

# Whistled Languages and Whistled Speech

**Julien Meyer**<sup>a,b</sup>, **David Díaz Reyes**<sup>b</sup>, **Andre Batchelder-Schwab**<sup>c</sup>, and **Bernard Gautheron**<sup>d</sup>, <sup>a</sup> Université Grenoble Alpes, GIPSA-lab, CNRS, Grenoble, France; <sup>b</sup> Aula de Silbo, Universidad Las Palmas Gran Canaria, Las Palmas, Spain; <sup>c</sup> Boston University, Boston, MA, United States; and <sup>d</sup> University of Paris III, Paris, France

© 2025 Elsevier Ltd. All rights are reserved, including those for text and data mining, AI training, and similar technologies.

This is an update of J. Meyer, B. Gautheron, Whistled Speech and Whistled Languages, Editor(s): Keith Brown, Encyclopedia of Language & Linguistics (Second Edition), Elsevier, 2006, Pages 573–576, ISBN 9780080448541, <https://doi.org/10.1016/B0-08-044854-2/00034-1>.

<b>Introduction</b>	<b>1</b>
<b>Body Text</b>	<b>2</b>
Historical Sketch of Studies on Whistled Languages	2
Signal Characteristics and Audibility	2
Geographical and Social Environments	2
Diversity of Whistled Languages	3
Whistling Techniques	3
Phonetics and Phonology	5
A Practice at the Phonetic-Phonology Interface	6
Intelligibility	6
Whistling as a Tool for Linguists Studying Tone Languages	7
Endangered Linguistic Diversity	7
Revitalization Initiatives	7
Language Evolution and Whistled Language	8
<b>Conclusion</b>	<b>8</b>
<b>References</b>	<b>8</b>

## Key Points

- Provide a state of the art on whistled languages and whistled speech.
- Give a new overview on the diversity of whistled languages worldwide (including a map).
- Describe the geographical and social environments of use of this practice.
- Show how whistled speech represents an opportunity for research in language sciences (description, intelligibility, evolution, education, phonetics-phonology interface).
- Provide a sketch on revitalization initiatives.
- Provide an extended bibliography on this little known topic.

## Abstract

Whistled languages are secondary speech codes based on whistles anchored to, and derived from, a spoken language thanks to a relation of acoustic iconicity. Whistled languages essentially consist of a complementary/auxiliary modality of speech mostly used for distance communication that is mainly used in language communities maintaining a traditional lifestyle. Indeed, whistles propagate well in natural surroundings. This special speech practice is often called “whistled speech” because its productions maintain and augment some acoustical features of spoken speech while degrading others, to adapt spoken sentences into a simple melodic line modulated in amplitude and frequency.

## Introduction

Many populations all over the world have endemically developed a whistled form of their spoken language which people can use for distance transmission of speech and thus to communicate words, phrases, and more generally whole conversations. Indeed, whistles propagate well in natural surroundings. Whistled languages essentially consist of a complementary/auxiliary modality of speech that is mainly used in language communities maintaining a traditional lifestyle in order to communicate when individuals are isolated during outdoor rural activities (Busnel & Classe, 1976). This special speech practice is often called “whistled speech” because its productions maintain and augment some acoustical features of spoken speech while degrading others, to

transform spoken sentences into a simple melodic line modulated in amplitude and frequency. Whistled speech recognition is made possible thanks to a perceptual resemblance with spoken speech, which is based on a relation of acoustic iconicity between the two. These secondary speech codes are very different from “lexical ideographs”—that lack phonetic resemblance to spoken language (Niles, 2010; Stern, 1957; Zemp & Kaufman, 1969)—and from secondary representations based on writing systems such as Morse code. Such “whistled languages” are anchored to, and derived from, a spoken language; this also makes them substantially different from sign languages, which are self-standing lexically, grammatically, and phonologically. Whistled Greek, Spanish or Mazatec are still Greek, Spanish or Mazatec, but with a more constrained articulation leading to phonetic reductions in comparison to the spoken form. Indeed, speaking while maintaining a whistled signal imposes reduced articulatory movements to the vocal tract. This procedure shows some similarities with other natural speech types, such as whispered or shouted speech, in which speakers also transform/modify the phonetics of speech by applying changes in the vocal tract to adapt to special circumstances of communication. While shouting reinforces particularly voiced sounds, in whistled speech the vocal folds do not vibrate anymore but just participate to control the airflow. Strikingly, whistled languages are also quite unintelligible to untrained speakers but intelligible to trained ones, which makes them objects of interest for science, but also explains why they long remained a mystery for the general public. Moreover, they often survive among remote rural populations of the planet—even if whistled speech has also been found in towns and cities—and the great majority of these populations speak some of the less spoken and less documented languages worldwide.

## Body Text

### Historical Sketch of Studies on Whistled Languages

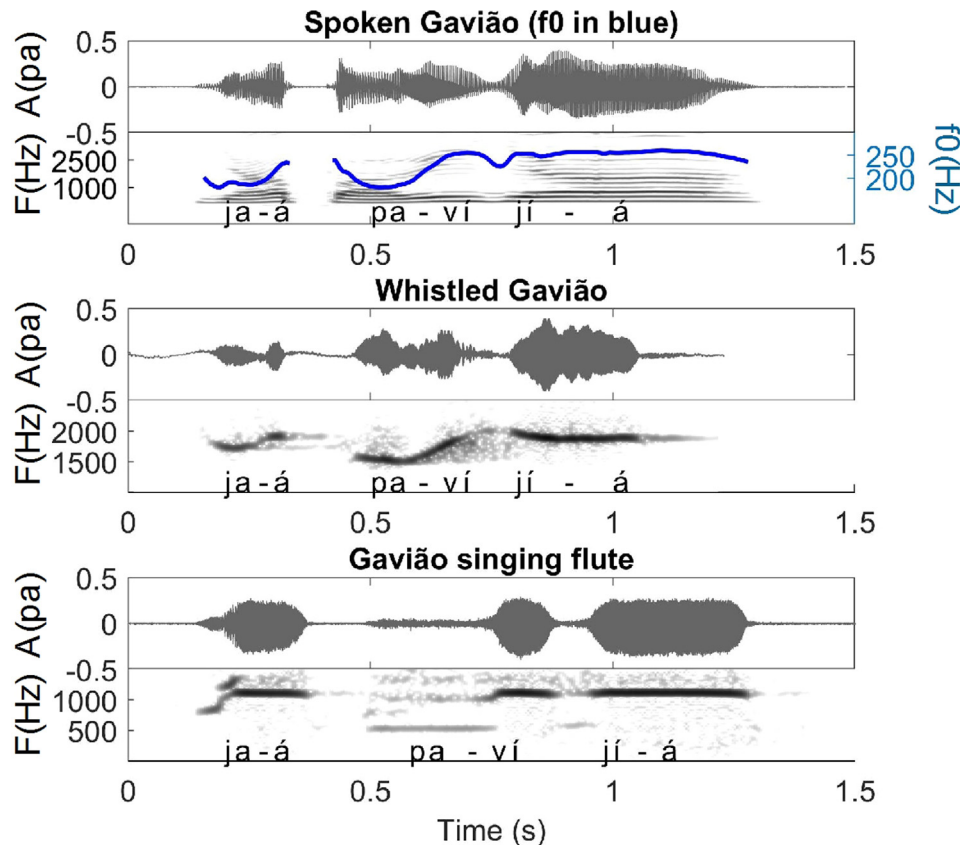
Whistled languages represent communicatory systems that encode features of a spoken language into whistles through community-specific conventionalization in order to produce intelligible utterances. These conventionalizations are based in articulatory features found in the consonants, vowels, and prosody of a language, allowing the transmission of sentences by transposing a selection of salient phonetic and phonological aspects. Speech transformed into whistles is hard to grasp because of the elimination of canonical acoustic correlates of phonemes from the spectrum. One consequence for linguistics is that the classical phonetic annotations fail to characterize the dramatic change in production that they operate (Figs. 1 and 2). The first scientific studies on this topic concerned mainly anthropological and ethnomusicological aspects (Eboué, 1935; Haddow, 1952; Kirby, 1937; Labouret, 1923; Lajard, 1891; Nketia, 1962; Pepper, 1956; Quedenfeldt, 1887). Linguistic description of the phonetics and acoustics of whistled language only began in the mid-20th century (Busnel & Classe, 1976; Busnel et al., 1962; Classe, 1956; Cowan, 1948). Recent work has largely been collaborative between scientific researchers and traditional leadership (Batchelder-Schwab & Mali, 2024; Díaz Reyes, 2022, 2024; Meyer & Casimiro Nava, 2008; Meyer & Davy, 2025; Meyer & Díaz Reyes, 2017; Moore & Meyer, 2014; Sicoli, 2016).

