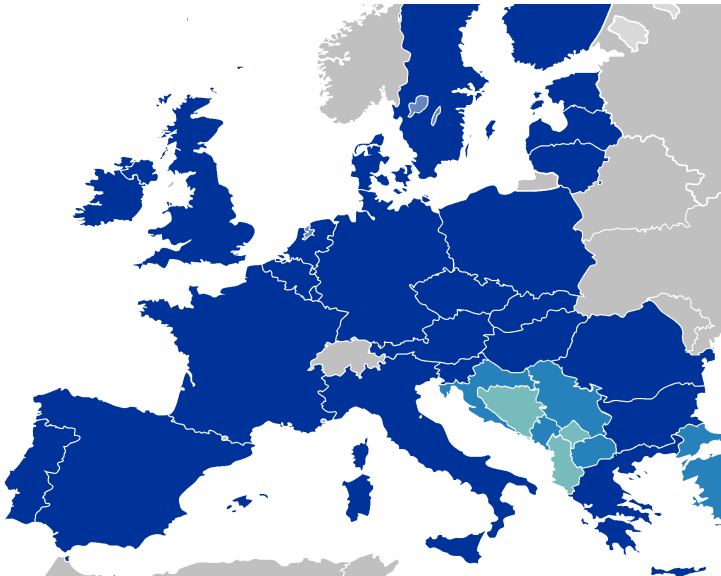


Science Communication in 20th Century Europe

International Working Group

Science Communication in 20th Century Europe

- exploring key issues of science communication in the 20th century
- leading role of radio and television in the creation of the prevalent experience of a »knowledge society«
- the need for both history of science and media studies to extend their current foci beyond print and the 19th century
- interaction of different political, economic and cultural forces in a »scientification« of the European societies
- comparative studies of national approaches to putting science in print, on the air, on the stage or into a museum or »science centre«



Introduction

The knowledge society is based on science communication and, historically, on science popularisation. History of science has identified popular science as a very fruitful field in recent years, which has now reached a state allowing for national comparisons, such as between Victorian popular science, German bourgeois popularization and French vulgarisation. Few scholars, however, have gone beyond print media, i.e. journals, books and newspapers, nor have they explored much into the 20th century. Recent research has shown now that scientists remained important actors of popularisation in the 20th century. Furthermore, the claim that they withdrew from popular science (and hence left the field to journalists and hack writers) has been revealed to be a »myth« at least for early 20th-century Britain. It has been demonstrated that the allegedly »widening gap« between science and public due to abstract theory, such as quantum and relativity theory, stands in stark contrast to the strong interest, supply and demand of popular science in Weimar Germany. A promising study of the US case has exhibited the rise of new, nationally specific forms, modes and effects of popular science as a result of the new media of radio and television.

On the other hand, we experience a great demand to discuss and evaluate current and recent programmes on improving public understanding of science, promoting a scientific and technological culture or creating a dialogue between science and public(s). As far as historical analysis and case studies have been employed here, they mostly examined only recent decades. Thus, activities like PUS etc. that began in the 1980s need to be historicised and linked with the scholarship on science popularization, all the more so as they relate to a greater extent to audiovisual media.

Bridging a double gap

The key idea for the international working group is hence to bridge this double gap in the history of 20th-century science communication as well as in the coverage of non-print media from the 1920s to the 1980s. In these media – so the key thesis of already a number of workshops – the prevalent experience of a »knowledge society« took place, a concept that is now used as often as a (laudatory) descriptive notion as it is used as a definition of a (politically important) societal goal.

For these reasons, a series of exploratory workshops have brought together leading scholars of history of science, media history and other fields of analysis and practice of science communication for the various European countries. In so doing, these workshops have stimulated a much needed project of writing – and partly rewriting – a first comparative history of science communication for the 20th century. This project is thought to have wide-reaching importance as a necessary historical basis for the current discourse on pro-

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grammes of science communication, science literacy and science dialogue.

The role of the media

In particular, the discussion concerns the ways in which the image of science in European societies was shaped by a number of media revolutions. These range from the rise of mass media, like affordable newspapers and magazines featuring science and technology, to the advent of broadcasting, whose introduction was sometimes justified by visions that workers could go to school at night or that the nations' universities would be opened to all. Although these optimistic visions did not come true so easily, it is apparent, for example, from programme listings that topics of science and technology had a surprisingly large share in early radio in the 1920s and 1930s. Similar development can be found after World War II, when television started its first programmes - a further media change that allowed for new and different types of science and technology coverage.

Radio and television were set up in very different ways in various countries. For example, in Portugal, amateurs organised early radio while in Germany strong state-control was decisive. In France, it was the electro-technical industry, in the Netherlands, listeners' associations and in the US, commercial networks who were the driving forces behind early radio and television industries. Given this diversity, a number of topics arise. First, with regard to general questions of history of science, media and education in the various European societies:

- factors favouring science programmes
- radio as a »scientific« medium (both the producer as well as the listeners had to acquire a certain technical aptitude)
- radio and television as means of education
- media-related paths of scientification

And secondly, with regard to historical and sociological questions on society:

- new »understanding« or new »culture« of science through new media
- political, economical and cultural agendas impeding science communication, e.g. in authoritarian regimes of Eastern Europe, in the German or Iberian dictatorships, and also in democratic states

In dealing with these questions, rich scholarship can be built on and integrated into the new perspective of comparative science communication. This integration has already resulted in the following:

- national histories of radio and television have been written
- radio magazines provide a good picture of quality and quantity of science content on the air
- strategies of making radio and television into means of education, propaganda etc., with respect to science and technology, are known for some cases
- comparative approaches have successfully been implemented in recent studies of science in newspapers and journals
- available theories of media in general and of mediatisation of science, in particular allow for scholars to integrate with the intended historical frame

The general outlook

The workshops and activities pursued so far served to identify fields of comparative work and have incited farther-reaching collaborative projects on pairs or groups of European countries. This also served to help locate relevant sources and to identify primary dimensions of comparison for follow-up projects of comparative, in-depth historical studies.

Key insights disseminated in workshop presentations and a number of publications comprise the following:

- that current problems of science communication, seen from a historical perspective, turn out to be rather old ones (such as discussions on the best way to deal with science and technology in newspapers),
- that history may help to better integrate (public) issues of science and technology as societies have become more and more science based, and
- that tracing the emergence of national scientific cultures may help to better deal with current projects and problems of science education, science literacy and science understanding in more convincing ways.

On the following pages a number of examples of ongoing research on case-studies, comparative perspectives and theoretical considerations are presented in short abstracts.

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Radio: Changing Structures

These charts characterize the ideal development of radio broadcasting as it can be summarized for many countries. Their purpose is to show the various forces that influenced the progress.

The starting point for radio broadcasting in a country is normally defined by the start of the first regular programme. In the USA, official radio broadcasting began in 1920 with Radio KDKA, Pittsburgh; in the UK, in 1922 with the British Broadcasting Company; in Germany, in 1923 with Deutsche Stunde, Berlin.

1 Ownership:

After World War I, the radio industry was interested in opening up new sales markets. Leading the establishment of regular programmes were enterprises like Westinghouse (USA), Marconi (UK) and NSF (Netherlands), followed by private companies, as in the case for Italy and parts of France, or associations, as in the Netherlands, Switzerland and Finland, that started to broadcast regularly. Sooner or later the state would take over, either as regulator of a restricted market, as licensor of one public service company, or as even as the sole operator.

