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The Continuum of words, voice and music.

In search for a vocabulary for the timbre of song and voice

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ABSTRACT

This text offers some principal and methodological issues on studies of timbre in words, music and vocal performance. Timbral relationships between word and music can be conceptualized as a continuum following an fictive axis running from meaning and timbre of words, through melody and music to performance. Sometimes the order might be different, but the ingredients will always be there. To get a grip on the totality of timbre and meaning involved in the songs and performances of one single artist, Swedish balladeer Olle Adolphson, a study was conducted along this research design. The interplay between the inherent timbres in vowel sounds and melody were firstly studied in the songs themselves and relationships were noted that showed signs of systematic appearance. Perspectives from these observations were intergrated with analyzes of timbral bearings on meaning and signification in words and musical settings of a number of songs.

Following the axis to performance, aspects of timbre were studied with aid of visual representations of the signal as waveforms, melograms and spectrograms, verifying observations and as tools for identification and discussion. The study points further towards timbre and emotional cues in vocal performances as signs of individual/enviroment interactions.

Background in first discipline

(acoustics, musicology, popular music studies)

They all possess the true ballad art in some respect - the way of spinning the story and the poem together, not with the crude drama of the concert singer, but with the subtle nuance and understatement that is fitting to to ballad art. [...] They sing in their traditional country ways, conforming to vocal styles which in many cases predate concert singing, and are far more appropriate to their material [...] Their art, for they have an art, is to mould the words and tune together into a whole, introducing subtle variations into the melody and shading their intonation as the song runs on.

(Lomax, Alan. Liner notes to the album "Songs of courtship", Topic LP, 1961)

These are the words of Alan Lomax, written more than 40 years ago, and are very well applicable to popular music, blues and folk song today. The song it is long and it started out long ago, evrywhere and is continuing still today and will go on tomorrow. Still at this time, music cultures are different from each other and the cultures of classical and popular music are separate ones, sethered by dark depths, especially when it comes to the social and hierachical evaluative domains. Studying relationships between word, voice and music in popular song is as intriguing and urgent as ever today and raises needs for conceptualization both of the details and the totality of song and voice. Bob Dylan writes in his recent memoirs "musicians have always known that my songs were about more than just word, but most people are not musicinas (Bob Dylan, *Cronicles*, New York 2004:119). To get easier access to these matters and the interactions between the components involved, I will in this paper suggest that the conception, composition and performance of popular song can be conceptualized as a *continuum*. A continuum following an axis running from meaning and timbre of words, through melody and music to the actual performance. This is to get a handle on it, starting out with a general musicological approach, however one "soon hits the harder stuff" as the poet says. When the game gets tough, this time it is in phonetics, linguistics and acoustics.

Background in second discipline

(music performance, voice research and vocal pedagogy)

The experience of singing is one of wholeness, incorporating knowledge of the emotional content and meaning suggested in a song, as well as the technical aspects of voice and performance. This has to be acknowledged both by the singer and the researcher interested in vocal performance. To

understand vocal performance with any scientific ambitions one has to take an interdisciplinary approach and keep an open mind. Recent as well as established studies in musicology, voice research and acoustics has to be taken into account.

Articulating our perception of vocal performance in song still seems irritatingly difficult, as if it was one of the “blind spots” of human senses. We hear it, we know it, but it still is so difficult to communicate around it.

Aims

The aims of the study has been threefold. 1) Investigating timbral aspects along the continuum of word, voice and music. 2) Suggesting a vocabulary to empirically identify timbre in song and vocal performance. 3) To bridge gaps between musicological (hermeneutic and semiotic) approaches and laboratory findings in voice research in order to gain better understanding of the totality of song and singing.

Words ↔ Voice ↔ Meaning ↔ Melody ↔ Music ↔ Performance

Main contribution

The research presented in my dissertation *The Continuum of Popular Ballad, Words, Voice and Music* (Lund 2002) focused on the songs and performances of Swedish ballads and singer/songwriter *Olle Adolphson*, who is well known throughout Scandinavia for meticulous work in combining words and music in many successful songs. The work consisted of two main parts. One biographical description of the artist, his work and artistic persona, and one analytical part, divided into three subdivisions.

Timbral relationships in the song itself between word and music were studied as the first step in the analytical part of the work, following the continuum, analyzing musical aspects of relations between word and music in terms of the timbres inherent in the lyrics. In doing this, relationships were observed between *formant frequencies* of the lyrics' vowel sounds and the frequencies of melodic movement in a number of songs. One song was studied in depth to illustrate the model of thought as completely as possible, and a selection of other songs were also studied with a similar but less elaborate approach.

