

Julien Meyer

Whistled Languages

A Worldwide Inquiry on Human
Whistled Speech

With a chapter in collaboration with René-Guy Busnel

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Paris
France

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Preface

Around the world, humans whistle their language
Some live in mountains, others in forests
Whistling is used to speak across distances
This means of communication makes a person one with nature
One can express love and every aspect of life
The melody resembles birdsongs
It tells the story of the people, of their lands and of human language.
Extract of a corpus collected by the author with various whistlers.

This monograph addresses a fascinating and little-known language practice based on whistling. Whistling is one of the multiple modes of expression for some local languages. Whistling does not replace but instead complements ordinary speech, often under different circumstances. It profoundly modifies the phonetic system of the local speech: the voice is replaced by a whistle, which carries the information. This drastic transformation consists of the emulation of selected acoustic cues of standard speech. Therefore, whistled speech is adapted both to the structure of each language—namely its syntax, grammar, and phonology—and to the articulatory constraints of whistling. The advantage of this procedure, from the user’s perspective, is not only a vastly increased audible range but also, under certain circumstances, a degree of secrecy toward outsiders. This work is a follow-up of a previous monograph on this subject by Busnel and Classe (entitled “Whistled Languages”) published in 1976. Thirty-eight years later, a great deal of additional research has been performed, and several discoveries have provided new insights into the phenomenon. As we will show, during the last 12 years, new instances of whistled languages have regularly been found, thanks to extensive fieldwork. Moreover, we now understand better the processes of whistled speech perception. However, with the modernization of the countryside throughout the world, the traditional activities that justify this special speech register are frequently disrupted, and whistled forms of languages have become endangered oral practices.

The description provided in this book consists of an account of the authors' own investigations supplemented by a large pluridisciplinary bibliographical review. The manner in which the various aspects of the subject are described in Chap. 2 (Historical sketch) results from the collaboration between two authors (Meyer and Busnel). The other chapters have been written by Meyer. The original idea to propose this new monograph to the editor came from Busnel. Meyer decided to write it in homage to the different world cultures he visited and to Professor Busnel, who is in his 100th year of life and is still in close interaction with Meyer, following his research with different collaborators around the world. Among these collaborators, Dr. Laure Dentel is the most significant. Other outstanding collaborators are Professor Colette Grinevald, Dr. Fanny Meunier, Dr. Denny Moore and the speakers of various languages. The last 12 years of research on this subject were made possible thanks to the financial support provided by various institutions such as the Centre National de la Recherche Scientifique (BDI-CNRS grant, France), the Fyssen Foundation (Post-doc grant, France), the Endangered Language Documentation Program (Post-doc project IPF0136, SOAS-University of London), the Conselho Nacional de Desenvolvimento Científico e Tecnológico (PDJ grant, CNPq Brazil), the European Union's Seventh Framework Programme for research, technological development and demonstration (EURIAS Fellowship, Lyon Collegium; Marie Slodowska-Curie Fellowship, project Icon-Eco-Speech) and by prizes including a 2006 Rolex Award and the scientific prize of Paris-Jeunes-Aventures (Mairie de Paris).

The general structure of the book makes it accessible to both the general reader and specialists of various domains, with a primary emphasis on linguistic, acoustic, cognitive, ethnologic, and environmental features.

