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Origin of polyphony: late cultural invention or part of predator defence system?

Summary

The paper discusses the changes in our understanding of the central problem of human music history: the origins of human ability to sing in harmony, from the initial belief that vocal polyphony was a cultural invention of medieval Christian monks to the contemporary view that singing in harmony was a result of the forces of natural selection. Polyphonic singing appears to be part of a defence strategy against predators based on aposematic display and rhythmically well-coordinated singing in dissonant intervals, which provide two important lines of defence: an external factor (scaring away predators and competitors with a massive wall of sound), and an internal factor (putting the participants of ritualized action in a specific altered state of consciousness – battle trance—in which they did not feel fear and pain). This ability of communal singing is known and actively employed by contemporary military forces as well. It is suggested that vocal polyphony has been constantly diminishing since the evolutionary shift to fully-articulated speech. The uneven distribution of polyphony in the contemporary world is explained by differences in the timelines of acquiring articulated speech among diverse populations of archaic humans, from the earliest in East Asia to the latest in sub-Saharan Africa. The available data from several scholarly fields, including palaeoanthropology, speech pathology (stuttering), reading disability (dyslexia) and acquisition of phonology by children and general populations from different cultures, support the proposed idea.

Keywords: origin of polyphony, defence strategies of early humans, music in the military, stuttering prevalence, dyslexia prevalence, origin of speech

Introduction

Humans in many cultures sing together, and sing polyphonically, which means dividing singers into various parts. This is quite an intricate phenomenon. Participants coordinate their singing both in timing and in pitch, creating complex harmonies consisting of several parts. Together with singing they also often dance for hours and sometimes go into a deep trance.

How did this predilection for choral singing emerge and develop? Why did people in only some cultures sing in harmonies, and people from other cultures sing without harmonies, instead of everyone just following the same single melody? And most importantly, *why* and *how* polyphonic singing develop in our history?

A brief history of ideas on the origins of polyphony

Humans have a set of natural beliefs about many things, including the origins of polyphonic singing. So, for many, it is obvious that:

(1) singing in one part (when everyone sings the same melody) is much easier than singing in several coordinated parts, therefore,

(2) singing in many coordinated parts (singing polyphonically) must be a later phenomenon, more precisely, a cultural invention, a higher level of musical cultural development, that will gradually become the leading form of music in every culture.

This simple logic appeared to be so obvious that, quite amazingly, not a single scholar of music history tried to formulate this idea as a scholarly hypothesis. The only scholar who expressed some form of this idea, albeit very shortly, was the late Bruno Nettl, arguably the most authoritative ethnomusicologist of several recent decades. While discussing the evolutionist view on the history of music and the origins of polyphony, Nettl, who died in 2020, suggested in his 1961 article that although this [evolutionary] *“viewpoint cannot be generally accepted, but ... has been tacitly agreed upon for the special problem of polyphony. There is, indeed, no culture that has no monophonic music at all, and since each polyphonic composition must consist of (independent) monophonic structures, it can perhaps be assumed that monophony preceded polyphony in each culture”* (Nettl, 1961:360–361).

As a result of this seemingly obvious (“self-evident”) logic, for many centuries it was believed that monophony was the only common human musical tradition for millennia, and that polyphony was only invented in the end of 9th century by medieval Christian monks.

Musicologists believed that the very first polyphonic pieces were based on the parallel movement of fourths and fifths, known as “organum”. According to common belief, polyphony was later spread by Christian missionaries through polyphonic Christian hymns, which, it was believed, explained the existence of several cultures around the world that practice polyphony today.

When we are absolutely sure that we know something, there is a danger that we might become blind towards simple and obvious facts if these facts do not agree with our beliefs. This kind of blind belief caused (and still causes) deep troubles in the development of many spheres of science (e.g. Jordania, 2020). A relevant example concerns beliefs about the origins of polyphony.