In the second half of the 20th century, private broadcasting (commercial and non-commercial) was introduced in most countries, which led to the «dual system» of private and public service broadcasting common to most European countries (1970s in Italy; 1980s in France, Germany, Switzerland; 1990s in Eastern European countries).

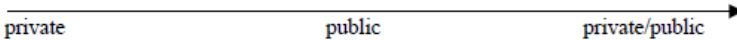
2 Transmission range:

In the early 1920s, due to weak receiving equipment, listeners had to content themselves with only nearby stations. Still, radio broadcasting crossed national borders from the very start. From the late 1920s on, long, medium and shortwave stations were established that targeted an international audience. Introduced in the 1950s, FM radio, with its better listening quality but a shorter range, favoured regional and local stations. Internet radio has widened the range yet again, making it possible to listen to programmes from all over the world in good quality.

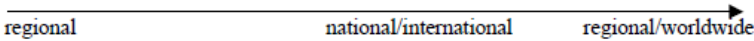
3 Role of the broadcaster:

In radio programming of the 1920s, it was typical to use available content from other cultural sources. Orchestras, specialists from any field of public interest, poets, actors or teachers were given air-time to perform content they would normally present onstage or in a lecture hall. Similarly, news reports came from the daily newspapers. Gradually, special forms of content evolved, such as the radio play in the mid-1920s or the documentary, which developed with the emergence of recording technology.

1 Ownership:



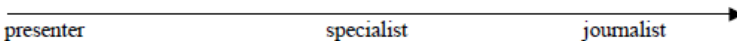
2 Transmission range:



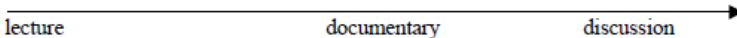
3 Role of the broadcaster:



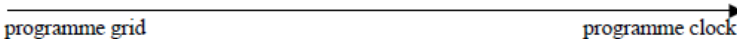
4 Role of the editor:



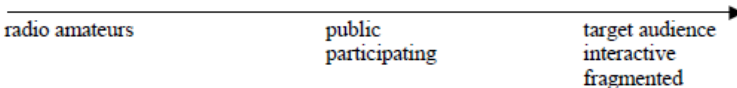
5 Typical programme:



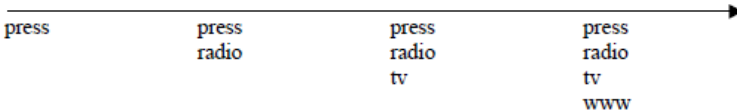
6 Programme structure:



7 Audience:



8 Competing media:



4 Role of the editor:

In the early era of radio programming, there were no radio journalists in today's meaning of the term, but rather editors who selected and presented a wide range of content. Science was presented first by talented contributors who eventually became radio stars in their own right.

5 Typical programme:

The easiest way to fill airtime with scientific content is to ask a scientist to lecture in the studio. This was practiced intensively in the first decades of radio programming. The radio documentary («feature») as a mixture of commentary, soundbites, noise, music etc., evolved around 1945 thanks to the adoption of the tape recorder. As a cheaper and more participative solution, discussion programmes became widespread, bringing together experts and listeners.

6 Programme structure:

The typical programme of public European radio stations up to the 1950s was a programme grid divided into small sections, with varying content for different audiences. It was only when several parallel services were offered that music and other content were used to create different styles and more specialised formats of programmes. What used to be a programme grid has become a programme clock, according to which every hour is structured the same way.

7 Audience:

In many countries there was an audience before there were radio stations. Amateurs built their own receivers to catch any kind of radio traffic. When broadcasting was established as a national institution, the audience of a national station was more or less identical with the general public of the country. Phone-in and discussion programmes invited listeners to participate. In the «dual system» that is common today, citizens have access to community radios. The Internet moreover gives radio an interactive potential, while also narrowing the audience down to a clearly defined, albeit worldwide, fragment of the population.

8 Competing media:

Radio was the first electronic mass medium that was able to cover political and cultural events only minutes after they had happened, or even live. It soon overtook newspapers, once the primary source of up-to-date news. Television started as a clumsier and slower provider of information, but is nowadays as fast as radio; yet television, in turn, has been challenged by Internet news sites.

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Linking the Histories of Science Popularization and Journalism

Europe

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Wherever you look, the presence of science and technology in the mass media was and still is usually judged negatively by observers; content featured in radio and television, magazines and newspapers is too little, too superficial, too distorted. For example, after mocking some former science TV programmes, the editor of the journal “Science” from 1956 expressed hope that the new coloured broadcast programme would find “a way to interest and entertain a mass popular audience without distorting the aims and spirit of science”¹

Attitudes like this have their origin in the disability to conceive journalism as something other than a bare mediator between science and lay audiences. Journalism is conceived rather as a sort of partner of science, as an interpreter with the ability and the duty to mediate between science and the public.

This concept of the mediating role of journalism stems from the voluminous body of social scientific research, starting from the 1960s, on the topic of science and media.¹ Based on what science is published these studies reflect critically on the picture of science drawn by journalism.² Commonly a mismatch was observed between science-in-media and science which ought to become public, often leading to a general criticism of journalism and its selectivity. In his theoretical conceptualisation of science journalism, Kohring holds the view that this model shaped over time almost all of English and German literature on the subject from the 1920s until today.³

Two interpretations are possible based on these conclusions:

1. Nothing has changed in the relation between science and journalism. Within the 20th century, marked by various sustainable fractures, the relation between journalism and the sciences is a shelter of continuity.
2. Something is wrong with the theoretical concept of this relation.

Reflection of institutional practices

In favour of the latter interpretation, I argue that what is reported by science journalism can neither be understood as a reflection nor as a distortion of what is going on “out there” in the sciences. Instead, what is seen on the screen, heard on the radio, read about science in magazines and newspapers has always been a reflection of the practices of workers in the organisations that have produced this content.⁴ These practices are organised in the sense that a media professional who acts as a member of an organisational unit like a newsroom, cannot act professionally in any way he or she sees fit. Professional journalism action is generally embedded and is led by decisions that enable the perception and reconstruction of

¹G. DuS: Science on TV. *Science* 124 (1956), 963.

² M. G. Pellechia: Trends in science coverage. A content analysis of three US newspapers. *Public Understanding of Science* 6 (1997), 49-68.
E. Kua, M. Reder, M. J. Grosel: Science in the news. A study of reporting genomics. *Public Understanding of Science* 13 (2004), 309-322.

³ M. Kohring, M.: Wissenschaftsjournalismus. Forschungsüberblick und Theorieentwurf, Konstanz 2005.

⁴ M. Fishman: News and Nonevents. Making the Visible Invisible. In: J. Ettema, C. Whitney: *Individuals in Mass Media Organizations: Creativity and Constraint*. Beverly Hills 1982 : 219-240, on 220.

the world by media professionals through the reduction of hyper-complexity.⁵

⁵ M. Rühl: Organisatorischer Journalismus. Tendenzen der Redaktionsforschung. In: I. Neverla, E. Grittmann, M. Pater, eds.: Grundlagen-texte zur Journalistik. Konstanz 2002, 303-320, on 318

Accordingly, if we link contemporary understandings of the importance and the true nature of science with normative purposes targeting journalism as transmitter of these understandings, we will always find the same: what is reported is too little, too superficial and too distorted.

If we are interested in a better and more adequate understanding of the historic genesis of science in the public sphere, we inevitably have to think about journalism as an organised production of meaning, we have to link the history of the popularisation of science with the history of journalism. More precisely, we need to think about journalism as a societal institution with an own identity, and we need to research the ways by which journalism has tried to protect this identity by providing science contents. We are then in the position to ask which external factors might have been influenced the establishment of structures within journalism that can be described as specialised on science. Ultimately this will help to overcome the science centricity of current and past approaches of science in media studies.

