



RAST MÜZİKOLojİ DERGİSİ

Uluslararası Müzikoloji Dergisi

www.rastmd.com

10.12975/rastmd.2017.05.02.000103

## IS THERE ANY SINGER'S FORMANT? A NAME PROPOSAL FOR A MISCONCEPTUALIZED PHENOMENON

Dr. Şahin Saruhan<sup>1</sup>

### ABSTRACT

The problem with so called "singer's formant" is not only limited to the name itself. But because terms determine the content of and set a limit to the practice of definition, to tackle the problem of the name/concept of "singer's formant" is the most urgent of these problems. Although in studies on various non-operatic singing styles, no evidence of such formant was found, this phenomenon has continued to be called singer's formant, and in literature there is no sign of disapproval in this regard. The act of singing is not unique to any given musical genre. The person who sings in any genre is a singer. But, although it was found only among the Western opera singers, to decorate this phenomenon with the prefix 'singer', intentionally or unintentionally, restricts one to be a singer of only the Western opera singers. What links music with science, or to put it another way, transforms music into musicology, is the application of scientifically defined methods on every musical matter. In this regard, in this study, an effort was made to offer a scientifically appropriate name to the acoustical phenomenon that called "singer's formant" until now. It was concluded that instead of "singer's formant", "Western opera singer's formant cluster" (FC<sub>wos</sub>) must be used for the peak found in the Western opera singer's.

**Keywords:** Singer's formant, Concept misformation, Scientific name, Misconceptualization, FC<sub>wos</sub>.

---

<sup>1</sup> Duzce University, Faculty of Art, Design and Architecture, Department of Music. Duzce/Turkey.

sahin.saruhan@hotmail.com

## HERHANGİ BİR ŞARKICI FORMANTI VAR MIDIR? YANLIŞ KAVRAMSALLAŞTIRILMIŞ BİR GÖRÜNGÜ İÇİN BİR İSİM ÖNERİSİ

### ÖZET

“Şarkıcı formantı” olarak adlandırılan akustik görüngenyle ilgili problem sadece kendisine verilen isim ile ilgili deęildir. Ancak, terimler içerięi belirleyerek tanımlama edimini sınırladıęı için, söz konusu akustik görüngenün adlandırılmasına ilişkin olanı bu problemlerin en acilidir. Çeşitli opera-dışı şarkıcılık türlerinde bu akustik görüngenye ilişkin herhangi bir bulgu elde edilmedięi halde, bu akustik görüngenü şarkıcı formantı olarak anılmaya devam edilmekte ve literatürde bu duruma ilişkin herhangi bir itiraza rastlanmamaktadır. Şarkıcılık, herhangi bir müzik türüne özgü deęildir ve herhangi bir müzik türünde şarkı söyleyen herkes şarkıcıdır. Oysa sadece Batılı opera şarkıcılığı türünde bulgulandıęı halde bu görüngenü “şarkıcı” ön-eki ile donatılarak, isteyerek ya da deęil, şarkıcı olma vasfı sadece Batılı opera şarkıcılarına tahsis edilmektedir. Müzięi bilimle buluşturan şey, müzięe ilişkin her konunun bilimsel olarak geçerli bir yöntemle ele alınmasıdır. Bu açıdan, bu çalışmada bu güne deęin “şarkıcı formantı” olarak anılmış olan söz konusu akustik görüngenye ilişkin bilimsel olarak uygun olan bir isim önerilmiş, bu görüngenün “şarkıcı formantı” olarak deęil, “Batılı opera şarkıcısı formant demeti”, yani kısaltması (FC<sub>wos</sub>) olarak adlandırılması gerektięi sonucuna varılmıştır.

**Anahtar Kelimeler:** Şarkıcı formantı, kavramsal yanlış şekillenme, bilimsel isim, yanlış kavramsallaştırma, Batılı opera şarkıcısı formant demeti.

### INTRODUCTION

Generally, linguistic signs that we use are coded culturally and handed over to us on a silver platter by our society, education, media, occupational circle and so forth. Thus, normally, we are consumers of a ready-made vocabulary, or in Said's words, "conceptual repertoire" (Said, 2003:121) and "most of us are bound to use words as they are normally understood" (D'Andrade, 1982:208). Certainly, this silver platter includes alternatives. Thus, we can consider the culture, in the Ann Swidler's words, as a "tool kit". In this way, we tend to appropriate a "kind of middle position that recognizes both the constraining force of culture and the instrumental and voluntaristic uses of culture by individuals" (Schudson, 1989:156). But, because what determines the repertoire or tool kit is the culture itself, our experiences and perceptions related to them, in the end at least at an important level, are being formed by cultural restrictions (cf. Swidler, 1986). For this reason, we are situated in a definite conceptual matrix that is not only created by, but also shapes that vocabulary itself, and acceptance of that vocabulary without any objection is much more normal and easier than interrogation.

But, what happens when we 'discover' a thing? A thing is a thing, and will remain so, as long as, we do not call it with a specific name. Exactly in this point some questions begin to emerge: How do we name/conceptualize a thing in such a case? Is it an arbitrary practice? Or, as I consider it, is it a game between 'the real' and our prejudices, in which in the end the

latter generally wins? Yes, generally our prejudices win. To accept the "Saussure's principle of the arbitrariness of sign (that) states that the connection between any signifier and signified, which together constitute the simple linguistic sign, is a fundamentally arbitrary connection" (Keele, 2004:69) doesn't require to neglect the experimental and epistemological 'situation/location' of the researcher. "In our everyday practice of experience, we do establish contexts which propel us towards the one or the other conceptualization respectively" (Glaserfeld, 2008:15). As said by Ackermann, individuals give form to their ideas, and these forms, once built, inform back their ideas (Ackermann, 1995). And, this fact is valid especially for researchers (see. Kuhn, 1970), who generally works with "hand-me-down concepts" (Jordan et al., 2004:197), that compel them to form their ideas in a specific conceptual matrix.

The problem with so called 'SF', is not only limited to the name itself. With the loosely described spectral location that changes not only between different researchers, but also sometimes among studies of a given researcher; and still unsettled situation in relation to physiological mechanisms that take role on the production of it are only some of problems that can be mentioned in this regard (cf. Saruhan 2016b). Moreover, the problem of misconceptualization in the field acoustical study of singing/speaking voice is not limited to the concept 'SF' (see. Saruhan 2017). Nevertheless, not only "one's results are heavily colored by one's definition of key terms" (Gerring, 1999:359), but also the terms themselves determine the content of and set a limit to the practice of definition. Thus, in my view, to tackle the problem of the name/concept of 'SF' that is derived from a culturally specific way of thinking about singing and is ill-defined and confusing is the most urgent of these problems.