### Signal Characteristics and Audibility

The pitches of whistles are concentrated in a narrow bandwidth (1000 Hz–4000 Hz) where the hearing in human beings is more sensitive and selective. The amplitude of whistled speech has more reasonable limits in its dynamic range (less than 12 dB) whereas the range of spoken speech is more than 50 dB. In natural conditions, background noise is typically weak at high frequencies, so whistling has a better audibility ratio than speaking in their respective bandwidths, when comparing signal to background noise. Such properties explain the use of whistles in noisy conditions or for communication at long distances, as whistles are more resistant to background noise. Whistling carries well in valleys, and can commonly remain intelligible up to 2km in places with good propagation conditions (Busnel & Classe, 1976; Meyer & Díaz Reyes, 2017).

### Geographical and Social Environments

Whistled languages have developed in response to the necessity for humans to exchange messages in conditions of relative isolation, mostly associated to outdoor rural activities such as herding, hunting/fishing or farming (Busnel & Classe, 1976). It is also often employed to speak in secret from foreigners or to remain hidden from animal prey while hunting or fishing (Meyer, 2015, 2021). Among the specific activities that have motivated the development of whistled language, taking care of herd animals is especially present in African plains as well as in mountainous landscapes. Other contexts where whistling is found is during courtship, during spiritual practice, and in certain lines of work like bus driving or market selling to cover distance and/or overcome interfering noise. Whistled languages are usually found in rural, rugged terrain with mountains and dense forest, as an adaptation to environmental conditions constraining communication, but can also be found in urban environments and flat, sparse areas in cultures that have developed whistled registers for other reasons like for animal husbandry. Whistled language is largely areal, with hotspots found in the Southeast Asian mountains, Papua New Guinea, the Amazon rainforest, Mexico, and sub-Saharan Africa. Communities that move into regions where whistled language is practiced often adopt the practice. Individuals who grow up in communities where whistled language is often practiced usually begin to use and master a whistled register very early in childhood through immersion, and is viewed as a way of expressing the language that is analogous to whispering, shouting, or singing a language. However, some communities like the VhaVenḡa in South Africa (language: TshiVenḡa) employ structured curricula to teach young



**Fig. 1** Waveforms and spectrograms of the sentence “*jaá pavijá*” (meaning “Let’s go to bathe” in the Gavião language of Rondônia, Brasil) uttered in spoken speech (upper row), in whistled speech with lip protrusion (middle row), and with the flute as in traditional flute songs (lower row). The blue line on the spectrogram of spoken speech represents the extracted F0, highlighting the surface tonal line of speech. This figure illustrates two cases of pitch-to-pitch emulation (from the F0 of spoken speech to mouth modulated whistles or to flute whistled pitches). The singing flute form in Gavião language (lower row) uses an alternative flattened encoding of spoken pitches, which preserves relations between consecutive tones, as described in Meyer and Moore (2021). Adapted from Meyer and Manfredi (2025); listen also to sound extracts in <https://soundcloud.com/user-28976943/sets/sounds-in-meyer-manfredi-2023>.

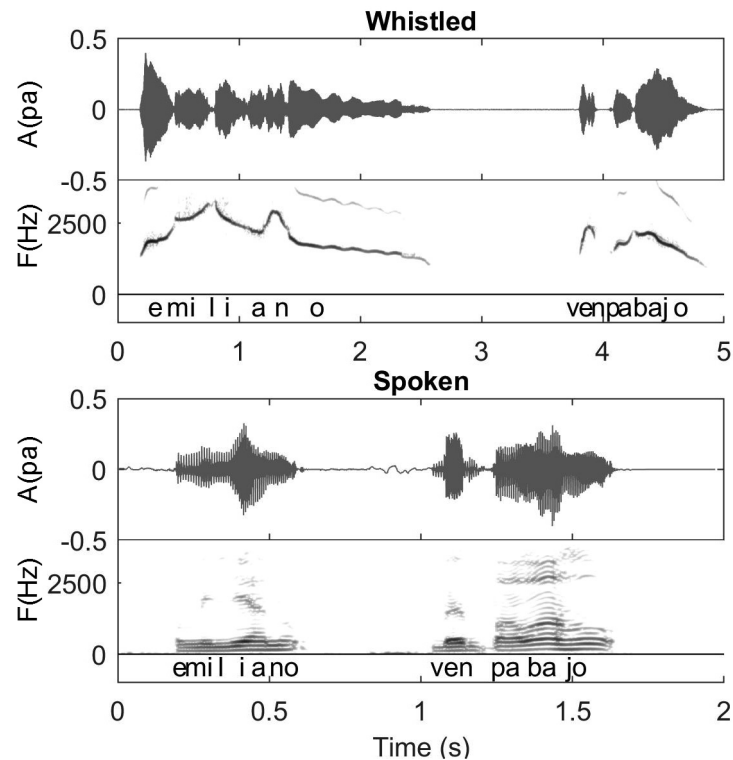
members of the community to learn to use and understand the whistled language, as part of their initiation rites or precolonial Indigenous education systems (Batchelder-Schwab & Mali, 2024; Blacking, 1972; Kirby, 1937).

