

Influence of the semantic content of urban sounds in the identity of outer spaces

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ABSTRACT

This paper shows the influence of the semantic content of urban sounds in the subjective evaluation of outer spaces. The study is based on the analysis conducted in three neighboring and integrated urban spaces with a different form of social ownership in the city of Cordoba, Argentina. It shows that the type of sound source present at each site influence, by its semantic content, in the user's identification and permanence in the place. The noise present in a soundscape is able to have a high semantic content, and therefore the sound has a particular meaning for the perceiver. Every particular social group influences the production of their own sounds and how they perceive them. This allows to consider the sound as one of the factors that define the sense of "place" or "no place" of a certain urban space. Evidently the sounds, and their ability to evoke and characterize the environment, cannot be ignored in the construction and recovery of anthropological sites. This urban culture is unique and specific to every society. The public spaces, with their soundscape, are part of the construction of the urban identity of a city. It is shown that for identical general sound levels present in each of the spaces, the level of annoyance or discomfort, in relation to the subjective acoustic quality, is different. This is the result of the influence of semantic content of the sounds present in each urban space. Coinciding with other similar research, the level of discomfort or annoyance decreases as the presence of natural sounds such as water, the wind in the trees or the birds singing increases, even when the objective values of noise level of natural sounds are higher.

INTRODUCTION

The soundscape approach carries the problem of the study of acoustic environment from spaces or residential areas, approached from the discomfort that noise produces, to urban open spaces for collective use, studied from the ability of sound to provide identity and quality to a space. The soundscape concept was proposed by Murray Schafer in 1969 under the principle that sound should be considered as a means of communication between man and the urban environment [1].

Each particular society influences the production of their own sounds and the way they are perceived. This allows us to consider the sound as one of the factors that define the sense of "place" or "no place" in a given urban space. For Marc Auge a place can be defined as a place of identity, relational and historical; on the contrary, a space that can not be defined either as a place of identity or as neither relational nor historical, is considered a non-place. Auge believes that "supermodernity" is a producer of non-places, spaces that are not in themselves anthropological places [2], i.e. spaces designed and developed by and for the man in a given society. Obviously the sounds and their environmental evocative and characterizing ability can not be ignored in the construction and recovery of anthropological sites. This urban culture is unique and specific to each society. Public spaces, with their soundscape, are part of the construction of city's urban identity.

So as to consider, according to Schafer, the urban sound as a means of communication, it is necessary to accept that the noise present in a soundscape is capable of having a high semantic content, and therefore the sound has a particular meaning for the people who perceive it. The consideration of the sound as a means of communication allows the application on this phenomenon of many of the tenets and principles of information theory, or better called, communication theory.

METHODOLOGY

The methodological approach adopted takes into account: field acoustic measurements, interviews with users and an analysis of studied urban areas and the environment. This will ensure an integration of the aspects that define a soundscape. The sound level measurements were used to objectively characterize the sound environment under study, the survey aims at knowing the subjective assessment of the sounds and the level of their presence in every urban area analyzed. We seek to analyze the presence and level of discomfort of various individual sound sources that can affect the user's subjective response against the soundscape analyzed.

For the analysis the choice of the urban area was determined based on the following criteria: identical bounding conditions, different spatial configuration, different appropriation and constituent urban elements. The objective

is an area of analysis that allows, by comparing different scenarios with similar conditions, to draw conclusions in relation to the quality and characteristics of the soundscape. The selected group is the open space system located in the central area of the City of Cordoba, consisting of Paseo Sobremonte (1), Plaza Italia (2) and the Plaza de la Intendencia (3) (Figures 1 to 4). The three spaces, with different settings, are located around the Intendencia de la Ciudad and the Palacio de Justicia buildings, acting as a framework for institutional buildings and as recreational spaces of various kinds.