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Chapter 1

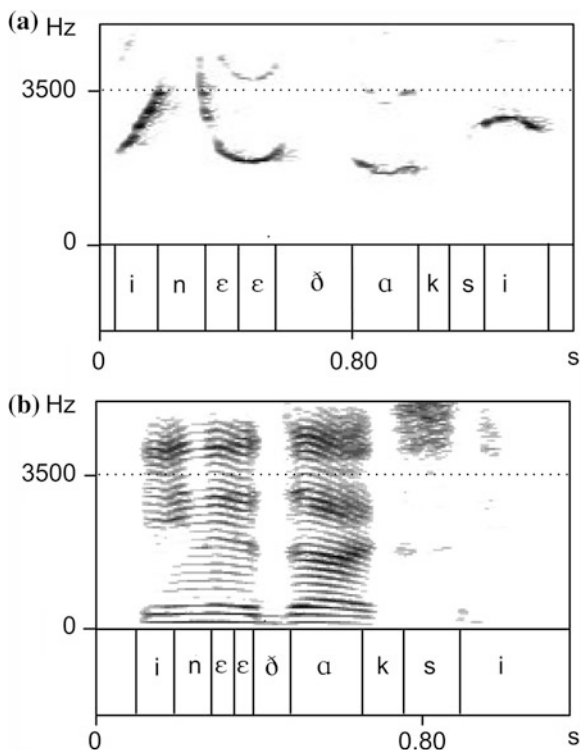
Introduction

1.1 Characterization of Whistled Languages

Whistled languages constitute ancient and natural means of telecommunication that permit spoken communication at great distances. This mode of speech is also used for other purposes, such as secrecy, courtship, singing and communication in noisy environments. Whistled speech is always based on a spoken language. Whistled Greek and whistled Gavião are still Greek and Gavião languages but adapted to another speech register, the “whistled mode of speech” (Figs. 1.1 and 1.2). Around the world, whistled forms of languages are usually found in landscapes that predispose humans to relative isolation during their daily activities. The traditional activities most commonly associated to such whistling communications are hunting, hill agriculture or shepherding. Moreover, mountainous or densely vegetated landscapes are the most common natural environments where whistled speech is practiced. Speakers living in such an ecological milieu often find themselves scattered across great distances, unable to hear each other clearly via speaking or shouting. Whistles represent an adapted response to such constraints to maintain coordination and social contact because their acoustic signal is well transmitted in natural environments and can overcome ambient noise much more effectively than a standard or shouted voice, however stentorian (Fig. 1.3). The principle of whistled speech is straightforward: people articulate words while whistling and thereby transform spoken utterances by simplifying them, syllable by syllable, into whistled melodies. Acoustic reduction operates almost exclusively at the frequency level, and it relies on the selection of key salient phonetic cues for the corresponding spoken utterances. Two primary strategies employed to transpose ordinary voiced speech into whistles have been found: one for tonal languages, called pitch-whistling because it emulates in priority the fundamental frequency of the voice (e.g. Fig. 1.2), and one for non-tonal languages, called formant-whistling because it emulates

The original version of this chapter contained errors which have been corrected. These are detailed in the erratum to be found under DOI [10.1007/978-3-662-45837-2_10](https://doi.org/10.1007/978-3-662-45837-2_10)

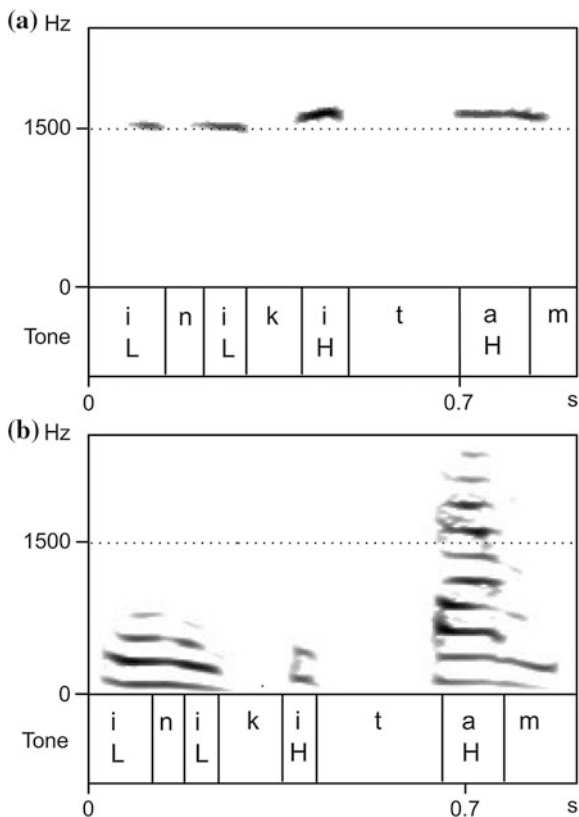
Fig. 1.1 Spectrogram of the Greek sentence ‘είναι εντάξει’ [ine edaksi], or ‘ine entaksi’ in roman transliteration (meaning ‘all right’) in whistled (a) and spoken (b) speech. Here, the whistled form consists of the emulation of the quality of spoken vowels and consonants (formant-based whistling)