### Diversity of Whistled Languages

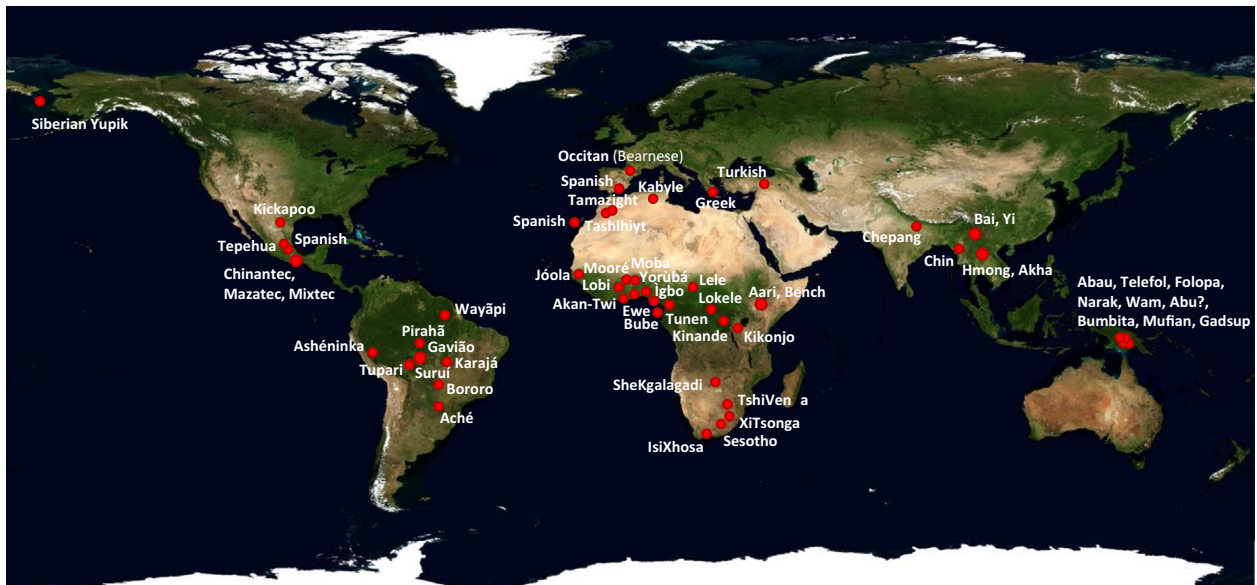
Whistled language has been found across the world in most major language families, in all inhabited continents (see Fig. 3). The only practical requirements for a whistled language are a technique for producing a whistle, and an encoding strategy from speaking into whistling. Thus, every spoken language could be whistled. Whistled language is versatile, and communities which undergo language shift readily adapt whistled registers into a new language. The best-attested example is the inhabitants of the Canary Islands who spoke and whistled a now-extinct Tamazight language sometimes called Guanche, and subsequently switched to both speaking and whistling Spanish. Similar case studies can be found in Congo, where speakers and whistlers of Kinande can readily adapt their whistled language to Kiswahili and to French, or in South Africa between whistlers of TshiVenda/isiXhosa/isiZulu and English (Batchelder-Schwab, 2025). In Mexico, there are records that whistled Spanish developed in populations speaking non tonal languages (Hasler, 1960), while speakers of tonal languages which had a whistled register, such as Mazatec or Chinantec would limit their whistled Spanish productions to names or very simple set phrases (Meyer, 2015).

### Whistling Techniques

Many techniques have been described among the populations who whistle their language. Whistled speech production by human whistlers is generally generated by a stream of compressed air in the mouth that is molded by the tongue, the jaw, the lips, and eventually the fingers. Whistling techniques produce a shock effect through compressing air through a small opening produced by the mouth, the hands, or eventually a tool. The airstream makes vibrations at the edge of the mouth (or the tool/hands),



**Fig. 2** Waveform and spectrogram of the whistled (upper row) and spoken (lower row) forms of the Spanish sentence “*Emiliano ven pa' bajo*” [emiliano ben pa βaxo] meaning “Emiliano come down”, where “*pa' bajo*” is the fast speech fusion of “para bajo”, i.e., an allegro version. The x-axis of the whistled and spoken forms are not at the same scale because the respective whistling tempos are relatively slower. Whistling as produced here by a traditional whistler (Emiliano Fernandez Armas, from El Hierro Canary Island) relies on over-articulations and lengthening—mostly vowels—to ensure long distance transmission of the signal. While being a frequency simplification of the spoken acoustic signal, the whistled form is mirroring different phonetic aspects of modal speech: vowels are the most stable parts of the signal and different vowel qualities are whistled at different frequency ranges (typically /i/ higher than /e/ higher than /o/). They are modulated by coarticulation with consonants and their whistled frequency may sometimes be influenced by stress (see for example the frequency of /a/ in /ba/ higher than the /a/ in /pa/). Adapted from Meyer and Manfredi (2025). Listen to sound extracts in <https://soundcloud.com/user-28976943/sets/sounds-in-meyer-manfredi-2023>.

