Jekyll.comm 1 – marzo 2002

Conversations between scientists and the public in radio *PHONE-INS*: an experimental approach to analyse public perception of science

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"Il ciclotrone" is the weekly science programme of "Radio Popolare - Popolare Network", the most important independent news radio network in Italy, based in Milan. During the last 12 years, once or twice a month listeners have been able to directly ask questions to the guest scientists in the studios, or to express their point of view on some controversial scientific issue.

Among mass-media, the radio has several characteristics which tend to enhance the sense of friendliness and belonging - essential to any true communication. *Phone-ins* at Radio Popolare are not filtered; regular and occasional listeners are used to communicate with or through the radio, and in doing so they contribute to the sense of spontaneity which characterise the programmes. During "Il ciclotrone", very often the "anchor" tends to disappear, and *phone-ins* become a lively conversation between the scientists and the public (whose members seldom agree with each other).

In this presentation, *phone-ins* on science - over the years they involved internationally famous scientists (such as Lewontin, Damasio, Amaldi, Rotblat, Di Chiara, …), and less well-known but reputed Italian researchers - are analysed in terms of their capabilities of providing a tool to understand public perception of science.

Moreover, the authors believe that science journalism shouldn't only inform or educate the public on the work of scientists, but also inform or educate the scientists on how their work is perceived. Indeed, scientists seldom have a chance to hear the criticism (positive or negative) of a large, unselected audience and to have a first-hand grasp of public feelings concerning their work.

Radio Popolare and the weekly science magazine "Il Ciclotrone"

Radio Popolare was born on January 1976 as a "community radio" broadcasting in Lombardy, the richest and most populated region of Italy. It broadcasts mostly news, culture and debates (with phone-ins). At first a co-operative with few underpaid workers and many unpaid volunteers, it is now a company with a staff of 45, one third of whom are professional journalists, and with about 100 external collaborators covering specific topics and expertise. Approximately 60% of its stock is owned by over 13,000 shareholders, the rest by the co-operative. Revenues are evenly split between advertising and subscriptions. 15.000 listeners support the radio by freely paying an average annual fee of 180 dollars. In the last five years, Radio Popolare has built a network all over Italy, supplying news and programmes by satellite to 20 similarly minded smaller local radios. The radio has an average audience in Lombardy of 250.000 listeners a day (but reached 500.000 four years ago), with peaks during the news. Most of them (45%) are in the age range 25-44, with middle or higher education curricula.

Il ciclotrone is a weekly magazine, one hour long, devoted to science and technology. It was started in 1987 by one of the authors (S. Coyaud), and since then has been a regular appointment for the listeners. It is currently edited by the two authors of this paper and relies on a pool of experts, doing physics, astrophysics, biology, maths (no chemistry, regretfully), linked by a common taste for science communication and story-telling. Apart from some series - on climate sciences, or recently on radiation - the format is flexible. Scientific conferences and events open to the public are announced, books reviewed, and one or two core issues discussed with specialists. The programme attempts to tackle hard science lightly but without oversimplifying. It tries to reverse the top-down approach often adopted in science communication (the ones who know speak to the ones who ignore), by presenting scientist as workers which conducts a very interesting and stimulating job. In other words, the programme aims at underlying that every citizen has a role - as a voter, as a consumer, but in particular as the main actor determining diffuse culture - in the development of the scientific enterprise. We would like to make explicit that citizens participate in science as much as science penetrates every aspect of the citizen's life.

During the years, *Il ciclotrone* has evolved. Some aspects, however, have remained unchanged. By exploiting as much as possible the specific features of a radio broadcast, *Il ciclotrone* is often conceived as a conversation between the audience and the scientists in the studio. As opposed to printed media, the radio does not need a reporter: the authors of scientific researches can report on their own work, and the journalist tries to awaken or summarise public curiosity. Moreover, by allowing non-filtered phone calls, the listener can talk directly to a Nobel laureate, or ask an expert about the safety of frozen foods or the means to get rid of space debris and so on. *Il ciclotrone* is constantly seeking the participation of the audience: technology – whether space travel, IT or biotech - kindles heated debates, and so do topics whose social impact is clear, e.g. genetics, neurochemistry of illegal drugs, greenhouse gases and atmospheric chemistry, etc. When treating so called hard sciences, e.g. basic research in physics or molecular biology, the call for participation is somewhat less successful, but over the years listeners' participation has been considerably improving.

Besides merely numerical data on the audience, one of the main assessment of success of the program is, in our opinion, the satisfaction of the invited scientists for the opportunity to communicate with an intelligent if untrained audience, showing true interest and curiosity for their work.

Some assumptions

We believe that the Italian public is indeed well informed about the news and the on-going debates in the world of science. Science has a large enough space in the popular and specialised press, on TV programmes, on the Internet. There are exceptions, of course, but from a technical and journalistic point of view the standard of scientific information is good.
Widespread scientific illiteracy, which is often addressed as a serious problem by Italian governmental and educational bodies, is not related to a lack of information.

