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"*Tableaux et Gravures*: a Graph Model for Schaeffer's Theory of Listening"

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Tableaux et gravures: a graph model for Schaeffer's theory of listening

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1. A cartography of listening practices: écouter, ouïr, entendre, comprendre

Is it possible to define a theory of listening, which is not opposed or detached from perception and from psychological/psychoacoustic models, and -at the same time- which shares the complexity of aesthetic and sociological attitudes? Such a theory would act as a bridge between low- and high- level theories. A first step toward such a goal would be to consider sensibility in terms of a practice, i.e. as an active moment and not as a mere reception of data. Such an approach immediately allows turning the *study of listening* into the *description of listening strategies*. With regards to this point, the audible domain aptly provides a case study for such a praxeological focus. As an example, Bregman's ecological approach to perception[1] assumes that the analysis performed by the auditory system is not a translation -more or less linear- of the acoustics into the psycho-acoustics, but, rather, a complicated negotiation, in which the historicity of listening plays a pivotal role. *To listen* is also *to know how to listen*. This said, the only available theory coherent with the mentioned assumptions is still Pierre Schaeffer's theory of listening, exposed in his *Traité des objets musicaux*[2] (hence on, TOM).

Taking into account the idea of listening practice, it can be noted that typically "listening" is intended as a singular term. As such, "listening" is the activity of a subject in relation to a phenomenological, global "field of audible presence". Schaeffer's first move consists in turning the singular concept into a collective one: listening now refers to a set of four listening modes. The philosophical grammar of the term leads to recognize four different meanings, exemplified by the French verbs *écouter, ouïr, entendre, comprendre*.

1. *Écouter* indicates a figurative listening. By "listening to causes" the subject is capable of reconstructing a landscape of sounding and resonating objects. The world speaks the figurative language of things: it tells tales of energy, an "anedoctique énérgetique".

2. *Ouïr*, on the contrary, implies a shift towards the listening subject. The modality of *ouïr* allows a "re-semantization", intended as a suspension of immediate figurativity so that a different "reading" (to speak with Barthes) of the sound can be performed. For Schaeffer, this mode -on one side- represents a sort of deposit of the perceivable, which can be the object of semantization processes. On the other side, it is a sort of toolbox: while the sound object is typically intended by Schaeffer as something more or less stable, by activating the mode of the *ouïr* it becomes possible to hear something different starting from the same sound source. Here, listening is *to be able to listen.*

3. *Entendre* indicates a selective relevance, an active moment of judgment. It is clearly not possible the *ouïr* without the *entendre*: a pure *ouïr* is conceivable only as an asymptotic limit. Schaeffer's famous example is related to listening to the ticking of the clock: "malgré moi, je lui impose un ryhtme" (TOM: 107). The *entendre* requires a specific operation: the "qualification", intended as the "mise en pertinence" of some features of sound in relation to certain values.

4. *Comprendre* requires to treat the sound following the Saussurean principle of linguistic arbitrariness (TOM: 115). As in the *écouter*, in the *comprendre* the sound object's sound essence is evacuated, becauses what is relevant is what is represented by sound. This mode sums up all the linguistic, symbolic (in the Peircean sense) listening strategies, in which sound perception aims at identifying the signifier of a signified, following a strong code-based model.

The four modes are grouped in a quadripartion (Figure 1a), according to two axes: the vertical one is based on the opposition between subjective/objective, the horizontal one on the opposition between abstract and concrete.

2. Hypothesis for a different syntactic model

Some notes can be added to Schaeffer starting from Schaeffer himself:

1. Listening is a practice according to the principle that "[l'auditeur] travaille son oreille comme [l'instrumentiste] travaillait son instrument" (TOM: 341);

2. Listening is defined as a set of interrelated practices: in this sense, the quadripartition is deliberately heterogeneous with respect to a high/low level organization in the treatment of information;

3. The quadripartition is nor a chronology neither a logic. Its precise aim is: "mettre en valeur provisoirement un certain nombre de processus habituellement non analysés" (TOM: 117);

4. Listening always operates by activating all the four modes: "le déchiffrement de la perception s'effectue instantanéament, même lorsque les quatre quadrants sont en jeu" (TOM: 117).