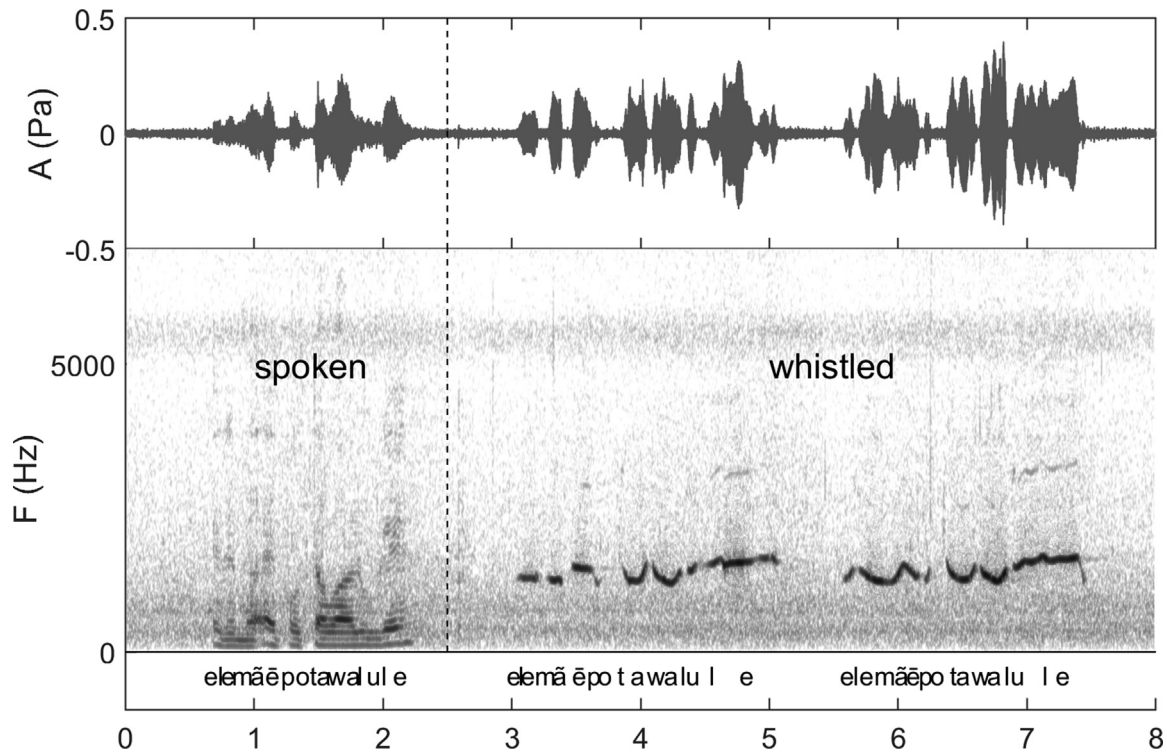


**Fig. 3** Map of the whistled languages in the world attested by published studies or field recordings. Adapted from Meyer and Batchelder-Schwab (2024).

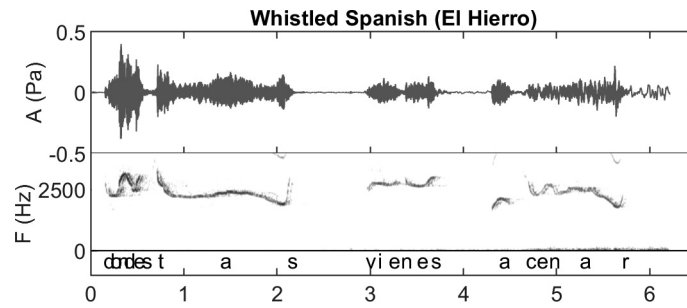
and higher air speed produces a higher and louder pitch. If the opening and the cavity (mouth) are well-matched, the resonance is tuned and the whistle is projected more loudly. The frequency of the whistle is modulated by morphing the resonating cavity in ways which are related to the corresponding spoken articulation, to an extent. The choice of a specific technique is dependent on practical concerns and personal preferences. Each community has some predominant whistling methods, though with individual variation. The bilabial technique is rather adaptable in power and it is common for short- and medium-distance discussion, like at a market, in a village or when fishing or hunting. Louder whistles for communication at longer distances can be accomplished through retroflexed tongue position (linguo-dental), and even louder by using one or two fingers in the mouth (creating a “V-shape” junction), or by pulling the lower lip forward (with ingressive air in this case). Whistling with a leaf or flute is often related to courtship or poetry, as of Mexican Kickapoo (Ritzenhaller & Peterson, 1954), Hmong (Busnel et al., 1989), and of Akha in Thailand and Hani people in China (Meyer, 2015). The leaf, wooden/clay whistles and flute methods represent the first steps toward use of instrumental surrogates (see reviews in Stern (1957); Meyer and Manfredi (2025)).

### Phonetics and Phonology

Linguists, anthropologists and bioacousticians have noticed a major typological distinction between whistled languages, and this distinction is based on lexical tone. For tonal languages like Akan-Twi and Kinande, the whistled pitch largely reproduces the fundamental frequency of the spoken register, including effects from lexical tone (Fig. 1), tonal interactions, and phrasal tone effects like question intonation and declination. In addition, basic segmental information is rendered by the amplitude envelope of whistled tonal languages (Barnes et al., 2023; Batchelder-Schwab, 2024; Cowan, 1948; Moore & Meyer, 2014; Rialland, 2005). For languages without lexical tone, like Spanish or Turkish, the whistled pitch largely reproduces segmental features of the language, even if prosodic effects may also influence the whistles in different ways (see Figs. 2, 4, 5): different vowel qualities are produced at different pitch levels and modulations at the edges of these whistled vocalic pitches encode consonantal information (consonant-vowel coarticulations). For example, /i/ is whistled among the highest mean pitch values, /o/ the lowest, and /e/ and /a/ are intermediate (Busnel & Classe, 1976; Meyer, 2015; Rialland, 2005). The frequencies of whistled consonantal modulations/transitions usually reflect the frequency shapes of the second and/or third speech formants (F2 and F3) of modal speech, though not necessarily their frequency values, due to a different sound production process in the whistle-like articulation (a more closed mouth with tensed muscles). This has been explained from an articulatory standpoint, where the acoustic resonance



**Fig. 4** Waveform (upper) and spectrogram (lower) of the sentence /elemãẽ po tawalu le/, spoken once (from 0 to 2.5 s) and whistled twice (from 2.5 to 7.5 s), meaning “Did you see the water turtle?”, where /tawalu/ is the water turtle. Note that the second repetition of the whistle is realized with more details than the first one, particularly in the beginning of the sentence. The last syllable of the sentence is each time lengthened, creating a phatic effect that is reinforced by a stronger energy in the second repetition. This recording was made in a realistic ecological context of communication shows that the spoken for much more covered by the ambient noise than the whistled frequencies. Adapted from Meyer and Davy (2025); listen to sound extract in Meyer and Davy (2023, 1 min. 09 s.)



**Fig. 5** Spanish sentences « ¿ donde estas? ¿vienes a cenar ? », pronounced [dondestas bienes a senar], with the fast speech fusion of the two first words based on the same vowel. This whistled extract, meaning *where are you? Do you come for dinner?* was recorded with a traditional whistler of El Hierro Canary Island targeting long distance communication (whistler: Emiliano Fernandez Armas). The El Hierro variant of Canarian Spanish is characterized by the pronunciation of [s] before the end of a speech group (differing from most other variants in other islands), which is whistled by a quick frequency rise at the end of the word, such as in /estas/. Note that by contrast, the final /s/ of /vienes/ is whistled differently with a flattened end, which is the whistled surface manifestation of a slight aspiration (see other examples typical of El Hierro in Díaz Reyes, 2008). Adapted from Meyer and Manfredi (2025). Listen to sound extracts in <https://soundcloud.com/user-28976943/sets/sounds-in-meyer-manfredi-2023>.