A large-scale empirical study of TV and radio science journalism

The considerations start with the premise that we cannot think about science journalism without thinking about its publics. Journalism is and has always been guided by the need to gain attention for its products, which is based on informational value and relevancy for the audience.⁶ In order to produce messages that can gain attention, journalism sections like science sections must follow routines in their selectivity. Lublinski, who studied three German radio science programmes and a news agency, called these decision-making programmes “editorial concepts”. These concepts decide to a certain extent what journalism can observe and select and how it is reconstructed.⁷

We can theoretically distinguish several editorial concepts guiding journalism in its relations with audiences. These distinctions are influenced by studies that focus on key decisions within science specialist units which shaped science’s reconstruction by media professionals working for these sections. Two basic types emerge in the decision-making programs: 1) Input orientation, meaning that events from within science guides journalism’s selectivity, and 2) output orientation, meaning that certain functions, such as education, guide the selection of topics. Although all types of science journalism face the task, to regularly send informative and relevant messages to their audience, they do it differently. Indeed, we can empirically distinguish five types of science journalism.

⁶ N. Luhmann: Soziologische Aufklärung 3. Soziales System, Gesellschaft, Organisation. Opladen 1981, S. 318.
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⁷ J. Lublinski: Wissenschaftsjournalismus im Hörfunk. Redaktionsorganisation und Thematisierungsprozesse, Konstanz, 2004.
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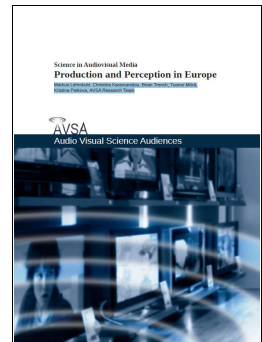
Five types of science journalism

- **Information journalism** on science specialises in observing news from the field of science and selects news based on the perceived usefulness to its audience.
- **Popularisation journalism** attempts to offer a large audience deeper insights into fields of science by contextualising scientific developments. The main challenge for this type of journalism lies in the development of communication techniques that motivate the media user to intensely engage with a topic.
- **Edutainment** seeks to enrich aspects of people's everyday experience using unheard-of scientific explanation. This journalism faces the task of delivering scientific explanations in an entertaining way. The selectivity of this journalism, independent from developments in science, is often based on questions and topics from its audience.
- **Advice journalism** on health or technology bases its selection and reconstruction of topics on the necessity to provide recipients with clear and unambiguous tips.
- **Advocacy programmes/Environment journalism** share characteristics of input oriented programmes, but are classified as primarily output oriented due to the centrality of fulfilling a specified need, that is, society's need of environment protection. Although these programmes report on recent science studies occasionally, they are primarily characterised by linking scientific expertise with political topics.

The application of these typologies can reveal insights into the past reconstruction of science and its external influences. It would be highly relevant to know, for instance, when journalism started to report scientific news on a regular basis. The intra- and extra-media factors may explain this extension of journalism's observation. In exploring the historical relationship between science and society, it would be helpful to locate when journalism started to supplement the popularization of science with scientific explanations, be it advice on improving health or explanations of everyday phenomena. This in my view would serve as an indicator for a change in the relation between science and the public.

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Head of Research and Public History

The Science Museum, London

Horizon and the Origins of British Science TV

In Britain, no television science programme has been more influential over the last fifty years than *Horizon*, with more than 1100 editions since 1964. Clearly, if we are to understand the place of science in culture, we need to pay attention to such a substantial body of work, and to understand its content and form. At present the three and a half chapters in my *Films of Fact*¹ give the longest narrative account of science on British television, and that only covers the period up to 1965 in any depth at all, and the account of *Horizon* there is slight. My new work seeks to understand *Horizon* in the context of TV science history.

Origins of Horizon

The programme arose in the context of a review of scientific programming; in April 1962 a decision had been made to drop the projected seventh series of six *Eye on Research* programmes. This, which was broadcast between 1957 and 1961, had been one of the best regarded series in the years before *Horizon*, a real breakthrough for regular science programming. With the main series off air, the BBC's scientific output was dominated by fewer and longer programmes, such as *The Prizewinners* (1962), which featured interviews with four Nobel winners.

Aubrey Singer and his team worked to develop a new kind of science programme. From the very first discussions, they were not thinking of existing science formats, but were intent on reproducing some of the approach and success of the arts magazine *Monitor* (1958-65). The rubric of *Monitor* was a programme with an engaging anchorman in the studio presenting and linking three diverse items, some of which – including interviews – might be live in the studio; others which combined studio with film inserts; and the remainder, which were short films complete and telecined during the broadcast.

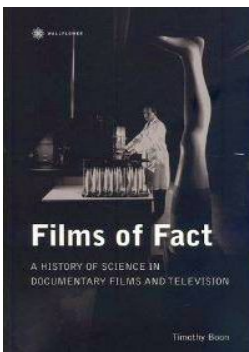
The Approach: Science as Culture

In 1962 Singer outlined what he had in mind for the programme:

It seems that the time has come for us to widen our scientific output. I think that one of the things that we ought to investigate is the possibility of a sort of scientific "Monitor". [This would be a programme] dealing with scientific topics which have philosophical impact on other fields of the arts and humanities. ... It would be a programme which would try to reveal the mind of the scientist in action in regard to the rest of society, and the social sciences would come into this very heavily.

Leach's resulting feasibility study is a thoughtful summary of the issues and potential, and it was in many ways the wellspring of the programme as it developed. Leach translated Singer's terminology of the 'philosophical impact on other fields of the arts and humanities' into the language of a "cultural" science programme', and the

¹ T. Boon: *Films of fact. A history of science in documentary films and television*, London 2008.



words ‘culture’ and ‘cultural’ stuck, reappearing frequently in ensuing discussions.

Philip Daly became *Horizon*’s first editor; he explained in a key policy document in March 1963 the intended level to be:

at or a little above the Scientific American level. It would not be tied to topicality, but it would reflect the current trends in scientific thinking. It would above all be an ideas programme in which scientists would communicate, not with others in their own discipline, but with people in other fields. This would ensure a high intellectual level in content but an absence of jargon in exposition.



Factor 1: Presenters vs Commentary

Magazine programmes like *Monitor* required presenters, ‘anchor-men’, as they were then called, to introduce and link disparate items. The *Horizon* team made extended attempts throughout 1963 to find suitable anchor men, culminating in screen tests for two candidates, the science writer Alan Isaacs and the theoretical physicist Roger Blin-Stoyle, with the latter chosen to present a pilot programme in November 1963. This unsuccessful pilot expressed the science as culture rubric in three magazine items.

Anchor-men were rare in the monthly 1964 programmes, only being used in two out of the nine broadcasts. But the ambition to emulate *Monitor* in this way persisted: in December, Singer was pressing Gordon Rattray Taylor, by then editor, to consider further anchor-men and reporters. The project succeeded and, consistently from March to December 1965, the programme was introduced by the BBC News Department’s science reporter, Colin Riach.

But, the shift from a diverse magazine to single subject programmes in 1967 entailed a move away from the use of ‘anchor-men’ because it was no longer necessary to link disparate items. The guiding voice in *Horizons* increasingly became that of commentator rather than presenter.