The results seemed to reveal that more than accidental timbral relationships existed, and that these proved to be complex and dependent on a rich number of factors. Correlates in melodic directions could be found especially in leaps, but many times also in long unbroken sequences of parallel movements between F0 and F2, but also between F0 and F1. Some of these results were quite amazing, proung for further research.

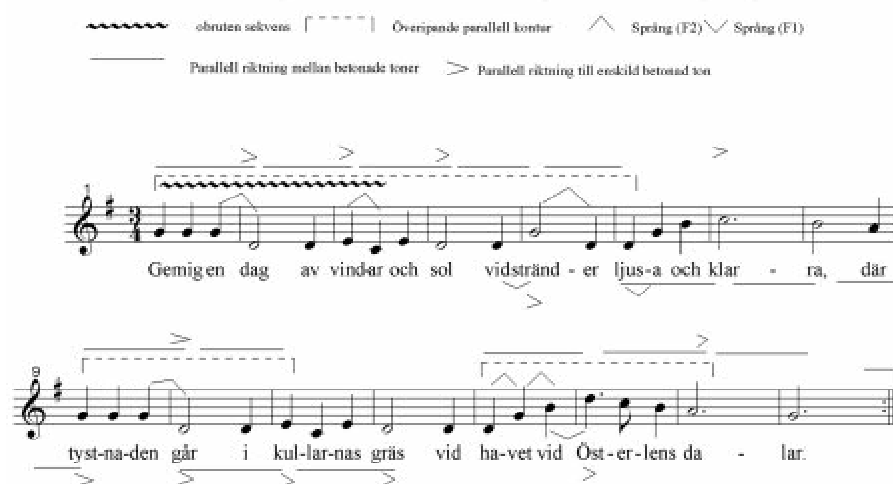


Figure 1. Overview of parallel directions in the movement of F0 versus F2 and F1, found in the Swedish song *Gemigen dag* (based on a traditional Scottish folk ballad *Maa Bonny lad*) recorded 1967 by the artist *Olle Adolphson*. The different symbols depicts different classes of parallel motion. The explanations in the heading translates left to right from Swedish: *unbroken sequence* | *general parallel contour* | *leap (F2)* | *leap (F1)* | *parallels between strong beats* | *parallel towards strong beat*. F2 is illustrated above the staff and F1 below it. The lyrics translates

freely: "Give me a day of winds and of sun by beaches so light and so clear, where silences roam in meadows and grass by the sea down by the valleys of Österlen".

When later put in comparison with random text, the correlates between melody and formants showed to be more frequent in the lyrics to the songs investigated than to a random text.

Parallell direction	Random Song		Percentage parallels in song in relation to random lyric.
	Random	Song	
towards individual tones	289	352	121 %
towards (relatively) strong beats	85	120	141 %
leaps	63	84	133 %
movement between strong beats	79	93	118 %
unbroken sequences of more than 3 tones	57	127	223 %

Distributed in congruences F0/F2 vs. F0/F1

F2	151 (51) % parallels in song compared to random lyric	447 / 296
F1	119 (19) % parallels in song compared to random lyric	332 / 279

Figure II. Comparison of parallell directions of F0 versus F2 and F1 in the swedish song *Ge mig en dag* (lyrics and trad.arr. Olle Adolphson) with random text, showing that the inherent pitch movement in the frequencies of the song lyrics coincided with the melody in a higher frequency than a randomly chosen text.

Singability The movements of formant frequencies relates both to lip movement and changes of the cavity of the mouth. To make a preliminary investigation of aspects of singability of individual phrases, these were studied through looking at the rate of lip movement between open and closed mouth. These showed patterns of lip and tongue movements that formed identifiable groups coinciding rhythmically with meter and phrasing of the song. Breaks versus continuation of airflow were also shown attention in this context. This study of singability was limited, but gave interesting results in showing a motoric cooperation between the choices of words and music in a song in musical practice. Something suggesting points of attention for further studies.

Rhythmic pendulum between open and rounded lips
/ = bar | - = open | * = rounded

(¾ beat)
- / * / - / *
Ge mig en /dag av /vindar och/ sol
/ - / * / * / -
vid /stränder /ljusa och /klar/a
/ * / * / * / -
där /tystnaden /går i /kullarnas /gräs
/ * / * / * / -
vid /havet vid /Österlens /dal/ar

Figure III. Example of rhythmic distribution of relatively open and rounded lips in articulation of the first verse of the swedish song *Ge mig en dag* (based on a traditional scottish folk ballad *Maa Bonny lad*) recorded 1967 by the artist *Olle Adolphson*, with the rhythmic distribution of the song (see fig 1 for translation of the lyrics).