of the articulated whistled signal occurs primarily in the oral cavities of the reduced vocal tract, which emphasize cavities defining the upper formants of modal speech (above the first formant). In this framework, consonant transitions are influenced by the neighboring vowels, and the combination results in context-dependent whistled loci. Historically, researchers first noted a strong resemblance to the second formant of the spoken equivalent (Brusis, 1972; Busnel & Classe, 1976; Leroy, 1970). Production studies of whistles later showed that frequencies of whistles are not only captured by the area corresponding to the second formant in speech, but also eventually by the area corresponding to the third formant because a frequency jump occurs between the two when these formants are close (Shadle, 1983). Typically, in whistled speech, this jump concerns vowels which are: (i) close or near-close and (ii) front or central ([i], [y] and [i̯] for example); it also happens in consonant transitions produced in the upper front oral cavity (Meyer, 2015, 2021). Moreover, some whistled frequency transitions may also resemble those of spoken F1 when F1 and F2 are close. This is likely to happen in the case of back vowels associated to labial or velar consonants (Meyer, 2015; Tran Ngoc et al., 2022) showing that the whistle is a dynamic reduction/synthesis of what happens in the vocal tract. Another interesting aspect is that frequencies of whistled schwa is largely dependent on consonantal context (Meyer et al., 2015) and that fine temporal aspects resulting from the amplitude envelope have been found to affect consonant closure duration in both tonal and non-tonal languages. These aspects may help whistlers to separate consonants into various classes in accordance with what happens in spoken speech (for example, voiced consonants are whistled with a shorter closure than voiceless ones and geminates are whistled with a longer closure) (Moore & Meyer, 2014; Ridouane et al., 2018).

### A Practice at the Phonetic-Phonology Interface

Whistled speech represents an interesting natural laboratory to explore some aspects at the interface between phonetics and phonology because the constraints imposed by whistling techniques affect both. This is very clear in tonal languages, where whistles reproduce tones or other prosodic aspects, but do not encode vowel quality. In non-tonal languages, the values of whistled vocalic frequencies encoding different vowel qualities sometimes greatly overlap, which leads to a drastic reduction of the vocalic space. In addition, phonetic consonantal similarities between consonants with close manner and/or place of articulation increase while whistling. All these reductions lead to a greater number of whistled allophones than in spoken speech. Similarly to what is done with acoustical correlates in spoken speech, the phonological structure of whistled speech should be grasped through features defined acoustically, but this time under specific constraints of whistling. So far, in Spanish, for example, different researchers have found different degrees of autonomy of the “whistled phonology” (Classe, 1956; Rialland, 2005; Trujillo, 1978, 2006). It must be noted that the precision attained in whistling to render vowels, consonants, and thus the groupings of phonemes consecutive to acoustic reductions, is partly dependent on the whistling technique employed by the whistlers (for example, a bilabial or a linguo-dental whistle let you close lips to articulate labials better than any finger whistling techniques) (Meyer, 2015). Another factor influencing the precision of realization of the consonants and vowels is the proficiency of the whistlers, which is very disparate in general because, just like for mastering musical instruments, whistling has something of a practice of specialists. The disparity is even more visible in situations of whistled speech endangerment (Meyer, 2015; Díaz Reyes, 2017).

### Intelligibility

One interesting and key aspect of whistled languages is their intelligibility. It is a principal functional parameter. Performance on recognition tests emphasizes the role of context and of natural conditions of use. Since the most common words are much more easily understood than obscure words, there is a correlation between situational vocabulary and intelligibility. Whistlers culturally use a set of words that correspond to their everyday activities. As a result, the dictionaries of common whistled words that have been

gathered by researchers (Busnel & Classe, 1976; Moles, 1970) appear to be more restricted than dictionaries of the corresponding spoken language. Whistled words are often chosen to maximize phonetic clarity by avoiding whistled homophones which are more common than spoken ones. A method to facilitate whistled speech comprehension is to replace a word with a synonym that has a stronger syllabic structure or more distinctive consonants because they consist of faster transitions, e.g. the Spanish word *abrigo* “coat” is often replaced by *chaqueta* “jacket”. Some communities seem to employ lexical items in their whistled language that have no phonological counterpart in the spoken language, like inventories of “whistled names” that refer to individuals (Moreau, 1997).

In tonal languages, the possibility of transmitting complex sentences to a trained listener depends on the informational load carried by pitch prosody in the language. For example, this informational load is much higher in Hmong (seven to eight contour tones, depending on the dialect) than in Suruí (two level tones). For this reason, in tonal languages with low informational load on spoken pitch, whistled sentences are more formulaic and therefore more predictable, while high levels of intelligibility can be reached in unpredictable sentences in tonal languages with rich tonal systems for lexical load, such as Chinantec (for examples see Sicoli (2016)). For nontonal whistled languages, some perceptual tests have shown that good whistlers can recognize phonemes of their whistled language in audio clips of other whistled languages (Moles, 1970). A neurolinguistic study showed that the brain areas associated with linguistic production (Broca) and perception (Wernicke) are only activated in listeners who have some knowledge of a whistled register when presented with whistled Spanish (Carreiras et al., 2005). Whistled phonetic details that are selected this way are sufficient for trained listeners to still reconstruct cognitively the words and their meaning: the salient auditory features of spoken speech that are imitated with whistles are enough to recall the linguistic system (Busnel & Classe, 1976; Meyer, 2015). Of course, there is a loss in intelligibility performance in comparison to spoken recognition but highly trained specialists remain quite successful. For example, in whistled Turkish, Busnel and colleagues showed that isolated words can be recognized at a rate of approximately 70%, whereas common whistled sentences were recognized at a rate of approximately 80–90% (Busnel, 1970; Moles, 1970). Moreover, highly trained specialists of whistled Spanish were found recently to understand reasonably well unexpected long sentences without much context (Meyer et al., 2024): recognition rates were measured at different levels in these sentences: 65,5% for words, 69,1% for syllables, and 78,9% for vowels.

However, in both tonal and tonal languages whistled sentences tend to be simple with single-clause utterances and equally simple conversational repairs (Díaz Reyes, 2008; Sicoli, 2016). These allow for longer discussions than in shouted speech because whistling prevents vocal fatigue. On the other hand, when conversations take place over long distances, the signal transmission time between whistlers limits the dynamics of dialog exchange (3 s to receive a message 1 km away). In addition, to add context, it is common to frame a whistled exchange by starting the discussion with a “phatic” call, such as *aaaa* or *oye* in Canarian Spanish, *oooo* in Pyrenean Bearnese or simply a rising whistle in Moroccan Tamazight (Meyer et al., 2021). Special codes may also indicate the end of a sentence (Sicoli, 2016). In addition, compensation for acoustic reductions can be done in different ways to increase the redundancy of information (cf. Jakobson, 1960; Shannon, 1948). In whistled speech, it is common to repeat the phrase. In populations living in dense forest, in particular, whistlers often immediately produce two repetitions of each phrase, especially when they cannot see the listener. This is the case among the Wayãpi (Fig. 4) and Gavião of Rondônia in the Amazon (Meyer, 2015). This has several advantages: ensuring that attention is captured with the first version, and next ensuring that the entire sentence is heard at least once with the second repetition.