Factor 2: Magazine vs Single Subject

Leach’s feasibility study had concluded by building into his proposal both Singer’s assumption that the programme would necessarily, like *Monitor*, be a diverse magazine, and a stress on the televisual means to deliver the cultural account of science:

The obvious lesson is that the items must be really varied – not only between subjects (eg different sciences, history, philosophy, politics, science and art, etc) but between approaches to subjects (eg personality as against facts) and in technique (film as against studio, wild track/synch sound/silence on film, etc).

The rejection of the pilot led to an intensive period of redefinition four months before the first broadcast. Ramsay Short, in conversation with Leach, was coming to the conclusion that ‘the single theme idea [was] the best’. This ‘single theme idea’ may be seen as a halfway house between the diverse magazine and the true single subject programme. The 1964, monthly, programmes were, like *The*

World of Buckminster Fuller, mainly on single themes, or linked in thematically as was the case with *Tots and Quots and Woodgerie*, (16 Nov 1964) which looked at two prewar groups of scientists. But, for most of 1965, *Horizon* moved on to achieve the originally intended magazine format, carrying two or three items linked by a presenter, very much in the *Monitor* style. The issue on 23rd June 1965, for example, featured an interview with Jacob Bronowski, then at the Salk Institute, an item on a solar eclipse, and the demonstration of a machine designed to help teach speech to deaf children. From May 1965, this magazine format was emphasised in the *Radio Times* billings by adding the strapline ‘a review of the sciences’.

Factor 3: Live vs Film

Availability of a film crew and editors was a key concern of the *Horizon* team in the run up to the first programmes, and across the first few years. There was a great deal of competition between programme makers for this resource, and for the very limited number of Ampex video recorders. At the start it was clear that there was not the film resource for “single theme” programmes regularly to be entirely on film, with the resulting question of the proportion that would be acceptable. But, as the programme moved more towards single-subject programmes in 1967, the demands of production were often intrinsically more complex, requiring more film sequences to be telecined-in, and encouraging a tendency to favour making entire programmes on film or, as videotape machines became more common, to record programmes ‘as live’ onto tape, which allowed some limited editing in advance of broadcast.

Conclusions

This particular paper cannot give a contextualised overview, but is close to the archive, very much an exercise in microhistory. The intention is to show how very significant the decision for *Horizon* to emulate *Monitor* was. This initial decision led not only to the emphasis on the *culture* of science but also to the series of representational conventions that were sought and followed in *Horizon*’s first few years; a presenter-led magazine programme live from the studio, rather than the narration-guided film carefully edited before broadcast, which is where they started, and also where they ended up from 1967.

I have told a story of programme makers, with little reference to the views of scientists. This is because this is what the paper archives reveal; in the words of Aubrey Singer just a couple of years later, ‘the televising of science is a *process of television*, subject to the principles of programme structure, and the demands of dramatic form. Therefore, in taking programme decisions, priority must be given to the medium rather than scientific pedantry” (Singer 1966: 13).



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ESF Exploratory Workshop on

PUTTING SCIENCE ON THE AIR

IN EUROPE, 1920s TO 1980s

Berlin, 3-5 May 2012

(Luisen Hall, Humboldt Graduate School, Luisenstr. 56)

The workshop aims at exploring key issues of science communication in the 20th century. It were primarily radio and television that created the prevalent experience of a "knowledge society", therefore history of science as well as media studies need to extend their current foci – beyond restrictions to print and the 19th century and towards attention to the fields of science and technology, resp. The different political, economic and cultural forces that interacted in this "scientification" of the European societies can be exhibited and analysed fully only by investigating the processes of putting science on the air in comparative studies.

web: histscicom.hu-berlin.de

PROGRAMME

Thu, 3 May 2012, 14.30-18.30

Is History of Science Prepared for Science on the Air?

I. Histories of radio and television

Jürg Häusermann (University of Tübingen)

Tomasz Goban-Klas (Jagiellonian University, Krakow)

II. Historiographical trends in science communication

Kostas Gavroglu (University of Athens)

Markus Lehmkuhl (Free University Berlin)

Fri, 4 May 2012, 9.00-13.00

Exploring the European Perspectives of Science on the Air

III. British v. French models of science on the air

Ralph Desmarais (Imperial College, London)

Timothy Boon (Science Museum, London)

Andrée Bergeron (EHES, Paris)

Daniel Raichvarg (University of Bourgogne, Dijon)

IV. German v. Eastern European models of science on the air

Arne Schirmmacher (Humboldt University, Berlin)

Jutta Milde (University of Koblenz-Landau)

Leszek Zasztowt (Polish Academy of Sciences, Warsaw)

Gabor Pallo (Budapest University of Technology and Economics)

Fri, 4 May 2012, 15.00-18.30

V. Centre and periphery – did it matter for mediatisation of science?

Ana Simoes (CIHST, Lisbon)

Ana Paula Silva (CIHCT, Lisbon)

Oliver Hochadel (Institutó Milà i Fontanals, Barcelona)

Faidra Papanelopoulou (University of Athens)

VI. Between independent science reporting and propaganda

Carlos Tabernero (Autonomous University, Barcelona)

Barbara Wurm (Humboldt University, Berlin)

Merav Katz-Kimchi (University of California, Berkeley)

Sat, 5 May 2012, 9.00-12.30

Historical Lessons on Media and Science Understanding

VII. Media changes, changes of genre

Nestor Herran (University Pierre and Marie Curie, Paris)

Safia Azzouni (Humboldt University, Berlin)

VIII. Science understanding in context

Peter Bowler (Queen's College, Belfast)

Agustí Nieto-Galan (Autonomous University, Barcelona)

Convened by: Arne Schirmmacher (Humboldt University, Berlin)

For the ESF Standing Committee: Jan Jirak (Charles University, Prague)

Interested scholars (in particular post-doctoral and early career) are welcome to attend the workshop. Due to space limitations you need to register before attendance: Arne Schirmmacher, Institut für Geschichtswissenschaften, Humboldt Universität zu Berlin, Unter den Linden 6, 10099 Berlin, Germany, Arne.Schirmmacher@geschichte.hu-berlin.de

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Popular Science as a Cultural Dispositif

Dramatic changes in the audience that popular science could draw occurred in the years after 1900. Instead of one, more or less restricted and general public for science, which was served e.g. by journals that all had circulations roughly between a few hundred and few thousand, the readership in Germany now quickly split into many publics of science, varying in kind, interest, focus and in particular size. It hence makes sense to distinguish at least four levels of audiences for science:

- mass public
- (occasionally) interested public
- attentive public
- (inner-)scientific public

They developed historically into a complex structure, which neither can be understood to be »linear« in some sense, nor can it be reduced to »key« media, nor was it necessarily commercially determined. As the following figure shows, there was a multi-leveled structure that remarkably survives the whole century, through the wars and despite all changes in the political system and society.