It was 1777 when members of James Cook’s crew became the first Europeans to meet the Polynesians from the Tongan Islands. Among other things, members of the expedition witnessed the local singing tradition. By accidental good luck Lieutenant James Burney, son of the English composer Charles Burney and highly musically educated was among the group. Clearly impressed by what he heard, Charles provided a very detailed and professionally immaculate description of what he heard, so that readers could learn that Tongan traditional singing con-

sisted of four parts, with the lowest part performing the role of a drone; the range was relatively small, using only four notes, varying the text and melodic directions; and they finished singing with minor triad. Other 18th century sources also mentioned dissonances (“discordant notes”) that were particularly appreciated by the local listeners (Kaepler et al., 1998:15).

This was a true sensation. An isolated people, living in the middle of Pacific Ocean without any previous contact with Europeans, were singing polyphonic songs! So, how did European educated men respond to the news from Polynesia?

They simply rejected James Burney’s detailed report as false, because they believed it *“a great improbability that any uncivilized people should, by accident, arrive at this degree of perfection in the art of music, which we imagine can only be attained by dint of study, and knowledge of the system and theory upon which musical composition is founded.... It is, therefore, scarcely credible, that people semi-barbarous should naturally arrive at any perfection in that art which it is much doubted whether the Greeks and Romans, with all their refinements in music, ever attained, and which the Chinese, who have been longer civilized than any other people on the globe, have not yet found out.”* (Cook and King, 1784: 143-144; cited in Kaepler et al., 1998: 15).

Simple as that: we believe it is impossible, so sorry, the facts presented cannot be true. Discussion is over.

20th Century: The change of a paradigm

When the paradigm is incorrect, impossible facts start to appear again and again, until the moment comes when they are impossible to reject or neglect. This became particularly evident from the turn of the 20th century, after the phonograph came into broader use, and polyphonic singing from several remote regions of the world was recorded, causing music historians to critically rethink the old model of the origin of polyphony as a medieval Christian invention. By the 1930s arguably the greatest living authority on polyphonic singing, German scholar Marius Schneider officially proposed that polyphony was invented by traditional singers, not by Christian monks (Schneider, 1934, 1935). But from whence did it originate? This became the new central point of discussion between musicologists.

Many regions were proposed as the “birthplace” of the polyphony. Victor Lederer proposed Northern Europe (1906), Ludwig Kuba – the remote mountains of the Balkans (1909); Vasil Stoin more precisely, the mountain regions of Bulgaria (1925); Cvjetko Rihtman, Serbia (1958, 1966); and Siegfried Nadel Georgia, Caucasus (1933). The greatest authority of polyphony of the time, Marius Schneider, was also sure polyphony came to Europe from Georgia, but for him it initially originated in South-East Asia where many isolated cultures still practise vocal polyphony (1969; cf., 1934–35). Paul Collaer, on the other hand, believed polyphony in Europe had local origins (1960).

Despite changing the origin paradigm for polyphony from medieval Christian monks to traditional cultures, the idea of polyphony as a cultural invention survived until the beginning of 21st century.

21st Century and another change of paradigm

The change came in 2006, simultaneously in the works of two ethnomusicologists unknown to each other at the time: Victor Grauer from the USA, a collaborator of Alan Lomax's widely known Cantometrics project (Grauer, 2006), and (2) my own work (Jordania, 2006). Despite a general similarity between the two works (both proclaiming polyphony a very ancient phenomenon), big differences remain in these two approaches. In Grauer's model, pygmy hocketing polyphony was declared humanity's earliest musical tradition, dating to at least 100 000 years ago (Grauer, 2006), and its creative source was alleged to be the imitation of natural world sounds (particularly bird choruses) by our already human ancestors. In my model, the origins of choral singing did not derive from imitating bird choruses nor does polyphony derive from monophony. Rather, vocal polyphony was an important element of humans' defense system from predators via the forces of natural selection, and the timelines extend back millions of the years to human ancestors on the African Savannah (Jordania, 2006, 2011, 2014).

