SISSA – International School for Advanced Studies Journal of Science Communication
ISSN 1824 – 2049 http://jcom.sissa.it/

Review

Science, Technology, and the public in the European Periphery

A report of the 5th STEP meeting (1-3 June 2006, Mahon (Minorca))

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From 1 to 3 June 2006, the 5th STEP Meeting devoted to the "Popularisation of Science and Technology in the European Periphery" was held in the city of Mahon in the island of Minorca (Spain). STEP ("Science and Technology in the European Periphery" [http://www.cc.uoa.gr/step/]) was founded in Barcelona in 1999, and gathers around hundred historians of science from all over Europe with a special interest in the role of Science and Technology in countries that traditionally have not played a leading role in the advancement of science and technology. The main results of the 5th STEP meeting are presented in this paper.

STEP is a multi-national research group focused on the study of processes and models of circulation of scientific and technological knowledge between European centres and peripheries from the sixteenth to the twentieth century. STEP gathers together researchers and university teachers from Belgium, Denmark, Finland, Greece, Hungary, Italy, Portugal, Russia, Spain, Sweden, Turkey, etc. The group organises thematic meetings to be held biannually, that revolve around three methodological/historiographical issues: the shift from an historiography of transmission to an historiography of appropriation, the shift from the perspective of the centre to the perspective of the periphery, the shift from the isolated study of the periphery to the comparative assessment of developments.

The 5th meeting of STEP that took place on 1-3 June on the island of Minorca in Spain, gathered over 35 speakers with papers covering various aspects of the history of science popularisation in the countries of the European periphery from the 18th century until our days. The great number of participants, as well as the great diversity in the papers presented, indicates the interest and proliferation of studies in the popularisation of science in the European 'periphery'. The meeting aimed at the examination of science popularisation as one of the practices of appropriation. Because of the specificities of the countries of the European periphery, such as for example the lack of rigid institutional structures, the blurred distinctive lines between professionalism and amateurism, the fused identities of scientist, science teacher, and 'science populariser', the terms 'science popularisation' and 'popular science' acquire a distinct character that can be only deciphered by answering the questions of Who? What? How? Where? When? For What? and for Whom?

Since a vast majority of 'peripheral' countries in Europe have never had a Newton, a Darwin or an Einstein, the historical analysis of their scientific culture (which embraces science and technology) through the study of the appropriation of ideas in the local contexts seems a more rewarding approach than a history based on the search of great luminaries.

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During the 17th century, science acquired a public character, through public demonstrations that aimed at the establishment of an epistemology of common experience.[1] However, 17th century natural philosophers perceived their public space as a secluded and narrowly defined space that was accessible only to the upper classes of society, the so-called 'gentlemen of science'. It was only during the late 18th and early 19th centuries that scientific activity became accessible to a public beyond an elitist sphere. Indeed, it was during these centuries that the term 'popular' acquired the sense of 'intended for or suited to ordinary people'.[2]

The incredible variety of means (books, pamphlets, magazines, museum exhibitions, public lectures etc) through which science was communicated to the lay public is often invariably described with the term 'science popularisation'. Although the terms 'science popularisation' and 'popular science' have been terms used by historical actors, historians and sociologists of science have transformed them into methodological categories, and a whole sub-discipline- that of the history of science popularisation- has been formed. However, recent trends in the historiography of popularisation, and especially the work of James Secord and Jonathan Topham,[3] have questioned the appropriateness of the use of the terms 'science popularisation' and 'popular science' both as methodological categories and as a sub-field of the history of science. Despite the unprecedented wealth of studies of science popularisation and popular science, the historiography of the field has not found a replacement for the rejected stereotypical notion of popularisation as a mere simplification of scientific knowledge, which is diffused, through various mechanisms, to a lay public.[4] Historians who have neglected their historical origins, and their change in meaning over different time-periods and different locations have often used the terms 'popular science' and 'science popularisation' uncritically. Moreover, The emergence of modern science, especially from the 18th century onwards, is intrinsically linked to power and politics. Recent historical research considers science as the embodiment of power claims of certain social groups. Communicating science to the public, therefore, cannot be seen as a simple procedure, confined to the simplification and diffusion of scientific knowledge.