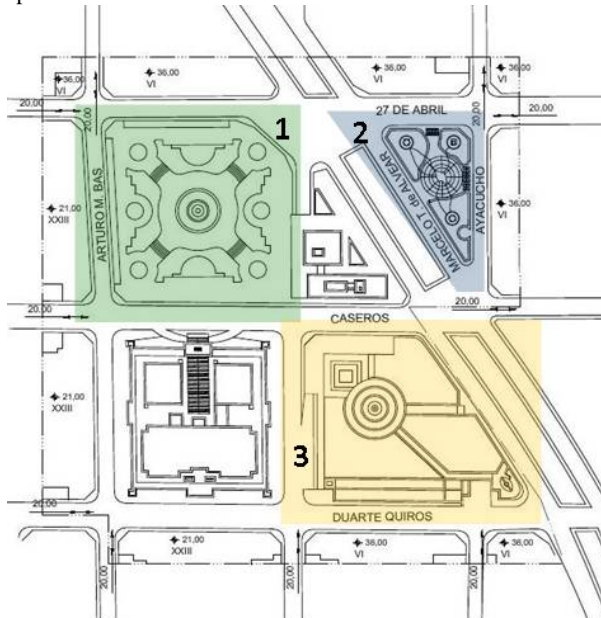


Figure 1. Relative location of the three urban spaces



Figure 2. Paseo Sobremonte (1)



Figure 3. Plaza Italia (2)



Figure 4. Plaza de la Intendencia (3)

Objective measurements of sound level

Statistical measurements of noise levels were carried out in the three areas for the purpose of an objective assessment of the study area. The points were selected in characteristic positions of internal areas of the studied spaces and in their perimeters coinciding with vehicular traffic routes. Measurements were carried out using a type 2250 Brüel & Kjaer sound level meter, equipped with BZ 7223 frequency analysis software.

The amount and location of the measurement points, located in Figure 1, were determined with the criterion of relieving the general behavior of the area: border situations of every analyzed areas, and the specific behavior of every space: center of squares, simultaneously with the subjective survey through opinion polls. The times measured were the busiest. Two measurements were performed for every of the points defined: business days and weekends. Figures 5 and 6 show the equivalent continuous sound levels measured in each of the points.

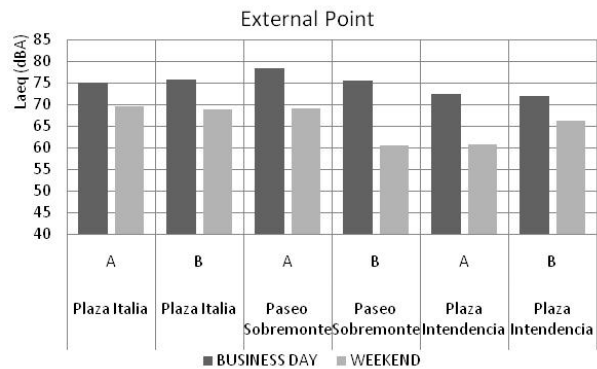


Figure 5. Sound levels in external points

The equivalent continuous sound level (LAeq) on surrounding avenues and streets is between 70 and 75 dBA, while towards the interior of the spaces it is placed between 65 and 70 dBA. The decrease in sound level towards the interior of the squares is approximately 5-10 dB. During the weekends the general noise decreases 5-12 dB in relation to weekdays. During the weekend the reduction of environment noise caused by traffic allows the emergence of other generally masked particular noise sources. The points located on avenues and streets with heavy traffic have a similar behavior both on working days and weekends; this happens because the only source of noise is the one related to traffic.

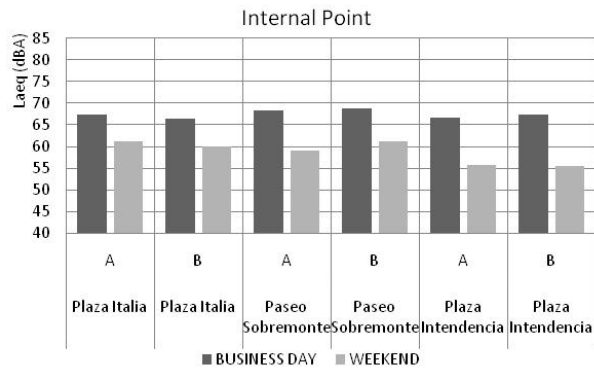


Figure 6. Sound levels in internal points

Whatever the situation analyzed, weekday or weekend, a very important uniformity is evident for the three areas analyzed in relation to objective noise levels present in the place. This situation is entirely predictable since it has to do with the same urban area.