certain aspects of the timbre of the voice that are called formants by linguists (e.g. Fig. 1.1). Some intermediary strategies between these two primary ones have been found, as we will see in Chap. 7. In any case, the resulting whistled signal has a linguistic structure with the same basis as standard speech. One of the most striking aspects of this whistled transformation of words is that the whistled sentences remain highly intelligible to trained speakers, despite a reduced acoustic channel to convey meaning. The whistlers even emphasize that they whistle exactly as they think in their language and that the whistled messages that they receive instantly recall those spoken sentences. In most of the whistled languages, skilled whistlers can effectively whistle any type of dialogue and are even often able to recognize non-stereotyped sentences. However, we will see later that the complexity of the messages that can be transmitted depends on certain structural aspects of the language, such as the complexity of the tonal system for pitch whistling (Chap. 7).

Whistled speech is used when voiced speech fails to fulfill the requirements for communication. All of the whistlers we met considered whistled speech to be an integral part of their local spoken language. The functional role of whistled speech is to complement ordinary speech under certain circumstances, similarly to whispering, shouting or singing. However, whistled speech requires more training than these other speech registers. Once mastered, it is much less demanding in vocal effort than shouting or singing because it does not tire the vocal folds. According to

Fig. 1.2 Spectrogram of the Gavião words ‘ini kítáp’ [ini kitam], meaning ‘hammock rope’, in whistled (a) and spoken (b) speech. Here, the whistled form consists of the emulation of the pitch of the spoken form (pitch-based whistling)



Busnel and Classe (1976), the process is not essentially different from the whisper-phonation type, which also dispenses with the glottal tone, relying as it does on the excitation of the pharyngo-oral cavity resonance by friction of the breath expelled under pressure. “Not essentially different” should not be taken to mean “to be equated with” because, in the whisper, the complex acoustic cues resulting in the perception of timbre, although subdued, are by no means eliminated. A whistle, however, is a simple oscillation that varies only in intensity, duration and frequency, i.e., loudness, time and pitch. Another important particularity is that in contrast to whispering or most shouting and singing techniques, whistled speech is unintelligible to untrained speakers. Such a limitation is not unique among language practices: it also exists in other drastic transformations of the speech signal, such as soprano singing. However, whistled speech is even more particular because it is not easily identified as a speech act by untrained and unaware speakers, which confers upon whistled speech the distinctive ability to talk unnoticed by strangers. This inherent secret aspect may have been one of the driving forces of the selection of whistled speech in various populations. At the same time, however, it often made whistled languages a mysterious subject for various researchers, who mistook them