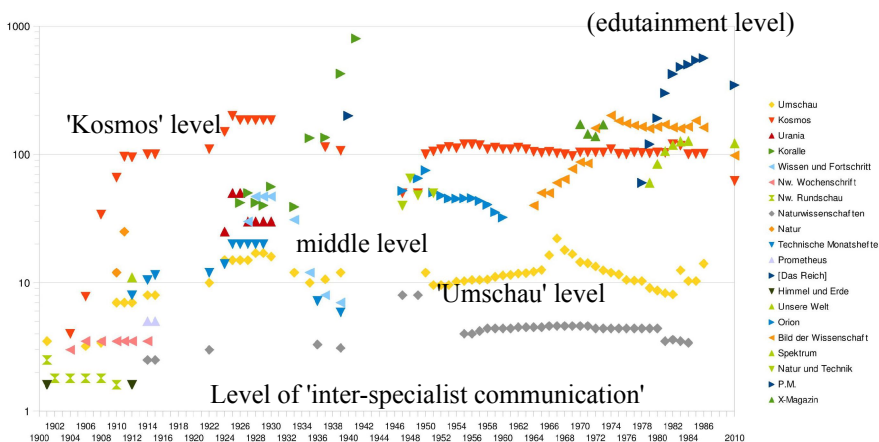
What is designated as the »Kosmos« level (corresponding to the journal Kosmos that sold 100,000s of copies) may be understood as an early mass public for popular science, while the »Umschau« level exhibits an equally persistent attentive public for science. A middle level of various journals reached occasionally interested readers increasingly through newsstand sales rather than subscriptions. Furthermore, it is interesting to observe that the inter-specialist communication within the science community - a certain scientific public - never exceeded a few thousand copies, despite the huge growth in the total number of scientists during the 20th century. Another important observation is that the Weimar period in Germany between World Wars I and II saw twice the amount of popular science journals (on most levels) as compared to earlier and later periods.

A Cultural Dispositif

These observations may already suffice to motivate several theses on science communication in 20th century Germany: a) it had a complex structure, b) there was more than one discourse between »science« and »public«, and c) there was some kind of apparatus, or »dispositif«, which determined:

- the visibility of topics and problems
- the ability of their enunciation
- the power associated with knowledge claims
- and the subjectivity related to all this¹

¹ G. Deleuze: »What is a dispositif?«, in: T. Armstrong: *Michel Foucault. Philosopher*, New York 1992, 159-168.



I suggest employing Michel Foucault's notion of a *dispositif* to characterise this structure. This concept denotes namely a heterogeneous ensemble comprising of, among others, discourses, institutions, laws, equipment, administrative rules, scientific statements, philosophical propositions and moral judgements – or rather, it expresses the net connecting all this.² (cf. Foucault interview of 1977).

A historical analysis of the German case of science communication can exhibit the workings of a cultural *dispositif*, or machinery, that underlies the cultural interpretation of science in Imperial Germany. This apparatus was similarly at work in the Weimar Republic, remaining powerful throughout the Third Reich, and was still present in the early periods of both postwar German states.

This may ultimately explain why political changes have been less important than cultural ones (to be dated around 1900 and during the 1960s) when it comes to science communication.

Genres and Changes of Radio Science

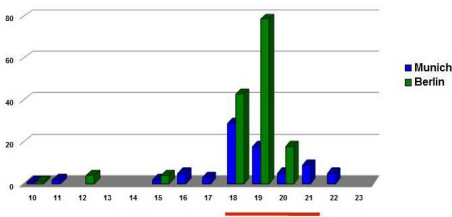
The possibilities of the new media (and the multimedia combination) gave rise to new genres of science communication, e.g. »Plauderei« (chat, causerie), interestingly, an adaption from print; »Hörbericht« (audible report), an early form of reporting, though not live; »Mikrophonstreifzug« (microphone excursion), a kind of an »expedition« into unknown contexts, such as the scientific laboratory; and the university radio with pedagogical, vocational or general educational programmes, often with additional material in radio magazines etc.

While in the field of popular science a strong continuity seems apparent in the German case, things gradually changed over the decades. The timeslots, for instance, during which science and technology were presented as well as their distribution over the week shifted. While in the 1920s science was in »prime time« (6–9

Circulation of German popular science journals in the 20th century in thousands (logarithmic scale).

² M. Foucault in *Power / Knowledge. Selected interviews*, ed. C. Gordon, New York 1980, 194.

Distribution of science programs over the day in 1925
(for Munich's "Deutsche Stunde in Bayern" and Berlin's "Funkstunde")



pm), hence indicating a promotion of science as a central cultural good, in the 1950s it became a late-night show (9–12 pm) and turned into a field of philosophical consideration rather than applicable knowledge.

Factors that Eroded the Cultural Dispositif

In the East after World War II, party politics took over the organization of radio in the same way as it did print media. This eventually led to a centralist structure

controlled by the Society for the Dissemination of Scientific Knowledge, which produced the public science programs for the radio of the GDR. Here not a few philosopher scientists, but rather armies of science workers – at least rhetorically – took the scene, trying to paint a positive picture of the scientific potential of the socialist project.

Science also remained an integral part of the general program of all federal stations in West Germany, only it moved more and more to late night hours and was combined with discussions of philosophy and world view. The scientists on (or in) the Western air celebrated their universal knowledge, untainted by inferior politics. It would take roughly until 1960, when a more critical approach was on the rise, for radio to turn its focus to science as a process and to the worker in the laboratory.

From a structural perspective, the two German offerings exhibited very similar mechanics, which moreover opened a natural field for competition, as air waves moved more freely than printed paper. A typical format both sides aired was the radio university with weekly broadcasts of talks on select topics. In times of particularly intensified confrontation, such as after Sputnik, more programmatic lecture series were launched.

In the East, state-control blocked again much of the dynamic for a further evolution of science communication in all media, while West German popular science eventually developed a closer relationship to the American model.

The remarkable structural stability was hence eroded mainly by the following factors in the West:

- politics (instrumentalisation of media)
- programme structure changes
- pluralistic developments
- commercial radio and TV (1980s)
- the turn to edutainment

After German reunification in 1990 this applied for all of Germany.

Further Reading

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STEP: Lessons on the Roles and Uses of New Media for Science

Europe

What is STEP? Aims and accomplishments

The international research group *Science and Technology in the European Periphery* (STEP) was created in 1999 and gathers scholars from many countries of the European Periphery.¹ STEP members aim at studying the circulation of science and technology within Europe in such ways as to overcome the constraints of their local contexts often heavily tinted by positivist approaches and explore ways to tie their research endeavors with mainstream historiography. By criticizing the value-ladenness associated with the center-periphery dichotomy and the assumptions behind diffusionist models, which accept the unidirectional flow of science and technology from creative centers to passive peripheries, they moved away from a historiography of transmission to a new historiography built on the concept of appropriation. Stemming from cultural history, this concept calls attention to the social, political, religious and cultural specificities of the «receiving» culture and provides a new framework, in which local agents are endowed with a creative function.

Our aim is two-fold. On one level we attempt to unravel the specificities of the appropriation process taking place in different peripheral contexts, periods and thematic situations. At a second level, without eliminating asymmetries, our main purpose is to highlight *similarities*, not *differences*, among the various peripheries in order to unveil common trends. This novel enterprise is oriented towards writing a historical narrative which will concur with the emergence and structuring of a concept of periphery, beyond the traditional centre-periphery dichotomy.

Preliminary conclusions in the constitution of *Science and Technology in the European periphery* as a historical actor are thus summarized:

- Politically-, rather than socially-, driven science and technology
- Personal networking (as opposed to institutional backing)
- Emphasis on immediate applications (as a kind of quick-fix)
- Transformation, not elimination of asymmetries
- Awareness of fluidity of (historiographical) concepts, historical actors and (historical) structures
- Blurred boundaries in the production and consumption of scientific ideas, practices and instrumentation

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¹ Participating countries include Belgium, Denmark, Greece, Hungary, Italy, Portugal, Russia, Spain and Sweden.

<http://147.156.155.104/>

Discussion List:
NODUS: Science and Technology in the European Periphery e-mail list

NODUS@LISTSERV.UV.ES

The role of newspapers in the European Periphery

A group of Portuguese members of STEP has been involved in research related to communication of/expository science and to science, technology and medicine (STM) in the press. My work in the latter field centers on Portuguese newspapers and particularly on the *peripheral* characteristics of the roles and uses of this print media. The starting point was the creation of a database of transcriptions of all STM news appearing in three generalist newspapers, chosen for their wide circulation, different geographical provenances and broad ideological scope, in the period from 1900 to 1926.