The general noise levels are between 65 and 75 dBA, in which range it has been shown that the subjective reaction is often independent of the general noise level and is related to other aspects of the sound source.

Level of presence of urban noise

A model of survey was developed to be applied to the three outer urban areas selected for the study. The polls were conducted to groups of people selected at random simultaneously with the objective acoustic measurements. Surveys were conducted in two different types of days with respect to sector activity, affluence and traffic flow. In relation to the sound sources the survey aims at detecting the level of presence of certain sounds and the level of discomfort they produce.

The question concerning sound sources finds out the level of perception in a scale from "not heard", "rarely heard", "sometimes heard", "frequently heard" and "completely prevailing", and the level of pleasure or discomfort under the scale: "Pleasant", "Unpleasant", "indistinct", "annoying" and "irritating". The sounds are divided into three categories: those produced directly by people, natural and technological sounds [3] [4].

Table 1 – Human, natural and technological sounds

| | |
|----------------------|------------------------------|
| Human Sounds | Pedestrians' talks |
| | Pedestrians' steps |
| | Children's games |
| | Street music |
| | Music from the stores around |
| Natural Sounds | Dogs barking |
| | Birds singing |
| | Water |
| | Insects' sounds |
| Technological Sounds | General traffic |
| | Mopeds and motorbikes |
| | Trains |
| | Airplanes |
| | Public transport |
| | Building construction |
| | Pedestrian crossing |
| | Music from cars |
| | Car parkings |

The graphs in Figures 7 and 8 show the levels of presence of each sound sources consulted in the survey. A strong presence of technological origin stands out, basically: general traffic, motorcycles and public transport. This situation remains both weekdays and weekends. The sounds produced by people have a variable presence, highlighting their increased presence towards the weekend. Among the natural sounds the presence of water is the most dominant presence in any of the analyzed situations.

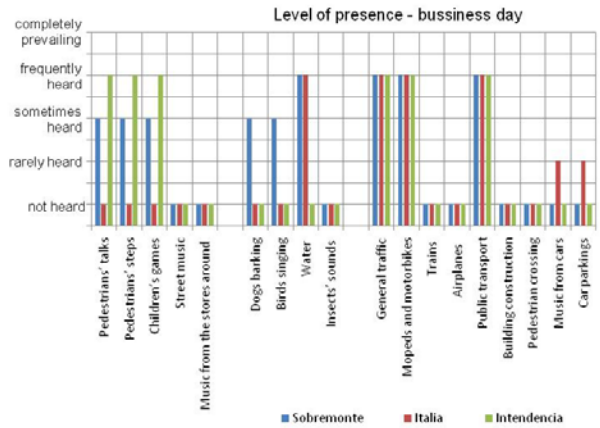


Figure 7. Level of presence – weekday

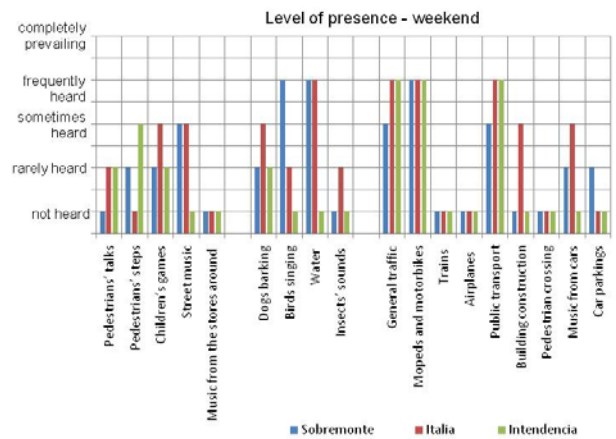


Figure 8. Level of presence – weekend

Sound Level of acceptance or discomfort

From the subjective analysis based on the surveys there is evidence that not all of the sounds present in the spaces have the same degree of acceptance on the part of the users. A higher preference for natural sounds over technological ones was pointed out. This situation coincides with multiple previous specific works [4] [5].

The level of discomfort of technological sounds such as traffic and transport is higher on the weekend, despite the decline in general environmental noise levels. This situation may be related to the occurrence of pleasant and natural sounds that are normally masked. As regards all the sounds whose level of acceptance is low, the lower the overall environment noise, the less pleasant those sounds are considered.