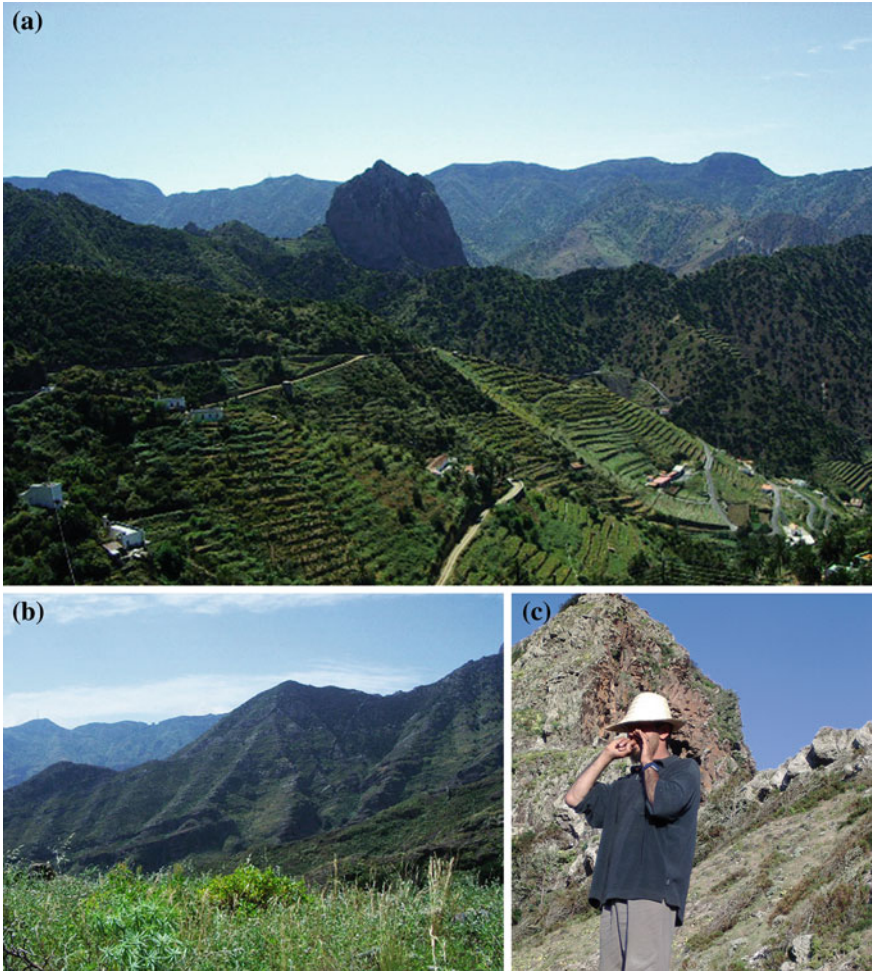


Fig. 1.3 Views of La Gomera Island where whistled Spanish (locally called *Silbo*) is still practiced. **a** The scattering of dwelling houses in the hills is characteristic of mountainous landscapes where whistled speech is found. **b** A highland valley above the capital St Sebastian. **c** A traditional whistler showing *Silbo* practice in the environmental context of **b** [Photo a, b, c Courtesy of Julien Meyer/Laure Dentel (© Julien Meyer/Laure Dentel 2015. All Rights Reserved)]

for codes that created a substitute for language with its own rules of syntax, vocabulary and the like. In the past, whistled languages have sometimes been compared to Morse code because of their common use for telecommunication. However, Morse code relies on an intermediary, purely symbolic code that refers to the written alphabet. In whistled speech, the relationship between the signifier (the whistled signal) and what is signified (the utterance in normal speech) is not purely symbolic but is based on physical similarity with the vocal signal, combining abridgment and acoustic iconicity (see details in Chap. 7).

It is also important to underline an essential difference between natural whistled forms of languages and a practice employed by linguists studying tonal languages that consists of asking an informant to whistle the pitch of vowels to ease the identification of tonal patterns, even in languages that do not use natural whistled speech. This technique has greatly contributed to the development of modern phonology over the last thirty years because it has helped produce reliable tonal analyses (Moore and Meyer 2014). However, the technique cannot be considered a “whistled language”; it is a linguist’s tool, with clearly different objectives. As we will see in Chap. 7, natural whistled speech in tonal languages is more complicated than simple pitch transposition of the vowel nuclei, even in languages carrying a high functional load of information in tones.

