CATEGORIES FOR SOUNDSCAPE: TOWARD A HYBRID CLASSIFICATION

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Abstract
To complement recent efforts in standardizing perceptual assessment of human sound preference through a taxonomy, we propose to contribute to the elaboration of a scientific classification of the diversity of soundscapes as presently studied, from our theoretical knowledge on categorization and naming. In a small collection of publications, selected on the basis of their explicit reference to soundscape studies, we identified exemplars of soundscapes, their structure, and naming. Furthermore, we assessed the consensus of categories mentioned by different research domains in this corpus. Through a linguistic analysis of the wording of the categories we identified different types of classifications, dependent on the research domain, and the object under investigation. Based on this finding we suggest that researchers should be explicit about the type of categorization they apply, and to which aspect of soundscape they are contributing. This suggestion is aimed at reaching a consensus not only on a generic definition, but also on the empirical investigations in a more explicitly structured domain, which the concept of soundscape intends to cover.

Keywords: soundscape, categorization.

1 Introduction

Since R. Murray Schafer introduced the concept of soundscape in the late 1960's [1], the focus of environmental sound research has shifted from noise pollution to a broader perspective on sonic environments, including its positive aspects (see the World Soundscape Project). Specifically, a multi-disciplinary research domain has emerged that aims to link acoustic measurements of a sonic environment to its evaluation by people (see the special issue of Acta Acustica united with Acustica, 92(6), 2006). Through numerous congress

sessions and workshops, this community seems to have reached a consensus on Truax's definition of a soundscape from 1978: "an environment of sound (sonic environment) with emphasis on the way it is perceived and understood by the individual, or by a society" [2].

Since then, a lot of research has been conducted that provides empirical content to this definition, through the investigation of "concrete" cases of soundscapes. Reporting on the work of working group 54 of ISO/TC 43/SC 1, Brown et al. [3] discuss the attempt to elaborate "standardization for perceptual assessment of human sound preference (in out door space)". They point out that besides the fundamental question of "what is a soundscape", they had to face a great diversity of case studies, as well as a large diversity of wording, to describe the entities under study, inducing "an unsatisfactory situation". This unsatisfactory situation does not seem to depend on the definition itself, which remains consensual on the Truax's definition. Instead, the difficulty seems to be in getting at an overall structured picture of soundscapes, through the diversity of cases and terminologies to account for it. To progress toward this goal, they propose a possible taxonomy of the acoustic environment grounded on "categories of places, categories of sound sources, and sound sources".

We will not directly discuss this impressive collaborative attempt of designing a taxonomy, but more restrictively propose to contribute to the elaboration of a scientific classification of the concept soundscape from our knowledge on categorization and naming for different objects and sensory modalities [4, 5]. More specifically, we restrict ourselves in this paper to the principles along which the classificatory tradition in our scientific culture has proceeded, namely as a descriptive step, applied before developing theories [6]. This tradition has first taken place for categories of plants and animals, which has allowed Biology to become a science and invent the explanatory concept of evolution [7]. However, a comparable classification has not been possible to be elaborated for categories of smells [5]. Therefore, we would like to contribute to give a heuristic conceptual value to the notion of soundscape, by defining it empirically. Beyond the definition of soundscape, we attempt to collect and classify the exemplars of soundscapes specified in literature, since botanists' first classificatory procedure was to collect plants and to structure them within herbarium, with a great attention to naming them in order to get at a precise terminology [8].

Additionally, the classificatory tradition imposes to clarify the complex interactions between identifying entities, defining concepts, and naming.

- Entities and concepts: The scientific interest of systematic classification such as taxonomies is to propose sets of concepts that structure knowledge about entities at different levels of abstraction and generality. For example, Medor can be conceived (and named) as a dog, as an animal, and as a living being, at different levels of the classification system as concepts covering entities. One of our goals is to explicitly question what type(s) of entities the concept of soundscape coverts. Are there different levels of categorization? If we consider the generic concept of soundscape, what can be the subordinate concepts that could fit the requirements of a scientific taxonomy?

