

INTERACTIVE THEATRE AND SCIENCE COMMUNICATION¹ TEATRO INTERATTIVO E COMUNICAZIONE DELLA SCIENZA

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Abstract:

To avoid the mistakes of the past and to make the public communication of science more effective in terms of anchoring a scientific mentality in society, it is necessary to believe in the possibility of a co-construction of knowledge together with citizens. The relationship between science and society is realized today in a communicative action that is more egalitarian than the one underlying the concept of scientific dissemination, thanks to a new tool, the active involvement and direct relationship between scientists and citizens, for a democratic education of both. A possible form of constructive dialogue between scientists and citizens is theater, which for a long time has lent itself to the involvement of the public and performances in which spectators are called to think, participate, and make decisions, also becoming an opportunity for personal and social change. We experienced an interactive performance during European Researchers' Night 2022 in Bologna, where viewers were called upon to make decisions, physically intervening and taking responsibility for determining the course of the narrative. Through the final interviews we learned that having an active role in the theatrical performance has helped to increase attention, to solicit reflexivity and in general to raise awareness of the subject matter.

Per evitare gli errori del passato e per rendere più efficace la comunicazione pubblica della scienza in termini di radicamento nella società di una mentalità scientifica, occorre credere nella possibilità di una co-costruzione della conoscenza insieme con i cittadini. Il rapporto fra scienza e società si realizza oggi in un'azione comunicativa più egualitaria di quella che era sottesa al concetto di divulgazione scientifica, grazie a un nuovo strumento, il coinvolgimento attivo e il rapporto diretto tra scienziati e cittadini, per una formazione democratica di entrambi. Una possibile forma di dialogo costruttivo tra scienziati e cittadini è il teatro, che da molto tempo si presta al coinvolgimento del pubblico e a performance in cui gli spettatori sono chiamati a pensare, partecipare e prendere decisioni, diventando anche occasione di cambiamento personale e sociale. Abbiamo sperimentato una performance interattiva durante la Notte dei ricercatori 2022 a Bologna, dove gli spettatori erano chiamati a prendere decisioni, intervenendo fisicamente e assumendosi la responsabilità di determinare il corso della narrazione. Tramite le interviste finali abbiamo saputo che

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l'averne un ruolo attivo nella performance teatrale ha contribuito ad aumentare l'attenzione, a sollecitare la riflessività e in generale a sensibilizzare riguardo all'argomento trattato.

Keywords: science communication; public engagement; interactive theater; european researchers' night

Parole chiave: comunicazione della scienza; coinvolgimento e partecipazione; teatro interattivo

1. The context: from popular science to public engagement

Looking at the history of scientific popularization, we realize how this is connected to the history of the mass media, starting with the press. If initially the disclosure had a cultured public as a reference, with the diffusion of the printed book the publishers, seeing the possibility of increasing sales, try to reach a wider audience of readers, publishing works designed and structured for the "people". After the unification of Italy, series and magazines dedicated to scientific topics and designed for the public spread. The work of the author-scientist consists in adapting the theme and the narrative to the literary genre and to the publisher's requests based on the categories of readers. The goal was to take science out of the labs and universities and help fight the prejudices of popular culture. The operation was, however, partially successful, and already at the end of the nineteenth century the interest of publishers in continuing with this type of investment waned. The main reason for the limited success of this dissemination channel was probably the high level of illiteracy of one part of the population, which was added to the low level of education of another substantial part of the population (Govoni, 2002).

Popular scientific literature would have brought about another phenomenon, more harmful than profitable: the authors were forced to reach, in their narrative form, extreme levels of simplification, which, according to some analysts, would have been the cause of the emergence of false scientific theses. Dissemination had become an impoverishing process for science, which will be used for propaganda purposes and for the dissemination of false beliefs (one example above all: the myth of the superior "race").

After the Second World War in a climate of cold war, on the other hand, in the United States the need to train more young people in scientific culture, to create more and more capable scientists capable of leading the nation to win Soviet competition. Thus arises the need to bring citizens closer to science, also overcoming prejudices and hostilities due in part to bad information. All the means of mass communication are therefore used, from cinema to television, with the aim of bringing scientific thought closer to the people, also using public communication.

