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Discussing Three Models for the Visual Representation of a Recorded Song

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Abstract

The aim of the paper is to discuss some methodological and theoretical perspectives in popular music studies and musical analysis, focussing on the relationship between the use of standard notation (transcription process) and three visual forms of representation (spectrogram, waveform, soundbox transcription). The methodological reflections are interrelated with the sound analysis with digital technologies concerning three case-studies of recorded songs from an Italian canzone d'autore production. The analysis explores the specific ways in which experimentation and manipulation practices occur on a micro-rhythmic level and in the spatial dimension, in connection with the evolution of recording and sound technologies. In the first and third part of the paper the focus is on instrumentation and sound sources in general and on the possibility to represent those aspects thanks to a visual representation of music which goes beyond the staff: what instruments sound like, how they work together, where they appear to be situated in the soundbox, including other aspects in the experience of listening to sound (like echo and reverberation) that enable the construction of sound space. The second part examines how specific decisions made during the recording sessions by musicians, engineers and producer have an impact on the micro-rhythmic discrepancies. The sound analysis and visual representations of specific musical details give the opportunity to discuss some aspects that relate to the description of grooves and micro-rhythmic discrepancies as a means to distinguish each work from the other and to convey a distinct authorial production identity.

Keywords: Popular music, sound analysis, canzone d'autore, visual representation, micro-rhythm



Discutiendo tres modelos de representación visual de una canción grabada

Resumen

El propósito de este artículo es discutir algunas perspectivas metodológicas y teóricas para el estudio de la música popular y el análisis musical. El énfasis está puesto en la relación entre el uso de la notación estándard (proceso de transcripción) y tres formas de representación visual (espectograma, forma de onda y transcripción en soundbox). Las reflexiones metodológicas se refieren al análisis del sonido con tecnologías digitales en tres casos de estudio relacionados con canciones grabadas de la producción italiana de la canzone d'autore. El análisis explora las formas específicas en las que las prácticas de experimentación y manipulación ocurren en el nivel microrrítmico y en la dimensión espacial, en conexión con la evolución de las tecnologías de la grabación y el sonido. En la primera y en la tercera parte del artículo el foco está colocado en la instrumentación y en los recursos sonoros en general, y en la posibilidad de representar esos aspectos gracias a la representación visual de la música que va más allá del pentagrama: cómo suenan los instrumentos, cómo funcionan juntos, dónde aparecen situados en el soundbox, y otros aspectos de la experiencia auditiva (como el eco y la reverberación) que posibilitan la construcción del espacio sonoro. La segunda parte examina cómo, durante las sesiones de grabación, las decisiones específicas tomadas por los músicos, ingenieros y el productor impactan sobre las discrepancias microrrítmicas. El análisis del sonido y las representaciones visuales de detalles musicales específicos brindan la oportunidad de discutir algunos aspectos relativos a la descripción de los grooves y a las discrepancias microrrítmicas, como una forma de distinguir una obra musical de otra y expresar una identidad distintiva de la producción autoral.

Palabras clave: música popular, análisis sonoro, canzone d'autore, representación visual, microrritmo

Discutindo três modelos de representação visual de uma canção gravada

Resumo

Este artigo tem por objetivo promover a discussão entre as perspetivas teóricas e metodológicas sobre análise musical e estudos de música popular, com especial enfoque na relação entre a notação convencional (processos de transcrição) e três formas de representação visual (espectrograma, forma de onda e transcrição em soundbox). As reflexões metodológicas decorrem da aplicação da análise do som usando tecnologias digitais, a três estudos de caso da produção italiana da *canzone d'autore*. A análise explora a forma especifica como a experimentação e a manipulação acontecem ao nível micro-rimico e da dimensão espacial, em conexão com o desenvolvimento das tecnologias do som e da gravação. A primeira e a terceira parte do artigo estão centradas na instrumentação e nas fontes sonoras em geral e na possibilidade de as retratar graças à representação visual da música para além da partitura: o modo como os instrumentos soam, como se articulam, como aparecem situados na *soundbox*, incluindo ainda aspetos da