Understanding this latter model requires not only a new understanding of the origins of polyphony but also the new mechanisms of the evolution of human morphology and behavior.

Beginning with this latter premise, in Charles Darwin's model, the central force of evolution is said to be sexual selection. Darwin never mentioned defense strategies for survival; indeed, he proposed that humans probably existed in an environment lacking any serious predators. In the concluding words of one chapter he stated:

“... granting that the progenitors of man were far more helpless and defenceless than any existing savages, if they inhabited some warm continent or large island, such as Australia or New Guinea, or Borneo (the latter island being now tenanted by the orang), they would not have been exposed to any special danger. In an area as large as one of these islands, the competition between tribe and tribe would have been sufficient, under favorable conditions, to have raised man, through the survival of the fittest, combined with the inherited effects of habit, to his present high position in the organic world” (Darwin, 1871:158).

Today we are sure that humans evolved in African savannah, the region of the fiercest predator danger and competition of the various carnivore species. So, having a potent defense strategy was crucial for our ancestors, and this need for a powerful defense strategy frames the discussion below.

Of the various defense strategies common in animal kingdom are two opposing strategies pertinent to the discussion at hand: cryptic defense and aposematic defense (Caro & Girling, 2005; Ruxton, et al., 2004).

The central strategy of the cryptic defense system is based on animals trying to go unnoticed by predator species by all possible means. Thus, cryptic species stay low and try to hide, often characterized by camouflaging colors to be unnoticed. They lack strong body odor, and they try to be silent all the time. And if they are noticed by a predator, they instantly flee. In sum, cryptic species are very good at hiding and running. The common rabbit is a classical cryptic prey species.

In contrast, the aposematic defense strategy involves animals trying to communicate by all possible means that they are not afraid of the predator, and that if a predator attempts to attack them, they will fight back, and potentially harm the predator.

To achieve this, aposematic animals use different means to communicate this warning constantly. They try to be as visible as possible, often possessing bodies featuring contrasting colors; they may make constant sounds when moving around; and they often have constant body odor. When confronted by a predator, aposematic animals do not flee; on the contrary, they stand their ground, and through a combination of postures, sounds, and behaviors try to scare away the predator. To do this, they may increase their body size by standing in a bipedal threat posture to seem taller; or by inflating their bodies; additionally they try to make much louder, aggressive sounds, aggressive movements, and emit a stronger odor. The word “aposematism” comes from the Greek and can be translated as “giving warning ‘stay away’ sign”. Skunks and porcupines are among classic aposematic species. They use an array of warning signals using visual, audio, olfactory and behavioral modalities.

Cryptic defense is much better known than aposematic defense. Even some biologists today are not aware of this term, and many facets of aposematic defense are not well researched. The notion of “warning coloration” is much more popular among scholars than aposematism per se, although coloration is only one (visual) aspect of aposematic display.

In my 2017 book *A New Model of Human Evolution: How Predators Shaped Human Morphology and Behavior* (and the earlier edition with a different title *Tigers, Lions and Humans History of Rivalry, Conflict, Reverence and Love*; 2014) I proposed that human morphology and behavior were formed by the forces of natural selection via an aposematic strategy of defense. Our highly visible bipedal posture, long legs and long tightly coiled hair on the top of the head that makes us look taller and more intimidating; the use of colorful body painting and clothes; the ability to make very loud and coordinated group sounds, our hyperactive sweating glands that are very effective at creating a strong body odor; our instinctive freezing response to an imminent life-threatening aggressive situation; our slow, awkward and ineffective running; and several other elements of our mor-

phology and behavior indicate that our ancestors were using the aposematic strategy against predators (see also, Weldon, 2018), but for purposes of this paper, the discussion will be limited to the audio element of this defense system.

Group loud singing, synchronized by a common meter and rhythm, is a very effective tool to strongly affect both the opposition (predators or competitors) and the group of singers itself.