- Concepts and their names: The history of classification and classificatory systems, as a first step in building a scientific framework of understanding the world as it is, also shows that the construction of such taxonomies is scaffolded by naming the concepts and entities referred to. For example, it has taken several centuries to elaborate the systematic naming and labelling of botanical species to finally get at the Linnaeus system. In this system the names indicate not only a specific object that could be identified as an example (instance) of some concept, but also the locus within the hierarchical system of classes, at which superordinate or subordinate levels it fits.

As Brown et al. [3] already mentioned, specific attention should be paid to get at a negotiated consensual naming of soundscapes. The question is of importance inasmuch the

soundscape community is plurilingual and that the English language is actually playing the role of a technical terminology that Latin was playing some time ago.

In this paper we restrict ourselves to this first step of classification through exemplar membership and naming, based on an extensional perspective. The following step in the classificatory tradition would also impose the development of the classification along an intensional perspective, that is, along the properties, characteristics or features that contribute to the definition of a concept. For example, a bird is an animal "because" it has the following properties: having wings, being able to fly, laying eggs, etcetera, and, belonging to the class of animals, it inherits the properties of animals (breathing, eating, reproducing, …). As far as soundscapes are concerned, what are the relevant properties (acoustics, perceptual, "contextual") that define soundscapes at the different levels of generality or specificity within a taxonomy?

We consider the work of Brown et al. [3] and WG 54 as a first attempt of the soundscape community to work as botanists, putting each plant or flower in a (soundscape) herbarium, with each person in the group as a collector. Inspired by the epistemology of science [9] and linguistics—the role of language in constructing concepts and their references to entities of the world [8], we aim at the same objective in collecting our (soundscape) flowers in the field of a set of publications.

2   Procedure

In a first attempt to gather some exemplars of the concept of soundscape, we collected 166 papers, all written in English, of which one dates back to 1979, 9 papers have been published in the nineties, and the rest (156, that is 94%) has been published after 1999. The collection of papers contains the work of more than 30 different research groups, and is published in around 15 different journals and in the proceedings of 4 recent conferences. However, this selection is not an exhaustive representation of the soundscape research community, but just a first selection of studies from primarily the last decade. With this selection, we aim to illustrate our reflection and present some guidelines toward the elaboration of a systematic classification of soundscapes. The selection can be divided into four major groups:

- studies that focus on (psycho-) acoustical measurements and modeling (~25), e.g. [10, 11];
- studies about theories and concepts in soundscape research (~32), e.g. [12, 13];
- studies that focus on modeling soundscapes, for example through automatic sound recognition (~30), e.g. [14, 15, 16];
- studies that focus on the assessment of human evaluation of soundscapes (~82) e.g. [17, 18].

Depending on their domain of expertise, studies from these different groups can contribute to identify the object of investigation, which is a multifaceted notion integrating physical environments and their psychological evaluation by people. Figure 1 shows the organization of such a hybrid approach to soundscape research.

Focusing on the last group, we could observe that studies from diverse disciplines have attempted to structure human evaluations and judgments, acquired through questionnaires or from laboratory settings. Furthermore, they link these evaluations to physical properties, such as acoustical parameters, and geographical properties, such as set of locations. A large part of these assessments studies deal with the categorization of properties of soundscapes, mostly expressed in hedonic descriptions, such as 'pleasant' and 'noisy'. In this survey we