It is interesting to observe how, although scientific popularization was a widespread phenomenon throughout the twentieth century, theoretical and empirical research on the public communication of science was born very late. In 1985, the Royal Society introduced in its report the concept of Public Understanding of Science, which in fact constitutes the first attempt to define a reference model and a few years later, in 1992, the first academic journal entitled «Public Understanding of Science», which contributes to a first level of systematization of the theoretical context. The PUS

model was soon renamed as a “deficit theory”: at the basis of this approach there is the belief that the public's hostility towards science depends on a lack of information and therefore on a deficit that removes the expert knowledge (that of scientists) from the secular knowledge of non-experts. To arouse citizens' trust in science and to determine behaviors aligned with the recommendations of scientists, it is necessary to ensure that the people have access to scientific information. Access to information, therefore, would be the determining condition for the success of science among citizens (Corazza, 2021).

Today, this conception, although still widely diffused, is judged naive and lacking in a complex reading of reality. Those who criticize the PUS model bring some considerations that testify to the existence of a more articulated relationship between the knowledge of individual citizens. In the first analysis, especially after the advent of the Internet, the people have direct access to information, moreover without a real control of the quality and scientific validity, but which in any case constitute a set of knowledge that generates personal ideas on the topics; moreover, each person associates emotional experiences with knowledge, such as fear, also conditioned by specific personality traits, such as the ease or otherwise of trusting someone or perceiving a sense of self-efficacy; finally, the relationship that starts from above (the scientist) to go towards the target audience does not provide for a bi-directional exchange, helping to distance rather than bring the parties closer. The limits of this approach are also evident today, when the role of the scientist as holder of the truth (to be shared with the vulgar, hence the term disclosure) is often questioned; moreover, often the need to simplify the message, dictated by the speed required of the message by the mass media, induces the scientist to give up the necessary need to problematize and frame the information in broader and more detailed cultural and logical contexts (Bucci, 2020; Davies, 2013; De Bortoli, 2017; Fabris, 2014; Mede, 2020; Pitrelli, 2003).

All this led to the development of a second model for reading the public communication of science, what has been defined as PEST - Public Engagement with Science and Technology. The model incorporates a new concept, public engagement, which, considering science structurally embedded in society, provides the citizen with a role of co-participation in the construction of knowledge, with personal forms of involvement and commitment, especially towards decisions with social repercussions. and in everyday life (Bucchi, 2016, 2019, 2021).

The concept of “deficit” is replaced by that of “dialogue”, which brings science closer to society by attributing to dissemination activities a new scientific dignity and renewed objectives: the need to create a common environment where not only scientists and citizens can compare themselves, different ideas, and positions, but also the results of research work from different sectors for an interdisciplinary perspective.

To avoid the mistakes of the past and to make the public communication of science more effective in terms of anchoring a scientific mentality in society, it is therefore necessary to believe in the possibility of co-construction of knowledge and in the importance of investing economic resources to raise the level. education of citizens.

2. From dialog to public engagement

The relationship between science and society is realized today in a communicative action that is more egalitarian than the one underlying the concept of scientific dissemination, thanks to a new tool, the active involvement and direct relationship between scientists and citizens, for a democratic education of both (Bucchi & Trench, 2016).

At the base there is an essential question: can knowledge be transferred? From the pedagogical-didactic point of view, in the engagement model we can see that cultural transition from the concept of transmission of knowledge to the socio-constructivist paradigm that the school is already implementing. The change of perspective, a true Copernican revolution, assumes that the learning process is the work of the subject, who, inserted in a social and relational context, carries out an active restructuring of what he already knows thanks also to the exchange with others. Rethinking the relationship between Science and Society in the name of engagement means carrying out a process like that which the socio-constructivist paradigm requires of the school: redesigning the learning environment, relationships, spaces, tools for a renewal of educational and didactic practices according to a holistic and systemic approach (Castoldi, 2021). If the school is taking this step, the public communication of science has yet to change its paradigm. Public engagement activities are considered a function of research institutions and included in the third mission of universities, but the debate is still open on which are the most suitable communication models and languages to achieve the purpose and which professionals should be involved. The needs to be considered are, on the one hand, respect for scientific rigor, on the other the need to clearly communicate complex realities, in a dialectical relationship between science and society. It is a question of meeting in the third space of digital communication of science and therefore of hybridizing more polarity: scientific rigor and originality, known and unknown, individual knowledge and collective knowledge.