Regarding the first, no animal species can withstand the massive “audio attack” by a human group. All the strongest predator species, including lions and tigers, try to avoid confrontation with a group of loudly vocalizing humans. And it should be noted that, apart from singing loudly, human ancestors most likely employed other loud sounds, like clapping, banging stones together (the stones that they were going to use as projectiles in confrontation), and stamping their feet, plus moving their bodies in ideal synchrony (entrainment). Popularly known examples of the powerful effect of such group synchrony for intimidation are the synchronized drill of Nazi soldiers, or the display of the ritual Haka by the New Zealand rugby team, the All Blacks: such synchrony creates the impression of one monstrously big living organism.

Regarding the second, the internal effect of loud synchronized singing among group members, synchronous singing and stamping was (and still is) even more powerful. Synchronous singing and body movements can put the individual members of a group into trance (I call this state the “battle trance”), a state in which they all feel as a single collective, with united collective identity (Jordania, 2011; Wade, 2016). It was recently found that people’s heartbeats synchronize while singing (Vickhoff et al, 2013). In the state of battle trance, the common goals of the group override individual needs, including even the instinct of self-survival, so participants of the confrontation do not experience fear or even the pain of horrible wounds. Military organizations have been aware of this phenomenon for several centuries. Every general knows that the best tool to transform new recruits into soldiers ready to follow orders and engage in a potentially lethal attack is long sessions of group rhythmic drill (McNeill, 1997).

It is amazing that, although our understanding of the power of music has been increasing during the last decades, scholars still fail to notice the power of music in matters of defense, particularly since militaries have employed it for centuries.

But why was singing in parts, in polyphony, important to our ancestors? Is not just singing by a big group of humans enough? Actually, singing in harmony amplifies the overall sound. Furthermore, the most robust effect is attained if singing contains **dissonant intervals**.

Dissonant intervals are those that make the sound more distinct, stronger, more noticeable and the most like to grab the attention of both humans and animals. Car horns are often tuned on dissonant intervals, as they are better at commanding instant attention of the target audience. And the last feature of dissonant singing is that it is the most effective for creating the so-called “Beau Geste Effect,”

referring to the ability of a small group of singers creating the impression of a much larger group of singers. This effect occurs in animal world as well, for example among wolves and coyotes (Harrington, 1989). Thus, it is logical to conclude that the initial group polyphonic singing of our distant ancestors trying to scare away lions and achieve battle trance would be heavily based on the frequent use of dissonant intervals, particularly the most dissonant interval, the second.

The evidence bears out this thesis. Rather astonishingly, the tradition of singing in dissonant seconds can be encountered across the most isolated regions of the world. These traditions are sung by peoples and tribes on different continents, among diverse human populations and races, and speakers of different language families, including: the Aremai and Aba Tibetans in China; the Nuristanis from Hindi-Cush mountains, in an impenetrable Afghanistan mountain range; most archaic musical relicts of the Balkan and Caucasian mountains; the mountain tribes of Papua New Guinea; the Ainus from North Japan; the mountain tribes of North Vietnam; the tribal Gonds from Southern India, and others too numerous to mention.

Is vocal polyphony disappearing?

The distribution of dissonant polyphony in extremely isolated regions all over the world strongly suggests the **survival of an ancient more widespread tradition**. Taking this as an initial point for the historical dynamics of vocal polyphony, I predicted that polyphonic singing should be in decline globally, which runs counter to the idea that polyphony is a late cultural invention, according to which the number of polyphonic cultures should be increasing as a result of cultural borrowing of the progressive invention.

In my books (2006, 2015), the disappearance of vocal polyphony has been independently documented by various scholars over the five continents, briefly:

Northern Europe. Countries from Scandinavia to the British Isles possessed traditional vocal polyphony by the end of the 12th century (Cambrensis, cited in Hibberd, 1955). Most of these countries today have only late pan-European style polyphony with parallel thirds or completely lack data on vocal polyphony. Only Iceland has retained the earlier form of polyphony.

