

TEACHING THE SOUND OF THE SPACE

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ABSTRACT

Teaching acoustics in the Schools of Architects is not that easy: it means teaching to listening (hear) in a profession almost based in looking (seeing).

How to design sound and space together?

One way to arise interest for the sound could be learning to listen to the space. By this, we mean learning not only about how the people use the space but also about ourselves, do it.

TEACHING THE SOUND OF THE SPACE

I have been teaching acoustics at the architecture school in Barcelona (ETSAB) from 1976. During these 25 years I have realised that the students from the first years need more general education than the ones from the third cycle (specialisation and P.H:D).

Probably the most important thing it's that the student learns about basic relation between the space and the "sound message". But, what do I have to teach if the important thing is not what we do communicate, specially the way we communicate?. How can I teach this communication has got more dynamism with related to the volume, sound, head, intimacy and so on?

The message can be heard or isolated, reverberated or absorbed in the space, but our vision do not allow us in a lot of faces to realise all this facts. In fact we want that architecture shows with fidelity his communication, but they are always a lot of facts to found.

The sign's transmission is not always perfect, because the space is first showed with the vision that with our heard. For this reason, we have to listen the architecture.

ACOUSTIC EXPERIENCE WITHOUT THE EYES

In this case care the students on the reader has to stroll with closed eyes, walk around the quotidian places. In this practical case the students have to realise an individual practice about the flat where they are living.

This experience can also be done by the reader. If somebody is able to notice and vibrate with sounds, sound energy has to be noticed when you create. In every place and in every moment this energy is variable and different. The heard has been educated consciously or unconsciously.

After that, the students have to make a letter of their perceptions. Later on when time have gone the one who made the writing is someone else (now I show how is your place for an utopic blind visitor).

At the end I enclare a survey used to have the opinions of the experience, when the questions have got two faces. First of all we have to see if with the students closed eyes, is able to notice space dimensions and the existence of walls, windows and furniture.

On another hand it's interesting that he is conscious of the sounds of his place, and about the relationship with internal and external sounds versus noises.

In this case we ask the student which of this sources more annoying and which will be the first thing to do limitate it and also to know his personal opinion.

This survey has been answered for the majority of students doing the experience of heading their quotidian architecture.

The survey has been realised to a different profile of student. On one hand to the students of the 2nd cycle of architecture or 2nd cycle of UPC (Catalonian Politecnic University) that are studying a structural subject, an optional or an elected one; on the other hand graduated architects, engineers and so on and as will at the students of the third cycle they have got very interesting experiences with a lot of contrast with the first ones.

Is for that reason that we made two groups: 18 surveys to the P.H.D students of sound in architecture and design and 89 surveys to the students of the 2nd cycle , 79 of the ones using the optional subject of "Arquitectura acústica", of the years 1994-95, 1995-96, 1996-97, and 10 of the optional subject "forms and acoustic spaces" (ALE).

We have to notice that the students of the subject forms and acoustic spaces (from new Ale) only 3 were from architecture and the rest come from other places in the UPC. Maybe that's the reason why the answers are so atypical.

The survey has got 22 questions, from them 18 were affirmative or negative, one of them was a multiple choice question (18 one), two were about explaining (9 and 21 questions and one of score from 1 to 10 (question number 22), and then a place to do the observations.

QUESTIONS AND ANSWERS

1. The practice can be done walking through the different spaces of the house or standing still in one of them. Do you think it's better doing it walking?

Yes: 66% students from doctorate and 77% from 2nd cycle (where we include students from ALE, who answer affirmatively the 80%).

Everybody thinks is better do it walking.

2.Thanks to the reflected sounds, do you think you have noticed the obstacles existence (walls and big furniture) in front of you?

No: 50% from doctorate

Yes: 67% from 2nd cycle (60% of ALE)

The contradictory result indicate that students from doctorate are not used to them houses, due they come from other countries.

At the same, the students from ALE seem to be less attentive than houses, maybe because they are students from the courses not architectonics.

3. Do you consider that you have noticed the variations of the interior volumes (pass from the passage/corridor to a bigger room or from a normal room to double high room, etc) due to the sound variations?

Yes: 89% from doctorate and 85% from 2nd cycle (60% ALE's students).

Almost everybody noticed the volume's variation. We noticed again a certain unconcern in the case of students from ALE, not used to think about design of spaces.

4. In general, do you consider the external sounds emission (vehicles, pets, voices, the lift, weeps, etc.) like discomfort?.

Yes: 55% of the doctorate and 46% of the 2nd cycle (50% from ALE).

Although the students weigh up the annoyance that comes from external noise, in general we noticed a poor interest. Inclusive prevailing the affirmative answers, this is under of 50% in the group of students from 2nd cycle. It seems that external noise concerns a little bit more to the students from doctorate.

5. Have you noticed infrasonic vibrations not audible (due to the subway pass, vibration of the forget on, etc.)?

Yes: 55% of doctorate.

No: 70% 2nd cycle (90% ALE)

Here, the difference is clear: students from the doctorate perceive the solid vibrations more than students from 2nd cycle.

Curiously, the sensibilization to the subsonic is manifested in the professionals that knows what means the elasticity and rigidity of the floor on the buildings designed for them selves.

All seems to indicate that this is in the case of students that study courses unlinked of the building.

6. Do you think that a lot of internal sounds are caused by buildings' movements (dilatation and retraction differential of materials, forget on or cover, crashes of wood beams, etc.?).

Yes: 61% of the doctorate and 75% 2nd cycle (50% ALE)

The majority answers affirmatively, but prevail the students from architecture, that know better the sounds of their houses.

