Introduction: communicating science, technology and medicine

by Ana Simões[*]

Popularization of science has already been at the forefront of research among members of the community of historians of science for more than two decades. While the focus was initially on books and periodicals in the Victorian (essentially early 19th to early 20th century) context, other periods, spaces and sources have been progressively taken into consideration.[1] At the same time historiographical revisions have compelled historians to move away from the categories underlying the diffusionist model and their associate meanings, which oppose creative producers to passive recipients and consumers, and contrast the production of knowledge with its transmission.[2] The vertical model has given way to a horizontal one of circulation and appropriation of science, which gives voice to various actors and to their different, often contradictory, agendas, and conceives science as an active form of communication, in such a way as to ultimately blur the distinction between the making and the communication of science.[3]

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[1] The literature on this topic is extensive. As merely indicative let me refer to James Secord, *Victorian Sensation. The Extraordinary Publication, Reception and Secret Authorship of* Vestiges of the Natural History of Creation (Chicago: The Chicago University Press, 2000); Jonathan Topham, "Scientific Publishing and the Reading of Science in Nineteenth-Century Britain. A Historiographical Survey and Guide to Sources," *Studies in the History and Philosophy of Science,* 2000, 31A: 559-612; David Knight, *Public Understanding of Science. A History of Communicating Scientific Ideas* (London: Routeledge, 2006); Aileen Fyfe, Bernard Lightman, eds., *Science in the Marketplace. Nineteenth-century Sites and Experiences* (Chicago: The Chicago University Press, 2007) for the British context. For the French and Italian contexts see Bernadette Bensaude-Vincent, Anne Rasmussen, eds., *La Science Populaire dans la Press et l' édition. XIX et XXe. Siècles* (Paris : CNRS, 1997), Paola Govoni, *Un Pubblico per la Scienza. La Divulgazione Scientifica nell' Italia in Formazione* (Roma: Carozzi, 2002). For the European Periphery see Faidra Papanelopoulou, Agustí Nieto-Galan, Enrique Perdiguero, eds., *Popularizing Science and Technology in the European Periphery 1800–2000* (Aldershot: Ashgate, 2009); Josep Simon, Néstor Herran, eds., *Beyond Borders: Fresh Perspectives in History of Science* (Newcastle: Cambridge Scholars, 2008).

[2] For a description and a critical comment of the diffusionist model regarding popularization of science see Stephen Hilgartner, "The dominant view of popularization: conceptual problems, political issues," *Social Studies of Science,* 1990, 20: 519-39.

[3] Concerning historiographical reappraisals see for instance Terry Shinn, Richard Whitley, eds., *Expository Science. Forms and Functions of Popularization* (Dordrecht: Reidel, 1985); Roger Cooter and Stephen Pumfrey, "Separate Spheres and Public Places: Reflections on the History of Science Popularization and Science in Popular Culture", *History of Science*, 1994, 32: 237–267; Bernadette Bensaude-Vincent, *L'Opinion Publique et la Science. A chacun son Ignorance* (Paris: Institut d'Édition Scenofi-Synthélabo, 2000); James A. Secord, "Knowledge in Transit", *Isis*, 2004, 95: 654–672; Kostas Gavroglu, Manolis Patiniotis, Faidra Papanelopoulou, Ana Simões, Ana Carneiro, Maria Paula Diogo, Jose Ramon Bertomeu-Sánchez, Antonio Garcia Belmar, Agustí Nieto-Galan, "Science and technology in the European periphery. Some historiographical reflections", *History of Science* 2008, 46: 153-175; Jonathan Topham, ed., "Focus: Historicizing Popular Science", *Isis*, 2009, 100: 310–368; Agustí Nieto-Galan,

The topic of this HoST issue, dedicated to communicating science, technology and medicine, is in line with the journal's founding aims of striking a balance between local concerns and international trends, interweaving history of science and history of technology (and also in this case history of medicine), and extending the provenance geography of the papers while giving a place to contributions by Portuguese authors.[4] In fact, articles in this issue address what has formerly been called the popularization of science, broadly conceived in order to encompass also technology and medicine; centre on different (peripheral) contexts, yet circumscribed to the two countries of the Iberian Peninsula, which are not usually the object of mainstream historiography; cover an extended time period, ranging from the 18th to the 20th century; and at the same time, contribute to recent historiographical debates, offering new considerations on the role and functions of the communication of science, technology and medicine. Together with other works focussing on contexts of the European periphery,[5] this issue hopes to create a momentum that will soon enable to include in scholarly discussions, such as the FOCUS section "Historicizing 'Popular Science'", reflections encompassing perspectives stemming from contexts other than those of the so-called Big Four.[6]