restrict ourselves to a subset of 35 papers dealing with the assessment of human evaluation of categories of soundscapes, sounds, sound sources, sound events, or noises.[1] In other words, we first focus on the categories of what is assessed, and in future work we will further investigate the categories of properties of soundscapes. Furthermore, in this paper we disregard classifications based on location, since they are discussed by Brown et al. [3]. From this point on we will refer to this initial selection of 35 papers as our corpus.[2]
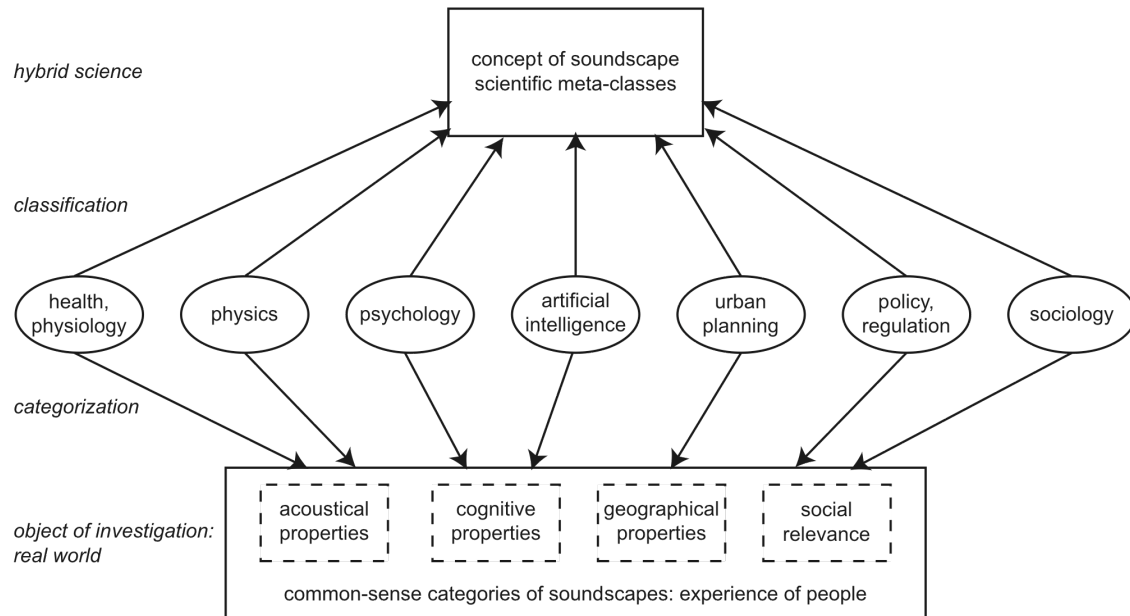

Figure 1 – Different aspects of the every-day categories for soundscape are investigated by different research domains. These domains communicate and integrate their results in shaping the concept of soundscape.

2.1   Getting at categories through names

First, we collected the main category names that were mentioned in the corpus.[3] Subsequently, we present how we can already structure the domain from a linguistic point of view through the way it is worded in the on this small subset of publications. In addition, we organize the category names that overlapped between different papers, including variations of these names.[4] Our methodology of organizing the categories is based on a linguistic analysis of the wordings of the categories, that is:

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[1] These different wordings are used and sometimes mixed without being explicitly defined. It should be more precisely worked on in the line of research already done for the contrast between *noise* and *sound* [17].
[2] Making such a selection obviously restricts the conclusions we can draw from this work, which is mainly designed to formulate questions about a possible taxonomy of soundscapes.
[3] We define a main category as a category at the highest or only level of categorization occurring in a paper. For example, 'natural sounds' is considered a main category, and its exemplars, such as 'birds', are not. However, if sounds are mentioned without a higher level of categorization, 'birds' will be considered as a main category.
[4] Whereas all papers included in the corpus are written in English, they do not all relate to surveys and experiments in English (although most of them do not mention original wordings when conducted in another language). Since our analysis is also done in English, it is important to remind there is no a priori equivalence between wordings in different languages. For a thorough analysis, the original wordings should be available, especially when category naming accounts for people's verbal evaluations.

- the explicit coupling of morphology and semantics, for example '*natural* sources' and '*nature*';
- the syntactic category and structure[5]: N (source) + sound ('nature sound'); N (source) + noise ('traffic noise'); sound + of + N (source) ('sound of natural origin'); noise + of + N (source) ('background noise of the city'); nouns of source ('bells');
- and the examples given by the authors to illustrate the categories.

Table 1 summarizes the twenty categories that were mentioned in more than one paper. The first column displays the category name that was either mentioned most frequently (e.g. 'natural sounds'), or that was the most common and shared word in the names used for a category (e.g. 'background'). The alternative names used for a category are listed in the second column. We refer to the papers applying a category name with a letter index, which points to the corpus in the appendix.

Table 1 – Main category names and the alternative names used for the same categories.