experiencia da escuta (como o eco ou a reverberação) que possibilitam a construção do espaço sonoro. A segunda parte examina o modo como, durante as sessões de gravação, as decisões específicas tomadas pelos músicos, engenheiros de som e produtores, têm impacto nas discrepâncias micro-rítmicas. A análise do som e a representação visual de detalhes musicais possibilitam a discussão de alguns aspetos relacionados com a descrição dos *grooves* e das discrepâncias micro-ritmicas, como forma de distinguir uma obra de outra e de expressar uma identidade distintiva da produção autoral.

Palavras-chave: música popular, análise sonora, *canzone d'autore*, representação visual, microritmo

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Premise

During the last two decades, the field of international popular music studies has seen a remarkable increase in researches addressing the development of new critical and theoretical models in the musical analysis of recording. A striking aspect of this development has been the growth of studies and research focussing on mediation and on the relationship between rhythm, technology, and the creative processes involved in the production of recorded music. This new academic subject represents not only a vital and exciting area of scholarship but a fundamental means to reconsider some habits of thought and modes of inquiry that have characterized conventional musicology (Frith and Zagorsky-Thomas 2012).

Digital technologies, indeed, have not only transformed how popular music is *produced* but have also provided the *means* for analyzing, describing, and representing specific aspects and details of the musical sound and the organization of the soundbox: features that conventional notation and analysis do not consider but which are, in fact, crucial for the understanding of the musical processes from a compositional and listener's point of view.

In this paper, I will focus on three models of visual representation and on the relationships of such visual forms and the use of staff notation. The analysis of three case-studies (three songs) gives the opportunity to discuss the use of specific tools of visual representation that I consider particularly appropriate in the analysis of recorded song production and, more precisely, the Italian *canzone d'autore* (lit.: "author's song"). The Italian *canzone d'autore*, indeed, is a specific genre that —especially in the '80s and on— exhibits a strong connection with mediation processes and with studio recording techniques¹.

My first study and analysis upon this topic was about the song production of an Italian singer-songwriter (*cantautore*), Fabrizio De André (1940-1999)². In the following research I enlarge my inquiry to include another Italian *cantautore*, Ivano Fossati (1954-), and, at the same time, I deepen the analysis including sound box configurations and spectrographic representation.

In recent times, I have started to address the issue of meaning; that is, considering how specific musical details and sound aspects can participate in the construction of (a range of) song meanings, related to a particular style in which the structures of the song are articulated. I refer, in particular, to what, in Moore's model, is defined as "the *inherent meaning* of a track" based on the statement that musical details, as how the sound-sources locations work in a recording, not simply *give shape* but actually *constitute* the (musical) content (Moore 2012). In this paper, I will present just a few considerations in this direction: my analysis is mostly descriptive and focuses on the role of recording techniques in song composition and it is meant to discuss how to give a representation of this kind of musical details.

In this study, the analytical and methodological reflections arise from the analysis of three songs of De André and Fossati, and two of them are taken from their collaborative work, *Anime*

¹ For an in-depth account of the musical genre of the Italian "canzone d'autore" see Tomatis (2014), Fabbri (1982), and Santoro (2002).

² For a first account of this study, see Pavese (2014).

Salve (Saved Souls, 1996)³. Although the idea of *cantautore* implies a man or a woman who solitarily composes and performs his/her own songs (usually self-accompanied by guitar or piano), De André's and Fossati's production became, especially from the '80s, a collective and mediated process, which involved several producers, composers, musicians, arrangers, and engineers. From the '80s onwards, a direct access to the manipulation of sound layers and the possibility of mixing different sources, and moving them in the soundbox, has become not only technical options, but musical and compositional properties in every respect.