The main sources of impact are general traffic, motorcycles and public transport considered to be "frequently heard" in all three areas, not only during working days but also on weekends, and they are in general considered as annoying or irritating. Moving water is clearly dominant in both Paseo Sobremonte and Plaza Italia, with a very good level of

acceptance, being the only natural sound that continues during the whole week. The rest of natural sounds, which as a whole have a higher degree of acceptance among people, starts to appear on the weekends when the influence of other sound sources decreases.

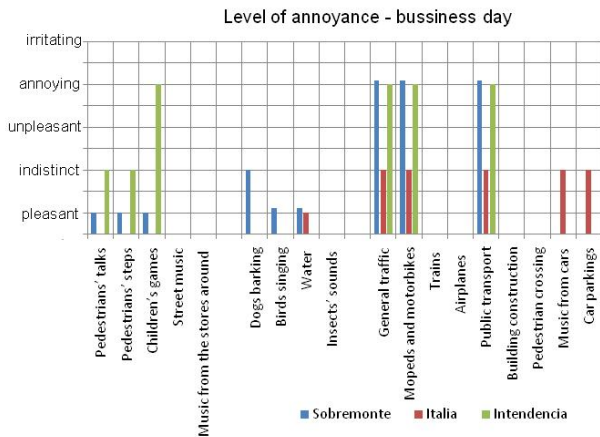


Figure 9. Level of acceptance – weekdays

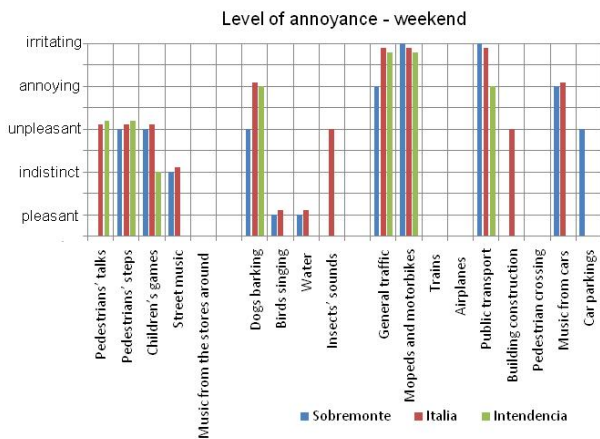


Figure 10. Level of acceptance – weekend

People's talks, pedestrians' footsteps and children's games have a strong presence during business days in Paseo Sobremonte, where they are "sometimes heard" and are considered pleasant, and in Plaza de la Intendencia, where they are "frequently heard" and are considered from "not pleasant" to "annoying". This situation suggests that for the same type of sound there is a limit on the level of presence over which the same sound which may be pleasant becomes annoying. The noise of natural origin is always accepted as pleasant, even when dominant; this situation does not occur in the case of noise produced by people.

RELATION BETWEEN SEMANTIC CONTENT AND SUBJECTIVE APPRECIATION

The type of sound is closely related to the type of use of urban spaces. From the objective standpoint the sound levels are equal in the three spaces, but it is shown that the form of appropriation is different for each of them.

The greatest acceptance of certain sounds on the part of users is directly related to their meaning, their ability to evoke pleasant or unpleasant situations. Natural sounds evoke in

general the rural environment, raise positive emotional states. Technological sounds evoke isolation situations; they are uninformed sounds. [5]. The ability of urban sounds to provide information and transmit a message means that they possess semantic content and that there is intelligible information for the recipient. Sounds with semantic content, as part of a communicational model, are sounds that convey a positive message, based on interpretation codes acculturated by the user.

The communication theory aims at studying the phenomenon of human communication based on the interrelationships among the agents involved, allowing the definition of communication models according to the forms of expression or means of interaction in the flows of information or energy. Accepting that the urban sounds are a means of communication and that most have a high semantic content, since they convey a message with a meaning for the receiver, we can infer that sounds components of a specific soundscape can be analyzed from the theory of communication, prior to defining an appropriate communication model adequate to the phenomenon under study.