Category name	Variations
Natural sounds [c, j, z, ee, ff, hh]	Nature sounds [v, y]; Sounds of nature [k, w]; Natural sources [x]; Nature [l, cc]; Sounds of natural origin [ii]; Biological [r, aa]
Human sounds [v, y, ff, hh]	Human activity/ies [d, i, m]; Sounds from human (beings) [c, w]; Human sound sources [aa]; Activity sound [j]; People's presence [cc]; Other people [l]; Anthropogenic [r]; Object sounds due to people in the park [z]
Technological sounds [v, w, y]	Technological noises [d]; Sounds of technological origin [ii]; Mechanical sounds [hh]; Mechanical sound sources [aa]; Artificial sound [j]
Traffic [l, m, p, dd, gg]	Road traffic [e, cc]; Traffic sounds [ff]; Busy road noise [a]; Sounds from traffic [k]; Traffic noise [c]; Transportation [ee]; Public transportation [l]; Transportation or works [cc]
Birds [l, u, gg]	Bird song(s) [s, dd]; Bird sounds [ff]; Bird twittering [e]; Brook and birds [a]
Music [e, l, p, cc, gg]	Music-related sounds [ff]; Music from PA system [q]; Music from shops [q]
Construction [gg]	Construction work [l]; Building site [a]; Transportation or works [cc]; Sounds from the surrounding buildings [z]
Voices [e]	Human voices [dd]; Adults' voices [s]; Children's voices [s]; Speech from PA system [q]; Speech between customers [q]; Surrounding speech [gg]
Children [gg]	Playing children [p, u]; Children's voices [s]
Bell	Bells [l]; Church bell [gg]; Bells of Misericordia [u]
Background	Background sounds [f]; Background noise [l]; Amorphous sequences [h]; Background noise of the city [i]; City background sound [o]; Background city [z]; Ambient noise [m]
Event	Source events [i, n]; Event sequences [h]; Sound events [m]; Event sounds [f]
Aircraft [p]	Aircraft sounds [z]; Aircraft fly-over [e]
Water [aa]	Water (fountains) [gg]; Water (river) [gg]
Cars [l, s]	
Machine	Working machines [cc]; Machine-related sounds [ff]
Wind [e]	Wheather ("sounds made by wind") [aa]
Dogs barking [e, p]	
Footsteps [q, gg]	
Other	Others [ff]; Other noise [c]; Other transportation [cc]

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[5] In scientific classification, entities and the concepts referring to them are generally (at least in English and in most indo-European languages) designated by nouns, whereas their properties are designated by adjectives.