Italy. In Lombardy, singing in seconds was documented in the 15th century, but later disappeared (Ferand, 1939).

Lithuania. The unique vocal polyphonic style *sutartines*, based on almost constant use of secondal dissonances, has disappeared during the last two centuries (Rachiunaite-Viciniene, 2002).

Latvia. A tradition of three-part drone singing, with the drone in the middle of the polyphonic texture, and the third part singing a major second below the drone, recorded at the end of the 19th century, disappeared without much trace (Yurian, 1907).

Estonia. A tradition of drone polyphony was recorded by Tampere (1938) in the beginning of the 20th century. No traces of this tradition survived.

Russia. A unique tradition of duet and trio singing with independent melodies was recorded by Gippius in the 1920s and never heard again (Zemtsovsky, 2000:758).

Sicily. According to archive recordings, the western part of Sicily was as polyphonic as the rest of this Mediterranean island, but after the 1968 earthquake the tradition seems to have been lost (Macchiarella, 2008:142).

Macedonia. According to local ethnomusicologists, as a result of government politics, the tradition of Macedonian singing in dissonant seconds was disappearing from the 1950s to the 1980s (Bicevski, 1986).

Californian Native Americans. According to historical sources and archival recordings, interesting forms of vocal counterpoint present among southern Californian natives, also disappeared (Keeling 2001:418).

Venezuelan Native Americans. According to Isabel Aretz (1967:53), there was a general tendency in the states of Lara, Falcon, and Portuguesa towards the disappearance of three-part singing.

Taiwan. According to archive recordings, the small mountain tribe Saisat had a tradition of singing in parallel fourths that disappeared within the first few decades of the 20th century (Tsang-houei, 2002:525).

Indonesia. Part of the traditions of vocal polyphony in Central Sulawesi has disappeared during the last decades (Rappaport, 2004).

Polynesia. A tradition of six-part polyphony on Tonga, which knowledgeable older singers still remember, was eventually lost, and partly replaced by late European three-part singing (Kaepler, 1990).

Africa. According to Simha Arom (personal communication, 7th August, 2007), vocal and instrumental polyphony has been declining among pygmies since the 1970s, and some songs that were known in four parts survive today only in three- or two-part versions.

Georgia. Documented cases of losing (and a major decline in) the traditions of vocal polyphony in Meskheti, Saingilo and Khevsureti warrant mention (Magradze, 1986; Jordania, 1989, 2000: 827).

On the other hand, despite my search for decades, **not a single example of the natural development of vocal polyphony was documented from any traditionally monophonic culture.**

There is more. Quite sensationally, a very large-scale forced “polyphonization” of monophonic peoples was attempted in former communist Soviet Union in order to create a common “socialist musical culture.” This experiment lasted for decades, cost millions of rubles, and involved countless efforts of creating polyphonic versions of monophonic melodies by trained professional composers and teaching them to newly created local choirs. The efforts were without any gain, and the experiment totally failed.

This clear historic tendency of the disappearance of polyphonic singing traditions is a strong argument for the idea of initial wide distribution of vocal polyphony cultures, its gradual disappearance, and its survival in the most geographically isolated regions. (We can say that this simple idea is the principle of Occam's Razor at its best.)

A new big question arises: if singing in harmony played a key role in the all-important sphere of defense, why has polyphony started disappearing?

Polyphony, human intelligence, language, speech, and speech pathologies

To answer this question, we need to address the complex topics of the origins of human intelligence, language, and speech in relation to the origins of music and choral singing.

In my 2006 book I proposed that the initial reason for the decline of polyphony was the evolutionary shift from a primary pitch-based language to fully articulated speech. Scholars have been arguing that the historical transition from song-based communication to articulated speech is the most plausible scenario of evolution in human communication (e.g., Darwin, 1871:161; Brown, 2000). To fully understand the complexity of this process, it is important to differentiate two closely related but very different phenomena: **language and speech**.