It is thus possible to rewrite the quadripartition in form of a graph: in the graph, vertices represent the listening modes and the edges represent all the possible relations between couples of modes. By turning the planar representation into a graph, it is possible to shift the focus from a static description to a dynamic one: in other

[1] A. Bregman, *Auditory Scene Analysis*, Cambridge (Mass.)-London, The MIT Press 1990.

[2] P. Schaeffer, *Traité des objets musicaux* , Paris, Seuil, 1966-1977. See at least M. Chion, *Guide des objets sonores* , Paris, Buchet/Castel-INA 1983 and J.-C. Thomas (ed.), *Ouïr, entendre, écouter, comprendre après Schaeffer*, Bryn-sur-Marne-Paris, INA-Buchet/Chastel 1999. A first draft of this work was presented in A. Valle, *Preliminari a una semiotica dell'udibile*, Ph.D. thesis in Semiotics - XV cycle, Bologna, University of Bologna 2004. See also A. Valle, "Eliche e bivalvi. Sulla relazione tra ascolto e oggetti sonori a partire da Pierre Schaeffer", *Semiotiche*, 4, 2006, 101-122.

words, it is possible to describe sequences of modes. In every listening process there is a continuous circulation among the four modes (TOM: 148): as a consequence, the resulting graph is the complete graph K_4.
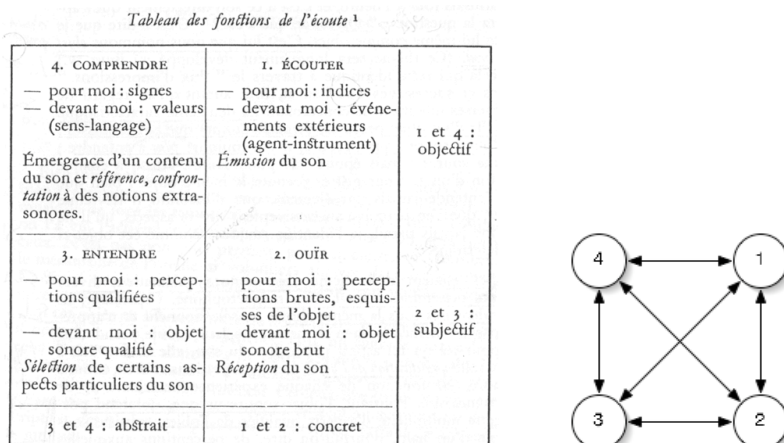

Figure 1. a) *Tableau des fonctions de l'écoute* **(from TOM: 116) and b) graph modelization**

3. Listening actions and listening practices

From this graph modelization, a first definition can be derived:

Every path on the graph K_4, intended as an ordered sequence of vertices, represents a specific listening action.

The famous situation of the *cocktail party* is peculiarly relevant to exemplify the emergence of many different listening actions. In the middle of a diffused, masking buzz caused by the mass of voices, at a certain moment it is possible to recognize a speaker in the noise: "someone is speaking" ([2,1]). On the other side, the opposite path is typical too, going from the perception of a voice to the focusing on the perceived material -"to give hear to" ([1,2]). While at a cocktail party, one can easily notice that someone is speaking in French: this is a "qualification" of the sound material with respect to a certain system of features, such as the ones defined by the phonological system of French ([2,3]). If the speaker is speaking in French about politics, the language is intended as an expression of a specific content, and the access to sense defines a path [3,4]. The typical linguistic listening can be thought as a direct connection between *écouter* and *comprendre* ([1,4]): in fact, the linguistic listening is eminently the construction of a relation between the voice of an utterer and the sense of the utterance ([1,4]: "*What* are *you* saying?"), and -symmetrically- the reconstruction of an utterer starting from the comprehension of the utterance ([4,1]: "*Who* has said *this*?"). While listening to a known person, the appreciation of the sound of the voice (2) is relevant only if the voice in itself manifests some peculiarity: only in this case, the action needs to be described in terms of [1,2,4]. On the other side, while listening to a known voice, the relevance of the linguistic system is taken for granted. But if the utterer speaks in a foreign language that the listener does not know well, the listening action of the latter seems to be [1,3,4], as the phonological system is not perfectly possessed by the listener, so that s/he has to focus on the uncertain results of the qualification. More, if one knows a voice, s/he can listen to it inside the buzz: from a certain set of features (its "timbre") it becomes possible to locate the speaker ([3,1]). If such an operation requires a specific "attention to the activity of sound" (as John Cage would have said), the path would be [3,2,1]. But, on the other side, the buzz resulting from the interaction of a large number of speakers makes the listening situation acousmatic, as it blocks a stable audio-visual correlation. In such an immersive situation, there is a continuous circulation between 2 and 3: the extraction of phonological strings from a complex source ([2,3]) works in parallel to the appreciation of phonetic fragments brought back to their sonic nature ([3,2]). Finally, the extreme complexity of the cocktail party scene favors the unstable oscillation between the *comprendre* and the *ouïr*: sometimes, semantic shreds emerge from the buzzing ([2,4]), sometimes the sense progressively evaporate ([4,2]).