According to Sundberg, referring to the peak in the spectral envelope found between 2 and 3 kHz as the "singing formant" has begun with the Bartholomew's study, and continued in the studies of Stanley and Sette (1935), Rzhevkin (1956), McGinnis, Zlnick & Kraichman (1951), Fry & Mankn (1957) and Vennard (1964) (Sundberg, 1968:4). In this point I have to state that, because I do not have possibility to attain other studies, my data was restricted to the study of Bartholomew (1934) and 1967 year study of Vennard. Under this condition, I can clearly say that, although he mentions "a high formant usually lying for male voices between approximately 2400 and 3200 cycles" and relates this formant with "the better voice" (Bartholomew, 1934:27, 28), there is no reference to the "singing formant" in Bartholomew's study. Thus, even though we can consider Bartholomew's study as the first study attracted attention to the 2.8 kHz formant (Bartholomew, 1934:31), it is not possible to ascribe the use of the concept of "singing formant" to the study in question. This is the case for the 1967 year study of Vennard, too. All he did is to only mention the results of Bartholomew, to name it as "2800" throughout his book and to relate it with "a good singer who can keep (it) in his voice while singing softly" (Vennard, 1967:89, 251). Thus, the first place I encountered the concept of "singing formant", is the 1968 year study of Sundberg. The name initially used as the "singing formant" is seen to have transformed into "singer's formant" after a while. But, by whom and when this concept was first used, do not matter for me, at least at present. Although important, the structural and historical backgrounds that have produced this concept are not the subject of this study, either. The problem is the use of

this concept itself. The aim of this study is to draw attention to the drawbacks of this concept, and to offer a solution.

### **The problem of concept of Singer's Formant (SF)**

As mentioned above, Bartholomew's study credited as the first study that used the concept of "singing formant" (Sundberg, 1968:4) and the first report on the "singer's formant" (Sundberg, 2003:11; Wang, 1986:303). Studies on the subject have been carried out by many researchers, including Winckel (1952; 1953; 1954; 1956), Rzhevkin (1956) and Vennard (1967) (Sundberg, 2003:11; Wang, 1986:303). But, beginning with his 1968 study, it was Sundberg himself who particularly focused on the matter. His contribution to literature is quite significant. Although some of his claims such as his explanations on the laryngeal tube as the source of 'SF' (Sundberg, 1990; 1974; 1972b) received objections (see. Detweiler, 1994; Detweiler and Detweiler, 1995), all of his data have been used vastly by other researchers, including the data on the laryngeal tube.

Although at first glance it may seem irrelevant, in order to firmly establish my arguments, I must focus, at this point, on one dimension about the so called the 'SF'; the necessity of the lowered laryngeal position in production of 'SF', which is also one of Sundberg's pivotal claims (Sundberg, 1972b; Sundberg, 1974). According to him, in order for the laryngeal tube to serve as a quasi-autonomous resonator with a resonance frequency in the vicinity of 3 kHz, which is not much influenced by the rest of the vocal tract, the ratio of area between the opening of the larynx tube into the pharynx and the cross-sectional area of the pharynx at the level of the larynx tube outlet, must not be more than 1:6. and a such case can only be obtained by a lowered larynx (Sundberg, 1972b; 1974; 2003). We observe that, except for the studies of Wang (1986) and Bele (2006), this claim gets a widespread acceptance and reiterated by various studies (cf. Vest, 2009:83; Miller, 2008:143; Smith et al., 2005:621). According to Bele, who claims that the creation of the 'SF' without a laryngeal lowering is possible, "there may be other articulatory and phonatory configurations to generate it". Furthermore, individual shapes of the pharynx and larynx can make a lowering of the larynx unnecessary to obtain an 'SF' (Bele, 2006:568). Also, in his study, Wang found that in both the high and low laryngeal singing, the gained relative amplitude of the formants roughly between 1.8 and 3.8 kHz, which he calls the Bright Timbre Frequency Range, accompanies the increased fundamental frequency (Wang, 1986:307). Thus, he concludes that, "because the singing voices were rated as bright and we also found the extra formant in high larynx singing, the explanation of Sundberg and Bartholomew, based upon studies of the Western operatic voice, that larynx lowering is responsible for the singing formant and bright timbre, does not account for their presence in this study. Therefore, lowering the larynx is not necessary to produce bright timbre and its associated acoustic feature" (Wang, 1986:308). Subsequently, Sundberg responds to Wang and asserts that because "the evidence he published was not vowel spectra, but rather LPC approximations of such spectra", his findings are invalid (Sundberg, 2003:12). What is interesting is that, although, he was opposed to Wang, a study he did with his collaborator, Friedemann Pabst, concludes "that a lowering of the larynx is not the only way to establish a pharyngeal configuration compatible with a singer's formant" (Pabst and Sundberg, 1992:76).

While clearly deciding which of these assertions is more accurate is not possible for me, such absoluteness is not a binding matter, at least for this study, either. Nevertheless, two noticeable points cause to consider the lowering of the larynx as a pivotal strategy in production of 'SF'. The first, is the fact that 'SF' was not found in singers who uses elevated or at least not lowered larynx, such as Country singers, Abdal singers or belters (cf. Saruhan, In Review; Saruhan and Parlak, 2013; Björkner, 2006:39; Titze, 2007:557; Wells, 2006:67; Popeil, 1999:28; Sundberg, 1991:61-62; Bateman, 2003:98). The other point, that has historical roots, is the well known story of the "do di petto" (for details see. Saruhan, 2014b and Cathcart, 2013). During the period between the second half of the 18th century and the first decades of the 19th century, related to social, political, economic, etc. changes (that have begun to sprout especially since the beginning of the 18th century), the production and performance conditions of opera art have begun to change. The new conditions before anything else, came to mean for singers to necessarily adopt a new singing technique that would provide them with the possibility of being heard: a) over an orchestra that not only got crowded, but also its string instruments begun to use steel wires that make its sound more loud, and b) by the all of spectators/audiences at more large spaces (Vest, 2009:70, Lamesch et al., 2007:6, for details see. Saruhan, 2014a; 2014b; 2014c). It is a rather troubling period, but in the end, the Guillaume Tell (Arnold) performance of Duprez in 1837, brings a solution to the problem (see. Saruhan, 2014b). Changes never come easily, and the provided solution would not be free of this fact. The solution would not be welcomed by all opera-goers (Marek, 2006:37) and 'do di petto' not only would be defined by some of them as "uncultured and ghastly scream" (Austin, 2005:309), but also by Rossini, as "the squawk of a capon whose throat is being cut" (Henry Pleasants, 1966:167 quoted in Austin, 2005:309). Later on, in the study of Diday and Pétrequin (1840), it would be established that, Duprez created this dark timbre by "intentionally (keeping) his larynx at a low level throughout his singing" (Vennard, 1967:151). Taking into consideration this historical dimension, too, I am prone to be in favor of the idea that emphasizes larynx lowering as an extremely important strategy in producing the 'SF', at least for opera singers. It is not subject of this study but in this point it must be clear that, I did not say "at least for opera singer", in a cursory manner or merely for the sake of saying it. Through its effect on intrinsic laryngeal muscles, lowering of larynx has an important role on register shifts, or say, register unification, that is a prerequisite for opera singers (Brown, 1996:25-26; see also Saruhan, 2016a). Thus, even if 'SF' can be produced with an elevated larynx, opera singers could not adopted such a strategy; it would not permit acquiring sameness between registers and cause a 'break' (for the matter of break see Barefield, 1991). Thus, the laryngeal lowering was not a thusly option that can be chosen or not. But, as I stated above, although it merits to be discussed in detail, it is not subject of this study, and I will cut it short here.