Integration of timbral aspects of the interaction between words and music with a broader musicological approach was the next step along this continuum. When the studies of the formant frequencies were integrated with more general musicological analyses of words, music and meaning, broader understanding of the timbral complexity in the songs could be achieved. For example were rather obvious patterns found in the shifting between high and low second formant in connection with weak beats in a ¾ beat song. In certain songs the choice of vowels also coincided most clearly with the emotional mode of song or segment. Other things that were observed were shifts of semantic content in the lyrics supported by shifts of parts of form. This part of the work also included in-depth analyses of the musical settings of songs and the ways these related to meaning and content of the lyrics.

Vocal performance - expressive qualities in timbre and timing. Using the present research design, following the continuum along the axis of from written song finally towards the actual recorded

vocal performance, the expressive qualities of timbre, timing and pitch in the singing could be observed. To do this, graphic representations of spectrograms and pitchgraphs were used, in addition to conventional transcriptions made “by ear”. The conventional transcript presented a basis for orientation of gross timing and pitch, in comparison with both the written sheet music and alternative performances. The transcriptions were illustrative, though staff music would be quantized in ways similar to the quantizations of MIDI software. Comparisons of two performances of the same song were visualized together, as starting points for discussions on relations between semantic content and performance, phrase by phrase throughout the song.

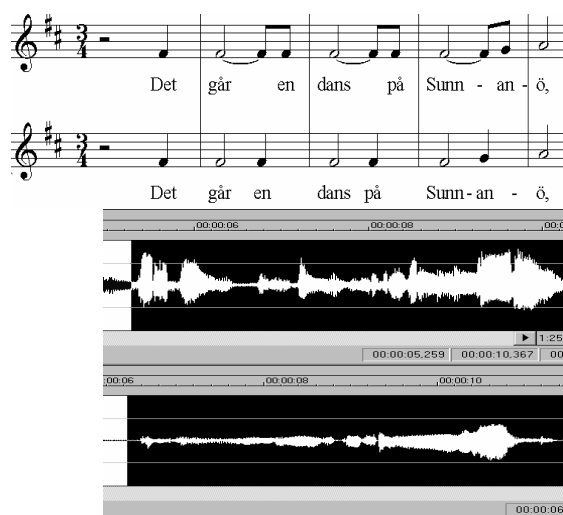


Figure IV. Two performances of the song *Dansen på Sunnanö* (Evert Taube) showing dynamics and timing of two different singers. The waveform and transcript acted as starting point for discussion on idiomatic style, and the expressive modes of the two recordings.

Visuality of the waveform and melograms (pitch graphs) gave support largely for observations of intonation and timing and acted as a tool for identification and discussion. To extract information from spectrograms is more delicate matter however, but showed to be applicable in studies of short detailed segments. Thus the difference between the timbre used in a bluesy performance of a certain line or word could show a rather different visual appearance on a spectrogram than a more conventionally sung one.

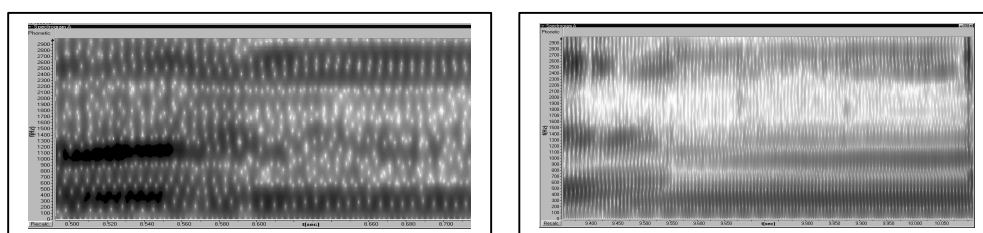


Figure V. Example of one singer’s (left) clear pronunciation of the transition from ‘u’ to ‘n’ of the word *Sunnanö* in comparison with another singer’s moody and bluesier interpretation (right).

Some general conclusions

The conceptualization of relationships between words, music and performance as a continuum gave room for acknowledgement of the complexity of the interaction of a rich number of parts involved in song and singing. The study as a whole suggested points of attention for further research. The timbral relationships throughout this continuum should not only be viewed as euphonic ones, but also as being closely tied to musicality and meaning. The approach may be useful in studies of anglo-american/cosmopolitical popular music performances through the space allowed for a blending of humanities and laboratory technology.

Timbre in the singing voice is a delicate matter and often more difficult to distinguish from aspects of phrasing, intonation and dynamics, than one would imagine. They are in practice integral parts. This intertwining is represented by the four topics of this section of this very conference: Gestural control of timbre by instrumentalists and vocalists; Timbre and the communication of emotions; Music and

paralanguage; Persona: vocal characters in popular music. These are all intimately linked as may be understood by the last headline "Persona: vocal characters in popular music", as the realization of an artistic persona through vocal characterization, involves gestural control, communication of emotion and as well as use of paralanguage. The topics were very well chosen and call for a synchronous study of the whole and the details – illuminating each other – bearing the continuum in mind.