The students from doctorate don't seem to be sure of the sounds of their houses.

7. Have you based more by the sense of touch (heat and texture with the fingers) than by the sound?.

No: 61% from doctorate and 63% from 2nd cycle (50% from ALE)

Almost all are into the same percentage, and they seem sincere. The group little motivated by the architecture has based a little more in the sense of touch than the rest.

8. Have you noticed heat variations between different rooms and site and different air movements?

Yes: 89% from doctorate and 81% from 2nd cycle (50% ALE)

The same that anterior case. The majority perceive hygrothermic aspects of the house, with similar percentage except for the ALE's students.

9. In the case of rehabilitating your house, which of the noises that you have listened do you prefer to remove?.

The majority answers, grouped together in the three blocks respective to the house's interior, in the same building and on the exterior, are the next:

Interior of the house: refrigerator

Building: pipes

Exterior: traffic

10. Supposing that during the experience you have heard a lot your own steps. Could you recognise your just family listening their steps?

Yes: 89% from doctorate and 92% 2nd cycle (100% ALE)

Almost all are sure to recognise then relatives just listening their steps sound and curiously, the surest (100%) are ALE'S students.

11. Have you had problems to identify every space (sitting-room, kitchen, etc) and even have you confused them?.

Yes: 63% from 2nd cycle

No: 78% from doctorate (100% from ALE)

We can see that students who are very habituated to their houses are confused when they have to listen it. The professionals have less problems, although a lot of them don't know so much the places where they live. The surprise is the security in the answers of students from other courses, that fully deny to have any problems in the identification of the spaces where they live.

12. Have you located easily the windows to the street thanks to the noise of the external traffic and even it has helped you to differentiate between room?

Yes: from doctorate and 86 % 2nd cycle (90% ALE)

Almost all in the same proportion locate the external sounds of the buildings. But this denote that in general there isn't a great concern for the acoustical rehabilitation of the city's facades?

13. Have you considered the bass sounds of your house as the furthest or coming from exterior, and the highest frequencies as coming from near distance (as if they took place in the same room)?

Yes: 72 % from doctorate and 48% from 2nd cycle.

No: 50 % from ALE

The students from doctorate go on the natural tendency of affirmative answer to this question, but in students not licensed decreases until arrives at 48 %. In the case of ALE's students, the answer is reversed clearly and prevail the negative response that arriving at 50 %. Can we deduce in this way that there is most sonorous of architecture in licensed and in students more linked to the ambit of the spaces' design?

14. Have you find connection between the real distances existents between different parts of your round and the perceived ones during its realisation? That is to say, can be the distance controlled without seeing the space?.

No: 72 % from doctorate and 58% from 2nd cycle (70% ALE)

The answers is always negative, which indicates that the people have a small hearing education of the spaces. Obviously, the less habituated to the spaces where they live are who have more difficulties, or also those that don't study the architectonic space in their degree-studies.

15. Have you used all your experience without open your eyes (not even for taking notes, because you have done it at the end of the experience)?.

Yes: 55% from doctorate and 76% 2nd cycle (60% ALE)

It seems that they are sincere in their answers, and we see that the less habituated to their spaces (doctorate and ALE) need to open their eyes in some moment of their round (for fear or ignorance of the space).

16. Have you perceived sounds that you can't identify without looking the cause that produced them?.

Yes: 61% from doctorate and 81% 2nd cycle (70% ALE)

They identify quite well the different sounds of their round. The justification is similar to the anterior question's justification for groups less habituated to their houses.

17. Have you heard perfectly the Doppler effect of falling-off in the frequency when a vehicle (motorcycle, ambulance etc.) that goes for the street move away?.

Yes: 66% from doctorate and 76% from 2nd cycle (60% ALE)

18. For recognising a space, what do you think it has been more important for you?: a) the reverberation of the space (generate with the foot, applauding, snapping fingers, etc), b) the sound of the pavement (generated with the foot), c) the sound of the walls (generated with hands, fingers, etc.), d) any of the preceding answers because I have finally had to look.

a) 55% from doctorate and 63% 2nd cycle (40% ALE)

The reverberation of the space is the parameter that allows to recognise the space, but not the most dominant if we bear in mind the percentages. The ALE's students are who have less control.

19. Have you commented this practice's realisation with your relatives, partners from other groups, courses, etc.? Do they think it's a good or interesting practice?.

Yes: 72% from doctorate and 78% from 2nd cycle (70% ALE)

A very little can hide the anecdotal fact of the experiment. Being a non-habitual exercise they need to comment it. The coincidence is very high in the three studied groups and only three of every ten people prefer to tell nothing to nobody.

20. Still in the case of precedent comments not very positive, do you recommend me that the next year I propose this practice again?.

Yes: 95% from doctorate and 94% from 2nd cycle (80% ALE)

The coincidence is very high and affirmative. Almost all think that I have to propose the experiment year after year.

21. Which title do you think is better for the practice we are talking about?

A lot of them answer that the same of the inquiry "listen the architecture". Others make reference to the topic absence of vision (blindness) or to the learning of the noises.

22. Punctuate from 0 to 10 the utility of the practice for your formation in the energy camps.

8,41 (of average) from doctorate

7,11 (of average) from 2nd cycle

A majority thinks the practice and the active learning of the sounds is quite positive. We don't observe differences between different courses or groups.

Observations

A lot of them point out the need of repeating the experiment, but do it in a place that they don't know. It seems that they want to listen the sonorous space out of their house, but they look for help of some partner guiding them.