Human Voice Treatment in Various Types of Electroacoustic Music

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The paper shows an overview of a project done at INA-GRM in Paris/France focusing on the different ways of human voice treatment in various types of electroacoustic music (as a general term) throughout the last fifty years. In order to select those oeuvres being sort of "paradigmatic" in using one, yet also any combination of the three undermentioned functional treatment modes determined as a starting point, more than hundred important electroacoustic compositions (most of them stored in the GRM's archives) created within the last fifty years were taken into consideration. From this pre-selection a third was chosen again for thoroughgoing scrutiny; these works were described and visualized more in detail as regards type and treatment method, (parallel to) their structure, yet also, as far as possible, the how and why of the compositional techniques applied.

1 Introduction
The treatment of human voice in electroacoustic music, as a general term, can functionally be differentiated in (I) an informational (speech), (II) an instrumental (voice), and (III) a material (sound) processing mode applying to the use of both voice source and speech content, with the "material" one being the one most recent as well as most peculiar to electroacoustic music. I.e., while the two former types can well be found in other compositions using human voice, including all intermediate forms between singing and speech used in contemporary classical acoustic music, the third one does well-exceed those traditional aspects. That is, due to the completely different (post)processing techniques — at the same time corresponding to a differing compositional aesthetics which itself again is influenced by those technical means —, the matter type of human voice-in-music does even most immediately originate from electroacoustic music, as making voice/speech a constituent sound matter is possible only by virtue of a given technology applied to manipulate, to modify, to transform a live or recorded sound into a new sonic object. I.e.,

A) Speech: normal speech and (un)processed text, either sampled or recited ("accompagnato"), where the informational (semantic) aspect remains most important;

B) Voice: song-like or melodious/vocalizing either prerecorded or live accompanying voice being more instrumental (in the sense of having a more music instrument-like function) and immediately emotionally effective; and here also (artistic) voice production aspects other than pure singing are often manifest;

C) Matter: the due to the applied transformation technique more or less unrecognizably manipulated, transformed, and distorted voice, where the above aspects dilute and human voice does get more material-like, i.e., (in the pure form) voice as well as speech as such are only sound matter estranged from all emotional or informational connotations.

— However, presupposing any intermediate, sub and mixed categories combining different techniques/levels of voice processing.¹

Hence, the classification chosen here on the one hand aims at compositional and constructional principles and techniques regarding the treatment of human voice, also as to the period of time, and on the other hand at different levels of voice-in-music per se. Furthermore, the significant aspects of those compositions taken into account, which in consequence belong less purely to the former two but to the third treatment mode in its rich variety, were spectrographically visualized.² In addition to the aforementioned distinction and the analysis connected with, the visualizations thus also shed some light on further stylistic aspects manifest (yet not exclusively) in the "material" domain, like, for instance, any formal aspects.

2 General Findings and Examples
— Sampling basics in human voice treatment:
I. reorganization of voice/text segments;
II. de/recontextualization of voice/text excerpts.
In order to generate
i. new sound types/colors;
ii. new machine-like (i.e., non-human-like) rhythm events/patterns (e.g., by means of loops/repetitions);
iii. new (direct) semantic relations/references (indices)

¹ For instance, Fugitives Voix (1997) an acousmatic piece by D. Teruggi, combines both the instrumental-emotional (voice production) and the material (voice processing) aspects regarding the composition with human voice and/as music. In addition, a second-level semantic aspect can be found in the way the two singers do interact. Other compositions, putting whole words or phrases into new contexts supplement the material with the semantic (text) aspect. This recontextualization characteristic to all collage-like assemblages is possible only by editing means, with them (often) implying a kind of higher-level scenario contextually developing over time (see below).
² GRM-software Acousmograph and Sound Forge 4.3™
Important in all aspects of semantics and compositional organization: the (often) personal relevance of the voice/text excerpts used (aiming at the how and why of the respective usage). Hence, the (re)contextualization of a particular voice (type) (a) text (b) language (c) segment having a special meaning to the composer; for instance,

(a) a voice with a certain timbre or expressive capacity, of a beloved or a person otherwise important to the composer;

(b) a certain text excerpt (referring to the biographical and/or ideological background, life circumstances, surrounding etc.