2.2 Getting at category structures

In addition to collecting the category names in the papers, we counted how many main categories were mentioned in each paper. For example, some papers state that sounds can be categorized in either 'human sounds' or 'natural sounds' (two categories), while others mention a collection of more than five, and up to fifteen categories of sounds present in some environment, referring to the specific sounds, such as 'birds', rather than a general category, such as 'natural sounds'. The amount of categories mentioned in the papers is summarized in the histogram in Figure 2. The horizontal axis shows the possible amounts of categories, and the vertical axis indicates how many papers mention a particular amount of categories.[6] Most studies that apply a small amount of main categories (at the left side of the histogram), mention more than one level of categorization. On the other hand, the studies that apply more than five main categories, mention mostly one level of categories.
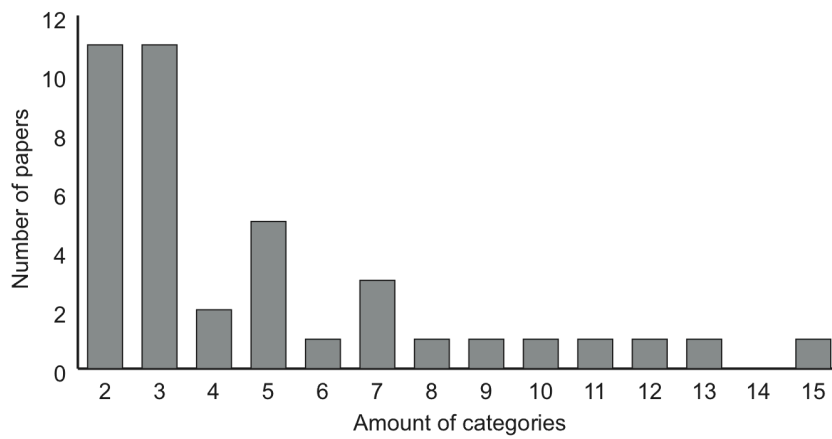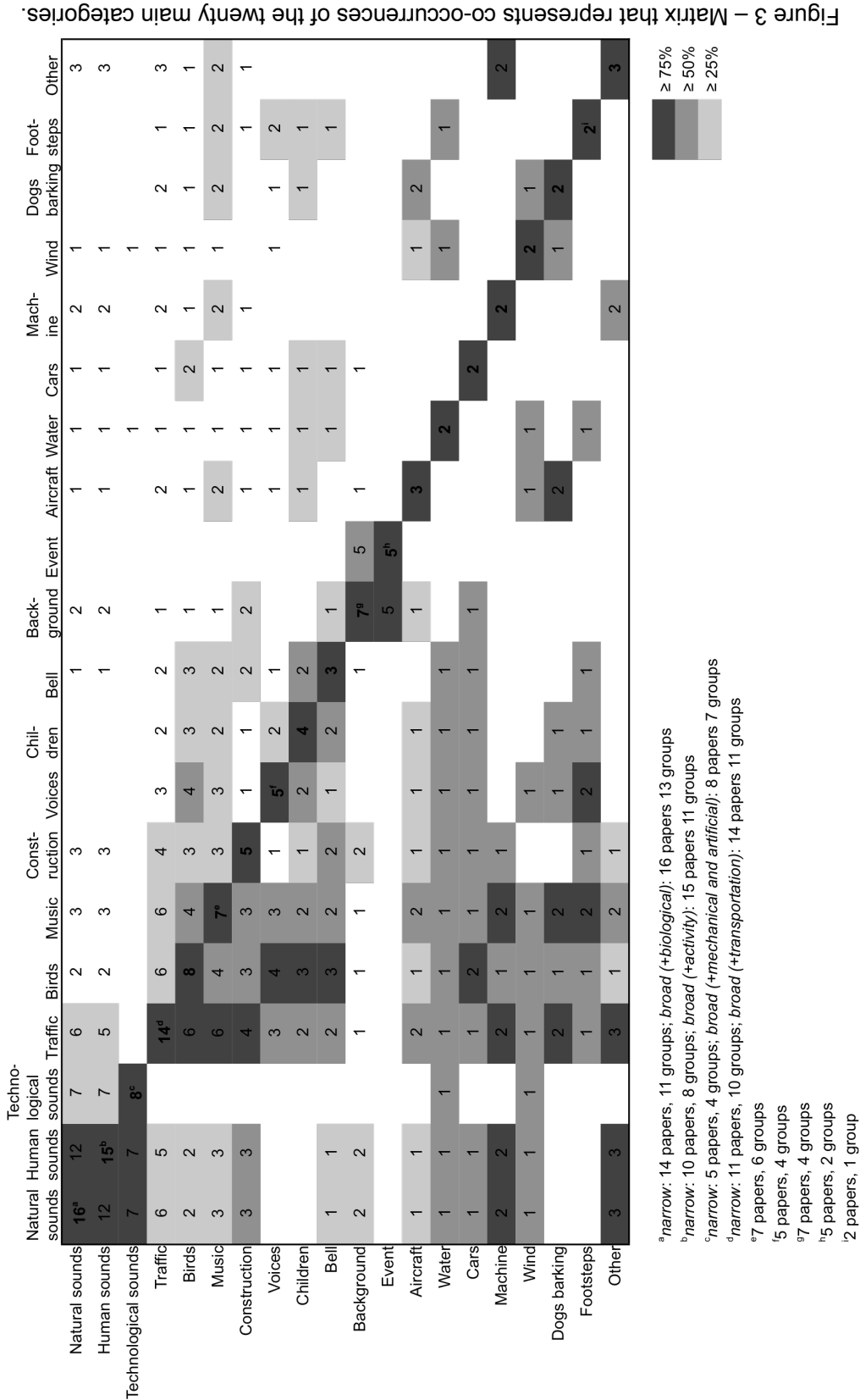

Figure 2 – Histogram of the amount of categories mentioned in the papers.