Starting from the definition of "listening action", the concept of "listening practice" can be defined too:

A listening practice *is a graph K_4 where some paths are more frequent than others: in other terms, every practice determines a specific weight for each involved edge. This weight represents the value of each relation among the modes in that practice.*

In other words, every listening practice is characterized for a different appreciation of the modes and of their relations, i.e. for emphasizing specific listening actions. A possible example is provided by "sonification". In the last ten years the interest for the design and realization of auditory interfaces ("auditory displays") has grown constantly. In particular, "sonification"' indicates "the transformation of data relations into perceived relations in an acoustic signal for the purposes of facilitating communication or interpretation" (http://icad.org/node/392#S). Sonification studies have repeatedly observed that the auditory system is peculiarly apt to recognize temporal information. An interesting case is the sonification of cardiological information extracted from heart rate variability analysis[3]. In HRV analysis the data set represents the heart behavior in terms of different parallel time

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[3] In particular, consider the work of Mark Ballora, starting from M. Ballora, *Data Analysis through Auditory Display: Applications in Heart Rate Variability*, Ph.D. thesis, McGill University, Montréal, 2000.

series, one for each analysis parameter. The sonification strategy can associate to each of the time series a certain synthesis/processing algorithm. The result is a sort of polyphonic composition where the information streams are converted into audio streams. With a specific training, it is possible for the listeners to analyze by ear, with a great amount of details, the heart condition. In this case, some features of the auditory system are exploited to reconstruct a causal behavior, the heart one: the analyst must retrieve from the resulting sound material some relevant dimensions allowing her/him to describe this behavior. A certain sound material (2) is qualified (3) in order to reconstruct a behavior (1): hence [2,3,1]. On another side, it is evident that the analyst is a competent listener: her/his listening practice starts with a specific intention of finding certain features in the sound material, as s/he knows that these features are surely present because of the way the sound material has been created. Then, the listening practice could be [3,2,1].