1.2 Research Based on Fieldwork Inquiries

1.2.1 *The Linguistic Communities Visited by Meyer and Busnel*

This work is primarily based on the fieldwork inquiries of Meyer and Busnel. It also draws information from the publications of the linguists, acousticians, anthropologists and musicologists who are studying or who have studied the local language and the way of life in villages where the population uses or has used the traditional practice of speaking with whistles.

Busnel researched whistled languages from the late 1950s to the end of the 1980s. He visited the whistling linguistic communities of Aas (Béarnese geolect of the Occitan language, French Pyrenees), Kusköy (Turkish language, Turkey), La Gomera (Spanish language, Canary Islands), the Mazatec mountains (Mazatec language, Mexico) and the Hmong diaspora in Paris and French Guiana (Hmong language, originally from Southeast Asia). More details on Busnel’s fieldwork inquiries are provided in the next chapter.

Meyer began research on this subject in the late 1990s after having discovered this peculiar phenomenon in an article written by Classe in *Scientific American* (republished in 1998 in the French edition of *Scientific American*) and continues his investigation today. Discussions between the two authors began in 2002. That year, Meyer had just begun a new formal inquiry on whistled languages for his Ph.D. At that time, the sample of languages represented in the studies of whistled speech remained small in comparison to the approximately 7,000 world languages. Moreover, original recorded material was rarely available, and detailed descriptions were often missing. Consequently, a long-term international inquiry based on fieldwork in different regions appeared to be the only means of finding new sources of whistled speech and collecting enough material to answer essential questions raised by whistled languages. Until today, Meyer’s inquiries lasted 30 months in collaboration with the cultural representatives of approximately twenty linguistic

communities around the world. During the first stage of research, a one-year worldwide field survey was organized. Mountainous areas were visited as a priority because they represent the principal biotope where whistled languages have been found in the past. After two other years of laboratory analysis and short additional field trips, a documentation program was launched in Amazonia in collaboration with the Museu Goeldi (Brazil) and the Parc Amazonien de Guyane (French Guiana). During that same period, an informal research team called the “Whistled Language Unit” was also created by Busnel and Meyer together with colleagues who had extensive experience with whistled speech.¹ Finally, in total, Meyer and Busnel collected original ethnographic and linguistic field data in the following communities: Béarnese in Aas, Greek in Antia, Turkish in Kusköy, Akha in northern Thailand and Laos, Hmong in Northern Thailand and French Guiana, Mazatec and Mixtec in Mexico, Spanish in La Gomera (Canary Islands) and Topares (Andalusia), Ewe of Ghana, Siberian Yupik in Alaska (St Lawrence Island), Gavião and Suruí in Rondônia (Brazil), Wayãpi in Brazil and French Guiana and Tamazight in Morocco.

1.2.2 Methodological Concerns

This research required the design of a specific methodology adapted to the special acoustic form of whistled languages, to the reality of their gradual disappearance and to the desire of several speakers to participate in safeguarding this aspect of their oral tradition. The investigation of this phenomenon represents a multidisciplinary challenge. Our methodology has been adapted to the conditions of use of whistled languages, utilizing the techniques and tools of language documentation, phonetics, phonology, psycholinguistics, bioacoustics and sociolinguistics. In each linguistic community, the first step was to identify and survey the most skilled whistlers. Several important questions specific to whistled speech were asked during the study: Where and when do people whistle? What do they whistle and with whom? What is the intelligibility of the most common sentences used in comparison to less common sentences? Can they whistle and understand everything? What are the different techniques and modes of whistling and in which contexts are each used? Do they whistle segments or not? A typology of whistlers’ profiles and an evaluation of the state of vitality of the practice were then derived from this information (of the type presented in Chap. 4).