A **language** is a structured system of communication used by humans. It can be based on various modes of communication: speech, gestures, writing, pitch. For example, whistle language uses only pitch for communicating complex messages, particularly over a great distance. Thus, **articulated speech is just one of the possible mediums of language**, the most effective and economical, perhaps, but still just one of the possible medias only. And most likely, human language was born much earlier than articulated speech.

I proposed (2006) that the shift to human language (and self-developing intelligence) occurred from developing the ability to ask questions. Humans are probably the only species that can ask questions. None of the apes trained in various communicating systems, including those that can answer questions from their trainers, ever asked a single question by themselves (Premack & Premack, 1972, 1983).

The only probable exception that I am aware of is Alex, the African grey parrot, who participated in language learning experiment with Irene Pepperberg. Interestingly, Alex was the only grey parrot who asked questions; all other grey parrots failed to achieve the same in Pepperberg's experiments to date (personal communication, 2018).

Humans of all cultures ask their first questions using a raising intonation, a strong indication that the ability to ask questions emerged during the pre-articu-

lated speech stage of human language development. Further elaboration of this point is beyond the scope of this paper, but most likely *Homo erectus* (an awkward name of archaic *Homo sapiens*) already had human cognitive abilities and dialogical language with questions, but did not yet have a fully articulated language and question-based dialogical communication (on dialogical communication, see Zemtsovsky, 1986).

The anatomically fully modern human face was most probably formed with the development of speech, as articulated speech was the last evolutionary force that changed the morphology of human face (Krantz, 1980; cf., Ishim et al., 2007).

With that in mind, to understand the puzzling distribution of polyphony across cultures, I proposed that, unlike the shift to dialogical language, the shift to fully articulated speech occurred in different populations in different epochs (Jordania, 1988, 1989, 2006, 2015).

So, when our ancestors left Africa some two million years ago, they most likely already had human cognitive abilities and could formulate questions, but their language was based on pitch (Steven Brown's "musilanguage"), not fully articulated speech.

Later these different populations, separated by thousands of kilometers (in Asia, Europe, and Africa) for tens and hundreds of thousand years, shifted to articulated speech at different times. The appearance of articulated speech triggered the long process of losing the initial polyphonic singing. Consequently, regions where the shift to articulated speech happened earlier lost their traditions of polyphony, whereas regions in which the shift to articulated speech happened later, still display polyphony, although also in the long process of disappearance.

This unlikely proposition, which I made in the end of the 1980s, later was supported by paleoanthropological evidence. One of leading paleoanthropologists, Milford Wolpoff (1999), after studying the regional development of human skeletons on different continents, concluded that very important differences exist in the timelines of forming contemporary facial morphology around the world. Wolpoff called this "regional continuity" when facial details, particularly around the nose and chin, resemble contemporary humans from the same areas.

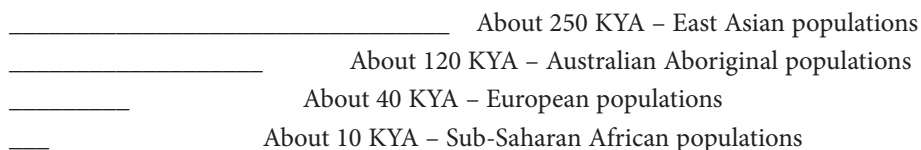
Significantly for the present argument, regional continuity is deeper in some regions than others. More precisely, regional continuity is the deepest in East Asia, where clear elements of contemporary facial morphology appeared 250 or even 350 thousand years ago (350 Kya; Jurmain & Nelson, 1994: 422), which suggests that the change to articulated speech happened earliest in East Asia. The second earliest area of regional continuity is Australia (links possibly with the Solo-Ngandong specimen about 120 Kya). Next is Central Europe, where local Neanderthals with several archaic facial features were changed (replaced, and partly interbred) into contemporary-looking modern humans about 32–40 Kya. Middle Eastern Europeans probably had a longer, about 100 Kya, history of articulated speech. And finally, regional continuity is most recent in sub-Saharan Africa, where the

similarity of skeletal features between fossil and contemporary sub-Saharan African populations appears no more than 11 Kya (Asselar Man, dated variously at 8–11 Kya).

