

A phonetician's reading of Darwin's notes on the vocal

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Abstract

Sexual dimorphism has played a key role in research on vocal attractiveness. This paper looks at Darwin's *The Descent of Man and Selection in Relation to Sex* (1871[2021]) with the following questions in mind: 1) What role does the vocal have according to Darwin?; 2) What reasons are provided for any tendencies identified by Darwin?; and 3) Have these (in humans) been supported by research conducted since? Darwin consistently acknowledges the role of the voice in sexual selection. Specific details are discussed in the paper, which further compares these with more recent research on vocal attractiveness and suggests further avenues of research from a phonetician's perspective.

Introduction

The field of vocal attractiveness (VA) has established the role of several vocal traits which contribute to the listener's percept of the speaker's physical, and in some cases romantic, attractiveness (Weiss, Trouvain, Barkat-Defradas, & Ohala, 2021). Because much of this research, either explicitly or implicitly, focuses on sexual attractiveness, it is perhaps not surprising that much of the research on VA has been conducted in the fields of evolutionary biology and psychology, and only considerably more recently also in linguistics. Sexual selection (Darwin, 1859) thus necessarily recurs in the literature focusing on VA.

In this paper, the following questions are asked: 1) What role does the vocal have according to Darwin?; 2) What reasons are provided for any tendencies identified by Darwin?; and 3) Have these been supported by research

conducted since? Because Darwin's notes on the vocal may seem rather "scattered" throughout (some of) his works, one of the primary goals of this paper is to provide a more practical overview of Darwin's notes on the vocal (RQ1-2). However, discussing RQ3 facilitates a second primary goal of this paper, namely to outline areas in the field of VA which remain somewhat of a terra incognita and which should be explored in future research on VA. This discussion is written from a linguistic perspective as well, which has been less represented in the highly interdisciplinary area of VA. This paper therefore ultimately also attempts to bring linguistics and biology and psychology closer together in a mutual endeavour.

Sexual selection and natural selection

According to Darwin (1871[2021]), "sexual selection [...] depends on the advantage which certain individuals have over others of the same sex and species solely in respect of reproduction". When contrasted with natural selection, "[s]exual selection acts in a less rigorous manner [...]. [Natural selection] produces its effects by the life or death at all ages of the more or less successful individuals" (1871[2021]).

If we take f_0 as an example to illustrate the two types of mechanisms, we could paint the following picture. Firstly, lower f_0 is strongly indicative of a larger body size (Ohala, 2010) and also correlates with strength (Puts, Apicella, & Cárdenas, 2012) and the individual's survival chances. An individual can lower one's f_0 on purpose in order to (attempt to) exert and/or signal dominance. A lower f_0 may also increase one's

chances to propagate the species. For instance, if f_0 correlates with more physical size and strength and prowess, and if these are desired characteristics, then f_0 would also signal to the listener which vocalisers/speakers are more desirable to mate with and/or more likely to overpower a mate.

Method

Two books were chosen for the analysis: *On the Origin of Species* (1859) and *The Descent of Man and Selection in Relation to Sex* (1871). The two works have been chosen of Darwin's several works as these have been the most influential in terms of the theories of natural selection and sexual selection. However, due to limited space and because the former provides few comments on the vocal, only the latter is discussed here.

Results

The Descent of Man and Selection in Relation to Sex is rife with comments on the vocal and (in humans) the linguistic, with the table of contents giving them a more prominent place by their explicit mention, as in “musical instruments of the males” in the chapter on secondary sexual characters of insects; “vocal organs” in the chapter on secondary sexual characters of fishes, amphibians, and reptiles, and those of birds (but not mammals). The chapter on the secondary sexual characters of humans (“man”) also explicitly mentions “differences in mental powers, and voice”. Overall, Darwin's commentaries on the vocal (and the linguistic) fall within the following types: speech impediments and communication disorders, racial aspects of the vocal, evolutionary and historical development of language(s), aesthetic aspects of the vocal, the vocal in fights and combats, and finally the vocal as a “charm” (i.e. a VA trait). As we will see, sex enters in the discussion of most of these and some of the discussion is coloured by racial and gender stereotypes in places.