Although we agree with the methodological refinements put forth by Secord and Topham, we believe that there is still space for studies on the 'popularisation of science' on the condition, of course, that historical actors and historical categories are not used as historical short hand but are considered in their historical context. Secord's emphasis on the 'transit of knowledge', where there is no distinction between the making and the communication of science is in tune with the quest for an historiography of appropriation that does not depend on bipolar categories (making- communication, production-reception etc) but considers the circulation of scientific knowledge as an ever-going creative process. In this paper we would like to present some of the common characteristics of the practices of science popularisation in the countries of the European Periphery that were put forth by specific case-studies presented at the meeting.

The case studies presented in Minorca may lead to the identification of a specific typology of science communication in the periphery. It is often the case that the 'populariser' is not easily distinguished from the 'scholar-scientist' or even the 'science teacher'.[5] Popularisers' interests usually extended to more than one scientific field. Their activities were also various and diversified. They directed journals of popular science, wrote and published articles in the general press, collaborated with publishing houses, produced their own books, organised museum exhibitions, public lectures etc. Different types of professional and occasional popularisers have been identified in studies about the various groups of popularisers in countries of the European 'centre'. The salient characteristic of the professional popularisers was their awareness that they belonged to the same group: they knew each other, met in the same places and obtained close social links. In France, for example, the formation of the *Cercle de la Presse Scientifique* in 1857 gave them the opportunity to gather weekly and discuss their future plans.[6] Who were the popularisers of the periphery? Were there different groups of popularisers? What was their relation, or were there identified with the rather dominant corpus of amateurs in the peripheries? Which were their international networks and what was the character of their particular enterprise in the periphery? What was the role of women in science popularisation in view of their relative exclusion from the 'legitimate' sites of knowledge production? [7]

Peripheral scientists played a very important role in the making and circulation of scientific literature, but often without establishing a clear distinction between the works of the experts and the popular accounts, nor between *savants* and *vulgarisateurs*. The blurred division into professional and amateur science is well demonstrated in Terry Shinn's and Richard Whitley's book *Expository Science*, who stated that even in leading scientific centres there is no clear distinction between experts' and laymen's accounts, but a continuum of communication strategies from top international research journals to very popular texts, without a defined epistemological frontier.[8] Similarly, Bernadette Bensaude-Vincent and Anne Rasmussen showed the difficulty to establish boundaries between experts and laymen accounts, and considered the transformation of a scientific journal into a popular periodical as a survival strategy in the fragile institutional context of the 'periphery'.[9] There is abundant historical evidence to show the ambiguous role that scientific periodicals played in the periphery, often on the fringes of popular and

expertise knowledge.[10] A compilation of translations of foreign articles from prestigious scientific, technical and popular periodicals often made local scientific journals. In that sense, a scientific journal in fragile institutional local contexts often shared many features usually associated with a popular science periodical. The selection of the subjects and most significant papers to be included in a journal in the periphery is an important filtering process worthy of careful analysis.

Along the same line, the frontier between amateurs and professionals in the periphery is hard to establish. Amateurs have historically played a very important role in contexts such as Victorian Britain, and their contribution to the scientific culture as a whole cannot be considered exclusively peripheral. Nevertheless, it is quite astonishing to notice the important role played by amateurs in peripheral scientific societies, even in the twentieth century.[11] As it was clearly stated in the meeting in Minorca, some scientific disciplines, such as astronomy, enjoyed a wide interest from different publics. Its social impact along the 19th century, as well as a good part of the 20th century, could not be properly understood without the prominent role of amateurs. They constituted a fundamental network of data collectors, instruments users, and popular lecturers. They worked in close collaboration with professional astronomers in the making of new astronomical societies, many members of which considered lay knowledge on the moon, the starts or the weather to be useful and reliable. They aimed to achieve a critical mass to legitimate their discipline, as well as to raise the scientific level, to stimulate young people to take the road of science and its values in peripheral societies with a weak scientific culture.[12]