### Whistling as a Tool for Linguists Studying Tone Languages

Many linguists use whistles in their fieldwork as a tool to help them to sharpen the tonal description of their phonology, even if the language has no endemic whistled register. Whistling can be used to describe tonology (Cowan, 1948; Moore & Meyer, 2014; Rialland, 1980), but also to examine the status of tone in a language more generally (Caughley, 1976; Pike, 1970). Whistling has been used in language acquisition, such as in helping to teach orthographies that encode tone like Mazatec (Meyer & Casimiro Nava, 2008), and may prove to be an effective method for teaching lexical tone systems to learners whose home languages lack lexical tone (Batchelder-Schwab, 2025; Heinitz, 1916; Armstrong, 1976).

### Endangered Linguistic Diversity

Whistled languages are a reliable human indicator of the vitality of the traditional way of life of the cultures that developed them. The gradual disappearance of activities like shepherding and the aging of rural populations are the main reasons for the documented extinction of a whistled language in France (Aas). Many whistled languages face extinction due to the combined effects of the devaluation of local culture and of rural exodus. The gradual disappearance of whistled language reflects losses in cultural and linguistic diversity more broadly. In many African and Amazonian communities, whistled language is still widely and robustly practiced, but the phenomenon is almost universally evaluated to be in decline.

### Revitalization Initiatives

The tendency of gradual disappearance of whistled speech has successfully been reversed in several populations. For example, in the Canary Island of La Gomera, the process of revitalization carried out by elders since the middle of the 80s on a voluntary basis has been supported by the local government for school teaching in 1999. Moreover, several popular associations also sprout to teach

back this tradition in several Canary Islands (the oldest one, active since 2011, is the cultural and research association Yo Silbo). In Mexico, some Mazatec local councils have made whistled language a priority and whistled speech was also introduced at school for phonological awareness of tone (Meyer, 2015; Meyer & Casimiro Nava, 2008). And there are currently initiatives of revitalization in several other places in the world such as Greece (Antia), Béarn (French Pyrenees), Turkey (Kusköy) ... Teaching methods developed in Canary Islands have inspired methods used to revive whistled speech in Occitan Bearnese in the French Pyrenees (Díaz Reyes, 2011). Two revitalization initiatives managed to gain a Unesco recognition: Silbo of La Gomera was inscribed in 2009 on the Representative List of the Intangible Cultural Heritage of Humanity while whistled Turkish called Kus dili ("the language of birds") of the village of Kusköy has been inscribed in 2017 on the Unesco List of Intangible Cultural Heritage in Need of Urgent Safeguarding. A strong demand for official national and/or international recognition/protection measures of other local whistled practices also exists, in particular concerning Silbo variants practiced traditionally in other Canary Islands (Acosta Armas, 2020; Díaz Reyes, 2008; Gavilán, 2023, 2024; Trapero et al., 2023). Indeed, the presence of articulated whistled Spanish has been documented in El Hierro, Gran Canaria and Tenerife islands in historical documents (Lajard, 1891; Abreu Galindo, 1632; Tejera Gaspar & Navarro Mederos, 2007) as well as during field inquiries, providing recordings and testimonies of traditional whistlers (Díaz Reyes, 2008, 2017, 2022, 2024; Gavilán, 2023, 2024; Lorenzo Perera, 2002; Trapero, 1991, 2003). Interestingly, these recordings reveal that specificities of spoken variants from different islands are expressed by traditional whistlers in their whistled speech (see one example in Fig. 5 and other examples in Díaz Reyes, 2017), opening new perspectives of research.

### Language Evolution and Whistled Language

Many aspects of whistled languages make them good candidates for the study of the evolution of languages. Their strong link with the ecological environment and their use in isolated conditions resulted in an adaptation to the performance of the hearing system and to the acoustical characteristics of both the producing system and the acoustical area. Their use in emergency situations or in contexts related to the local tradition has clear effects on lexical use. The fact that they are often associated to situations of urgency or subsistence activities such as herding, farming and hunting. Moreover, a whistle is rich enough to transmit the essential aspect of the languages of the world without requiring the intervention of the vocal cords. They highlight how complex information is and can be encoded in what appears at first sight to be simple whistled modulated signals, thus they can serve as a model for elucidating how information may be encoded in complex animal whistle communication (Busnel, 1966; Meyer et al., 2021). The transfer of the whistling technique from one local language to another makes this practice resistant to language domination provided that the traditional way of life is maintained. In some locations, the whistles and some musical instruments are used both for transmitting messages of linguistic attitude and for traditional music, opening perspectives for studies on music-language relations (Meyer and Manfredi, 2025). Moreover, musical experience of listeners has been found to influence whistled speech recognition in naive listeners (Tran Ngoc et al. 2024a, 2024b).

### Conclusion

Human languages are complex systems that can be encoded and decoded by speakers and listeners with a certain amount of adaptability and flexibility. This makes speech communication resistant to different types of acoustic variations: speakers' voices, dialects or foreign accents, but also speech modalities such as shouting, singing, or whispering. Around the world, at least 80 different rural communities are known for using whistled speech. This special speech register/mode represents an extreme transformations of spoken words and sentences. In spite of the perceived simplicity of its whistled signals, whistled speech shows the same design features as spoken speech including the principle of duality of patterning (Hockett, 1960). It is even a challenging opportunity for research that it produces a different perception of fully intelligible sentences. It allows us to revisit human language with original insights.

### References

- Abreu Galindo, J. (1632). *Historia de la Conquista de las siete Islas de Canaria*. A. Cioranescu (ed.), Santa Cruz de Tenerife, Goya Ediciones.
- Acosta Armas, J. (2020). *El fantasma del silbo gomero*. Las Palmas de Gran Canaria: Canarias Ahora.
- Armstrong, R. G. (1976). Talking instruments in west Africa. In T. A. Sebeok, & D. J. Umiker-Sebeok (Eds.), *Speech surrogates: Drum and whistle systems* (pp. 865–877). The Hague: Mouton.
- Barnes, J., Oppong, O., & Batchelder-Schwab, A. (2023). *Phrase-level prosody of Akan-Twi in spoken and whistled modalities*. *Phonetics and Phonology in Europe 2023*. <https://andreschwab.com/static/media/pape2023.10f8b4c52c7448329259.pdf>.
- Batchelder-Schwab, A. (2024). Spoken, whistled, drummed, and fluted Kinande: An asymmetry for encoding pitch and rhythm. In *The 54th annual meeting of the north east linguistics society (NELS)*. [https://andreschwab.com/static/media/nels\\_54\\_poster.da4d82a011c8ec4b28ba.pdf](https://andreschwab.com/static/media/nels_54_poster.da4d82a011c8ec4b28ba.pdf).
- Batchelder-Schwab, A. (2025). *Topics in whistled languages*. Boston University (in press).
- Batchelder-Schwab, A., & Mail, Z. (2024). Initiation rites of the IsiXhosa culture are education systems. *Journal of the African Language Teacher's Association (JALTA)*, 11, 147–163.
- Blacking, J. (1972). *Music of the girls' initiation school, sungwi or musevetho*. Track 14. University of Washington Ethnomusicology Archives.
- Brusis, T. (1972). Die phonetischen Grundlagen der Pfeifsprache "Silbo Gomero." *Almogaren*, 5–6, 85–92.