“Arrests of development”

Darwin mentions the possibility of cleft palate being inherited to provide an example of “[v]arious monstrosities”. He does not link this directly to speech. An explicit comment on speech is connected to the cognitive faculties, with some “arrests of growth” affecting the development of the brain in ways which can result in the inability to “acquire the power of speech”. The most explicit comment concerns “some hemiplegic patients and others”, who, “at the commencement of inflammatory softening of the brain, unconsciously imitate every word which is uttered, whether in their own or in a foreign language, and every gesture or action which is performed near them”.

Evolutionary and historical development of language(s)

Darwin makes several observations on the development of the linguistic faculty. A whole chapter is dedicated to “Mental faculty”, which contains a section on “Language”, but discussions of the linguistic faculty appear in various places. In particular, Darwin suggests that the development of the linguistic faculty went hand in hand with the development of overall mental capacities. Indeed, to him the discovery of fire is “probably the greatest ever made [...] excepting language”.

Darwin speculates that vocalisations were used before language evolved, which were emphasised particularly through sexual selection (during the “season of courtship”), and language developed from these. However, Darwin acknowledges the use of non-linguistic vocalisations as an important part of human communication today: “Our cries of pain, fear, surprise, anger, together with their appropriate actions, and the murmur of a mother to her beloved child are more expressive than any words.” While some of Darwin's notes on the linguistic faculty seem shrouded in a mist of admiration for humankind (or “man”), he is at

the same time well aware of the fact that human beings are also very physical beings: “Although the intellectual powers and social habits of man are of paramount importance to him, we must not underrate the importance of his bodily structure”; and “Man still bears in his bodily frame the indelible stamp of his lowly origin”.

Darwin also explicitly discusses “difference(s) in the mental powers of the two sexes” in humans. More specifically, “[w]oman seems to differ from man in mental disposition, chiefly in her greater tenderness and less selfishness”. Darwin further notes that the intellectual powers are higher in men than women, because “[i]f two lists were made of the most eminent men and women in poetry, painting, sculpture, music (inclusive both of composition and performance), history, science, and philosophy, with half-a-dozen names under each subject, the two lists would not bear comparison [...] the average of mental power in man must be above that of woman. [...] Thus, man has ultimately become superior to woman.” These represent some of the (from today’s point of view) most glaring gender stereotypes in the work.

Racial aspects of the vocal

It is not only gender stereotypes which can be seen in some of Darwin’s work in places. One commentary reflects racially stereotypical aspects of communication: “the light-hearted, talkative negroes” are contrasted with “taciturn, even morose, aborigines of S. America”. Darwin also claims that “the voice and the form of the larynx differ in the different races of mankind; but with the Tartars, Chinese, etc., the voice of the male is said not to differ so much from that of the female, as in most other races.”

Aesthetic aspects of the vocal

Numerous notes can be found on aesthetic aspects of the vocal, especially regarding “instrumental music” as opposed to speech, although Darwin makes

subjective comments on the aesthetic of the vocal in speech as well.

Many of these notes are explicitly linked to sexual selection (e.g. “The sweet strains poured forth by many male birds during the season of love, are certainly admired by the females.”). The groups of animals for which Darwin makes such observations include (many) birds, crickets, fish, frogs, grasshoppers, and humans. In one of the four chapters on birds, an entire section is dedicated to “instrumental music”.

What seems to motivate Darwin’s decisions behind which vocalisations are “instrumental music” is 1) whether the vocaliser can give “a complete and correct octave of musical notes” (as in the case of the gibbon); 2) whether the sounds are perceived as smooth or symmetrical, and/or 3) pleasing to humans. On the one hand, Darwin points out that a range of species derive pleasure from “instrumental music” in some way, which suggests more universal tendencies. On the other hand, the role of culture is also explicitly acknowledged: “but such high tastes [i.e. human preferences for art] are acquired through culture, and depend on complex associations for landscapes and refined music”.

The aesthetic is also explicitly linked to the sexual in several places: “The true song, however, of most birds and various strange cries are chiefly uttered during the breeding-season, and serve as a charm, or merely as a call-note, to the other sex.”