(c) mother tongue, local or foreign language (as in (b)).

All at once referring back to the composer's intention in using (just) them and the direct/indirect (or even non-) message connected with, or, the listener's invitation to project his/her own ideas into, or to (more or less actively) "participate" in a composition is intended by the composer (or his/her message...).

Here also the aspect of expression comes into play:

(1) via the voice-as-an-instrument used in an expressive way (live or tape, parallel to music);

(2) via the voice-as-a-material used: (modified) voice samples creating a certain expression in a montage;

(3) via the new contexts created by using a certain text excerpt: (modified) text samples (i.e., information) creating a certain expression on a direct or superior level, like associations, plays on words implying ambiguous or twofold contextualization, etc.

• Blurred boundaries:

E.g., the information aspect in

(a) arbitrarily distorted (or reversed) speech: voice as (noisy) material or covered information? Or distortion (reversion) even for expressive use?

(b) nonsense "texts": sound and expression of the voice, often in the genuine mixture of vowel-consonant (much more CV-combinations than vowels alone; see also concrete poetry), hence voice-as-an-instrument rather.

• Further:

I. Instrumental voice treatment by means of the computer (or tools formerly available):

(a) voice segments/vocalises quasi as "voice-as-an-instrument" (cf. also P. Henry in 3), often along with, again, an increase in expression;

(b) in mixture with any (live or recorded) instrument or (also real-time) electronically transformed/generated partials14, fusion voice-instrument, voice interacting with itself, etc.

II. Formal treatment modes:

i. specifically (traditional) musical treatment, with respect to a certain (ancient/foreign) stylistic model (e.g., vocalise, motet, hoquet styles) that implies, too, a formal "a priori";

ii. chorus/sound area-like treatment (referring to a more "spectral" way of musical thought);

iii. collage-like treatment, which, (a) is less "musical", and

(b) (often) implies a kind of inherent (second-level) story or scenario developing contextually over time (see in the following).

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3 E.g., P. Schaeffer et P. Henry in their programmatic "Symphonie pour un homme seul" (1950), a so-called "opera for blinds", and similar to "composed" film soundtracks (e.g., in J.-L. Godard); or suggesting a more theater-like scenario as L. Berio's Laborintus (1965), and — in a more abstract manner — La Divine Comédie (1972/94) by F. Bayle and B. Parmegiani, F. Bayle's Théâtre d'ombres (1988); or, on another level again, more explicitly making use of the new media's possibilities, A. Savouret, Don Quixote Corporation (1981), A. Petit, La Place de la République (1991), G.H. Hovagimyan/P. Sinclair, A Sou(p)era for Laptop Computers (1998).

4 For instance, is someone's using excerpts of the "Canto General" by Pablo Neruda because she/he is a communist, she/he is born or did spend several years in Chile, she/he likes the poetic force of his poems, s/he simply loves the sound of the Spanish language (or it's his/her mother tongue), s/he's in fond of the performer or his/her voice... — a combination or nothing of this at all?


7 E.g., L. Ferrari, Hébœrygoëtie (1964) using 4: G. Grisey, Chants d'amour (1982-4) even 22 different languages.

8 Which might be a coincidence of both arbitrariness and accidence rather; on the other hand a word might come in rather accidentally (e.g., via radio/TV); on the other hand the selection and use of just that word/text excerpt shows it having a certain relevance to the composer, again...

This might yield, too, to sort of the suggestion of such an intended message/story due to a listener's immediate association in understanding text; at least any intelligible text (excerpts) may support this as it is a typical human tendency to see(k) connections/contexts.

9 E.g., in the Requiem (1973) by M. Chion.

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10 Cries as well as sighs, as human voice (or voice-likeness) causes the most immediate emotional response in the listener; cf. e.g., several works by P. Henry.