An analysis of what is being 'popularised' in respect with the geographies of scientific disciplines that may vary from country to country, their changing identities and relationship, as well as the presence or absence of a local community of researchers may have an impact on how popularisers approach science, and on the public image of science that is being conveyed. For example, peripheral scientists used to accept open discussions in the press on controversial theories only when they were not working on that kind of uncomfortable subjects themselves.[13] Science from the centre was used as a rhetorical tool for local scientific interests. The examination of the criteria for choosing a scientific subject to be popularised in conjunction with the strategies and various agendas of publishers, booksellers, museum keepers etc, as well as the explicit or implicit epistemological attitudes adopted provide interesting insights for the reconstruction of specific practices of appropriation.

Peripheral scientists, educated under the influence of the scientific elites of the 'centres', often favoured uncritical and hagiographical accounts. They perceived popularisation as a fundamental tool to strengthen the scientific culture of the country. Critical statements were usually considered dangerous for the success of this endeavour. Although the uncritical reception of science from the 'centre' is often supposed as non-political, neutral and objective, popularisers often have their own political, intellectual or religious agendas. For example, one can discern the links between 'science popularisation' and local or national politics. In many instances, 'popular science' was a significant part of the discourse of modernity and had an impact on the construction of the perception of a national scientific culture.[14] Under the banner of the utilitarian virtues of science, local scholars used to organise in local academies, agricultural societies, libraries, clubs etc. open sessions on science and technology that gathered a large range of audiences. A popular lecture on agricultural chemistry for farmers, for example, is not merely about teaching, but also about convincing, transforming, modernising. In this process many actors are involved: the state or some local authority, farmers' associations, the food industry, local teachers or professional lecturers, university professors, wealthy and poor farmers, scientific societies, local elites, etc. Therefore, popularisation is not just an interaction between science and the public, but a complex interplay between large numbers of actors.

Science popularisation in the periphery played an important role as a strategy for the legitimisation of the main values and ideas of the scientific culture of the centre. As Stephen Hilgartner has shown the, now-contested, dominant view of 'science popularisation' as a process of simplification is often used by local scholars and popularisers themselves in order to reinforce working scientists' authority and intellectual control of the audiences.[15] The study of the science popularisation in the periphery is also relevant for the analysis of particular strategies of local political and economic elites for the control of the public sphere in which science and technology play an important role.[16] Activities of provincial scientific societies across Europe from the Enlightenment onwards were often designed for the encouragement of the arts and manufactures of a specific locality, but also for the legitimisation of the social prestige and political control of the local elites. In the nineteenth century, these activities, which

included technical educational plans, popular science lectures and courses, public experiments, a wide range of scientific literature etc, were also orientated to the "necessary" control of the working classes.

However, we should not forget the creative aspect of popularisation, and hence the independent nature of the process (not merely copying) going on in different local settings. A local scholar talking, for instance, about Newton was not only explaining Newton's scientific achievements, but usually picked out those aspects which were relevant for science and scientific careers in his own locality.[17] Even the study of the choices and creativity of translators, as well as the strategies and agendas of publishers and booksellers is crucial. Translators with notes, additions, new titles and structures have had significant roles in forming the identities of popular books. Studies of translations that are used in popular science books and periodicals can help to articulate the multiple and constrained creativity of translators, while their changes and amendments offer data about the intended audiences of the books. The intended audiences, with their epistemologically active attitudes also matter, and they are a fundamental aspect that peripheral historians of science and technology should take into account. Audiences are no longer portrayed as passive receptors. Although audiences were often actively constructed by the agendas of various popularisers, they could also actively influence (made evident through changes and amendments in works of popularisation) or give new meaning to the processes of popularisation.[18] Studies in the history of the book, for instance, have shown how readers appropriated books in different and contradictory ways, how their perceptions of them varied and changed over time, and how the ways of reading and using books defined their status.[19] The study of these issues is possible thanks to the immense historical heritage of primary sources devoted to popular science that can be found in every archive, library or antiquarian bookshop in the periphery. A substantial number of studies along with comparative analysis will provide further answers to the general problems associated with communicating science and technology in the periphery.[20]