The vocal (and acoustic) as a charm

Many males are discussed in using their voices and other sounds to appeal to the female during the “breeding-season” or as part of “courtship”. Darwin mentions beetles, birds, cicadas, crickets, crustaceans, fishes, frogs, gibbons, grasshoppers, humans (“man”), monkeys, seals, snakes, spiders, and tortoises. The voice and body sounds are therefore very explicitly and consistently identified as a secondary sexual trait of most species

discussed by Darwin. In the case of the cicada, as is the case for other species, Darwin notes that it is only the male that utilises the voice, and accompanies this with a misogynist quote from the poet Xenarchus: “Happy the Cicadas live, since they all have voiceless wives.”

Darwin attributes this to the fact that “the male of almost all animals [has] stronger passions than the females. Hence, it is the males that fight together and sedulously display their charms before the females”. While Darwin also identifies the male as more active than the female, he also comments on the fact that the female could be seen as active in exerting a choice. He also makes an interesting comment on the fact that she does not necessarily choose “the male which is the most attractive to her, but the one which is the least distasteful”. It is somewhat curious that, when it comes to deer, while the stag is claimed not to use the voice to “charm”, “[t]he voice of the female, on the other hand, quickly brings to her one or more stags”. Although this note implies that the *female* voice is utilised in sexual selection, Darwin nevertheless concludes that the stag does not use the voice for sexual selection purposes, even though the implication is, at the same time, that they must pay attention as *listeners* at least. At one point, Darwin admits that not only males but also females might compete with other males and females, respectively, and that not only males but also females might utilise the vocal as a “charm”: “[w]omen are generally thought to possess sweeter voices than men, and as far as this serves any guide, we may infer that they first acquired musical powers in order to attract the other sex. [...] But if so, this must have occurred long ago, before our ancestors had become sufficiently human to treat and value their women merely as useful slaves.” Darwin frames this within a contemporary parallel with “utterly barbarous tribes[, where] the women have more power in

choosing, rejecting, and tempting their lovers, or afterwards changing their husbands.” Thus, although the focus of VA traits is repeatedly on the male as a producer and the female as the perceiver, Darwin nevertheless speculates (and in some places strongly implies) that female voices, too, can serve as a “charm”.

AGEING. A slightly different aspect linked to female vocalisations is touched upon with respect to ageing, with an example of ageing hens. A female within the same species can adopt the “male” characteristics, including the voice, especially as she ages. Although this is not discussed as female “charms” being lost, this is ultimately what this relates to.

SYMMETRY. In his notes on the aesthetic, symmetry is discussed as a result of sexual selection. However, this does not seem to apply to the male sea-elephant’s nose and its “gurgling” sounds.

HUMANS (MALES, BUT ALSO FEMALES). A considerable amount of space is dedicated to the vocal in sexual selection particularly with respect to birds and (less so) humans. For humans, the male voice is described as having a “more powerful tone” than the female voice. This “great difference between the adult sexes” lies “in the power of [male] voices”, which is due to male vocal folds being larger than female ones. According to Darwin, the reason is “the long-continued use of the vocal organs by the male under the excitement of love, rage and jealousy”. Finally, with respect to humans, Darwin clearly identifies language as a complex and a more evolved form of expressing and communicating love and desire: “before acquiring the power of expressing their mutual love in articulate language, [they] endeavoured to charm each other with musical notes and rhythm”; and “[h]e [i.e. ‘man’, i.e. the human] differs also from the lower animals in the power of expressing his desires by words, which thus become a guide to the aid required and bestowed.”

VOCAL VS NON-VOCAL TRAITS. Although the vocal is, across the different species discussed by Darwin, positioned as less important than other secondary sexual characteristics, Darwin explicitly comments on one scenario in which this may not be the case: “if bright colours were dangerous to the species, other means would be employed to charm the females; and melody of voice offers one such means.” However, even though the vocal is framed as less important than non-vocal traits in the work, Darwin consistently positions it as widely relevant and important in the evolution of many species: “[f]rom the curiously diversified means for producing various sounds, we gain a high idea of the importance of this means of courtship.”; and “To suppose that the females do not appreciate the beauty of the males, is to admit that their splendid decorations, all their pomp and display, are useless; and this is incredible.”