So, while drawing closer to timbre and what the components of timbre can be said to consist of, one discovers that the game gets really tough, since the voice source and its resonance frequencies are not the only components of our experience of timbre, maybe not even the main ones, but are closely tied to many other things.

Going on - Intensifying the search for a vocabulary of timbre and singing

Songs are often written with the singer in mind – especially if the singer and songwriter is the same person – often leading to a performance perceived as something of an integrated whole with the song. It is hard to divide the song from the performance and the performance from the song. Looking for aspects on signal processing, *Sergé Lacasse* makes a division between *paradigmatic* and *syntagmatically contrasting* effects (Lacasse, 2001). In discussing timbre in vocal performance this approach can be most useful. That is, to distinguish between the overall timbre of the voice the singer uses in the recording, and the "local" variations made to stress certain expressive aspects of the lyrics. If that is possible to do, a clearer understand can arise.

To get closer to useful conceptualizations of expressive qualities in song performance, and closer to conducting a reasonable vocabulary for the study of it, it is obvious that speech research has things to offer. If we use the concept of paradigmatic vs syntagmatically contrasting *cues of emotion*, the paradigmatic emotional context needs to be characterized together with general cues of emotion in timbre, intonation and phrasing, and used as a basis for decoding the song as a whole. In the syntagmatically contrasting cues of emotion, individual cues of emotion in various segments may be identified and discussed, making use of relevant parameters.

When listening to folk and popular ballad, difficulties arises of how to isolate cues of emotion in the voice from lyrical content and musical settings. In laboratory settings these cues in speech studies has been studied in isolation, and some of this material may be integrated with hermeneutic and semiotic performance studies.

Emotional cues in song performance raises the need to be able to empirically distinguish *determinants of emotional expression*. Operational definitions of what exactly the word "emotion" is to signify ought to be conducted or chosen, immediately presenting new problems. One is how to distinguish posed emotions (and thus stereotyped) from naturally occurred ones. Another vital problem is how to distinguish gross, clear cut emotions like *anger, fear, disgust, happiness...* from attitudes and subtler states of mind. The gross emotions tends to be represented as extremes, where as in reality, in daily life, we move between smaller variations, and so does nuanced vocal artists. The opposite, and less successful artistic approach in music, is found in the notion of over-theatrical opera singers, who feels alien to many listeners of popular music today. However, considering the complexity of the matter of understanding emotion and song, one has to start looking at the gross emotions and then continuing to the finer states.

Different voice qualities are often associated with social connotations. According to some previous research, throatiness in male speakers is perceived as a "sign of a realistic and mature personality, while in a female speaker it gives an impression of a less intelligent, masculine, ugly and careless person" (Laukkanen et al., 2004)

In his dissertation "Vocal expression of emotion" *Petri Laukka* (Laukka, 2004) raises the question "Are there distinct patterns of voice cues that correspond to discreet emotions", and proposes tables showing patterns of various acoustic cues for different main emotions. He looked at variables like speech and pause rate, precision of articulation, intensity and intensity variability, pitch and pitch variability, attack and microstructural variability as well as bandwidth of the first formant. The most obvious differences in emotional cues recorded in speech from his own investigations and from a systematic scanning of previous research is shown between the "active" emotions like anger and happiness on one side and sadness (sometimes also tenderness) on the other. (Laukka 2004, 798-802) Detailed readings however reveals many problems and contradictions, as Laukka acknowledges (as for instance very similar readings for anger versus happiness), but also points at intriguing and interesting routes for study of song and song performance.

Laukka discusses the conceptualizing of what emotions are, and divides them in two general (psychological) schools of thought. One approach concentrates on the subjective feeling states based on a notion that three main dimensions (i.e. pleasure-displeasure, strain-relaxation and excitement-calmness) account for all differences among these emotional states. The other approach focuses on emotions as "discreet" entities, being more or less solid and clear, consisting of a few basic ones, each one representing a *unique individual-environment interaction*.

Interestingly these are connected to theories suggesting that they have evolved as tools to respond to life situations such as competition (anger), danger (fear), cooperation (happiness) or loss (sadness) This is well worth meditating on. On turning the order around we can see emotional landscapes expressed in the singer's vocal act, indicating a tangible outer world in interaction with the self, and vice versa. Timbres of voices changes according to emotional states of the speaker or singer. Thus the concept of timbre in the singing voice also indicates a relationship to the world, an attitude and a unique individual-environment interaction. I think one perceives this as one listens to singers one enjoys. Yes, you're right, this leads us back all the way to semiotics, signification, and to Plato seeing the shadows on the wall in his cave as evidences of the real world.

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