From the spectrogram to graphic representation

My first analysis and reflections focus on the use of the spectrogram as an analytical and representational tool and refers to the introduction to *La pianta del tè*, the title track of the eponymous album of Ivano Fossati's (1988). The song opens with an introduction largely based on the usage of *reverberation* and *echo* that have the effect of widening the virtual space we can perceive. Some of these reverbs originated from the acoustic features of the large country house that hosted the studio recording sessions itself; these sounds are fixed as sonic sources located in different spatial dimensions of recording and mixed with the recorded sounds of a *cetra*.

Traditional musical notation and staff not only cannot represent this kind of organization and the specificities in the mixing of the sounds, but also cannot "encourage" focussing on these features and to explore them as something functional; namely underlying their structural importance in the meaning-making of the song.

In this direction, a useful tool is the spectrogram. Spectrographic representation (figure 1) reveals the "amalgam" between the opening sounds of the *cetra* (in the center of the mix) and the large number of reverbs with different spectral content and decay times that create a particular setting on a both vertical and horizontal plane; a dialectics of instantaneous *versus* continuous. We can note the readability of the spectrographic representation that makes explicit the continuous timbre, amplitude, and frequency variations. The combination of the spectral content of sounds and their different placement in the perceived acoustic space emphasize the sensory experiences of listening to the overall sound structure.

Figure 1 displays a quick annotation with very simple symbols and colours which correspond to each of the different sonic events (reverbs), according to their different amplitude and frequency content.

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³The official Fabrizio De André website is http://www.fondazionedeandre.it. Another very good website on De André is also http://www.viadelcampo.com, which includes his complete and annotated discography (http://www.viadelcampo.com/html/discografia.html). Ivano Fossati's official website is: http://www.ivanofossati.com, and it includes his complete discography.

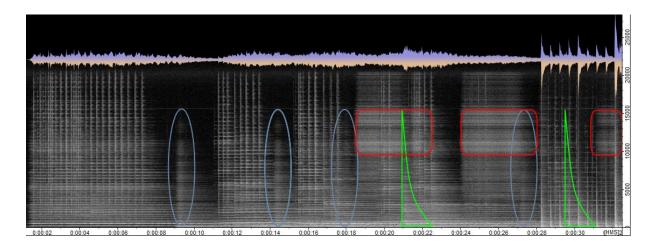


Figure 1. Spectrogram of "La pianta del tè" [0'00"-0'27"].

This is just a first step to the representation of this level of sound complexity for this song's episode. Nevertheless, it gives the opportunity to discuss the topic of the visual representation of sound, especially with reference to the main split between the iconic and symbolic categories of representation.

In recent studies, especially in the electroacoustic analysis, several graphic representations are offered, often related to a range of computer images generated from the digital audio file of the recording. Every graphic representation allows us to analyse a collection of sound criteria, acting as complementary to one another, in order to create an ensemble of symbols and a graphic object. However, according to Couprie (2004), we can notice that the iconic representation —that is, the use of graphic objects that have iconic functions (e.g., the shape of the dynamical envelope)—presents some undeniable advantages in the transmission of analyses: iconic representations, indeed, do not always need a *legenda*; this is the case of the relationships between sound and graphical forms (Couprie 2004: 110).

The following episode of "La Pianta del tè" allows us to focus on polyrhythm formations and on their representation. The rhythmic articulation of the antara (Andean flute) notes, played by the Argentinian musician Uña Ramos, is detached from the beat sequence of the prevailing meter (4/4), stepping forward through the interplay of bass and bass drum: the antara's notes, both in terms of duration and of their placement, seem to be syntactically based on 3/4. There are continuous points of deviation that conceal the perception and location of the main 4/4 basic pulse. Otherwise, there are some moments of synchrony, as indicated by the arrow in the transcription (figure 2). The transcription with staff notation can represent this particular superimposition, which can be described as "a counter-rhythm with a tendency toward a cross-rhythm" (Danielsen 2006).