11 E.g., the use of excerpts of Mozart's Zauberflöte in M. Chion, TV (1977/81), or the evocation of famous mythical couples in G. Grisey, Chants d'amour (1982-4).

12 E.g., "I'm an individual"/"I'm an in divide you all" in F. Dhomont's Sous le regard d'un soleil noir (1981); also "si" is used in a twofold manner, i.e., both the word and the note; the German "Au-gen/Ge-nau" in K. Saariaho's Stilleben (1987/88); or, by means of phase shifting by montage, in S. Reich's early tape compositions, Its Gonna Rain (1961) and Come Out (1966).


3 Visualization of Paradigmatic Aspects

The visualization examples are chosen with particular regard to the "material" aspect in functional human voice treatment, also as being peculiar to electroacoustic music. In addition to formal aspects, due to the spectrogram's very characteristics both the temporal (words/syllables) and spectral (partials/formants) aspects in voice/speech (treatment), and here again: vowels (i.e., sound) and consonants (i.e., noise) can be visualized. Furthermore, the two spectrograms (Fig.1+2) reflect well two entirely different compositional approaches, like a serial one in the former case, parametrically organizing highly contrasting material, and a more spectral one in the second, where subtle temporal and transparent overtone changes are prevailing.

(1) Pierre Henry (*1927), Vocalises (1952) (238"), showing a temporal (form) as well as a spectral (filtering) treatment, yet with regard to a more formal musical model (vocalise); no semantic aspects are implied. The piece by Henry, who put the human voice having been the "melting pot" of the musique concrète, is quite paradigmatic in its approach of being built in "modules" connected to one another in a serial way by using tape and several electronic filters available at this time.

Various voice sounds, recorded nonverbal sound syllables (vowels) by male and female speakers (the original meaning of "vocalise": only vowels in a musical rendition), along with different kinds of filters applied, are yielding a melody gotten from (subtractive) filtering ("mélodie de filtrage") in addition to the given differences in pitch due to the material chosen. In the spectrographical representation (Fig.1) the great variety of the sound elements used can be seen, by virtue of their serial organization differing in pitch, duration, timbre, and amplitude, as well as the "patchwork" technique as such making a melodic yet very contrasting chain out of originally separate sonic modules.

(2) Daniel Teruggi (*1952), Léo le jour (1985) (5'15") Created by means of the former GRM digital sound processing system SYTER (Système Temps réel, "INA-GRM"): here a child's voice (the French "maman") recorded in advance is used as material for further transformation. Hence exclusively treated as sound material, the voice sample is being denatured with, in consequence, the spectral aspects thoroughly prevailing; besides a certain personal reference no semantic aspects are implied. On the other hand the formant coloring (/a/) given by nature is artificially "retouched".

The spectrographical representation (Fig.2) visualizes well the transparency of the two layers of a rough-sounding, "multiphonic", and more static overtone thread on the one, hereof as well the sidebands can be seen, and a more gestural as/descending one on the other hand, designed as to give two different levels of presence within the sonic whole.

References
Fig. 1 Pierre Henry, *Vocalises* (1952) (excerpt): separate tape-recorded and electronically filtered voice samples are mounted in a way yielding a serial melodic chain, varying all at once in pitch, duration, timbre, amplitude. — Display: FFT size 4096, Hamming window, frequency range: 0.75 kHz (linear), amplitude range: -15 to 90 dB.

Fig. 2 Daniel Teruggi, *Léo le jour* (1985) (excerpt): spectral transformation of a prerecorded voice sample by means of the SYTER digital sound processing system. In the representation the two transparent layers of the rough-sounding, more static overtone, and the more gestural as/descending threads can well be differentiated; moreover, within the former's multiphonic texture sidebands can well be seen. — Display: FFT size 4096, rectangle window, frequency range: 0.12 kHz (linear), amplitude range: -10 to 75 dB (both Sound Forge 4.5).

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