To identify the overlap of categories between papers, we counted the number of co-occurrences of categories in the corpus. Figure 3 displays a matrix with the twenty categories from Table 1 on the axes. Each number in the matrix indicates how often two categories co-occur. In the diagonal the total of occurrences of a certain category in the corpus can be seen. For example, the category 'natural sounds' is mentioned in 16 different papers, and of those 16 papers, 12 mention it in combination with the category 'human sounds'. When a number in the diagonal of the matrix holds a superscript letter, there was some ambiguity in counting the papers. Below the matrix we indicated how we counted these specific cases, for example if some papers are written by the same research group.[7] The number in the matrix is always the broadest interpretation of counting the amount of papers that apply a category. The matrix is organized so that clusters of categories are apparent, with the most frequently applied categories at the top left. When the number of co-occurrence exceeds a certain percentage of the total of occurrences of the category on the vertical axis, it is given a matching gray-scale, of which the key is indicated below the matrix. For example, 12 papers (75%) of the 16 papers that mention 'natural sounds', also mention 'human sounds', hence the number 12 behind 'natural sounds' and below 'human sounds' is shaded dark gray.

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[6] The histogram adds up to 40, which is more than 35 papers, because some studies mention more than one type of categorization.
[7] We consider two papers to originate from the same research group when at least one of the authors is shared.

Figure 3 – Matrix that represents co-occurrences of the twenty main categories.

	Natural sounds	Human sounds	Techno-logical sounds	Traffic	Birds	Music	Const-ruction	Voices	Chil-dren	Bell	Back-ground	Event	Aircraft	Water	Cars	Mach-ine	Wind	Dogs barking	Foot-steps	Other
Natural sounds	16[a]	12	7	6	2	3	3			1	2		1	1	1	2	1			3
Human sounds	12	15[b]	7	5	2	3	3			1	2		1	1	1	2	1			3
Technological sounds	7	7	8[c]										1	1	1	1	1			
Traffic	6	5		14[d]	6	6	4	3	2	2	1		2	1	1	2	1	2	1	3
Birds	2	2		6	8	4	3	4	3	3	1		1	1	2		1	1	1	1
Music	3	3		6	4	7[e]	3	3	2	2	1		2	1	1	2	1	2	2	2
Construction	3	3		4	3	3	5	1	1	2	2		1		1	1				1
Voices				3	4	3	1	5[f]	2	1			1	1	1		1	1	2	
Children				2	3	2	1	2	4	2			1		1			1	1	
Bell	1	1		2	3	2	2	1	2	3	1			1					1	
Background	2	2		1	1	1	2			1	7[g]	5	1		1					
Event											5	5[h]								
Aircraft	1	1	1	2	1	2	1	1	1	1	1		3	2		1	1			
Water	1	1	1	1	1	1		1		1			2	2			1	1		1
Cars	1	1	1	1	2	1	1	1	1		1				2					
Machine	2	2	1	2		2	1									2				2
Wind	1	1	1	1	1	1		1					1	1		2	1			
Dogs barking	2			2	1	2		1	1				2			1	2		2	
Footsteps				1	1	2	1	2	1	1				1			1		2[i]	
Other	3	3		3	1	2	1							1		2				3

≥ 75%
≥ 50%
≥ 25%

[a]narrow: 14 papers, 11 groups; broad (+biological): 16 papers 13 groups
[b]narrow: 10 papers, 8 groups; broad (+activity): 15 papers 11 groups
[c]narrow: 5 papers, 4 groups; broad (+mechanical and artificial): 8 papers 7 groups
[d]narrow: 11 papers, 10 groups; broad (+transportation): 14 papers 11 groups
[e]7 papers, 6 groups
[f]5 papers, 4 groups
[g]7 papers, 4 groups
[h]5 papers, 2 groups
[i]2 papers, 1 group

3   Preliminary analyses and results

3.1   Naming of categories

Through a brief linguistic analysis of categories names mentioned in the corpus (Table 1), different inferences can be made, especially in trying to identify what the object of categorization is referred to through naming, and if there are different levels of categorization that can be explicitly and implicitly identified in the studies.