- Busnel, R. G. (1966). Information in the human whistled language and sea mammal whistling. In K. S. Norris (Ed.), *Whales, dolphins, and porpoises* (pp. 544–568). Berkeley and Los Angeles: University of California Press.
- Busnel, R. G. (1970). Recherches expérimentales sur la langue sifflée de Kusköy. *Rev Phonétique Appliquée*, 14(15), 41–57.
- Busnel, R.-G., & Classe, A. (1976). *Whistled languages*. Berlin: Springer Verlag.
- Busnel, R.-G., Moles, A., & Vallencien, B. (1962). Sur l'aspect phonétique d'une langue sifflée dans les Pyrénées françaises. In *Proceedings of the international congress of phonetic sciences, helsinki* (pp. 533–546). The Hague: Mouton.
- Busnel, R.-G., Alguri, G., Gautheron, B., & Rialland, A. (1989). Sur quelques aspects physiques de la langue à ton sifflée du peuple H'mong. *Cahiers de l'Asie du Sud-Est*, 26, 39–52.
- Carreiras, M., Lopez, J., Riveiro, F., & Corina, D. (2005). Linguistic perception: Neural processing of a whistled language. *Nature*, 433, 31–32.
- Caughley, R. (1976). Chepang whistle talk. In T. A. Sebeok, & J. Umiker (Eds.), *Speech surrogates: Drum and whistle systems* (pp. 997–1022). The Hague: Mouton.
- Classe, A. (1956). Phonetics of the silbo gomero. *Archivum Linguisticum*, 9, 44–61.
- Cowan, G. (1948). Mazateco whistle speech. *Language*, 24, 280–286.
- Díaz Reyes, D. (2008). *El lenguaje silbado en la Isla de El Hierro*. Santa Cruz de Tenerife, Excmo: Cabildo Insular de El Hierro.
- Díaz Reyes, D. (2011). *El Lenguaje Silbado en Canarias y en Aas (Pirineos Franceses). Similitudes y diferencias*. Asociación Cultural Revista Digital BienMeSabe.org 381. <https://www.bienmesabe.org/noticia/2011/Agosto/el-lenguaje-silbado-en-canarias-y-en-aas-pirineos-franceses-similitudes-y-diferencias>.
- Díaz Reyes, D. (2017). *El lenguaje silbado en la Isla de El Hierro* (2nd ed.). La Orotava, Spain: Le Canarien.
- (Director) Díaz Reyes, D. (2022). *El lenguaje silbado en la isla de Gran Canaria (Documentary)*. Skyline Films SL Macaronesia. <https://www.youtube.com/watch?v=V1UJeZd4ZU4>.
- (Director) Díaz Reyes, D. (2024). *El lenguaje silbado en la isla de Tenerife (Documentary)*. Skyline Films SL Macaronesia. <https://www.youtube.com/watch?v=rUAar17-tjl>.
- Eboué, F. (1935). La clef musicale des langages tambourinés et sifflés. *Bulletin du Comité d'étude historiques et scientifiques de l'Afrique occidentale française*, 18, 353–360.
- Gavilán, L.-J. (2023). *Silbo Herreño. Revitalización, investigaciones y testimonios*. Santa Cruz de Tenerife, España: Kinnamon.
- Gavilán, L.-J. (2024). Recuperación del lenguaje silbado de la isla de El Hierro. *Living Languages*, 3(1). <https://doi.org/10.7275/livinglanguages.2003>
- Haddow, A. J. (1952). Whistled signals among the bakonjo. *The Uganda Journal*, 16(2) (Kampala: The Uganda Society).
- Hasler, J. A. (1960). El lenguaje silbado. In T. A. Sebeok, & D. J. Umiker-Sebeok (Eds.), *Speech surrogates: Drum and whistle systems* (pp. 1412–1425). Paris and La Haye: Mouton.
- Heintz, W. (1916). Ein Beitrag zur Reproduktion des Musikalischen Elements in der Ewe-Sprache. *Vox* 26, 83-90. In T. A. Sebeok, & D. J. Umiker-Sebeok (Eds.), *Speech surrogates: Drum and whistle systems* (pp. 307–315). The Hague: Mouton (1976).
- Hockett, C. F. (1960). The origin of speech. *Sci. Am.*, 203, 88–111. <https://doi.org/10.1038/scientificamerican0960-88>
- Jakobson, R. (1960). Linguistics and poetics. In T. A. Sebeok (Ed.), *Style in language* (pp. 350–377). Cambridge: MIT Press.
- Kirby, P. R. (1937). The musical practices of the native races of South Africa. In I. Schapera (Ed.), *The Bantu-speaking tribes of South Africa: An ethnographical survey* (pp. 271–288). London: Routledge.
- Labouret, H. (1923). Langage tambouriné et sifflé. *Bull Comité Afrique Occid Franc*, 6, 120–158.
- Lajard, M. (1891). Le langage sifflé des Canaries. *Bulletins et Mémoires de la Société d'Anthropologie de Paris*, 4, 469–483.
- Leroy, C. (1970). Etude de phonétique comparative de la langue turque sifflée et parlée. *Revue de Phonétique Appliquée*, 14/15, 119–161.
- Meyer, J. (2015). *Whistled languages: A worldwide inquiry about whistled speech*. Berlin: Springer.
- Meyer, J. (2021). Environmental and linguistic typology of whistled languages. *Annual Review of Linguistics*, 7, 493–510.
- Meyer, J., & Batchelder-Schwab, A. (2024). World Map of whistled languages attested by published studies or field recordings. <https://hal.science/hal-04912578>.
- Meyer, J., & Casimiro Nava, J. (2008). Exploiting the didactic aspect of whistled speech in gomero Spanish and Mazatec: Interactions between phonetic research and education. *Language Design – Journal of Theoretical and Experimental Linguistics*, 57–64.
- Meyer, J., & Díaz Reyes, D. (2017). Geolingüística de los lenguajes silbados del mundo, con un enfoque en el español silbado. *Géolinguistique*, 17, 99–124.
- (Directors) Meyer, J., & Davy, D. (2023). *Mondes Sonores Amazoniens, imitations animales et parole sifflée des Amérindiens Wayäpi*. Lyon: Beto Acosta et Tiffanie Deschamps [Short Film] [https://youtu.be/F\\_BZ4GYVCIM](https://youtu.be/F_BZ4GYVCIM).
- Meyer, J., & Davy, D. (2025). Communications acoustiques adaptées au biome amazonien : imitations animales et parole sifflée des Wayäpi. In F. Bondil, M. Danglades, D. Davy, & M. Palisse (Eds.), *Sociétés et humanités en Guyane : traces, mémoires, enjeux et dynamiques*. Editions ORPHIE (in press).
- Meyer, J., Gautheron, B., & Ridouane, R. (2015). Whistled Moroccan Tamazight: Phonetics and phonology. In *Proceedings of the 18th international congress of phonetic sciences*. London: Int. Phon. Assoc. <https://www.internationalphoneticassociation.org/icphs-proceedings/ICPhS2015/Papers/ICPHS0930.pdf>.
- Meyer, J., Magnasco, M., & Reiss, D. (2021). The relevance of human whistled languages for the analysis and decoding of dolphin communication. *Frontiers in Psychology (Language Sciences)*, 12, 689501. <https://doi.org/10.3389/fpsyg.2021.689501>.
- Meyer, J., & Manfredi, V. (2025). Auxiliary speech by vocal tract modulation and musical surrogacy. In D. Sammler (Ed.), *Oxford handbook of Language and music*. Oxford: Oxford University Press (in press).
- Meyer, J., Rolland, V., Socas, T., & Díaz Reyes, D. (2024). A sentence comprehension test with whistled Spanish experts. In *Proc. 14th exling conference, Athens 2023* (pp. 65–68).
- Meyer, J., & Moore, D. (2021). A flute, musical bows and Bamboo clarinets that “Speak” in the Amazon Rainforest; speech and music in the Gavião language of Rondônia. *Frontiers in Psychology (Language Sciences)*, 12, 689501. <https://doi.org/10.3389/fpsyg.2021.674289>.
- Moles, A. (1970). Etude sociolinguistique de la langue sifflée de Kusköy. *Revue de Phonétique Appliquée*, 14/15, 78–118.
- Moore, D., & Meyer, J. (2014). The study of tone and related phenomena in an Amazonian tone language, Gavião de Rondônia. *Language and Documentation Conservation*, 8, 613–636.
- Moreau, M.-L. (1997). La communication sifflée chez les Diola (Casamance, Sénégal). *Diversité Langues*, 2.
- Niles, D. (2010). Editor's introduction to Zemp & Kaufmann. *Kulele: Occasional Papers on Pacific Music and Dance*, 4, 1–50.
- Nketia, J. H. K. (1962). *African music in Ghana: A survey of traditional forms*. Accra: Longmans.
- Pepper, H. (1956). *Musique centre africaine*. Paris: Encyclopedie coloniale et maritime.
- Pike, K. L. (1970). The role of nuclei of feet in the analysis of tone in Tibeto-Burman. In P. R. Léon, G. Faure, & A. Rigault (Eds.), *Prosodic feature analysis* (pp. 153–164). Québec: Bibliothèque Nationale.
- Quedenfeldt, H. M. (1887). Pfeifsprache auf der Insel Gomera. *Zeitschr Ethnol*, 19, 731–741.
- Rialland, A. (1980). Les sifflements des tons et les structures syllabiques en Gurma (parler de Botou). *Phonologica*, 36, 354–357.
- Rialland, A. (2005). Phonological and phonetic aspects of whistled languages. *Phonology*, 22(2), 237–271.
- Ridouane, R., Turco, G., & Meyer, J. (2018). Length contrast and covarying features: Whistled speech as a case study. In *Proceedings of interspeech 2018*. Baixas, Fr: Int. Speech Commun. Assoc., 1843–47.
- Ritzenhaler, R. E., & Peterson, F. A. (1954). Courtship whistling of the Mexican Kickapoo Indians. *American Anthropologist*, 56(6), 1088–1089.
- Shadle, C. H. (1983). Experiments on the acoustics of whistling. *Physics Teacher*, 21, 3148–3154.
- Shannon, C. E. (1948). A mathematical theory of communication. *The Bell System Technical Journal*, 27, 379–423.
- Sicoli, M. A. (2016). Repair organization in Chinantec whistled speech. *Language*, 92(2), 411–432.
- Stern, T. (1957). Drum and whistle languages: An analysis of speech surrogates. *American Anthropologist*, 59, 487–506.