What interests me in this point is that, although the above mentioned historical facts are well known and studies done on various non-operatic singing styles have not found any evidence of such formant (Saruhan, In Review; Dong et al., 2014; Saruhan and Parlak, 2013; Sundberg et al., 2012; Hamdan et al., 2008; Boersma ve Kovacic, 2006; Kovačić et al., 2003; Aithal et al., 2011; Ross, 1992; Johnson, 1984), this phenomenon has continued to be called singer's formant, and in the literature there is no sign of disapproval in this regard. This can certainly be explained by several points. Firstly, it can be seen that, most researchers studying the topic, more than musicology that before all else concerns with socio-cultural,

historical, epistemological, etc. aspects of any musical subject, at a confusing degree came from other scientific fields. Secondly, it appears that, to use a concept, "taken from an institutional discourse which figures in the 'textbooks'" (Nijhof, 1998:743), such as 'SF', is the easiest and less troubling road to follow. Also, what makes the use of such a concept more appealing is "the supplementary role" of this concept in the "impact" (Nijhof, 1998:743) of the study of the researchers. In addition, disapproving a concept will, at the same time, come to mean to interrogate the paradigm that the concept has situated in and has been shaped by. On the one hand, as researchers will be saved from the need to specially justify each concept, they can avoid the reactions that would come from authorized scientists (Kuhn, 1970), as well. Thus, for a researcher, who not see problematic to act in the limits of "normal science" (Kuhn, 1970), to use the concept of 'SF' is the best thing to do. At this point, I have to confess that, what I have done in this respect so far has not been much different what from those researchers do. In the research I have done over the course of my last eight years on the acoustics of singing voice, I have used the name 'SF' without considering its musicological dimension. Why? Perhaps, although unconsciously, all the factors mentioned above were valid for me. Or, perhaps, to be aware of the drawbacks of using this concept, one should have comprehended this phenomenon in detail by studying on it a long time; it was so at least for me. I don't know what the exact answer is but at this point it is not relevant. What is relevant for me, is to find a solution to the problem that attracted my attention for a while ago and I suppose that solution can be found by focusing the semiological dimension of the problem.

"Because, signifier and signified are two sides of a single coin, it may not be feasible to treat signifier and signified as two independent terms that enter into relations with one another as sovereign entities in the world" (Slobin, 2005:317-319). Also, we can not isolate meaning of a sign from "the implied". We cannot put Humpty Dumpty's claim forward that is "when I use a word, it means just what I choose it to mean -neither more nor less". We don't live in Alice's wonderland; "the signified overflows the signifier" (Laclau & Mouffe, 1985:11), and all the signifieds come to be 'situated' by their 'implied' others. There can only be 'insiders' where there are also perceived to be 'outsiders' (Smith, 2002:155). Thus, to call an acoustical phenomenon with a name that connects it with the 'singer' unavoidably brings to mind the 'non-singer'. It does this not only with implying its antonymous, but also with making a contact between a definite formant and 'to be singer'. Regardless of our intents, it will point out not only to 'the singers', but also to the 'non-singers', who implied as such only because they do not possess the given acoustical phenomenon. Why we define an acoustical phenomenon, that well-established that is found only in Western operatic singing style, as 'of singer'. What do mean, when we said 'singer'? Who is 'the singer'? Who do this category/name refers to? Only the Western opera singers? It is clear that although it was found only in Western opera singers, to decorate this phenomenon with the prefix of 'singer', intentionally or unintentionally, restricts it (to be a singer) to only the Western opera singers. Categories/names bears potential to over emphasized sameness, singularity and homogeneity (see. de Cillia et al., 1999:161-162). For example, in his article stressing the constructive nature of categories, Maines defines the category nation as a highly consequential and reified construction and states that, "when looking closely at a nation's people, though, one invariably finds an amalgam of ethnic heritages, languages, contested territorial claims, internal cultural divisions, and religious lineages that destabilize the

category nation" (Maines, 2000:579). The act of singing is not unique to any given musical genre. The person who sings in any genre is a singer. Thus, the category of singer, regardless of our aesthetics preferences, unavoidable will contain all the persons that act on songs with their voice, with no exemption. To maintain such an assumption, that the real/the best/the developed etc. act of singing is what the opera singers do, can explain the case and doing so, we can be rescued from such an annoying matter. But in this case we must possess an answer to the question of "what do you mean in saying the real/best/developed etc.?" Or to describe the 'singer' with reference to a 'sublime art' that is assumed to be opera can take us away from such an onerous work. But, in this case we will confront another question: "what makes it sublime? Some inherent qualities of it? Or, taking into consideration that all descriptions "encapsulate a history, both cultural and personal and is epistemologically framed" (Hamman, 1999:95), should not the answer be the hegemonic power of Europe (and for the last century, of America) at epistemological field all in the world, as I think? It is not so easy to be convincing on such disputed explanations! In addition, I don't think that any of users of this name/concept, will agree with such explanations, either. In sum, it is obvious that, "singer's formant" is a misleading name/concept. Assuming that this is the case, what should we do? Not bother (about) it? Or else, is it possible to find any solution? Some examples from other scientific fields imply that yes, it is possible!

### **A New Name Proposal**

The importance of the concept or conceptualization has not been realized only by intellectuals, academicians and the like who are in close proximity to the capital of knowledge. An interesting transformation process that has occurred through the last few decades in Turkey, in the conceptualization of what is signified in English as (physically) 'disabled', illustrates this situation very well. The term used to define the blind people in the first place was 'kör' that referred not only to inability to see at a physical sense, but also to be 'unaware of what's happening'. Over time, as if to make the situation more humanistic, the concept of 'özürlülük' (defectiveness) begun to be used instead of 'disabled', and this change was reflected on the concept of blind people as 'görme özürlü' (physically defective in ability to see). But, should it be their fault to have such physical inability? How could one accuse them for their trouble? In the end, because it was realized that 'özürlülük' sounded unsympathetic, the term 'engellilik' (handicapped, having obstacles, obstructedness) replaced this concept. A similar change occurred in the Turkish term for 'scientist', as well. The term 'bilim insanı' (the human being who works in the field of science) substituted the term 'bilim adamı' which implies as if the scientists were 'men' only. It is clear that, these changes can not be comprehensible without reference to the perceptual changes brought by communicative means in Turkey during the aforementioned period. Also, as claimed by the Gestalt theory, "perception is very much influenced by conception" (Duit, 1996:45). It means that alteration of the signifier causes not only "a conceptual change" (Saussure, 2004:70), but, in the same vein, a perceptual change, as well.