Figure 2. Transcription of "La Pianta del tè" [00:31-00:52] (antara's melodic profile).

Representing micro-rhythmic aspects

I will focus now on the micro-rhythmic level, that is, the level of rhythm usually understood in terms of phrasing and timing and conventionally referred to as *groove*. The analysis of two songs from the De André and Fossati's collaborative album *Anime Salve* gives the opportunity to discuss how to represent these specific aspects. The contribution of micro-rhythmic studies, especially those that focus on the analysis and representation of data derived from records, was central in defining the methodology used here⁴.

The song "Dolcenera" –the fourth track of Anime salve— is a paradigmatic case of the importance of the relationship between the standard transcription and other forms of representation and analysis.

Let's focus on the beat layer. The Italian entry of *Wikipedia* defines this song as characterized by "an oscillating and sinuous rhythm". In analytical terms we can refer to this rhythmic complexity as the result of two interrelated aspects: (a) the superposition of elements clearly set on two different meters, and (b) the presence of rhythmic events that go beyond a conventional metrical subdivision.

At a first analytical level, the rhythmic complexity is related to the polyrhythmic formations occurring between voice and instrumental parts, and among the different sections as well, especially between the rhythm section (drum, *shaker*, and the Nigerian instruments *udu* and *urucungu*) and the other instruments. Such rhythmic interweave recalls what conventional theory defines *hemiola* or "three-over-two" cross-rhythm, which is the juxtaposition of a simple meter and a compound meter. The use of the term polymeter, with an emphasis on the vertical axis, is related to the specific context, to the recording process and the stylistic intention that aims at recalling the *polca paraguaya*, a form of song and dance of *Guaranì* indios.

The transcription with staff notation can be useful to represent this polymeter, defining a static underlying meter (for example 12/8, as indicated in the available published sheet music) and beating the eights in relation to a different quaver patterning (figure 3). Although oversimplified in notation symbols, the transcription can also underline De André's vocal rhythmic articulation, which is the ability to move between the duple and triple subdivision of the beat, that emerges

⁴ I refer, in particular, to recent studies related to the international research project called "Rhythm in the Age of Digital Reproduction" at the University of Oslo (see, in particular, Danielsen 2006 and 2010; and Kvifte 2004).

⁵ Cf. https://it.wikipedia.org/wiki/Anime_salve#Dolcenera. [Accessed: July 27, 2015].

from the frequent shifts of stress in the vocal performance.



Figure 3. Transcription of "Dolcenera" [1'16"-1'24"].

The process of transcription has been useful not only to represent this rhythmic and metric features but, most importantly, to reveal and highlight the deep nature of the song's particular *groove*—the kind of details that a "normal listening" does not reveal, but which are relevant to understand the structure and the effect of the song (Winkler 1997). In fact, also at a normal speed listening, it is possible to perceive some of these micro-rhythmic variations, within and between the vocal and the instrumental parts, which Charles Keil (1994) would define as "participatory discrepancies" and "bring to life the beat".

In the following part, I focus on one of the major constituents of the groove, which is the

basic classical guitar accompaniment. The flexibility of this guitar strumming pattern is difficult to capture on the score, but it is fundamental to understand the "feel" of a recorded song and, in our case, the groove of "*Dolcenera*".

In fact, although (as we indicate in figure 3, second line) the guitar rhythm is clearly built on a division of a compound meter, the finger strokes prominently deviate from what we would expect. The analysis of the distribution of rhythmic units at a micro-rhythm level reveals some subtle but repeated differences in the subdivision of the beat, recalling what in other musical contexts is generally defined as an "uneven quantization": within each beat, the division is asymmetrical, with a significant range of discrepancy and with a pronounced and constant tendency to a "medium-short-long" asymmetry. Figure 4 shows a waveform representation of the attacks of the guitar strokes in a specific point of the song: within each beat, the division is asymmetrical, with a significant range of discrepancy and with a pronounced and constant tendency to a "medium-short-long" asymmetry.