As a representative sample of their skills, the most common sentences used by each whistler were recorded at a short distance. Next, the researchers recorded

¹ Gautheron was a research engineer in the Busnel team in Turkey and the Rialland team in La Gomera. He also works with Meyer studying whistled speech in Atlas. Dr. Dentel worked with Meyer since 2003 in most of his fieldwork. Pucheux is working under the initiative of the association “Lo Siular d’Aas”, which seeks to restore the Béarnese whistled speech recorded in 1962 by Busnel.

spontaneous whistled speech, accompanying the speakers during everyday activities that required whistled communications (dual video and audio recordings from the viewpoint of each participant in the dialogue). In complementary elicitation tasks, the speakers were asked to pronounce words and sentences twice in spoken form and twice in whistled forms. All of the different techniques of whistling available in each place were recorded. On that basis, a set of simple sentences was built with the help of linguistic consultants. Depending on the thoroughness of the description, additional sentences were used to complement the description or to perform an intelligibility test in semi-spontaneous and semi-natural conditions (again with dual distance recording). In the latter case, common sentences were mixed with less common sentences, but all were coherent in their natural contexts of use.

The author and his colleagues have benefited from new technological tools that were not available to the researchers of the 1970s, both in terms of documentary research and of technology available to collect and process the data. Today's equipment for collecting data is much more convenient than used 40 years ago, is discrete and robust and is adaptable to difficult climatic conditions. The Internet accelerated the preliminary inquiry to organize fieldwork in collaboration with several researchers around the world. However, it is important to underline that most of the reliable contacts have been found on location. For data analysis, modern data treatment technologies using computer programming and digital signal treatment also permit complete analyses and accelerate data processing.

In each location, research was conducted in accordance with the Declaration of Helsinki. Our work was approved by the ethics committees of our different research groups, and each participant gave written or oral consent. In Brazil, there was no standing ethics committee at the Museu Goeldi, our host institution in Belém. Ethical questions were addressed by an internal investigative committee called a "sindicância". In Brazilian law and practice, the participating indigenous community indicates, either orally or in writing, their informed consent to the proposed research to the local office of the National Indian Foundation (FUNAI), which in turn transmits that consent, in the form of a document, to the central FUNAI office in the national capital. This office issues written research permits. Our research followed these established procedures. Native local authorities authorized our work in all of the visited communities. Permits were obtained from the National Indian Foundation (FUNAI) and the National Research Council (CNPq). In French Guiana, the procedures are similar to those in Brazil. The scientific council of the Parc Amazonien de Guyane and the "Prefecture" of the region authorized the investigation. In St Lawrence Island (Alaska), a land crossing permit was obtained from the Kukulget Inc. and language documentation agreement was signed with the Native village Council of Savoonga.

To ensure accessibility and usability for different scientific purposes and for permanent free consultation by the local speech communities, linguistic documentation procedures were conducted in collaboration with professional linguistic archives. When requested, both native collaborators and university students were trained in linguistic data collection and annotation. Copies of the recordings and

photos obtained in the field were returned to the local collaborators in the desired format (printed, CDs, or DVDs²).

Such a policy of research and documentation was elaborated and improved through the years to offer sufficient guarantees to the local communities in order to build a relation of confidence with the speakers. In general, in very traditional communities an ‘Agreement for documentation’ was signed with the representatives of the native community. It specifies that the researchers would use the recordings exclusively for research (analysis and communication) under the following conditions:

- (a) Audio and video copies of the original recordings will be delivered to the local community under the form that they will specify.
- (b) A copy of the documented material will be kept by the researchers who will be in charge of preserving it in good conditions and provide free access to it to the Native communities under request of their representative authorities.
- (c) These recordings won’t be sold.
- (d) These recordings won’t be given to individuals or organizations which have commercial means without previous authorization from the representatives of the Native community and/or the individual informants (depending of the local rules concerning traditional property rights).