In this point, the event that took place when an enzyme was named as New Delhi metallo- $\beta$ -lactamase-1 (NDM-1), which is described in detail by Singh, is rather interesting and instructive. A journal editor apologizes for publishing a 2010 paper in which authors designated an enzyme as New Delhi metallo- $\beta$ -lactamase-1 (NDM-1) and its related gene

blaNDM-1 after a city, New Delhi (Singh, 2011). This enzyme has been named so, "because it was first described by Yong et al. in December 2009 in a Swedish national who fell ill with an antibiotic-resistant bacterial infection that he possibly acquired in India, [but] although in the past new discoveries were named after the location/country, the trend of pointing a nation is no more in practice" (Mohapatra, 2013:213, 215), and the situation raises a demand for a new name. Having the same opinion as health authorities, media and medical practitioners who raised an outcry in India demanding New Delhi must be dropped from the name, Singh reminds us some cases where the names found derogatory to races, groups, cities, and countries, have been changed (Singh, 2011:304-305):

*"Down's syndrome was earlier called "Mongolism", Rubella was "German" measles, and HBsAg (Hepatitis B surface antigen) was "Australia" antigen. Traveller's diarrhoea was earlier called "Delhi" belly, and schizophrenia was earlier called "dementia" praecox. A patient with a psychosis was earlier called "insane", "mad", "lunatic", etc. The "pandemic H1N1/09" (WHO) or "2009 H1N1 flu" (US Center for Disease Control) was earlier called "Mexican" swine flu. AIDS was earlier GRID (Gay Related Immune Deficiency) in the lay press, and even a scientific body like the US CDC earlier called it the "4-H disease" (the "Haitians", "homosexuals", "haemophiliacs", and "heroin" users disease)".*

Singh (2011) answers the question of whether a name, once given, can be changed, with "yes" (p. 304), and says that in order for the name changing to be "scientifically appropriate, we must understand what is special" (p. 306-307) about the thing whose its name will be changed. Thus, (describing the two factors unique to this metallo- $\beta$ -lactamase enzyme and related gene as: 1- its transfer by plasmids, i.e. plasmid encoding and 2- its resistance to the higher class of antibiotics, carbapenems, i.e. carbapenem resistance), Singh claims that, the correct name should be plasmid-encoding carbapenem-resistant metallo- $\beta$ -lactamase, in short, PCM. In other words, PCM should replace NDM-1, both in the enzyme and the gene (Singh, 2011:307). According to Singh, "by giving a name that is scientific, based on its distinctive characteristics as per our existing state of knowledge" we ensure that, even if "this knowledge may alter over time...the name will stand scientific testimony to how it all started" (Singh, 2011:307), and concludes with a claim, that I consider crucial for our matter: "names giving must be based on scientific characteristics alone" (Singh, 2012:181; Singh, 2011:309). Thus, a name that will substitute 'SF' must refer to and be descriptive of the given acoustical phenomenon itself. Relying on the studies of Ogden and Richards (1989) and Sartori (1984), Gerring claims that (Gerring, 1999:358-359):

*"'Concept formation' conventionally refers to three aspects of a concept: (a) the events or phenomena to be defined (the extension, denotation, or definiendum), (b) the properties or attributes that define them (the intension, connotation, definiens, or definition), and (c) a label covering both a and b (the term). Concept formation is thus a triangular operation; good concepts attain a proper alignment between a, b, and c."*

In this regard, with the prefix of "singer's" which erases the question of 'which singers?' from the picture, the concept 'SF' connotes that this acoustical phenomenon is a property that, regardless of singing genre, can be found in all singers of the world. Thus, the



concept 'SF' makes the extension of phenomena indefinite. Besides, it must be pointed out that the problem about the name is not restricted to the agent ambiguity, caused by generalization. As emphasized by Sundberg (2003:11):

*“The term formant is somewhat problematic in this context. The singer’s formant is a spectrum peak rather than a formant. Calling it a formant is in accordance with the idea that a formant equals a peak in the spectrum envelope... Hence, with this definition of a formant, each partial becomes a formant. A more adequate term would be the singer’s formant cluster”.*

I will take into consideration Sundberg's statement and will use the 'cluster' characteristic of this phenomenon in my proposal. In this sense, it is certainly possible to use, for example, the "2.5 kHz centered formant cluster". On the other hand, it is well established that this formant cluster do not show itself in everyone universally. Thus, we can offer a more concrete definition that will associate it with a definite agent. But, because, it was not found all the singers, this agent cannot be the 'singer'. In the same vein with Singh, thus it will be useful to list the factors unique to this phenomenon (for details see. Saruhan, 2014d; Saruhan, 2014e and Saruhan, 2016b):

1. Related to the voice class variable, the frequency of the given formant cluster is formed in the 2.4-3.2 kHz region (Lee et al., 2008: 93; Sundberg, 2006:138; Wakefield, 2003; Sundberg, 2001: 176,181; Weiss et al., 2001: 458; Ekholm et al., 1998: 194; Berndtsson and Sundberg, 1995:36,39; Dmitriev and Kiselev, 1979:238; Sundberg, 1974:838; Sundberg, 1972a),
2. It is not found in non-operatic singing styles (Saruhan, In Review; Saruhan and Parlak, 2013; Sundberg et al., 2012; Aithal et al., 2011; Hamdan et al., 2008; Boersma and Kovacic, 2006; Kovačić et al., 2003; Borch and Sundberg, 2002; Cleveland et al., 2001; Ross, 1992),
3. Likewise, because lied singers do not show it prominently (Johnson-Read et al., 2015), it cannot be attributed to all singing styles of 'Western classical music', either.
4. Nor, the other opera traditions use it (Dong et al., 2014; Sundberg et al., 2012), and,
5. Thus it can be said that, it is peculiar to the 'Western' operatic singing style, so that, it was described by Sundberg as "it is frequently found in artistic singing in Western culture" (Sundberg, 1970:21), and "...belongs to the acoustical characteristics of professionally sung vowels in our culture" (Sundberg, 1972b:45)
6. It provides singers with possibility to be heard over a loud orchestra (Sundberg, 2006:138; Wells, 2006:73; Bele, 2006: 571; Mendes et al., 2003:530; Borch and Sundberg, 2002: 31; Sundberg, 2001: 176; Sundberg, 1979:7-8; Sundberg, 1974:843; Sundberg, 1972a:61), and
7. It was obtained by lowered larynx (Miller 2008:143; Vest, 2009:83; Master et al., 2008:147; Sundberg, 2003:12; Sundberg, 1974:840-1) that,
8. Produces a 'sombree' voice quality, a characteristic of 'covered' singing (see. Vest, 2014).