3.1.1 Categories of what?

As mentioned in section 2, we could observe different and a priori non-equivalent words used to refer to acoustic phenomena such as *soundscapes*, *sounds*, *noise*, *sources*, and *events*. Whereas most of the authors refer to soundscape as a main concept that underlies their work[8], *soundscape* is no longer used, and replaced by *sounds*, *sources, noise, sound sources, sound events, …*, when they shift to the description of the experiments and surveys that have been done. Therefore, we are interested in finding out whether those wording refer to equivalent concepts. And are they designating the soundscape itself, some instance (some type of) or some part of it? A linguistic analysis of the category wordings can be a first step to specify and give some elements of answer.

Considering the object of categorization, categories names mentioned in the corpus can be sorted into 2 groups:

- The object of categorization is explicitly inscribed in the naming, through syntactic structures such as nominal syntagms (*technological sounds, traffic noise, sounds from human*) that can be described as N/Adj+*sound*(s), N/Adj+*noise*, or *sound*+prep+N. The object of categorization, as an entity, is then designated by a head noun (*sound*, *noise*, *source*), and another noun (or adjective) specifies (or qualifies) the extension of the category (the range of entities it applies to), for instance *bird sounds*, *sounds from traffic*, and *ambient noise*. This group mainly concerns naming of **categories of sounds** (30 occ. such as: *nature sounds, sounds from human, mechanical sounds, background sounds …*), and also a few namings of **categories of noise(s)** (6 occ such as: *ambient noise, technological noises*), events (3 occ: *sound event*) or sources (2 occ: *natural sources*).

- The object of categorization is not explicitly included in the syntactic structure of the naming (*bells, cars, water, transportation, speech, building site*). Then two cases can be distinguished. A lot of categories are named via **nouns** referring to **sound sources** as entities (21 occ. -*, brook and birds*, (*human*) *voices, water, aircraft, bells*) whereas some others designate **activities** (12 occ. - *aircraft fly over, building site, working machines, …*) by means of **verbal constructions** (*bird **twittering***) or verbal nouns (**construc**tion, **transport**ation).

For some wordings, such as *voices*, *music* of *traffic*, it is difficult to decide whether they refer to sources or activities, and if they take part of a categorization of entities or of events. Is *music* related to one (instrument as a) source of music or as the activity of someone playing (and/or listening to) music? Is *traffic* referring to the grouping (generic level of the category) of all the kinds of transportation vehicles as entities or to the activity of transportation and its consequences?

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[8] They do so in order to be in line with a "soundscape approach" as a shift from noise annoyance, emphasizing human positive or negative evaluation of the sonic environment [19].

These last wordings illustrate what is often implicit in naming sound categories via nouns referring to sources. However, when referring only to sources via nouns, there is no information about the mode of excitation of the source, the acoustical properties of the sound, and the subject's involvement in producing or perceiving the sound. In this case the categorization is driven by categories of sources, rather than by their acoustic properties per se, as it is the case for smell [5]. Furthermore, when taking into account verbal constructions (*bird twittering* or *car passing*) acoustic phenomena have to be conceived as events or activities affecting humans rather than entities.

Although these points have to be further analyzed and investigated, they already raise some questions about the underlying conceptualizations (see section 3.2): What are the relationships between sounds and noises? What are their links to soundscape? (Why not *noisescape*?). While *sound* refers more to the physical properties and belongs to a tradition of scientific description in Physics, *noise* refers to the effect of the event on the subject and is less autonomous from the sources [20]. In our corpus, *noise* (that appears much less often compared to *sound(s)*) is restricted to some specific domains: *technological noises, traffic noise* and *background noise,* and may indicate the scientific nature of the discourse (discourse of experts in physics) talking about sounds, in contrast with users' discourses, referring to noise or to noise sources.

3.1.2 Identification of categorization levels in naming

Different levels of categorization can be identified in naming via the lexical forms used (*voices* < *speech*, *transportation* < *cars*, *aircraft*) or via the syntactic structure of the naming (Nspecifier+Ncat: *nature sounds, traffic noise* or Adj+Ncat: *human sounds, artificial sounds, adult voices, …*). It is worth noting that what some authors mention as a category level may be an exemplar of some others:

- *transportation* vs. *cars, aircraft*;
- *natural sounds* vs. *water, wind, bird …*;
- or *voices* vs. *human voices, adult's voices, children's voices and speech …*

The authors that mention several levels of categorization are also the ones who explicitly designate *sources* and *events* at a generic level (*background noise, sound event, source event*). There is thus an attempt of abstraction by means of lexicalization and meta-category wording, allowing further conceptual analysis as the following.