More correctly, the reasons underlying an uncritical - and eventually misconceived - approach toward scientific issues have to do with the fact that the public feel that outsiders' opinions are irrelevant. In the last decades science failed to find a stand in the cultural debate, mainly because it tended to stress the distinct roles of experts and lay people.

Moreover, in that same period Italian science communication was conceived as a top-down transmission of knowledge and information; there have been very few attempts to identify and discuss how the perception (both physical and intellectual) of the surrounding world generated by scientific advances could be practically improved.

If in every form of communication we can identify an offer by a knowledge-rich actor and a demand by the public, we believe that in science communication the demands of the public are often by-passed or misunderstood. The main goal of the work presented here is to look for an alternative (though obviously not exclusive) way to understand public demands concerning science.

Understanding the questions of the public: the pro and cons of analysing scientist-public interactions in radio phone-ins.

Most of the means presently available to media and scientists in order to identify the questions of the public are somehow inadequate.

As stated by J.M. Lévy-Leblond : "If science communication is so inefficient, couldn't it be because it answers questions that were never expressed by the 'public', instead of grasping the real ones - even if their meaning may be confused and mostly implied?" (1).
On the one side, statistically significant surveys (such as polls and questionnaires), and even letters to magazines or newspapers and "ask the experts" sections usually imply that the questions can be explicitly formulated. This severely reduces the spectra of elements which build up the so-called public perception of science.

On the other side, questions during conferences or public debates, or the conversations between the public and the scientists in radio phone-ins presented here, are extremely fertile but not statistically relevant: the analysis can be very stimulating, but no general conclusions can be drawn.

The approach presented is a "work in progress" started only recently. The idea of conducting a systematic analysis came from the enthusiastic reactions of some scientists who had taken part in *phone-ins*. In stressing the rich interaction they experienced, they suggested that collecting the main elements of such interaction could be extremely useful both for them and for the public. And, we add, for the journalist.

The approach has many limitations, of course. No extrapolation or generalisation to a broader audience or "the public" is acceptable, since the listeners of our radio programme (and of every programme) is self- selected and yet not easily identifiable. Thus, narrative approach must per force replace quantitative analysis.

These limitations have nevertheless their positive counterpart. Conversations in radio phone-ins emphasise emotional rather than rational aspects of the listeners' personal relationship with science; they represent one of the few opportunities to study the reactions of scientists toward public perception of science; they highlight contradictions rather than straightforward conclusions; last but not least, participants feel they learn something in the process, and their satisfaction leads to a greater personal involvement.

They also provide valuable inputs for the three players of the game.

For the public, they represent a way to be informed not only about scientific results, but also about how a scientist works, thinks and talks; the listeners know they are also talking to each others and contributing to a more general reflection about science and its impact, i.e. about their daily life, a subject on which *they* are the best experts.

The one-hour format of «Il ciclotrone» also allows scientists to take the time to explain the crucial aspects of their work in their own words. When such words aren't deemed appropriate, listeners may propose their own blunt "translations" or summaries, giving the scientists further clues on why their work is interesting or obscure or even threatening to outsiders. Moreover, they undergo a self-training in talking *with* (and not only *to*) the public.

Journalists too are taught useful lessons: how to act as go-betweens, in order to avoid incomprehension and its embarrassing side-effect (calls suddenly stop…); how to give due consideration to the interests, curiosities, feelings, fears, enthusiasms that the public express.

The "conversations"

Questions of the listeners during several radio phone-ins were recorded and analysed, also in terms of the reaction they generated in the guest scientists. No attempt to classify the questions was made, due to the limited data-base available at present and to the specificity of every broadcast and even of every questions, which make any systematisation somehow arbitrary.

A part of this work, concerning a specific series of broadcasts devoted to radiation, was presented elsewhere (2). We report here only two aspects.

Although several questions were asking for a clear cut answer ("I have a large antenna on my roof: am I in danger or not?"), the listeners appeared to be more satisfied with answers concerning methodological principles. Statistical association between exposure to low doses of radiation and cancer induction is poorly understood, and no numbers or data seemed helpful in clarifying the issue: however, answers such as "this is the way we try to understand" seemed more appreciated than answers such as "these are the limited data we have". When the level of accuracy of scientific results is still weak, explaining what is measured, how and when, and how risk rates are being calculated from these measurements make a lot more sense than raw data.

Comments quoting esoteric issues, New Age, Hartman nodes, etc. (when dealing with electromagnetic fields) and accusations against "official or Western or scientific medicine" (e.g. when dealing with radiotherapy) were frequent. Scientists had to take these questions seriously as they were not addressed to science as a kind of abstract activity, but to each of them personally - and to recognise that doubts and diffidence arise from real beliefs (i.e., from part of the cultural background of the speaker). We believe that these same questions would not have been considered with the same respect outside a direct conversation: instead, they would have been shrugged off, thus increasing the gap between scientist and non scientist, and the conviction on both sides that each had been wilfully misunderstood. In this sense, a greater attention to "informal" approaches in understanding public perception of science such as the one presented here could help devising strategies to promote, but not impose, the scientific culture.