1.3 The Structure of This Monograph

This monograph is organized into nine different chapters, including this introduction. The historical sketch in the next chapter proves that whistled languages have a respectable ancestry, and it shows how researchers have progressively revealed the existence and functioning of this speech mode. Chapter 3 provides a synthetic view of the linguistic and geographical diversity of the phenomenon of whistled languages. We illustrate this diversity by reporting the languages on a world map and by analyzing in detail the relationships between whistled languages and the most typical landscapes in which they are generally found. In the fourth chapter, we present the different social contexts of the use of whistled speech and analyze the dynamic of the attrition of this practice. Whistled speech is arguably one of the most endangered language forms worldwide, and our field methodology had to be adapted to this reality. We analyze the impact of political and social changes on whistled speech and we introduce the initiatives that have been developed in some populations to safeguard or maintain this part of the local language. In the fifth chapter, we describe the different techniques of producing human whistles, and we

² See for example the DVDs ‘Língua Suruí assobiada’ and ‘Língua Gavião assobiada’ edited with the Museu Goeldi, Brasil (<http://www.museu-goeldi.br/linguistica>; see section ‘Produção Científica/Multimídia Recentes’ of the website).

explain how a whistled articulation is performed to emulate speech. Furthermore, we describe the principal acoustic characteristics of a human whistled speech signal. A comparison with spoken, shouted and sung forms is provided to better characterize the idiosyncrasy of this phenomenon. At this point, we will be able to describe the parameters that explain why whistled languages are efficient telecommunication systems, which is the subject of the sixth chapter. The results of several outdoor experiments will illustrate our explanations. The seventh chapter addresses the phonetics, the phonology and the typology of whistled forms of languages. Several examples of different languages belonging to different whistling strategies are provided. The eighth chapter presents the neurocognitive aspects of whistled speech. For example, the intelligibility of whistled speech is explained in light of human acoustic and linguistic perception. The results of most of the existing perceptual experiments on whistled speech are explored. The ninth chapter is a reflection on the evolutionary perspectives opened by studies on whistled languages. We revisit the music-language relation and some animal whistled communication systems to explore what whistled speech adds to the current debates on language evolution.

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Chapter 2

Historical Sketch

2.1 Whistled Languages and Ancient Texts

Several very ancient texts mention the presence of whistled traditions used for spoken communication. Here, we will cite texts that are possibly related to whistled languages that remain in use today.

For example, two ancient Greek historians described people of North Africa who lived in hills or mountains and apparently spoke using whistle-like sounds. First, Elien (2nd century) explained in the *De Natura Animalium* that the Kinoprosipi people “*didn’t have a language but instead used acute whistling*” (1, X, Ch. xxv), and Herodotus (Vth century) mentioned some Ethiopian troglodytes who “*spoke like bats*” in the *Melpomene* (IV: 183). Several works revisiting these early historical sources proposed that these people were most likely related to the Tibbous, a Berber group of South Sudan that lived in rocky mountains surrounding sandy valleys, the type of ecological milieu where whistled speech is useful (Malte-Brun 1826: 11; Basset 1890: 69). Here, the link with a whistled speech practice is not very clear because those authors apparently had never heard of the practice, but these texts are worth mentioning because they underline that whistle-like communications related to speech existed in North Africa a long time ago. The texts also show the surprise of the scholars of those times when encountering such practices. Moreover, we now know that several Afro-Asiatic languages are still whistled in the Omo Valleys of Ethiopia and in the Atlas Mountains in Northern Africa (see Sect. 2.3).

In Asia, several ancient sources mention the practice of *xiao*, a Chinese tradition represented by an ideogram translated as “whistling” by most of the scholars. The earliest examples of *xiao* are found in a Shijing poem (XIth to Vth BC) where the protagonist whistles while singing (Su 2006). The practice of *xiao* was described in various early documents such as Chenggong Sui’s (231–273) *Xiaofu* (“Rhapsody of Whistling”) or the *Xiaozhi* (“Principles of Whistling”). The latter is preserved in a collection of ancient texts called *T’ang Tai Ts’ung-Shu* and has been translated in