Because items 1, 6, 7 and 8 can be considered as technical details rather than indicating a definite agent, I'll restrain myself to the remaining items. What other items indicate us is the concept's specificity to Western opera singers.

"We live in a world of signs and we have no way of understanding anything except through signs" (Chandler, 2005). "It is impossible to conduct work without using concepts. It is impossible even to conceptualize a topic,...without putting a label on it" (Gerring, 1999:359). But, being "always more than simple reflections of reality, names and their meanings, form part of the cultural systems that structure and nuance the way we see, understand and imagine the world" (Petee, 2005:153-154). With its ambiguously indicated agent, the concept of 'SF' is "incorporated" (Glaserfeld, 2008:17). Undoubtedly, "the lack of conceptual clarity created by ambiguities implicit in the terms is at a systemic level in the social sciences" (Jordan et al., 2004:195). Thus, it is not a problem peculiar to the field of music acoustics. But, with a little effort it can be solved. In this context, I propose that what a scientifically appropriate name may be the term "Western opera singer's formant cluster"; in short, FC<sub>wos</sub>. The act of naming unavoidable results with the inclusion of certain things and exclusion of others (cf. Milani, 2010), and it is the case for the present study, too. But, it can be seen clearly that the proposed concept is restricted to a definite agent and thus, is no longer a loosely-defined term and sound in a more accurate and descriptive manner. "What we wish to know about a social science concept is not merely what it is, but also where it is- which is to say, where it isn't, [and] in order to perform this task effectively a concept must be sufficiently bounded" (Gerring, 1999:377, emphasis added). Although with different words, we can see the same emphasis in Sartori, as well. Sartori (1970:1041) stresses the distinction and relation between the extension (denotation) (that is the totality of objects indicated by that word) and the intension (connotation) (that is the totality of characteristics anything must possess to be in the denotation of that word) of a word. According to Sartori (1970:1041-1042):

*"to broaden the extension of a concept by diminishing its attributes or properties, i.e., by reducing its connotation". But in this case, although "we obtain conceptualizations which, no matter how all-embracing, still bear a traceable relation to a collection of specifics, and – out of being amenable to identifiable sets of specifics – lend themselves to empirical testing... the denotation is extended by obfuscating the connotation. As a result we do not obtain a more general concept, but its counterfeit", that "are conducive only to vagueness and conceptual obscurity". Thus, "the rules for climbing and descending along a ladder of abstraction are thus very simple rules – in principle. We make a concept more abstract and more general by lessening its properties or attributes. Conversely, a concept is specified by the addition (or unfolding) of qualifications, i.e., by augmenting its attributes or properties."*

It is obvious that, in addition to clearly answering the question of 'where of', because the only agent that can be subsumed under a 'sufficiently bounded' and 'intensive' name/concept is the Western opera singers, the name FC<sub>wos</sub>, in my point of view, is definite enough. On the other hand, it is corrective at a second dimension, too, in that what the name/concept 'SF' makes ambiguous is not only the agent. Regardless of intention of users, it also makes other names such as "shouting formant" found in professional folk singers that

sings in ožkanje (called also as dozivački), a Croatian folk singing style (Boersma and Kovacic, 2006; for details see. Saruhan, 2014f and Saruhan, 2017) meaningless and unnecessary. If we accept that 'SF' is really the formant of all singers universally, why we need to call the 3-4 kHz located acoustical phenomenon found in the said folk singers with another name? Are these folk singers not singers? If that is not the case, why we should not call the given phenomenon with the name, for example, 'formant of singers'? It is clear from the naming this phenomenon with a different word that there are at least two different acoustical things used by different singers, of which the difference between them originates from the difference of the cultures they are live in. Does it seem a little strange that even to define the case, in just a single sentence I needed to refer the notion of difference time after time? If we pay careful attention what Saussure claims, it can be realized that, there is nothing strange about this: "in language...whatever distinguishes one sign from the others constitutes it" (Saussure, 2004:70). Now, what we have in the hands is the facts that there is a single category (singer), and two signs ('shouter formant' and 'singer's formant'). "Classification systems can themselves be classified according to whether they are constructed around theoretical/philosophical lineage, methods, or techniques" (Sandelowski, 2010:81). But the mentioned theoretical/philosophical matters are not free of being shaped by, in our case, researchers' 'positioning', or to put it another way, their "way of seeing the world" (Berg and Kearns, 1996:107). In this regard, it is noteworthy that while the name of 'shouter formant' stresses the act itself and thus erases the agent (the singer), what the 'SF' do through generalization is to obscure the 'location' of the agent by implying 'nowhereness' or universality, and result in reevaluation of a singing genre that is only one of the lots of genres which each of them in the end is created, shaped and reshaped by the culture they belong to.

As stated by Merriam, "theory, method, and data are inextricably intertwined: one simply does not exist without the others, and all three constantly in any intellectual enterprise. Without theory we can hardly have significant method, not only in the sense that no method can be theory-free, that no method should be theory-free. And without method, no gathering of data can occur, for the results will inevitably be random" (Merriam, 1977:191). "Concepts are the central elements of propositions and – depending on how they are named – provide in and by themselves guidelines of interpretation and observation" (Sartori, 1970: 1040). Thus, in Tulving's words, "no sound concept, no sound theory" (Tulving, 2000:34). It is clear that in order to point to a given phenomenon, it is a necessary for us to use a linguistic sign, but the sign must imply the thing itself as much as possible.

It is time to answer the question of this study stated in the title: My answer is that, there is no such thing as 'SF'. Saying so does not mean to reject the existence of the thing itself. The problem of 'existence', in spite of the efforts by many philosophers for thousands of years has got no answer free of a definite 'paradigm'. And solving this problem is out of the scope of this study. But, if there is no thing, how can a dispute on anything be worth doing? Thus in this point, regardless of whether it is the case, it is unavoidable for me to assume as valid or, at least for now, do not reject the internal realist approach, that while sees "the world [as] consists of some fixed totality of mind-independent objects" (Putnam, 1980:49), at the same time "says that the notion of a 'thing in itself' makes no sense" (Putnam, 1987:36). In this way, yes, there is a thing, and it is an acoustical thing in our case.

But, accepting the existence of a thing is not the same as being convinced on the 'pure reality' of the thing itself. Although in this study, the outcome of my procedure resembles "the most common prescription for the lack of clarity and confusion over concepts in management research (that based on) more careful and precise specification" (Welch et al., 2016:113), I do not approve the "positivistic ontology and epistemology, which takes for granted the existence of an external reality that can be accessed by objective scientific inquiry (and) assumes that there can be a single best definition that mirrors reality, an assumption based on the correspondence theory of truth, which posits a one-to-one fit between the empirical world and our representation of it" (Welch et al., 2016:113). Thus, even in the case that I assume the observer-independent existence of the thing, I don't accept "the notion of 'reality preceding viewpoint' [that] created by Western thought which is just one of viewpoints in the world [and] is no more than one type of reality created by the Western viewpoint" (Kawasaki, 1996:4). To put it in another way, "the 'facts' don't speak for themselves; they will always need to be interpreted" (Buller and Gamble, 2002:5), and because, in the Putnamian sense, "objects cannot be uniquely defined, but they can be defined with respect to conceptual frames" (Atmanspacher and Kronz, 1998:39), "concept formation is an important aspect of constructing interpretations" (Buller and Gamble, 2002:5). In brief, from my point of view, there had not been a "singer's formant" before we named/conceptualized it as such. And what makes it the formant of singer is our ascription of the name/concept "singer's formant" to it.