In many occasions, questions were not of the type "How does it works?", "What is it?", "Why is it so?", ... but rather: "What do you think of…", "How do you and your colleagues face the fact that…", "I agree/ disagree because…". Listeners are often eager to participate in the cultural debates concerning science if they feel that their illiteracy does not result in their point of view being ignored.

In a conversation with Richard Lewontin many questions came from well read and aware listeners, others from a clearly untrained audience: they ranged from a critical view of the Lewontin-Dawkins debate to "I always knew genes mean nothing, it is only the political system which shapes us...". Both aspects were appreciated by the guest who previously had a very different experience, having prepared "live talks" for a Canadian radio, and clearly enjoyed being "baited" about selfish genes. Curiously, Lewontin represented a turning point: though the guest spoke English with a sprinkling of a few Italian words, and everybody had to be translated, after a few minutes listeners just took over and ran the programme till the end, sometimes with an aside to the journalist-cum-translator ("put this into the right words, will you?"). It had not happened before, to the editors' frustration, and came as a surprise. Broadcasting in two languages was expected to add to the sense of "foreign-ness" of genetics. It didn't, as if the need for a translation, the reassurance that the journalist was in charge of "the right words" anyhow, made listeners bolder and freer.

This new found assertivity was confirmed in a subsequent conversation with Antonio Damasio. Much of the listeners' and Damasio's satisfaction resulted from the interaction between non scientific (often quite personal) views of the brain/mind/consciousness relationship expressed in the lay questions and the scientific view of the guest scientist. As in Lewontin's case, the opposition between nature and culture, biological (or genetic) determinism and free will, was questioned informally or naively by the listeners, and both sides were delighted to hear that the other was thinking along the same lines, that personal views - for instance assumptions about the parallel evolution of higher faculties and of neo-cortical mass - coloured the interpretation of results. Reductionism, the use of models, the assessment of their applicability to human health or behaviours also crop up frequently, though listeners do not use "the right words". They are grateful, and flattered?, when scientists recognise their points (dignifying it with the "right" word), and acknowledge that these are difficult and important matters for them too, as biochemist Gaetano Di Chiara did when he came to discuss his research on the effects of cannabinoids on rats' brains, which had just been published in «Science». Damasio's and Di Chiara's interviews were later published in the science page of a national newspaper with the anonymous listeners credited as "collective interviewers".

Not only listeners were emboldened. When invited to discuss the possible solutions to monitor and eliminate space debris, physicist Bruno Bertotti was initially taken aback: the subject was surely too "dry". He liked the challenge though, and was rewarded with much curiosity by science-fiction fans and green-minded people anxious to safeguard the "outer environment". They extracted ever more details from the scientist, and had imaginative proposals for space waste removal, disposal and recycling. Bertotti, a sedate gentleman, one of Schroedinger's post-docs, accepted to take even fantastic ideas seriously, and used them as cues to explain the "hard bits".

In other occasions, interactions were less positive: the guest scientist can indeed be perceived at the same time as an advisor and an “enemy”. Too much self-assurance can irritate the audience and provoke harsh criticism. As an example, during a *phone-in* on GMOs a too reassuring and self-confident scientist (“I know how it works, so trust me”) was attacked by the audience. The listeners appeared to be informed, in some cases misinformed, but nevertheless they had clearly given the subject ample consideration. Misinformation is very different from ignorance: it actually contributes to create a personal conviction which cannot be simply judged “wrong”. By not taking into account the listeners' “culture”, the scientist generated hostility, and prevented the audience from listening with an open mind to his arguments (i.e. GMOs could feed the hungry) or share his curiosity, his search for more knowledge. From the limited but rich material concerning this issue, it clearly emerged that the arrogance of science (and of ourselves, science journalists) is largely responsible for the poor success in fighting the spread of irrational fears.

Further developments

In the next years, we will continue the analysis of radio phone-ins outlined here, hoping to reach soon a data set large enough to draw more general conclusions. It is in any case intrinsic to the approach that no systematic (not to say scientific) conclusion will ever emerge, each programme being a "sum of stories". However, we are convinced that certain types of information, which we consider extremely valuable, can emerge in similar type of studies only.

Questionnaires, polls, interviews, “ask the scientists” sections in newspapers or magazines, etc. can indeed be a rich source of data and hints for the sociologist of science and more generally for studies in science communication. However, as the type of work presented here is missing statistical significance, these sources of information are missing (for their very nature, which implies a high degree of objectivity and the possibility of generalisations in the analysis) a crucial aspect: the emotional one. Awkwardly expressed or implicit questions, anxieties, beliefs and feelings can indeed be as important as well organised thought in drawing a correct picture of our audiences and their cultures.

References

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