For scientific dissemination understood in the classic way, therefore according to the deficit model or PUS model, the initiatives that we know and that can be activated are many: from television broadcasts to scientific documentaries, from conferences to lectures recorded for the web, from laboratory demonstrations to digital simulations. For the category of engagement, on the other hand, it is more difficult to find such a vast repertoire: to the classic situations, which involve a one-way scientist-citizen relationship, there must be added opportunities for engagement and involvement of the public, to allow opportunities for sharing and for collaborative construction of ideas, artifacts, processes.

3. Theatre as a tool for personal and social change

The underlying question is always the same: how to make the science-society relationship more effective in terms of cultural growth of citizens and the establishment of a scientific mentality. There are many scientific dissemination initiatives and often involve the mass media: television or radio broadcasts, YouTube channels, scientific conferences, theatrical performances. TEDs are an example of theatre lent to the needs of lecturers, in which the public is spectator of what increasingly resembles a show performance. An acronym for Technology, Entertainment, Design, the initiative started in 1984 from Silicon Valley with the aim of “inspiring people who listen with ideas that deserve to be disseminated” (this is the organization's motto). After the birth of

YouTube, the interventions are published on the Internet, where today they manage to reach a very large audience, often becoming viral. People considered experts on a topic have 15 to 18 minutes to present the topic in the most engaging way possible. As the acronym itself says, entertainment is one of the decisive aspects and conditions the style of the conference, making it more like a show than a lesson, focusing heavily on different forms of entertainment. Overall, however, it is a show of a single person, the lecturer, who addresses his audience without this being able to intervene: he tells stories that arouse interest, often proposing with great emphasis solutions considered decisive without producing a contradictory, nor any form of interaction. This model of public communication begins to be criticized, precisely because science placed at the service of the show can become an opportunity for advertising for individual products or a “catwalk” for some more narcissistic personalities who “devour” the scene, without leaving the public the possibility to reflect critically with the proposed contents (Congiu, 2022).

On the contrary, for a long time the theatre has lent itself to the involvement of the public and to performances in which the spectators are called to think, participate, and make decisions, as an opportunity for personal and social change. Not being able to enter here in the history of theatre and in the analysis of the various forms, we mention one above all: the Theatre of the oppressed by Augusto Boal (2011). Inspired by the ideas of Paulo Freire (1971), the method provides the possibility not only to speak but also to analyse, give answers, act, interact: the story represented does not originate from external authors, but from spect-actors who are thus placed in a position to reflect on their social situation, to identify conditions of discomfort, to become aware of the problems in order to participate in the proposal of solutions, in order to include different representations of reality and explore possible transformations in a creative and socialized form. By providing a technique and a tool for reflection and analysis, the Theatre of the Oppressed aims to train a conscious and active citizen (Gigli, Tolomelli and Zanchettin, 2008; Santos, 2018; Aglieri and Aprigliano, 2019).

There are many forms that can be invented to physically involve the audience of a theatrical performance. At the Researchers' Night in 2022, at the University of Bologna a group of students from the Department of Industrial Chemistry wrote and produced a show that involved the interaction and participation of spectators, as a way of raising awareness of the issue of ecological transition.

4. An interactive theatre experience at the European Researchers' Night 2022

The performance prepared by the students directly involves the people of the audience who physically enter the playing space of the actors. The technique of interactive theatre, which inspired the students, provides that people can hold props, move from one side of the stage space to the other, become characters of the performance, provide suggestions for the continuation of the story by voting collectively for guiding the plot in a new direction as in Augusto Boal's theatre (2011). Interactive theatre is not only made for entertainment, as in the case of the previously analysed TEDs (Congiu, 2022), but it is often used for debates on real-life social or political issues: it allows the audience to immerse themselves as an active part in the contents discussed and to be at the center of the debate. These performances applied to the scientific topics can achieve the goal of

creating the much-desired link between science and society and raise awareness of the need for a new “scientific thinking” (Kuhn, 2011; Murtonen, Balloo, 2019).