By analyzing newspapers articles focusing on natural events, including earthquakes, the 1900 total solar eclipse, and the 1910 return of Halley's comet, our research has attempted to illustrate:

1. The importance of locality in shaping news about science in the press;
2. The appropriation of natural events by Portuguese scientific/astronomical communities to serve their scientific agendas;
3. Scientists' use of the daily press as a means to educate and to modernize the country;²
4. The transition from science journalism to successful forms of expository science as a result of scientific elites' attempts to gain support of the general public for specific agendas.³

² A. Simões, I. Zilhão, M. P. Diogo, A. Carneiro, "Halley turns republican. How the Portuguese press perceived the 1910 return of Halley's Comet," accepted for publication in *History of Science*.

³ A. Simões, A. Carneiro, M. P. Diogo, "Riding the waves: natural events in the early twentieth-century Portuguese press", *Science and Education*, 21 (2012), 311-333. A. Simões, A. Carneiro, M. P. Diogo, "What can news about earthquakes, volcanoes and eclipses tell us?", Preprint MPIWG, in Arne Schirrmacher, ed., *Communication Science in the 20th century. A survey on research and comparative perspectives*, MPIWG Preprint 385, 2009, pp.27-43.

Finally, a truly comparative study of the public perceptions of the 1910 return of Halley's Comet stemming from the Greek, Portuguese and Spanish generalist press is under way.⁴

From the major conclusions of our group's research work emerge several characteristics of the roles and uses of newspapers in peripheral contexts:

1. The importance of scientists (when contrasted to science journalists or journalists *tout court*) as writers of newspaper articles in the popularization of science genre;
2. The recourse to newspapers by fragile scientific communities to legitimize specific scientific agendas;
3. The use of newspapers to push forward a rhetoric of modernization, centered on the importance of science for the common good and the country's progress.

From newspapers to audiovisual media

In formulating questions from the STEP perspective through the age of «new media,» such as radio, TV and movies, we should consider the following general guidelines:

- The suitability of looking for similar roles/uses/importance of audiovisual media when assessing contributions from so-called centers and so-called peripheries
- Similarities between the involvement of scientists in these media and in newspapers;
- The importance of comparative studies involving countries of the European Periphery as well as other European countries;
- The degree of interactions with the political context;
- The role of local, regional and national differences.

⁴ A. Carneiro, M. P. Diogo, A. Simões, I. Zilhão, E. Mergoupi-Savaidou, F. Papanelopoulou, S. Tzokas, "Comparing the public perceptions of science and technology in the Greek and the Portuguese daily press, 1908-1910," talk presented at the ESHS, Barcelona, 2010.

Just as in the case of newspapers and the specific issues of their use, we must consider the problems that emerge when moving into different sorts of new media:

- What role for radio and TV in reaching out to a population that is, if not strictly illiterate, often deeply scientific illiterate?
- What role for programs imported from abroad when contrasted with local ones?
- In what instances have radio and TV become privileged vehicles for popularization of science?
- How are radio and TV used as vehicles for the legitimization of fragile scientific communities?
- How are radio and TV used as rhetorical tools of modernization?
- How do radio and TV become tools of political and ideological control over the audiences?
- In EP countries where middle-class women are often a considerable fraction of the working force did they become a privileged target for media broadcasts?

Conclusions

The former reflections were based on the STEP experience on the use of newspapers as sources for unveiling the public images of science and technology in countries of the European Periphery. What I tried to pinpoint briefly is the extent to which the results of such research can be used as a guide to outline research lines, topics and questions to enlighten future projects using as sources audiovisual media such as radio, TV and movies.

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Scientific Nationalism in »Peripheral« Countries in Palaeoanthropology and Archaeology

The »cradle of mankind« stood in Africa. The East-African Rift Valley has become the El Dorado of Western paleoanthropologists since the late 1960s. Important sites for hominid fossils are to be found in (often remote regions of) Ethiopia, Kenya, Tanzania, Malawi and South Africa. Most of the countries are considered to be extremely poor, politically volatile and »underdeveloped«.

The Mediterranean is a crucial region for prehistoric and pre-Roman archaeology. Turkey for example hosts a large range of important archaeological sites. Since the late nineteenth century numerous European (»Western«) researchers have excavated in Troy, Ephesos, Pergamon etc. and continue to do so.

Asymmetries and »scientific colonialism«

Although there are significant differences between these cases, the common denominator seems to be a stark asymmetry in funding and scientific expertise between the »host« country and the countries of foreign researchers excavating. This asymmetry is often a cause of tensions between countries and researchers of different nationalities framed in terms of »scientific colonialism«. This trope is obviously directly connected with the frame of centre-periphery. *Mutatis mutandis* cases of »scientific colonialism« in archaeology and prehistory can be traced back at least to the late nineteenth and early twentieth century. Even presumably »central« countries such as France saw their prehistoric riches being taken out of their country. Particularly in the 1920s, museums from the USA with their well-filled coffers purchased large collections of stone tools and other objects for their collections.¹

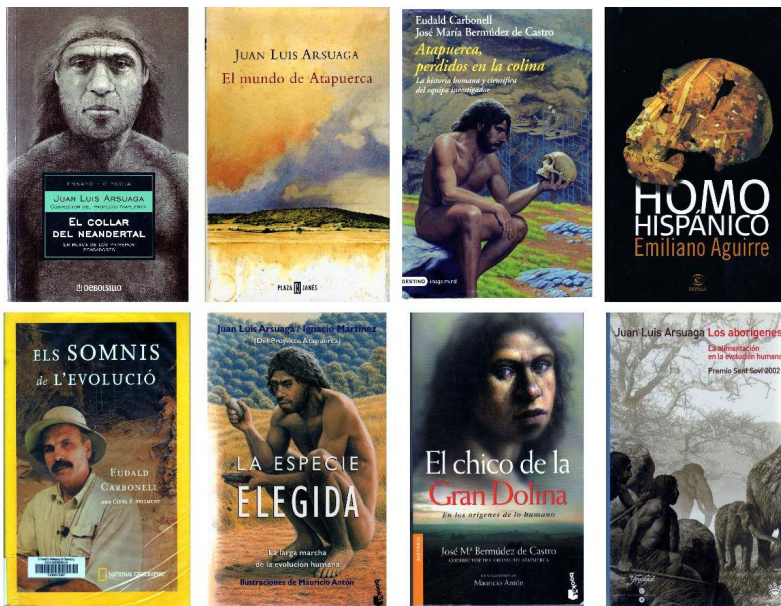
This alleged asymmetry has to be questioned in each case. It is often used as a rhetorical device to self-fashion one's nation as an underdog. My particular case study is Spain. The cave-paintings of Altamira provide the *locus classicus* for »scientific colonialism« by devious French scholars.²

Peripheral

For most of the twentieth century, Spanish prehistorians and archaeologists felt that they were at the margins of what was happening in their field. Despite a number of very promising sites it seemed to them that the »important things« were taking place in leading countries such as France, Great Britain and the USA. The self-perception of being »peripheral« is characterized by a deeply ambivalent attitude toward the »centre«. As French archaeologist Nathan Schlanger pointed out to me, »there is a double move implied by »emergent« scientific archaeological powers« in the early twentieth century. Countries such as Spain, Belgium and South Africa advertise themselves: »«come and see what we have». They invite experts from abroad to pay attention, recognize and

¹ R. White: »The historic and legal contexts of foreign acquisitions of paleolithic artifacts from the Périgord: 1900-1941« Paper presented at the The role of American archaeologists in the study of the European Upper Paleolithic, Liège 2002.