## CONCLUSION

In this study, an effort was made to follow Singh's and Gerring's methodological suggestions in name proposing process. In this way, it was concluded that the affirmative step we can take from now on is to reconsider the case and instead of 'SF', use the term "Western opera singer's formant cluster"; in short, FC<sub>wos</sub>. I claim that, this name/concept meets the criteria mentioned by Singh and Gerring. I don't know whether my proposal will pass into the history of the name 'SF' which has been used more than half a century, or 'SF' itself into the history of the name I have proposed, or perhaps, into the history of another name that will be proposed by some other researchers. On the other hand, in terms of the field of musicology, what is clear for me is the necessity of changing the name 'SF' (that transforms a misinterpretation into knowledge) with another name scientifically determined. It is clear in my opinion that being scientific does not ensure, what is called by Daston as "aperspectival objectivity" (Daston, 1992:599). 'Aperspectival objectivity' is just an unrealizable desire of a definite perceptive. It is sad, but I do not share the optimistic approach that sees possible for a scientist to "be liberated from [his/her] own culture, i.e., habitual ways of thinking" (Kawasaki, 1996:2), or completely to be rid of prejudices that s/he has obtained in this 'habitual ways of thinking'. "The demand of the Enlightenment for the overcoming of prejudices itself is a prejudice" (Gadamer, 1994:276), and all the prejudices, "in the neutral Gadamerian sense, can only be managed, not eliminated" (Ruskola, 2002:222). Again saying it "in the Gadamerian sense, no 'method' can transcend the interpreter's own historicity" (Hirsch, 1965:488) and so called "scientific objectivity" that can be obtained by "a certain methodology, a certain well-tried scientific technique for distinguishing between truth and falsehood" (Furfey, 1945:3) is not but a 'prejudice'. But, what makes music link with science, or or to put it in another way, transforms music into

musicology, is the application of scientifically defined methods on every musical matter. Thus, regardless of whether or not it is a problem for other fields of science such as acoustics, it is clear that, the problem of naming/conceptualizing so called 'SF' for the musicological field is rather important. As said by Gingras, "well chosen or not, a label [or a name/concept as in our case] is also a way to introduce a brand into the market of ideas" (Gingras, 2010:440). And, if there is a misleading name/concept, there is no idea that has the potential to touch even a 'suggested real'.

### **Acknowledgements**

I am grateful to Cihan Ertan, Emel Aras and Altan Doyran for helpful comments on earlier versions of this article.

### **REFERENCES**

- Atmanspacher, H. & Kronz, F. (1998). Many Realisms. *Acta Polytechnica Scandinavica* Ma-91:31-43.
- Ackermann, E. (1995). Construction and Transference of Meaning Through Form. In: Steffe L. and Gale (eds) *Constructivist Education*. NY:Lawrence Erlbaum, pp. 341-354.
- Aithal, S., Swathi, S., & Rajasudhakar, R. (2011). Effect of different levels of training on singing power ratio and singer's formant in classical Carnatic singers. *ninad: Journal of the ITC Sangeet Research Academy* 25: 45-56.
- Austin, S.F. (2005). Provenance: "Like the Squawk of a Capon" - The Tenor "do di petto". *Journal of Singing* 61(3): 309-313.
- Barefield, R.C. (1991). *The passaggio in tenor voice*. D.M.A. University of Cincinnati.
- Bartholomew, W. (1934). A physical definition of good voice quality in the male voice. *J. Acoust. Soc. Am.* 6(8): 25-33.
- Bateman, L.A. (2003). *Soprano, Style and voice Quality: Acoustic and Laryngographic Correlates*. PhD Thesis, University of Victoria.
- Bele, I.V. (2006) *The Speaker's Formant*. *Journal of Voice* 20(4): 555-578.
- Berg, L.D. & Kearns, R.A. (1996). Naming as norming: 'race', gender, and the identity politics of naming places in Aotearoa/New Zealand. *Environment and Planning D: Society and Space* 14: 99-122.
- Berndtsson, G. & Sundberg, J. (1995). Perceptual significance of the center frequency of the singer's formant. *Scand J LogopPhoniatr* 20: 35-41.
- Björkner, E. (2006). *Why so different? Aspects of voice characteristics in operatic and musical theatre singing*. PhD Thesis, Stockholm, Sweden.
- Borch, D.Z. & Sundberg, J. (2002). Spectral distribution of solo voice and accompaniment in pop music. *TMH-QPSR* 43(1): 31-35.

- Boersma, P. & Kovacic, G. (2006). Spectral characteristics of three styles of Croatian folk singing. *The Journal of the Acoustical Society of America* 119(3), 1805-1816.
- Brown, O. (1996). Pedagogical Opinion: Falsetto. *Journal of Singing* 53(2), 25-26.
- Buller, J. & Gamble, A. (2002) Conceptualising Europeanisation. *Public Policy and Administration* 17(2): 4-24.
- Cathcart, R.V. (2013). Do Di Petto: "Covering" the Castrato, the English Counter Tenor, and the Teachings of Manuel Garcia II. *The Phenomenon of Singing* 3:51-59.
- Chandler, D. (2005). Semiotics for Beginners. Available at: <file:///biblioteca/algorithms/Semiotics/sem01.html> (accessed 08 August 2016).
- de Cillia, R., Reisigl, M. & Wodak, R. (1999). The discursive construction of national identities. *Discourse and Society* 10(2): 149-173.
- Cleveland, T.F., Sundberg, J. & Stone, R.E. (2001). Long-term-average spectrum characteristics of country singers during speaking and singing. *Journal of Voice* 15(1): 54-60.
- Daston, L. (1992). Objectivity and the Escape from Perspective. *Social Studies of Science* 22(4): 597-618.
- D'Andrade, R.G. (1982). Cultural Meaning Systems. In: McC Adams R, Smelser NJ and Treiman DJ (eds) *Behavioral and Social Science Research: A National Resource. Part II.* p. 197-236
- Daston, L. (1992). Objectivity and the Escape from Perspective. *Social Studies of Science* 22(4), 597-618.
- Detweiler, R. (1994). An investigation of the laryngeal system as the resonance source of the singer's formant. *Journal of Voice* 8: 303-313.
- Detweiler, R. & Detweiler, G. (1995). Investigation of the laryngeal system as the resonance source of the singer's formant: Data from a pedagogically heterogeneous population. Paper given at the 24th Annual Symposium Care of the Professional Voice, Philadelphia June 1995.
- Dmitriev, L. & Kiselev, A. (1979). Relationship between the formant structure of different types of singing voices and the dimension of supraglottal cavities. *Folia Phoniatria et Logopaedica* 31(4): 238-241.
- Dong, L., Kong, J. & Sundberg, J. (2014). Long-Term-Average Spectrum Characteristics of Kunqu Opera Singers' Speaking, Singing and Stage Speech. *Logopedics Phoniatics Vocology* 39(2):72-80.
- Duit, R. (1996). The Constructivist View in Science Education– What it has to Offer and What Should not be Expected from it. *Investigações em Ensino de Ciências* V1(1): 40-75.
- Ekholm, E., Papagiannis, G.C. & Cagnon, F.P. (1998). Relating objective measurement to expert evaluation of voice quality in Western Classical Singing: Critical perceptual parameters. *Journal of Voice* 12(2): 182-196.