4. Extensions of the model

It is evidently possible to think of many different listening practices related to the "same" sound object. With regard to this, one can think about Adorno's typology of musical behaviors. The same piece of music can be listened at in an "emotional" mood, i.e. in term of a global emotional investment, or "structurally" -by the "expert", musicologist or composer-, i.e. by activating technical categories: in the second case, the *entendre* (the qualification of the object) gains a much greater importance than in the first case. With respects to the sound object of the *ouïr*, every listening practice activates a series of "partial objects" (TOM: 118): the double work of intersecting and uniting these partial objects, resulting from all the listening practices, asymptotically leads to a "certaine objectivité" of the "objet sonore brut" (*ibid.*). But, if the *ouïr* refers to the virtual, pure sound object, while the other modes are related to partial sound objects, the quadripartition is in some way unbalanced, as the *ouïr* becomes an abyssal vanishing point. The negative objectivity of the *ouïr*, intended as a liminal, in itself inaccessible, pure audibility, ensures the possibility of the circulation among all the different practices. The situation can be represented as in Figure 2a.
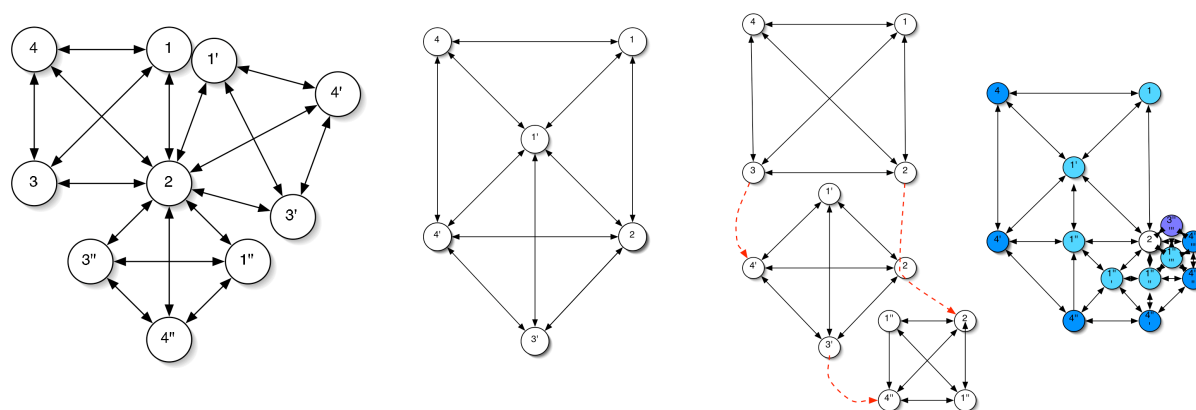
Figure 2. a) Different practices related to the same object through iteration, b) iconic listening, c) different practices related to the same object through recursion

A different situation can be imagined. It has been noted that the objective -or, better, intersubjective- modes are typical semiotic modes, i.e. they are two different ways of defining and stabilizing a sense from sound, in terms of an ecological figurativity (1) or of a socially accepted meaning (4). But this intersubjective, semiotic stabilization of listening can fail. The sound object can reveal itself as being irreducible to a symbol or to an index of something else, both as a consequence of a lack of competence of the subject or as an active attitude of suspension of the *deja écouté*. In this circumstance, the path goes back to the *ouïr* (2), the sound object (as a Peircean dynamic object) is re-appreciated and re-qualified (3). This new qualification highlights for the first time some other features capable of supporting a sense *en dévenir* (4) and indicating a specific logic of production (1). Such a situation defines a new listening practice. The listening practice is in some way "iconic", as new determinations are brought to the sound object. Here, iconicity must be intended in the Peircean sense, as a certain relation of structural dependency between the sound object determined by the new listening practice- and the sound object intended as the origin (in itself inaccessible) of all the listening practices.

Such a definition of "iconic listening" highlights the process that leads to the generation of a new listening practice. Here it is indeed worth quoting Schaeffer:

Le specialiste s'isole par rapport au monde des significations banales prenant naissance au secteur 3; mais ce faisant, il institue un nouveau monde de significations, lequel à son tour met en jeu dans un nouveau secteur 3 des finesses de perception –finesses dont l'habitude consacre bientôt la banalité- qui constituent peut-être le germe du développement d'autres pratiques auditives ultérieures. Ainsi la surenchère des qualifications apparaît comme illimitée. Autrement, dit, toute écoute praticienne suggère des attentions spécialisées qui la rendront banale (TOM: 125).

Every "expert listening" underlines the peculiarity of the "qualificative" *modus audendi*: through a "mise en pertinence" which moves away from established meanings, it recreates "un nouveau monde de significations". This new set of values, defined by a new qualification, depends on a specific movement, which is the relevant