In the classical models of communication essential basic components are: transmitter, receiver, channel, code and message. Since they are elements all easily detectable in the sound structure of the landscape, it is a model applicable only when the communication occurs between people and with the intention of delivering a message by the sender. In the case of urban sounds, transmitters are not always people and there is not always intention in the emission. Such situations may actually be analyzed from a semiotic model where the addressee or receiver constructs the message from the signals he/she receives and interprets them through a system of proper, individual or collective signs of a society.

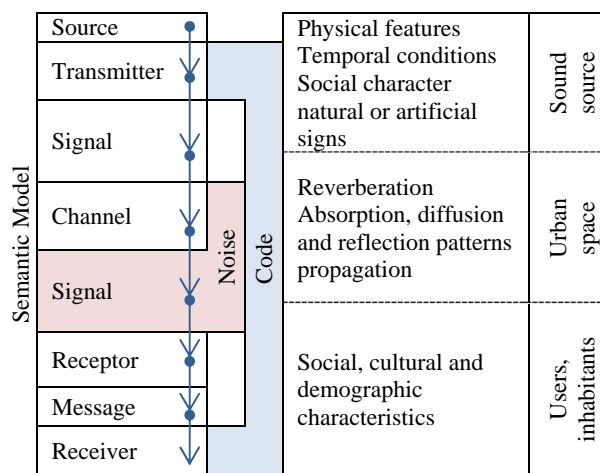


Figure 11. Semantic model and relationships

The semiotic model of communication [6], although more complex, is appropriate for the study of situations similar to those raised at the city level. The components in this case are: Source, Transmitter, Signal A, Channel, Signal B, Receiver (s), Message, Recipient, Code (which is a system of signs) and Noise. Figure 11 shows the outline of the semiotic model and the relationship with the basic aspects that characterize each of the three levels of analysis of an urban soundscape: sound source, urban space and users.

Some sounds may be unpleasant due to social, psychological or cultural reasons. Displeasure often occurs when the receiver fails to decode the sound perceived in terms of

his/her symbolic auditory schemes. The urban space with its components is the communication channel.

CONCLUSIONS

In the transmitter - receiver relationship it will be important to identify which are the emitted sounds that the receiver wishes to receive and why, for a particular society and in every type of space. Recognizing the semantic content they have implies decrypting the code and the message. Finally, the configuration of the urban space and the interference with different sound sources define and characterize the communication channel.

The study has allowed us to confirm the existence of a direct relationship between the ownership types of urban spaces, the level of acceptance of the sounds present in the place and the configuration and urban elements components of the urban landscape. Urban sectors of identical objective acoustic conditions have subjective acoustic behavior and different appropriation forms based, among other environmental aspects, on the modification of sound sources and types of sounds derived from urban components.

To study this type of situations we suggest the adoption of a semiotic communication type model that includes the possibility of developing an analysis where the intended recipient or receiver constructs the message from the signals he/she receives and interprets them by means of a system of typical, individual or collective, signs of a society. It is necessary to deepen in the study of these codes or sign systems that allow us to interpret the subjective response of a community in front of typical distinctive urban sounds that identify it. These studies will determine the urban variables in order to maintain or modify the urban soundscapes tailored to conditions typical of the place.

REFERENCES

- 1 Schafer, R. M. "The tuning of the world". *A.A. Knopf, New York*. (1977).
- 2 Auge, Marc. "Los «no lugares» espacios del anonimato, una antropología de la sobremodernidad". *Editorial Gedisa, Barcelona*. (2000).
- 2 Nilsson, M.; Botteldooren, D.; De Coensel, B. "Acoustic indicators of soundscape quality and noise annoyance in outdoor urban areas". *19th International Congress on Acoustics, Madrid, Spain*, (2007).
- 3 Zhang, M.; Kang, J. "Towards the evaluation, description, and creation of soundscapes in urban open spaces". *Environment and Planning*, vol 34, pp 68 – 86 (2007).
- 4 Guillen Rodriguez, J.; Lopez Barrio, I. "Estudio de preferencias en la evaluación de sonidos". *Tecniacustica. La Rioja, España* (2001).
- 5 Eco, Umberto. "Tratado de Semiotica General". *Editorial Lumen. Barcelona*. (2000)