This timeline correlates well with the regions of distribution of polyphonic singing. The polyphonic tradition has been already lost in East Asia and Australia (because of the earlier shift to articulated speech), and live polyphonic traditions still exist in Europe and particularly Africa (because of the later shift to articulated speech). So, I proposed that the shift to articulated speech first occurred among ancestors of East Asians, followed by Australian Aboriginal populations, then Europeans and finally sub-Saharan African populations.

Although this idea sounds “politically incorrect” and I might be accused of racism, I need to declare that earlier acquisition of articulated speech did not provide any real advantage to any of the populations, and East Asian and Australian aboriginal populations hardly benefited from their early shift to speech.

We can even create timelines of the shift to articulated speech in various populations. According to Wolpoff, the difference between the extremes is significant (East Asia 250–350 Kya, sub-Saharan Africa 8–11 Kya, see Graphic 1).



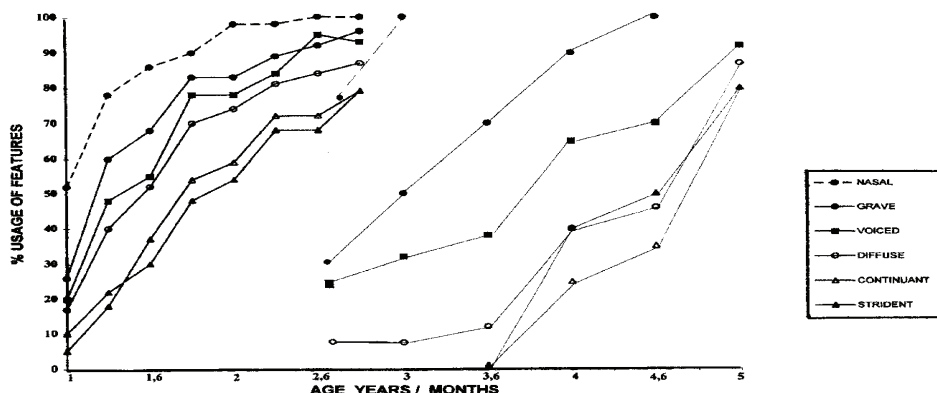
Graphic 1. The depth of the “regional continuity” of facial anatomy from different populations of Asia, Australia, Europe and Africa.

Based on this information, I made a few additional predictions: if East Asian and Australian Aboriginal populations shifted to speech so much earlier than other groups, they should show better adaptations to speech-related activities and have less genetic disposition towards speech pathologies:

- Less stuttering,
- Less dyslexia, and also,
- Earlier acquisition of phonology in children.

Contemporary studies do not pay much attention to such differences, but a few studies on the cross-cultural distribution of stuttering and dyslexia indicate that East Asian and Australian aboriginal populations have a less incidence of stuttering and dyslexia (e.g., Cooper & Cooper, 1993; Ziegler et al, 2003). More precisely, in Europe, and particularly in sub-Saharan Africa, the rate of stuttering seems much higher (1% in Europe and up to 9.2% in some West African populations; Nwokah, 1988; see also Yairi & Ambrose 2013). East Asian (and Native American) populations, on the other hand, show lesser prevalence of stuttering (see Reese & Jordania, 2001; Johnson, 1944; Bloodstein, 1993; Morgenstern, 1955).

The same pattern is found when comparing the acquisition of a phonological system among East Asian, European, and sub-Saharan populations to the distribution of polyphony, i.e.: children from the cultures without polyphonic singing traditions seem to acquire the phonological system earlier than children from cultures with polyphonic traditions (Graphic 2).