A study of scientific journals, dictionaries, encyclopaedias, popular science books, textbooks, newspapers etc in the scientific periphery can offer new light on the emergence of new literary genres in science and their relationships, changes and redefinitions over time and from one place to another. The popularisation of science and technology in its printed form is closely related to the rise and development of the book. That is to say, to the history of the book and to the history of reading.[21] The history of the printed popular works co-evolved with the history of the press and publishing. During the mid-nineteenth-century, in the European centres, mass production reduced the price of books, making them accessible to a wider public, whereas new techniques of printing, such as the monotype and the linotype, as well as the development of illustration rendered books more attractive. This great diffusion of popular books should also be credited to the publishers who were also driven by a commercial logic. Indicative are the gradual changes that occurred in the physical character of the popular science editions, which now tended to be more attractively laid-out and illustrated with corresponding improvements in the quality of the paper and the binding. Moreover, a characteristic feature of the period was the diversification of the product, namely the edition of the same oeuvre in various formats, sold accordingly in various prices and addressed therefore to a heterogeneous public.[22] We should not forget, nevertheless, that books and periodicals were often destined for a particular bourgeois audience, which could exclude the working class. These audiences were reached through public lectures, the activities of local societies, free pamphlets, museums, botanical and zoological gardens, trade fairs etc.

As Roger Cooter and Stephen Pumphrey rightly emphasised some years ago, practices and sites of popularisation can tell us a lot about the particularities of specific local contexts and, therefore, should be carefully analysed in case studies of the European periphery.[23] Are there international strategies of popularisation – exhibitions, theatres, popular magazines, books – which acted historically as standard patterns everywhere, or perhaps any of these practices was "different" in any specific local context? For instance, how can we compare – in terms of science and technology- international exhibitions such us London, Cork, Copenhagen and Lisbon?[24] Was Urania scientific theatre the same in Berlin as in Budapest?[25] And once in a specific peripheral context, how did the different social classes appropriate these popular scientific products?[26] These are obviously fundamental questions, which should be progressively answered if we want to have in a short term a new big picture of the transit of knowledge across European networks, but also inside specific peripheral contexts.

Writing the history of the popularisation of science and technology in the European periphery implies a necessary recovery of an enormous heritage of still unknown primary sources, which are kept in libraries

and archives across the Continent. They inform us about "obscure" everyday practices, which might be considered very far from "fist class" science at international level. Nevertheless all these sources provide extremely valuable data about the broad scientific culture in Europe, from the 18th century onwards. Therefore, the results of the 5th STEP meeting will surely contribute to build a more refined historiographical interpretation of how science and technology, without a clear distinction between expert and lay culture, has circulated historically in Europe. It will tell us a lot in terms of the process of appropriating the main scientific doctrines of the centres and also in relation to the interests of local politic, economic and intellectual elites. As in many other fields, history helps us to understand better the complexities of science communication in our contemporary societies.

Notes and references

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[18] P. Simón Castel, *Ganot's textbooks of physics: translation, the making of the book and the transit of knowledge* (5th STEP meeting).
[19] See also studies on libraries: R. Fontanals, *Instruments for popularising scientific and technical culture in the periphery: a study of the Public Libraries network in Catalonia (1915-1936)* (5th STEP meeting); T. Huguet-Termes, *Reading in the war: the Catalan 'Library Services of the Front' as a means for the popularisation of science and technology, 1937-1939* (5th STEP meeting).
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