In "A vulgar recreation," the first paper in this HoST issue, José Alberto Silva draws attention to the implications of recent views of science as a communicative enterprise by noting that they ultimately entail linking the emergence of "modern science" in the 17th century to its initial circulatory/communicative modes. These considerations set the stage for a discussion of the multiple functions (scientific text, textbook, popularization book) and the characterization of the typology of readers of the multi-volume work titled *Philosophical Recreation*, authored by the Portuguese Oratorian priest Teodoro de Almeida, which became a best-seller in the Iberian Peninsula and Latin America. It is in this context that the author puts forward the interesting claim that *Philosophical Recreation* should be called a *vulgarization*, instead of a popularization book, contributing in this way to the discussion of how the

Los públicos de la ciencia. Expertos y profanos a través de la historia (Madrid: Fundación Jorge Juan, Marcial Pons Historia, 2011).

[4] See editorial note of first HoST issue.

[5] Papanelopoulou et al. *Popularizing Science and Technology in the European Periphery*; Simon, Herran, eds., *Beyond Borders*, and contributions to *Centaurus*, 2009, 51(2), dedicated to science and technology in Spanish, Greek and Danish newspapers around 1900, coordinated by Faidra Papanelopoulou and Peter C. Kjærgaard.

[6] Despite reference to the perspective of the international group STEP (Science and Technology in the European Periphery) included in Jonathan Topham, "Introduction" to FOCUS "Historicizing ´Popular Science´" (*ISIS*, 2009, 100: 310–18), contributors include exclusively experts in the British, German, French and United States of America contexts.

processes of "popularization" of science should be appropriately named when one deals with periods before the 19th century. The emphasis on *vulgarization* emphasizes that in the context of a highly illiterate population, the readership of that multi-volume book was still restricted to a literate elite (clergy, nobles, the bourgeoisie, state officials, judges, academics, lawyers, teachers, and soldiers) who could afford to buy and read it, and that the use of vernacular languages, Portuguese in this particular case, was the main vehicle to conquer an enlarged—but still far from being popular—audience, which was neither knowledgeable in Latin nor of other European languages, such as French or English, in which many of the books on the new natural philosophy were being written and circulated.

Despite the risks of extrapolation to other contexts and periods, the former conclusion certainly raises a point. When dealing with geographical contexts associated with populations with high rates of illiteracy extending well into the 20th century, historians of science and technology have to constantly reassess the meaning of *popular* when talking about the *popularization* of science, technology and medicine. They should certainly be open to look for other (symbolic or non-symbolic) sources as possible means of communication accessible to illiterate audiences. In such contexts, the habit of oral and multiple readings of newspapers taking place in taverns, barber-shops or cafés, as opposed to individual reading of books and periodicals, or later in time, the practice of listening to the radio, or watching TV programmes, documentaries and films, offer privileged mechanisms for public access to knowledge under stringent communication constraints.

Extreme conditions often call for drastic measures, so these communication scenarios may unveil peculiar strategies and highlight singular trends. These are questions which the three first articles in this issue set out to implicitly or explicitly address. Despite the variety of topics and periods, all contributions draw attention to the (certainly unexpected?) active role played by readers, viewers and consumers, as well as the role of controversy and debate in contexts as different as mid-18th century Lisbon, late 19th-century Barcelona, and Spain in 1930s and 1940s, as seen through the lens of libertarian movements and Franco's regime, respectively. Additionally, some authors manage to tie the discussion of communication processes and strategies with recent fields such as the urban history of science and science under dictatorship.[7]

[7] For urban history of science see Sven Dierig, Jens Lachmund, J. Andrew Mendelshon, eds., *Science and the city, OSIRIS* 18 (2003), and references therein. Despite an extensive bibliography on science and fascism, the intersection of popularization and fascism is still to be explored.

In "Scientific 'marvels' in the public sphere: Barcelona and its 1888 International Exhibition", Agustí Nieto-Galan places the 1888 Barcelona International Exhibition in the broader context of urban history of science by claiming that this singular event should be envisaged as a manifestation of the city as a whole. It is within this methodological framework that various instances of the communication of science, technology and medicine are discussed, from the public fasting experiments of Giovanni Succi, to the technological failure embodied in captive ballooning, the amusing shows of electric and optical wonders, in which various panoramas played central stage; finally the exhibition of live animals, including exotic ones, displayed in several places throughout the city. In every case, public debate arose and contradictory opinions were expressed regarding the confrontation between traditional and alternative views of medicine, the scientific status of experiments, the impact of technological failures, and the role played by science, technology and medicine as tools in political debates concerning the pros and cons of the exhibition, as well as the associated discussion over the ways in which this complex event revealed the progressive or backward character of the city of Barcelona when contrasted to London, Paris, Vienna or Chicago. The communication of science, broadly conceived to encompass also technology and medicine, played, as usual, multiple functions, from entertainment to education and research, but contrary to the norm in other important cities, experiments were used to question the authority of local science and the status of local scientists.