feature of the "écoute praticienne": a "surenchère", a "higher bid" -so to say-, which recreates on a new level the quadripartition. The previous quadripartition at this point defines the "banalité" of the previous listening. The previously recognized values are suspended; new ones are defined; a new quadripartition is established, where a new circulation is thus possible. This mechanism in itself can be re-applied for an indefinite number of times. Thus, Schaeffer's observation about the "surènchere" allows to describe how a new practice is established starting from a previously established one. This process can be modeled in terms of a transformation of the graph centered on the *ouïr*: the previous *entendre* becomes the new *comprendre*. This transformation can be described as in Figure 2b. Two examples can be taken into account. The first is the case of pulmonary auscultation, where the physician invites the patient to cough. Such a practice aims at reconstructing the state of the body by making it resonate: the qualification here is properly "semeiotic", and the indexicality is organic. But the semantizations of coughing in terms of culturally established pathemic meanings (4) and of a global, somatic indexicality (1) are both suspended: the physician's practical listening requires the narcotization of the "suffering body", and of its symbolic and indexical meanings. The features (3) of a coughing (2) that ordinarily activates a sense of suffering (4) of a human body (1) are for the auscultating physician the result (4' = 3) of a a different set of features (3') recognized on the same coughing (2' = 2), now associated to the physiological body (1'). A second example can start from the sound of a siren. In this case, it is immediate the activation of symbolic and indexical background. On one side, the cultural meaning of "alarm" is evidently strictly related to the siren sound, like a signifier to a signified. On the other side, the indexical relation is so deep that, with a typical shift in the audible domain, the term "siren" can refer both to the mechanical device and to the sound that it generates. In *Ionisation* (1931), Edgar Varèse has used the sound of siren as the generator of a new sound spatiality: the scandal that has accompanied the première demonstrated how deeply incapable the audience was of suspending the most ordinary symbolic and indexical determinations. On the contrary, *Ionisation* asks the listener to practice an iconic listening with respect to ordinary practice, so that s/he can appreciate in the sound material the basic opposition between the impulsive nature of percussions and the continuous sustain of the sirens. In both examples, the expert, the *entendeur*, is the one who is able to *entendre*, to find a new sense in what for the ordinary listener is just a functional moment to access to sense.

Indeed, it is possible to generalize the previous passage. The relations among practices can be thought as a recursive chain of transformations centered around the *ouïr*. At each iteration, the *entendre* of a previous practice becomes the *comprendre* of the newly established one. Every practice is related and maintains as its background a previous practice. A possible representation is shown in Figure 2c. A chain of practices is built around the *ouïr*: at every iteration, the *entendre* becomes the *comprendre*, and a new *écouter* is established.

From this modelization some final considerations can be drawn:

1. The sound object of the *ouïr* is the pivot of the construction, because it maps on itself (2 = 2' = 2"=…). Thus, the whole dynamic is a circulation around the object of the "pure perception". This movement takes into account Schaeffer's idea of a subtractive abyssality of perception, of its negative objectivity.

2. At every iteration, a new couple of vertices are generated, 1 and 3. Every qualification converts the previous one into a *dejà semantisé* -its *comprendre*- and activates a new landscape of sound bodies (1).

3. The new relevance introduced by 3 acts as the engine of the construction: in this sense, the whole process can be thought as the spiral orbit of 3 around 2.

4. The introduction of a new 1 indicates that a new causal framework is established: in this sense, the identification of a new figurativity seems to be a consequence of the new qualification: to think about the human voice in terms of phonetic production requires to the phonetician to redefine the body in terms of an "articulating machine".

If the metrics of the edges is considered relevant, the construction is properly fractal: as shown in Figure 2c, the process can be thought as a progressive focusing on the sound object of the *ouïr*. In this sense, the *ouïr* is the asymptotical limit of listening as a whole. On the other side, if the metrics is not relevant (as effectively described in the model), the construction is not necessarily a spiral but a defines a circle around the *ouïr*. Expert and ordinary listenings are different because of their reciprocal position: the definition of an ordinary listening is possible only in a socio-semiotic perspective, where a certain practice is chosen as the observing, anchoring point of the whole construction.

5. As a conclusion

Listening as a practice is a process moving around the sound object of the *ouïr*. It is not by chance that Schaeffer considered crucial "l'épreuve de l'inouï"[4]. A test in itself paradoxical. If the unheard is external to the listening practices, it is only postulated. If it is internal, it is already determined, as it has already been heard. The unheard is the necessary myth of the origin, the positive form of the presence. "Par l'invention de nouveaux objets, on accède à l'inouï": but this same unheard "doit être récupéré, conquis, assimilé par une oreille qui s'éduque tout en le découvrant"[5]. There is a specific tension between the sensible as a potentiality and the semiotic as its social actualization.

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[4] P. Schaffer, *La musique concrète*, Paris, P.U.F. 1967: 5.
[5] *Id.*: 40-41.