² Moro Abadía, O. »Art caves as symbolic spaces: the case of Altamira.« In *Castrum Pragense. Sites of memory between scientific research and collective representations*, edited by J. Maríková-Kubková, N. Schlanger and S. Lévin, 69-78. Prague: Archeologický ústav Akademie věd České republiky, 2009.



applaud. At the same time they signal: «keep off this is ours» for us to do what we want, to give new names etc.»

This deep (post-colonial?) ambivalence continues to exist to the present day if we look at the aforementioned cases, palaeoanthropology in Africa and archaeology in Turkey. Often these countries are still in need of support in terms of finance and expertise. Nowadays their main objective is to create a strong scientific community of their own.³

Three Research Questions

1. The media seem to play a crucial role in this nationalization of research and the »defence« against the »exploitation« from abroad. Nationalist stirrings are far more difficult to detect in scientific publications. Therefore the popularization efforts of researchers, the strategies of museums and the discourse of mass media deserve special attention.
2. In the popular sphere we often encounter attempts to »appropriate« hominid fossils and archaeological objects in order to construct national histories. What kind of »continuities« are these?
3. A similar line of argument could be pursued in different disciplines, the common denominator being »scientific valuables« in a peripheral country. Biodiversity / zoological research / rare plants and animals are three such disciplines.

Book covers form various popular writings on paleo-anthropology in Spain

³ Gibbons, A. »Africans begin to make their mark in human-origin research.« Science 301 (2003): 1178–1179.

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O. Hochadel: A boom of bones and books: The »popularization industry« of Atapuerca and human-origins research in contemporary Spain, *Public Understanding of Science*, in press (2013).

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Félix Rodríguez de la Fuente's Cross-Platform Broadcasting of Nature, 1962-1980

The central figure of this discussion is the physician Félix Rodríguez de la Fuente (1928-1980), who as author, editor as well as radio and TV director, producer and broadcaster, enthusiastically believed in the creative and educational possibilities of mass audio-visual media. As a falconer and naturalist, la Fuente furthermore nurtured a strong passion for nature, its conservation, and the natural sciences, in particular ethology.

Rise to success

Key to his professional success was his diverse network of influential figures in the Spanish political landscape, including General Francisco Franco and the then soon-to-become King Juan Carlos I themselves, as well as in the scholarly landscape, including the cofounders of the Spanish Ornithological Society (SEO/BirdLife) José Antonio Valverde and Francisco Bernis Madrazo. Furthermore his ability to skilfully navigate Spanish bureaucracy and institutions of the 1960s and 1970s – such as the Departments of Agriculture and of Information and Tourism, environmental NGOs, the state-owned radio and television broadcasting corporations (*Radio Nacional de España* – RNE; *Televisión Española* – TVE; *Radiotelevisión Española* – RTVE), as well as several publishing companies – helped pave his way to success.

Legacy

De la Fuente's legacy lay in his highly influential, yet controversial representation of nature, which was informed by his conservationist and ethological perspectives, as well as his representation of the discipline and profession of the natural sciences. De la Fuente's involvement in a wide range media allowed for the dissemination of his ideas through numerous publications, ranging from encyclopaedias to comic strips, as well as through radio and television broadcast programs. Thus the highly charismatic de la Fuente rose to become a public staple of the media landscape in 1970s Spain. Indeed, following and in part as a consequence of his premature death in a plane crash while shooting a documentary in Canada, de la Fuente's impact acquired an almost mythic status.

Research Questions

The focus of this discussion is nonetheless on de la Fuente's major works, in particular his highly successful and influential *Man and the Earth* (*El Hombre y la Tierra*), an Iberian Fauna television series that aired from 1973 to 1980. The hypothesis is that this work contributed decisively to the popularisation of the natural sciences and of conservationist viewpoints in Spain, as well as more broadly to the overall transformation of Spanish society during the turbulent time of regime change. The central questions guiding the research include the following:

1. What kind of education and entertainment techniques did he use? How do these account for his (enduring) success and controversy?
2. What is the role in these processes of (a) his elaborate construction and exploitation of his own status as a celebrity, and (b) the multidimensional embedding of his media pieces in people's everyday lives?
3. How did, if so, these elements contribute to the social, political and cultural transformation of the Spanish society in the 1970s? Did his media output contribute to a process of 'scientification of the Spanish society'?
4. If so, to what extent did his media output participate in such processes by suggesting, staging and conveying somehow newly-offered/gained ways of knowledge management?



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Reflections on the Basic Function of Text in the Popular Presentation of Science

The media changes of the 20th century provided a large variety of new tools for communicating science. With the advent of radio, television and finally the computer, it seems that science could become more visible and even audible to a broader public than ever before. But how do we know that something we see or hear in the mass media is a popular presentation of science? Is it the topic of science, technology or nature alone that turns a radio or television programme into a science programme? Is every moving image of for example people in white coats working in a laboratory per se popular science in the sense of science communication?

Maurice Goldsmith: »The science critic« (1986)

Useful in finding answers to these basic questions is British science writer and UNESCO science editor Maurice Goldsmith's »The science critic«.¹ In this publication, Goldsmith sums up his experiences in the different fields and analyses successively the popular presentation of science in the different media cultures.

He begins by looking at newspapers, magazines and books. Despite his profession as a science writer, Goldsmith tends to have a rather pessimistic view on the future of printed matter in the context of popular science. Scholarly magazines and books might continue to be an important source of information for the science communicator himself, but Goldsmith believes that the public will prefer the presentation of science in audio-visual media.

In the process of communicating science, the science writer or communicator acts as a crucial mediator between the world of science and the public sphere. On the one hand, the science communicator must decide which scientific topics he wants to inform the public about. On the other, he must decide which means he could employ in order to fulfil this task. He has to be perfectly acquainted with the laws of the respective medium he uses, or as Goldsmith puts it:

Each medium has its own grammar, essential for the language used by its particular communicators, who have their personal perspectives with which they select and interpret the phenomena they seek to communicate.²

The language of the medium surely differs from the language of science. Like any specialized knowledge, scientific knowledge is characterized by the use of certain technical terms. The communicator has to adapt the language of science to the language of the daily press, the radio or television.

Goldsmith acknowledges the difficulties that a science writer already encounters when trying to find the right language for the presentation of a scientific topic in a newspaper article. A science

¹ N. Lichfield/H. Bondi: »Maurice Goldsmith, 1913-1997«, in: Science and Public Policy 24(2), April 1997, 135-137.

² M. Goldsmith: *The science critic*, London 1986, 17.

writer cannot do without a scientific vocabulary, because this is what really makes his text a popular presentation of science. This does not mean that he has to employ exactly the same terms as a scientist. And when he does, he has to explain them or he has to indicate how the average reader can find supplementary information. In this context, it is important to remember that the world of science is mainly a world of text, a world of scholarly publications. The written and printed word is essential for science.

Certainly scientists also speak. They teach at universities and they present their work at conferences. Those speeches are also a kind of text, but they are not spontaneous utterances; rather, they are often written down and supplemented by notes, handouts or other additional printed material. Hence orality, the spoken word or text, plays a role in science, but it very much relies on something that has been written.