3.2   Conceptual categories

Three clusters can be identified in the matrix of Figure 3: a cluster at the top left with the most frequently applied categories, a bigger cluster around the categories 'traffic', 'birds', and 'music', and finally a small cluster of only two categories, 'background' and 'event'. The last cluster and part of the first cluster include the small category group sizes, as depicted in Figure 2. In comparison, the bigger cluster in the middle part of the matrix mostly corresponds to larger category groups, partly overlapping with the categories in the first cluster, 'natural sounds' and 'human sounds'.

The cluster at the top left, with the most frequently applied categories ('natural sounds' and 'human sounds') is primarily composed of descriptive categories of the researchers established prior to a survey, or on site. The research domains from which these categories arise are mostly acoustics and urban planning. As a consequence, these categories contrast to the scientific meta-categories inferred from people's descriptions in psychological and psycholinguistic studies, as in the cluster 'background' and 'event'. These categories are explicitly established as meta-categories distinct from the common-sense categories of the people that have been interviewed. Therefore, the categories in the top left cluster are based on other principles than psychological ones, relating to the goal of the study, and the

categories of the researchers themselves (that they may share with everyone as a city user). For example, several studies in the field of urban planning categorize sounds (or sources, events, etc.) based on the function of a site, such as being a shopping area, a street, or a nature park.

Finally, the bigger cluster in the middle of the matrix arises from studies both in psychology and in acoustics and urban planning, which generally do not apply different levels of categorization. In that case, the sound events (or sources) described by the researchers correspond better to the sound events indicated by people, than to the meta-categories that can be inferred from them. However, the methods by which these sound events are established are along different principles. Psychologists and psycholinguists have their theories and methods to question people about their sonic environment, like physicists and urban planners have developed their own tools to measure acoustic properties of the environment or design a (sonic) environment. Soundscape research should integrate the scientific (meta-) classifications of these two different scientific objects into a classification of soundscape as a hybrid concept, that is, including both physical descriptions of the sonic environment and the ways (psychological processes) people feel about it. Thereafter, soundscape research can consider soundscape as a psychological object, as the consensual definition of soundscape engages us to do.[9]

4   Conclusions

In summary, from the analysis of this restricted corpus at least three different types of categorization could be identified. This indicates that within the field of soundscape, the levels and principles of categorization are different, depending on the goal of a study and on the domain of competence of the authors. A first suggestion would be to make explicit how soundscape research can bring together different research disciplines, with different methodologies, and different categories of interest. While up to now most of soundscape research has been developed within the acoustic community, the implication of human sciences is explicitly required by the consensual definition of soundscape. Psychologists should be interested in assessing the categories of soundscapes according to a subject-oriented point of view, dealing not with the *world as it is* but with *the world as far as humans are concerned with*, *involved and acting in it*.

Our investigation reveals that soundscape research has to account for a more applied perspective in developing the concept of soundscape as well. For example, an urban planner might be interested in structuring the domain according to locations, and hence in the categories of sounds that correspond to places in an urban environment, such as roads and water fountains, from his point of view. Therefore, we propose that each research domain (academic as well as applied) should be explicit about their point of view, which is reflected in their principles of categorization. As a consequence, researchers from all involved domains can negotiate on their contribution to the different concepts of soundscape, from their different scientific practices, goals and motivations. Only then we will be able to reach an integrative and hybrid approach, and the box in the top of Figure 1 will become one unifying well-defined concept, instead of a collection of different concepts closely related to the knowledge domain within which it has been elaborated.

A next step would be to identify the properties of soundscape, which will enable us to get forward at the principles of categorization. These principles could provide the classification system with a heuristic tool (productive scientific device) to develop some explanatory

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[9] In a similar manner as it can be done for other concepts, such as a global one of *comfort*, and more specifically for the concept of *quality* for industrial products.

principle, similar to the structure of the Linnaeus classification allows the development of the theory of evolution. If we rely on the consensual definition of soundscape as "made of" physical ingredients, such as sounds, and of human ones, such as perception and assessment, the unifying principles of classification for such a hybrid object should be systematically structured.

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