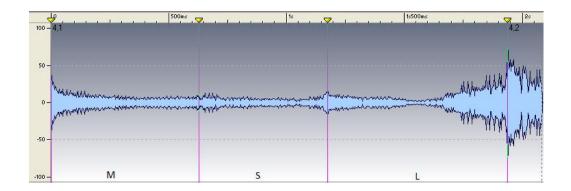


Figure 4. "Medium-short-long" asymmetry in rhythm guitar accompaniment.

This discrepancy, both repetitive and continuous, generates a distribution of stresses that departs from the normative metric accent by emphasizing the third quaver (like a "staccato upstroke"). The transcription with staff notation cannot fully capture the temporal micro variations of the very subtle temporal inflections in the guitar accompaniment (a precise noted transcription would be almost illegible).

Otherwise –not only in a "cantautori style" recorded song– frequently the guitar accompaniment does not constitute a mere harmonic filler layer but the key factor of the specific song musical style. That is, the groove accompaniment functions both, as a process and a texture, and the syntax is shaped right by this element.

For my analysis, I used the conventional metronome model according to which rhythm is understood in reference to a regular grid of evenly spaced pulses. I found it sufficient for the account of the rhythmic content of the song, even if, as in Danielsen's essay (2010) on the microtiming in D'Angelo's recording, we could have used other models to conceptualize and represent this groove and the listener's experience of a "widened pulse", opposed to the actual sounding rhythmic events on the recording.

3. The soundbox transcription

The analysis of "Â cumba" ("The Dove"), the seventh track of Saved Souls, can highlight how a visual representation of sounds can be more appropriate than the use of staff notation for a better understanding of stylistic and compositional features of a song and its complexity.

The complexity of \hat{A} cumba is partially related to the presence of three different vocal parts —lead vocals by De André and Fossati, and three female voices a cappella (a little female choir)—and partially through the construction of a refined sound space (soundbox), which is the (perceived, simulated) positioning of voices, individual sound events, and layers within the multi-dimensional virtual space: a popular song feature which would be generally omitted from standard transcriptions. On the contrary, a useful means to highlight and to represent these aspects could be the "soundbox transcription", as proposed by Moore (especially Dockwray and Moore 2010, and Moore 2012).

Since the main feature of this song is to create different musical situations, by altering significantly the positioning of sounds across the duration of the track, we will provide "snapshot" transcriptions that show the placement of sounds at a particular point in the song. I suggest, therefore, referring to the different phases of the song as *different situations* (that are repeated and combined throughout the whole song). The soundbox transcription of the first episode of the song (figure 5) shows the contrast between a loop of sounds produced by the rotation of sealing electrical wires (processed and spatialized in order to use all of the soundbox dimensions in the background) and a series of beats of light-duty "leaf rake" sounds, slowed down and placed in the centre of the mix.



Figure 5. Soundbox transcription of "Â cumba" [00:00-01:09].

The soundbox transcription of the second and third episode exhibits the usage of sound layering that emerges from two different recording practices. Firstly, there is a superimposition of a groove excerpt from *Blessing of the Earth* (CBS, 1989), an album by professional Japanese *taiko* drumming ensemble Kodò. As we can see from figure 6, the excerpts are looped and layered in the background.

Secondly, there is an interesting polyphony in the vocal parts (De André and Fossati voices) realized with overdubs. The two vocal melodies –differing in melodic profile, but referring to the same melodic *ambitus*– are delivered separately at first and placed in the centre of the mix and,

afterwards, they are mixed simultaneously with an opposite placement: this interchange (from opposite sides of the stereo spectrum, but also with inverted vertical axis) emphasizes the contrapuntal effect.