Graphic 2. The process and timelines of acquisition of phonological system by Japanese and American children (from Menyuk, 1968).

Japanese children start correctly pronouncing phonological elements at one year of age and are finished by 3 years. American children (of predominantly European descent) start this process at 2.5 years and finish at 5 years. The difference is considerable, although scholars tend to gloss it.

It is important to consider the reception and acceptance of the model presented here on the origins of polyphony in the context of human evolution because it represents such a break with past scholarship and “accepted wisdom.”

Conclusion

The paper contest can be summarized in several broad conclusions:

- (1) Vocal polyphony is not a result of later cultural invention;
- (2) It was developed by the forces of natural selection, as an important strategy of human defense strategy;
- (3) It was the audio part of the early human aposematic defense strategy;
- (4) Singing in dissonant intervals was an important part of the early human polyphony (and is still surviving in the most isolated regions of the World);
- (5) Vocal polyphony was taken by migrating humans about 2 million years ago from Africa;

(6) The central reason for the decline of vocal polyphony was the development of articulated speech - the last big evolutionary acquisition for humans;

(7) Articulated speech was developed by different populations in different epochs;

(8) Some human populations shifted to speech earlier (East Asian and Australian Aboriginal populations) and they have lost the “initial polyphony”;

(9) European and particularly, sub-Saharan African populations shifted to articulated speech later, and the polyphony is still present in their traditions;

(10) Data of epidemiology of speech pathology (stuttering), dyslexia, and acquisition of phonological system provides evidence of possible earlier shift to articulated speech among East Asian and Australian populations.

And finally, some leading experts on traditional polyphony support this new model. Eminent expert of traditional polyphony, particularly of African polyphony, Simha Arom wrote:

“I totally agree with the main idea of Joseph Jordania about the ancient origins of choral singing and its gradual disappearance. To my opinion also, there is no ‘evolution’ from monophonic to polyphonic singing, and I was glad to see that the argumentation of this idea is so strong and logical...”

Bruno Nettl, the leading American ethnomusicologist, mentioned earlier, also supports the new model. In one of his last articles, published in 2015 in Czech Republic, Nettl discussed the greatest discoveries in ethnomusicology for the entire 130 years of the discipline, and this model of the origins of polyphony as a human defense system against predators is mentioned twice (Nettl, 2015). And in 2009, I was awarded the highest international prize in ethnomusicology in Japan, the Fumio Koizumi Prize “*in recognition of his contribution to systematic analysis of folk polyphonies of the world, proposing a new model for the origins of traditional choral singing in a broad context of human evolution.*”

Despite the evidence and such recognition from authorities in the field, many music historians, from age-old habits, still stick to the old idea of polyphony being a cultural invention, developed from monophony. New ideas need time to be widely accepted, so we should be patient with the sometimes glacial rate of change in scientific development.

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ПОРЕКЛО ВИШЕГЛАСЈА: КАСНИЈЕ КУЛТУРНО ОТКРИЋЕ ИЛИ ДЕО ПРЕДАТОРСКОГ ОДБРАМБЕНОГ СИСТЕМА?

У раду је представљен нов модел порекла вишегласја у контексту еволуције човека. Интеракција хоминида с предаторима сматра се кључном покретачком силом у еволуцији морфологије и понашања људи. Заједничко певање и плесање, цртање по телу и употреба маски, сматрају се значајним стратешким елементима за застрашивање и одвраћање предатора, с једне, и довођење хоминида у измењено стање свести, с друге стране. У овом стању људи не осећају страх и бол и спремни су да жртвују своје животе за заједнички циљ. Ово психолошко стање и данас је важно за многе људске групне активности, посебно у религији и војсци. У раду су вишегласне традиције представљене у контексту порекла језика и артикулисаног говора.

Кључне речи: порекло вишегласја, одбрамбене стратегије људи, предатори, порекло језика.