- Furfey, P.H. (1945). The Sociologist and Scientific Objectivity. *The American Catholic Sociological Review* 6(1): 3-12.
- Gadamer, H-G. (1994). *Truth and Method*, New York: Continuum.
- Gerring, J. (1999). What Makes a Concept Good? A Criterial Framework for Understanding Concept Formation in the Social Sciences. *Polity* 31(3): 357-393.
- Gingras, Y. (2010). Naming without necessity. On the genealogy and uses of the label historical epistemology. *Revue de synthèse: tome* 131(3): 439-454.
- von Glasersfeld, E. (2008). An Introduction to Radical Constructivism. *Antimatters* 2(3): 5-20.
- Hamdan, A., Tabri, D., Deeb, R., Rifai, H., Rameh, C. & Fuleihan, N. (2008). Formant frequencies in Middle Eastern singers. *American Journal of Otolaryngology* 29(3): 180-183.
- Hamman, M. (1999). From symbol to semiotic: Representation, sign, and the composition of music interaction. *Journal of New Music Research* 28(2): 90-104.
- Hirsch, E.D. (1965). Truth and method in interpretation. *The review of Metaphysics* 18(3): 488-507.
- Johnson, A. (1984). Voice Physiology and Ethnomusicology: Physiological and Acoustical Studies of the Swedish Herding Song. *Yearbook for Traditional Music* 16: 42-66.
- Johnson-Read, L., Chmiel, A., Schubert, E. & Wolfe, J. (2015). Performing Lieder: Expert Perspectives and Comparison of Vibrato and Singer's Formant With Opera Singers. *Journal of Voice* 29(5): 645.e15-645.e32.
- Jordan, G., Halpin, D. & Maloney, W. (2004). Defining Interests: Disambiguation and the Need for New Distinctions? *BJPIR* 6: 195-212.
- Kawasaki, K. (1996). The Concepts of Science in Japanese and Western Education. *Science and Education* 5: 1-20.
- Keele, R. (2004). *Valentinus et Nomina: Saussure, Plato, and Signification*. *Alif: Journal of Comparative Poetics* 24: 68-92.
- Kovacic, G., Boersma, P. & Domitrevic, H. (2003). Long-Term Average Spectra in Professional Folk Singing Voices: A Comparison of the Klapa and Dozivacki Styles. Institute of Phonetic Sciences, University of Amsterdam. *Proceedings* 25: 53-64.
- Kuhn, T.S. (1970). *The Structure of Scientific Revolutions*. Chicago: University of Chicago Press.
- Laclau, E. & Mouffe, C. (1985). *Hegemony and socialist strategy: Towards a radical democratic politics*. Verso, Second ed.
- Lamesch, S., Expert, R., Castellengo, M., Henrich, N. & Chuberre, B. (2007). Investigating voix mixte: A scientific challenge towards a renewed vocal pedagogy. *CIM07 proceedings*.

- Lee, S-H., Kwon, H-J., Choi, H-J., Lee, N-H., Lee, S.J. & Jin, S-M. (2008). The Singer's Formant and Speaker's Ring Resonance: A Long-Term Average Spectrum Analysis. *Clinical and Experimental Otorhinolaryngology* 1(2): 92-96.
- Maines, D.R. (2000). The Social Construction of Meaning. *Contemporary Sociology* 29(4): 577-584.
- Marek, D.H. (2006). *Singing: the first art*. Scarecrow Press.
- Master, S., De Biase, N., Chiari, B.M. & Laukkanen, A-M. (2008). Acoustic and Perceptual Analyses of Brazilian Male Actors' and Nonactors' Voices: Long-term Average Spectrum and the 'Actor's Formant'. *Journal of Voice* 22(2): 146-154.
- Mendes, A.P., Rothman, H.B., Sapienza, C. & Brown, W.S. (2003). Effects of vocal training on the acoustic parameters of the singing voice. *Journal of Voice* 17(4): 529-543.
- Merriam, A.P. (1977). Definitions of "Comparative Musicology" and "Ethnomusicology": An Historical-Theoretical Perspective. *Ethnomusicology* 21(2): 189-204.
- Milani, T.M. (2010). What's in a name? Language ideology and social differentiation in a Swedish print-mediated debate. *Journal of Sociolinguistics* 14(1): 116-142.
- Miller, R. (2008). *Securing Bariton, Bass-Baritone and Bass Voices*. Oxford university Press.
- Mohapatra, P.R. (2013). Metallo- $\beta$ -lactamase 1 - why blame New Delhi and India? *The Indian Journal of Medical Research* 137(1): 213-215.
- Nijhof, G. (1998). Naming as naturalization in the medical encounter. *Journal of Pragmatics* 30: 735-753.
- Pabst, F. & Sundberg, J. (1992). Tracking multi-channel electroglottograph measurement of larynx height in singers. *STL-QPSR* 33(2-3): 67-78.
- Peteet, J. (2005). Words as interventions: naming in the Palestine – Israel conflict. *Third World Quarterly* 26(1): 153-172.
- Popeil, L. (1999). Comparing belt and classical techniques using MRI and videofluoroscopy. *Journal of Singing* 56(2): 27-29.
- Putnam, H. (1980). *Reason, Truth, and History*. Cambridge.
- Putnam, H. (1987). *The Many Faces of Realism*. Open Court, LaSalle.
- Ross, J. (1992). Formant frequencies in Estonian folk singing. *J. Acoust. Soc. Am.* 91(6): 3532–3539.
- Ruskola, T. (2002). Legal Orientalism. *Michigan Law Review* 101:179-234.
- Said, E.W. (2003). *Orientalism*. Penguin Books.
- Sandelowski, M. (2010). What's in a Name? Qualitative Description Revisited. *Research in Nursing and Health* 33: 77-84.
- Sartori, G. (1970). Concept Misinformation in Comparative Politics. *American Political Science Review* 64(4):1033-1053.