In "Scientific-medical knowledge management through media communication practices: a review of two opposite models in early 20th century Spain", Carlos Tabernero, Isabel Jiménez-Lucena, and Jorge Molero-Mesa build on their former research in order to compare the multilayered uses of communication of science, technology and medicine and their implications for the role of non-expert participants vis-à-vis experts in such antagonistic contexts as the anarcho-syndicalist press and documentaries associated with Franco's regime. Their comparative exercise also builds on the methodological premise that if science is presently considered as both practice and *communication*, mass media should concomitantly be viewed as both communication and *practice*. On the one hand, news on medicine and health published in libertarian newspapers and periodicals discussed the role of experts versus non-experts, putting into evidence the participation of non-experts (readers in Q & A sections in the periodical *Estudios*, to give one example), criticized hegemonic forms of knowledge, the control imposed by traditional networks of experts, and

discussed how common people could produce "true" (popular) science in such a way as to contribute to the emancipating role of the working class. On the other hand, the various documentaries on colonial medicine-health issues conveyed a vertical view of communication, clearly separating experts from non-experts, and contributing to the enforcement of an uncritical view towards the regime-reinforcing power relations already established by other means. In addition, both case studies highlight the ideological role of education, one of the multiple functions often played by popularization, as well as the power of knowledge as a privileged means for social transformation.

By seriously taking into consideration the role of the political context in shaping communication strategies, the first three papers in this issue emphasize how the communication of science, technology and medicine serves precise political functions. At times appropriated by social groups, political parties, or even regimes, its propagandistic style is often assumed as part of the ideological message to be conveyed. One can therefore claim that there is often (if not always) a strong ideological basis in the communication of scientific, technological and medical knowledge, which is often bypassed or underrepresented in historical literature when it should be taken much more seriously. This is precisely the focus of the last article in this HoST issue.

In "Science popularization, hegemonic ideology and commercialized science", Kostas Gavroglu calls attention to the oft-forgotten, or easily dismissed, ideological dimension of the popularization of science, going as far as claiming that if there is anything which closely accompanies the circulation of science, technology and medicine, then that very thing is ideology. According to the author, all instances of popularization of science serve a hidden agenda that should always be taken seriously in historical discussions. Popularization of science becomes a fundamental means to propagate and strengthen ideologies. This is broadly conceived as shared worldviews established by various means, in such a way as to become a tool for social groups, cities, regimes and empires to impose their agendas, as the former three articles have shown, or as a means to assert the reduction of human and societal complexity to simple mathematical modelling by the reinvented scientific imperialism of the hard sciences over the social sciences, as Kostas Gavroglu emphasises. Additionally, popularization contributes to the formulation and imposition of scientific utopias, ranging from the belief in cheap and limitless sources of energy to a global disease-free society; and finally, it helps to reinforce hegemonic values and discourses.

The final question I want to raise is indeed a vexing one: what is genuinely *peripheral* in the discussion offered in this issue, and how are we able to deepen mainstream literature by exploring this historiographical approach? No one doubts that the historical literature has been enriched by new case-studies and the consideration of new historical sources. However, beyond this straightforward claim, what can we find in communicating science, technology and medicine in peripheral regions that we would not find in other contexts? It seems to me that one distinctive characteristic is, first and foremost, the status and authority of science and scientists, which is often taken for granted in non-peripheral contexts, but pervades in discussions insistently in peripheral scenarios, often in relation to the rhetoric of modernization and of progress. This was the case with the controversies surrounding the writings, lectures and shows on the new natural philosophy produced by Teodoro de Almeida and those following his Opening Address at the Academy of Sciences of Lisbon, or the various controversies surrounding scientific, technological and medical aspects, and especially the fasting experiments and performances that took place at the International Exhibition of Barcelona. Therefore, it is the legitimization of science, its association with the building of a nation's identity, and the development and progress of places, cities, regions and countries, often considered as backward, that emerges as one of the distinguishing features of science, technology and medicine communication in the *periphery*. This is certainly a major and intriguing question, which needs to be further explored in case studies involving more research on local peripheral practitioners, popularizers and audiences.