INTERACTIVE ELEMENTS OF THE VOCAL. While few, some notes also comment on the interactive elements of the vocal of sexual selection, and how different phases of an encounter affect vocalisations. For instance, the male crickets and grasshoppers are described to stridulate in “louder notes” when attracting females to their burrow, and then utilising “a more subdued tone, whilst the successful musician caresses with his antennae the mate he has won”. A more complex example is also provided for the eared seal, in which we find a combination of the use of the vocal both to attract and then subdue and dominate in the process of sexual selection, with the female first being lured with low-intensity vocalisations, and then intimidated and held captive in the male seal’s harem.

The role of the vocal in fights

As already mentions, Darwin links “instrumental music” also to competitiveness within the same sex of a species. The first scenario falling within this

category is one in which a male or a group of males, for instance, intend to intimidate each other (e.g. baboons, birds, cicadas, gibbons, and monkeys).

Discussion and conclusion

RQ1: What role does the vocal have?

The vocal is consistently acknowledged by Darwin in his *Descent of Man*, particularly with respect to sexual selection. This is commented on fairly systematically for a wider range of species. Although more focus is given to birds and humans, this is nevertheless the case for other sexual characteristics as well. Darwin mainly mentions volume and power with respect to different sexes with respect to humans. Darwin’s comments on humans differ from those on other animals also in that humans express their desires through language, i.e. not solely or primarily through vocalisations, although vocalisations are still seen as very important.

RQ2: What reasons are provided?

VA is indeed one aspect of the vocal discussed most consistently across numerous species covered by Darwin. For humans at least, some of the assumptions put forward reflect gendered (and racial) deterministic and essentialist ideologies. At the same time, these are not adhered to consistently throughout the work, and both culture and biology are seen as important and interrelated.

RQ3: Have these been supported since?

Limiting the (considerably succinct) answer to this question solely to the human vocal, research has repeatedly shown that lower-pitched voices are associated not only with larger body size but also with higher percepts of dominance and aggression, and this is the case across different cultures (Puts, Apicella, & Cárdenas, 2012). However, while Darwin associates this deterministically with the two sexes, recent research provides us with more nuanced approaches to gender

and power and includes evaluations of both male but also female voices with respect to perceived dominance (e.g. Krahé, & Papakonstantinou, 2019; Pisanski, & Rendall, 2011; Tusing, & Dillard, 2006).

One note focuses on the symmetrical being aesthetically pleasing. Much research has been conducted which engages with the idea that “smooth” voices are evaluated as more attractive and good, which translates into periodic, harmonically rich voices. Discussions are ongoing regarding the role of symmetry vis-à-vis typicality in terms of exposure frequency and averageness (Pisanski & Feinberg, 2018).

Considering racial differences in the vocal, most sociophonetic work would struggle relating its findings to Darwin’s assumptions. Firstly, it has been acknowledged that both ethnicity and race (similarly to gender and sex) are discursively constructed. Secondly, Darwin does not specify *how exactly* strictly *vocal* (rather than communicative) characteristics of different races are supposed to vary. Different physiology of the larynx is mentioned, but not commented on. 21-century research has targeted racial differences in the vocal tract as a whole (e.g. Hao, 2002).

Areas to pursue

A sociophonetician would propose that future research on VA considers the role of gender and age identity, and gender and age norms of specific speech communities. Secondly, vocal traits of *romantic* attractiveness seem to be much less understood. Furthermore, the focus in VA research has been predominantly on heterosexual speakers/listeners. I also suggest that a plethora of interesting information lies in public discourses about “sexy voices” (and variably labelled un/attractive voices) as well as in media representations. Phonetic research has established much nuance in specific phonatory and other vocal aspects of speech production, which could be

approached in a more nuanced manner in future work as well. Finally, the phonatory typology of specific languages used in VA studies should be acknowledged, as it is not known to what extent these may constrain the availability of specific vocal traits as VA cues, especially in interactional settings.

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