- Saruhan, S. (2014a). Bir “meleksi”den hayali yaratık’a dönüş” hikâyesi: Kastratolar. *Akademik Sosyal Araştırmalar Dergisi*, 2(1), 561-572.
- Saruhan, S. (2014b). Opera sarkıcılığında bir dönüm noktası: Do di Petto. *Tarih Okulu Dergisi*, 7(17), 661-679.
- Saruhan, S. (2014c). Kadın opera sarkıcılarında formant uyarlama tekniği örneğiyle, sarkıcılıkta tınının oluşum bağlamları.. *Uluslararası Sosyal Araştırmalar Dergisi*, 7(32), 675-689.
- Saruhan, S. (2014d). Opera sarkıcılığında metinsel anlaşılabilirlik problemi ve nedenleri. *The Journal of Academic Social Science Studies*, 27(Autumn I), 553-573.
- Saruhan, S. (2014e). Türkiye’de geleneksel sarkıcılık türleri araştırmalarında sarkıcı formantı parametresinin kullanımına yönelik bir öneri. *Uluslararası Avrasya Sosyal Bilimler Dergisi*, 5(17), 163-190.
- Saruhan, S. (2014f). Opera-dışı vokal icra türlerinde bir akustik görüngü: konuşmacı/aktör formantı. *The Journal of Academic Social Science Studies*, 29(Autumn III), 293-312.
- Saruhan, S. (2016a). Laringeal açıdan vokal registerler. *Duzce Medical Journal*, 2016; 18(1): 23-29.
- Saruhan, S. (2016b). Şarkıcı formantı: bir zorunluluk mu yoksa tercih mi? *The Journal of Academic Social Science Studies*, 50 (Autumn II), 273-296.
- Saruhan, S. (2017). Is it the speaker's formant, actor's formant, shouting formant or calling formant cluster?: A proposal for a more proper name/concept. *Researcher: Social Science Studies*, 5(9), 368-377.
- Saruhan, S. (In Review). Spectrographic and electroglottographic findings of two traditional singers.
- Saruhan, S. & Parlak, E. (2013). Orta Anadolu abdalları sarkıcılığında sarkıcı formantı bulguları. *Porte Akademik*, 8, 212-225.
- Saruhan, S., Guclu, E. & Ertugrul, A. (In Press). Spectrographic and Electroglottographic Findings of Religious Vocal Performers in Düzce Province of Turkey. *Journal of Voice*.
- de Saussure, F. (2004). *Course in General Linguistics*. In: Rivkin J and Ryan M (eds) *Literary theory: An anthology*. 2nd ed. Blackwell Publishing, pp.59-71.
- Schudson, M. (1989). How Culture Works: Perspectives from Media Studies on the Efficacy of Symbols. *Theory and Society* 18(2): 153-180.
- Slobin, D.I. (2005). Linguistic representations of motion events: What is signifier and what is signified? *Iconicity Inside Out: Iconicity in Language and Literature*, 4:307-322.
- Smith, J.N. (2002). 'Making Culture Matter': Symbolic, Spatial and Social Boundaries between Uyghurs and Han Chinese. *Asian Ethnicity* 3(2): 153-174.
- Smith, C.G., Finnegan, E.M. & Karnell, M.P. (2005). Resonant Voice: Spectral and Nasendoscopic Analysis. *Journal of Voice* 19(4):607-622.

- Sing, A.R. (2011). Science, Names Giving and Names Calling: Change NDM-1 to PCM. In: Singh AR and Singh SA (eds.) *Brain, Mind and Consciousness: An International, Interdisciplinary Perspective*, MSM 9(1):294-319.
- Singh, A.R. (2012). Proposal about Scientific Names Giving. *Mens Sana Monogr* 10: 181-183.
- Sundberg, J. (1968). Formant frequencies of bass singers. *STL-QPSR* 17(1): 1-6.
- Sundberg, J. (1970). The level of the 'singing formant' and the source spectrum in professional bass singers. *STL-QPSR* 4: 21-39.
- Sundberg, J. (1972a). A perceptual function of the 'singing formant'. *STL-QPSR* 2-3, 61-63.
- Sundberg, J. (1972b). An articulatory interpretation of the 'singing formant'. *STL-QPSR* 13(1): 45-53.
- Sundberg, J. (1974). Articulatory interpretation of the 'singing formant'. *J Acoust Soc Am.* 55: 838-844.
- Sundberg, J. (1979). Perception of singing. *STL-QPSR* 20(1): 1-48.
- Sundberg, J. (1990). What's so special about singers? *Journal of Voice* 4(2): 107-119.
- Sundberg, J. (1991). Comparisons of pharynx, source, formant and pressure characteristics in /o/. *STL-QPSR* 32(2-3): 51-62.
- Sundberg, J. (2001). Level and Center Frequency of the Singer's Formant. *Journal of Voice* 15(2): 176-186.
- Sundberg, J. (2003). Research on the singing voice in retrospect. *TMH-QPSR* 45(1): 11-22.
- Sundberg, J. (2006). The KTH Synthesis of Singing. *Advances in Cognitive Psychology* 2(2-3):131-143.
- Sundberg, J., Gu, L., Huang, Q. & Huang, P. (2012). Acoustical study of classical Peking opera singing. *Journal of Voice* 26(2): 137-143.
- Swidler, A. (1986). Culture in Action: Symbols and Strategies. *American Sociological Review* 51(2): 273-286.
- Titze, I.R. (2007). Belting and a High Larynx Position. *Journal of Singing* 63(5): 557-558
- Tulving, E. (2000). Concepts of Memory. In: Tulving E and Craik FIM (eds) *The Oxford Handbook of Memory*. Oxford University Press, Oxford, New York, pp.33-43.
- Vennard, W.L. (1967). *Singing: the mechanism and the technic*. New York: Carl Fischer.
- Vest, J.C. (2009). Adolphe Nourrit, Gilbert-Louis Duprez, and transformations of tenor technique in the early nineteenth century: Historical and physiological considerations. PhD Thesis, University of Kentucky.
- Vest, J. (2014). The Weightier Matters: Low Larynx Positioning and Adolphe Nourrit. *Journal of Singing* 71(1): 27-34.
- Wang, S. (1986). Singer's high formant associated with different larynx position in styles of singing. *J Acoust Soc Jpn* 7(6):303-314.

- Welch, C., Rumyantseva, M. & Hewerdine, L.J. (2016). Using Case Research to Reconstruct Concepts: A Methodology and Illustration. *Organizational Research Methods* 19(1): 111-130.
- Weiss, R., Brown, W.S. & Morris, J. (2001). Singer's formant in sopranos: fact or fiction? *Journal of Voice* 15(4), 457-468.
- Wells, B. (2006). On the voice-Belt Technique: Research, Acoustics, and Possible World Music Applications. *Choral Journal* 46(9): 65-77.
- Wakefield, G.H. (2003). Vocal pedagogy and pedagogical voices. *Proceedings of the 2003 International Conference on Auditory Display, Boston, MA, USA*, pp. 6-9.