In the performance intitled “Houston, we have a problem”, written and produced by a group of university students from the Department of Industrial Chemistry, the space used was not a stage to encourage interactivity and to give the public the opportunity to actively participate even with the physical occupation of the space itself. On stage, two astronauts have a problem, they don't have enough oxygen to return to earth. Having solved the problem, they return to earth and discover that the life of human beings is in danger here. The scientist explains: “Maybe oxygen is not running out here, but we have other problems, equally serious. In the past, the production of energy on our planet was based on carbohydrates, which by oxidizing generated energy. Now it is based on hydrocarbons, which are in a smaller form, and therefore can oxidize more, and what follows? They allow us to get more energy! Too bad that no one initially posed some problems...”.

The spectators are called to take the role of the astronauts who have to solve the problem of energy production. To choose, spectators have at their disposal colored cards that they have to place from time to time; depending on the prevalence of color, the narrative takes one path rather than another. The spectators have some choices to make to avoid producing too much carbon dioxide:

- raise people's awareness, explain the problem to everyone, so that everyone understands and is aware of it ... but there is no time! Or take action now, taking drastic action to start the ecological transition right away! It doesn't matter if we don't have the support of the masses!
- Reduce energy consumption in our small, in our homes, or make a general economic sacrifice and invest in the development of energy from renewable sources.
- Choose photovoltaic panels or biomass.

At the end of the performance, we interviewed some spectators (22 young people, aged 16 to 25) asking the following question: “Did the request to physically take part in the event/show arouse greater interest in you? Why?”

Among the most recurring adjectives in the answers, there are: engaging, interesting, stimulating, fun. Below are some of these responses:

- Helps you think well about what you are doing.
- You feel involved.
- Yes, because there is human contact with people who have to do something together, a direct face-to-face exchange with others, watching what everyone is doing.
- However, it works in a context like this, where people came for the overall event and therefore also stopped here, I don't know if it would be easy to attract the public to an event exclusively dedicated to the show.
- Expressing yourself in words would have been more embarrassing, while having to participate by raising an arm to show a card you feel involved, because you have to do something, but protected from the crowd.

- It felt like playing a game, so I enjoyed it and was paying attention.
- It is easier to follow, you are forced to think because you have to act.
- It allows to get out of the “scientist against citizen” schemes and to bring together the information of scientists with the ideas of citizens.
- Because there is the possibility of interacting while maintaining a kind of anonymity. There could also be a higher level of interactivity.
- Having to take a position even physically, with movements, makes communication more impactful. Certain things said have stuck with me.
- I would have liked to play one of the characters, to be able to speak.

Among the most relevant aspects, the perception of a double need emerges: to restore human contact by progressively reducing the distance between 'the scientist' and the spectators and between spectators; give the word back to a body acting on the communicative level.

5. Corporeality in performative practice: new research perspectives

The proposed experience underlines the need to reflect on educational action in an active form through the adoption of engagement strategies that interact with the visual and performing arts. Strategies that claim the role of the participants' corporeality in building meaningful learning relationships. The body articulates the performative practice by placing itself at the center and redefining the processes of construction of meaning with its presence.

At the same time, the performative practice attributes a role to the body through the adoption of a specific technique and the assumption of a certain position that transforms an “any” body into a “particular” body that assumes a constructive role within the situation, bearer of meaning (Marrone, 2001). It is a body that thinks and acts, a body occupies and builds the space of sociality, contributing to its redefinition. The sense that is produced is a sense in the making where production and fruition take place simultaneously. Performer / actor and spectator interactively build the practice negotiating it from time to time. The sense is produced therefore in the here and now of the interaction. The performative practice relates the bodies that enter to form a field of co-presence that involves a circularity in the production/reception of meaning (Contreras Lorenzini, 2009). New interesting research perspectives that we would like to develop see theatrical performance fit into contexts of virtual or real games such as escape rooms, full of great opportunities for participation within new learning environments aimed at promoting knowledge and skills more effectively.

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