- Tejera Gaspar, A., & Navarro Mederos, J.-F. (2007). El silbo gomero. Un lenguaje de origen norteafricano. In J. J. Batista Rodríguez, & M. Morera (Eds.), *El silbo gomero. 125 años de estudios lingüísticos y etnográficos* (pp. 215–224). Santa Cruz de Tenerife: Academia Canaria de La Lengua & Dirección General de Cooperación y Patrimonio Cultural del Gobierno de Canarias.
- Tran Ngoc, A., Meunier, F., & Meyer, J. (2022). Testing perceptual flexibility in speech through the categorization of whistled Spanish consonants by French speakers. *JASA Express Letters*, 2(9), 095201.
- Tran Ngoc, A., Meyer, J., & Meunier, F. (2024a). The effect of musical expertise on whistled vowel identification. *Speech Communication*, 159, 103058. <https://doi.org/10.1016/j.specom.2024.103058>.
- Tran Ngoc, A., Meyer, J., & Meunier, F. (2024b). Musical experience and speech processing: The case of whistled words. *Cognitive Science*, 48, e70032.
- Trapero, M. (1991). Lenguaje silbado en El Hierro. *La Provincia*, p. 38.
- Trapero, M. (2003). *Archivo Sonoro de Literatura Oral de Canarias. Memoria Digital de Canarias*. Las Palmas: Biblioteca Universitaria de la Universidad de Las Palmas de Gran Canaria. <https://mdc.ulpgc.es/s/asloc/page/inicio>.
- Trapero, M., Tejera Gaspar, A., Rodríguez Medina, M. J., Perera Betancort, M. A., Meyer, J., Lorenzo Perera, M. J., et al. (2023). *Carta de miembros de la comunidad científica con el propósito de garantizar la protección, la continuidad y la investigación de las prácticas del lenguaje silbado en Canarias*. HAL Science Ouverte, 2023 <https://hal.science/hal-04386165v1>.
- Trujillo, R. (1978). *El silbo gomero: Análisis lingüístico*. Santa Cruz de Tenerife: Editorial Interinsular Canaria.
- Trujillo, R. (2006). *El Silbo Gomero. Nuevo Estudio Fonológico* [The Gomeran Whistle. New Phonological Study] (Spanish-English Bilingual Edition). Santa Cruz de Tenerife, Spain: Academia Canaria de la Lengua, Andres Bello.
- Zemp, H., & Kaufman, C. (1969). Pour une transcription automatique des « langages tambourinés » mélanésiens (Un exemple kwoma, Nouvelle-Guinée). *L'Homme*, 9(2), 38–88.