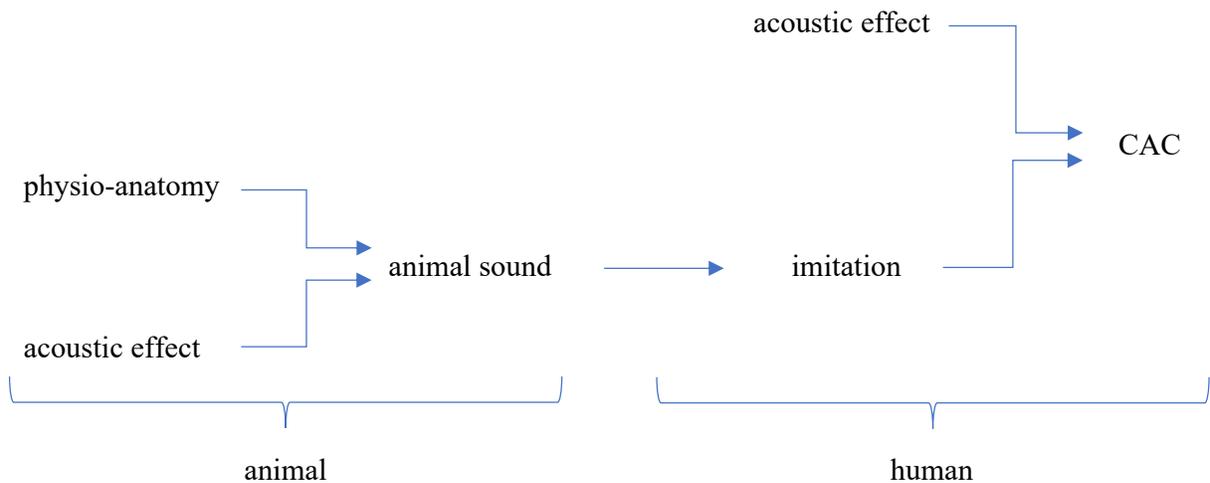
Figure 1: The model of motivation for the lesser sonority of CACs

5 Conclusion

In the present article, we discussed the consonantal nature of conative animal calls and the vocalic nature of interjections and the potential motivation (or accidentality) of their distinct phonetic substance. We studied this issue by drawing on data from Gorwaa and located them within a broader typological context. The evidence presented allows us to conclude that Gorwaa CACs exhibit a markedly consonantal character, manifested through a set of more specific phonetic properties, which stands in stark contrast with the vocalic character of interjections reported in our previous study; and both correlations are not accidental. The close relationship of interjections with vocality and that of CACs with consonantality stem from the more general distinct tendency of the two categories towards sonority, i.e., being more sonorous in the case of interjections and

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[22] Arguably, this model applies differently to the various pragma-semantic subtypes of CACs and operates differently across languages. This stems from the fact that, as explained above, summonses, dispersals, directionals, and CACs unrelated to motion exhibit themselves varying extents of propensity towards consonantality, with dispersals being the most marked in this regard. Nevertheless, each of the four subtypes of CACs can draw on all the strategies included in Figure 2. Indeed, we have shown that both summonses and dispersals may have acoustic (human and animal), imitative (human), and physio-anatomical (animal) foundation (see Section 4.2).

being less sonorous in the case of CACs. These opposite sonority tendencies are motivated. The greater sonority of interjections is motivated by the similarity of more sonorous phones with emotive cries. The lesser sonority of CACs in motivated by the iconic acoustic suitability of less sonorous phones for alerting, drawing attention, and chasing away interlocutors, especially non-human animal species, as well as mimicry (morphism) of noises made by animals – the less sonorous properties of which may in turn stem from their own acoustic suitability and an animal's physio-anatomy.

Acknowledgments

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