Even though limited by its fixed display, the soundbox transcription can represent how the different voices gain space in order to create an "effect of responding" that, otherwise, cannot be noted (figure 6): first, we hear the responding voice of De André at the top on the left, and then (next episode, not transcribed here) the voice of Fossati is placed at the top on the right.



Figure 6. Soundbox transcription of "Â cumba" [01:10-01:57].

The soundbox transcription can provide a representation of what happens in the song that would be impossible to account in standard notation. The sound-source placement in the soundbox and the other layers of sound gradually added or temporarily omitted from the mix –creating moments of different density and sound mix– clarify the position and role of the various parts, allowing us to discern the individual instrumental and vocal gestures and their dramatic relevance.

The analysis and representation of the *finale* of the song gives the opportunity to make a combination between the use of standard notation and soundbox transcription (figure 7). Standard notation can show the vocal "*cantu a tenore*" polyphonic style; but only the soundbox transcription can show the static (and, perhaps "cathartic") audiovisual image that emerges from the diagonal positioning (relative to the vertical axis) of the three overdubbed homorhythmic voices (with other instruments and sounds placed on either side).

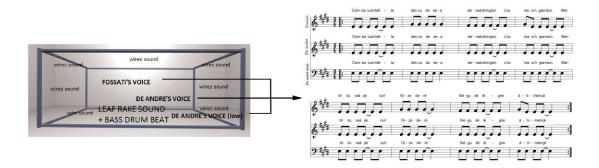


Figure 7. Soundbox transcription mixed with standard transcription of "Â cumba" [03:33-04:02].

In "A Cumba", the sound-world set up by the track has not only a structural importance, but also takes an active role in the overall meaning-making of the song. The narrative is realized through a mise-en-scène of the sonic events and it is their interaction that produces significance in the experience of the song: the sound events achieve their interrelated relevance by entering or going out of the soundbox, in order to allow us to comprehend what has happened in the early stages. In this sense, we understand the specific song content (also) through the relationship between sonic events.

By virtue of its three-dimensional plan of representation, we notice that the soundbox template and transcription is much more intuitive than other visual forms for the understanding of the spatial positioning of the sound/voice/instrument components. This visual representation has proven as something extremely useful for analytical purposes. Furthermore, the use of iconic objects –like the images of the instruments employed in Moore's model– instead of their script, could be, obviously, much more intuitive.

4. Conclusion

In this paper I have discussed the relationship between the use of staff notation and visual and graphic tools in the analysis of three recorded songs. In particular, I adopted (and tested) three forms of visual representation that seem to be appropriate to the investigation of the formal and stylistic features of a *popular* song production, which is "a compositional project that is primarily conceived as a sonic entity".

The musical analysis basically consists of sound analysis with digital technologies (waveform, spectral analysis) and specifically addresses complex parameters such as sound and rhythm in popular music. In my opinion, the analysis reveals two aspects that relate to theoretical issues: a) the description of micro-rhythmic discrepancies and sonic aspects —the simultaneous use of dissimilar rhythms and the organization of the recording space—reflects more than the structural organization of the "music itself" (in the conventional sense); b) visual and graphic representation of sonic details, which is "making structure visible", is a powerful aid to the understanding of music. Furthermore, the analytical representation gives the opportunity to discuss these aspects as a means to distinguish the work and to convey a distinct authorial production identity.

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Biography / Biografía / Biografía

Errico Pavese (1977) studied Sociology at the University of Trento and Classical Guitar at the Conservatory of Verona. He earned his PhD in "Science of Music" with Franco Fabbri and wrote a thesis on the Italian *canzone d'autore* and the concept of style in popular music. In 2013 he received a Master's degree and honorable mention with a thesis about the guitar work of Venetian composer Claudio Ambrosini. He is interested in popular music studies and music criticism and, in particular, Greek contemporary and modern music studies and history. Since 2005, he's a Lecturer of Film Music and Performing Arts at the University of Genoa.

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