So what happens when the medium of the spoken word, the radio, is used for the popular presentation of science? Here again, Goldsmith points out an obstacle, the science communicator has to meet with:

The main problem is that in many instances the broadcaster is talking about what really needs to be seen to be understood. Thus, where a piece of machinery has to be described, the only effective way of helping the listener who wants more detail is to provide a back-up service of written material.³

³ Ibid, 49.

In a radio programme, the function of a »piece of machinery«, like for example a steam engine, is often illustrated by original sound recordings. But even in this case, the listener needs a spoken commentary to really understand what he hears. And the listener also needs this commentary in order to recognize that through this radio programme he is supposed to learn more about the functioning of steam engines. And more often than not, the listener can get the written script from the radio station. Goldsmith states that additional reading of supplementary text is necessary to really understand a popular presentation of science on the radio. And one may add that the spoken or written text is necessary to identify a radio show as a popular presentation of science.

Goldsmith, however, is convinced that the radio derives its power from the idea of an almost direct contact with its audience. According to Goldsmith, the directness of sound also stimulates the listener's imagination and thereby prepares his mind for something new, coming for example from science. For this reason, Goldsmith considers the radio to be most useful for the popular presentation of science and technology especially in the countries of the so-called »third world«, because: »Most people live in rural areas and have been brought up in an oral tradition, learning about their village and the people who live there through songs and stories, many of which will have been passed down by word of mouth

for generations« Goldsmith connects the broadcasted form of popular science to the »oral tradition« in illiterate, or to be more precise, preliterate communities.⁴

⁴ Ibid, 77.

Walter J. Ong: »Orality and Literacy« (1982)

One can link Goldsmith's statements with some more general media reflections by the philosopher Walter J. Ong, whose field of work covered various forms of orality and literacy in different cultures. In his book »Orality and Literacy: The Technologizing of the Word«, Ong claims that the complicated process of storing and transmitting knowledge in an oral society is based on repetition as well as the use of fixed expressions and sayings. These techniques in turn produce »a highly traditionalist or conservative set of mind that with good reason inhibits intellectual experimentation«.⁵

⁵ W. J. Ong: *Orality and Literacy: The Technologizing of the Word*, London 1982, 41.

Literate societies (in which writing implies different kinds of conservative behaviour) do not have to rely on oral means to store and transmit knowledge. One can even say that to a certain extent they forget how preliterate or primary oral cultures deal with knowledge. Ong points out that by using modern electronic devices the recording and transmission of sound, literate culture has created another, a »secondary orality«, which is »essentially a more deliberate and self-conscious orality, based permanently on the use of writing and print, which are essential for the manufacture and operation of the equipment and for its use as well«.⁶

⁶ Ibid, 136.

Taking into account Ong's concept of secondary orality we have to say that the »grammar« or »language« of even a medium that uses sound instead of written words is a »grammar« or »language« of text.

Conclusions and questions for further investigation

- Words and text convey meaning and information. They also turn the audio-visual presentation into a popular presentation of science.
- Today we know very well that audio-visual media can easily be manipulated. Text is often meant to authenticate the pictures shown. This is crucial, especially for the communication of science.
- To what extent do these general ideas on orality and literacy provide us with a new look at the concept of »scientific literacy« that accompanies the demand for a public understanding of science since the 1950s?
- Based on the centrality of text as a basic aspect of popular science, we should examine more closely the relation of orality, literacy and the presentation of popular science in the different media.

The Uses of Popular Science

Theory

Why did people in the early 20th century read, listen to and watch popular science media? In Britain, at least, evidence from the Mass Observation surveys of the late 1930s and 1940s suggests that most people had little to no interest in the subject. But for the small proportion of the population which did access this material, how do we find out what they expected to gain from it?

Popular science media as historical source

One obvious method to answer this question is to survey audience reactions from letters, diaries and reports of discussions for instance. But this is a huge undertaking, and in the meantime we may have to make do with evidence derived from the rhetoric of those who produced and disseminated materials, such as advertisements, magazine editorials, etc. Such materials were no doubt in part intended to promote the interests of those who wanted the public to access their products. This is especially true for material generated by the scientific community (itself by no means homogeneous), the academic elite, publishers and those with specific political and cultural agendas such as the left-wing activists of the 1930s. However, anything derived from a medium requiring commercial success for its survival must at least to some extent reflect the public's interests; otherwise, the firm producing it would not attract enough attention and thus fail.

Note that in Britain this last point is not valid for the radio, which was the sole preserve of the BBC, a state monopoly whose director was determined to use it as a vehicle for raising cultural standards. Here, when science was addressed, the interests and values of the elite scientific community were reflected whether or not there was much of an audience for the broadcast *talks*.

Making the case for science and technology in everyday life

Here the interests of the scientific community were promoted, either by reporting on the exciting research in new fields, such as atomic physics and cosmology, or by establishing links to industrial development – although these last two positions did not always sit easily together. Academic scientists wanted parity with the old educational establishment based on teaching the classics and thus stressed the intellectual excitement of discovery. But those working in industry preferred a more practical approach: they hoped to convince the public that they should take an interest in science and technology because it was transforming their everyday lives. Both of these arguments linked science and technology to a sense that *modernization* was – or ought to be – an important aspect of everyday life. This rhetorical technique was available even in countries where modernization was more an aspiration than a reality. But in an industrial nation such as Britain, proud of its imperial heritage, it was often argued that it was a patriotic duty to

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be aware of the technological, industrial and military developments on which the nation's power depended.

Reaching the public: publicists, science experts, political activists

We should not dismiss these rhetorical devices as totally divorced from the interests of that small proportion of the population open to being persuaded that taking an interest in science was worthwhile. Exactly the same rhetoric appears in the promotional material disseminated by commercial publishers hoping to sell educational book series and popular science magazines. The success of these series suggests that the perceived demand was real.

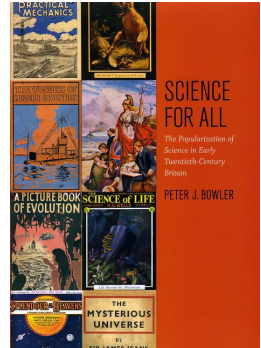
The efforts to promote public interest in applied science were not necessarily presented as being of immediate practical value to the individual reader. Details of how industrial processes worked were directly relevant only to those who actually worked in that industry. Nevertheless, it was often implied that in order to 'get on in life' one needed to show that one was abreast of the latest innovations. For some innovations with an impact on everyday life, the books and magazines did offer information of practical value in areas such as radio, electrical appliances or photography. Such books and magazines directly addressed the 'practical man' and hobbyists who wanted to build their own equipment.

This points us to an important division within the community of scientific enthusiasts. Much of the literature aimed at the market for self-education was written by experts and promoted as being authoritative precisely *because* of the authors' professional standing. Here the elite scientific community had the opportunity to present its case for public support of academic science by government and industry. But in some areas of applied science there were also writers who had practical, rather than academic experience, and they tended to promote a more populist viewpoint, encouraging ordinary people to think that they could invent valuable new technologies in their own home workshops. In Britain this viewpoint was actively supported by 'Professor' A.M. Low, who was not a professor and hence viewed with deep suspicion by the scientific elite. This populist vision of scientific progress was more active in America, where Thomas Edison was celebrated as a folk-hero and professional experts by contrast were often confronted with hostility.

A further division opened up in the 1930s, as left-wing activists became a significant force within the academic community. These scientists opposed the exploitation of technology by the existing social elite. Moreover they saw popular science education as a means of providing ordinary people a scientific outlook on social issues as well as the necessary information to see how science was being misused.

Balancing act between education and entertainment

These brief remarks outline some of the techniques used to promote popular science. While the local environment surely impacted the particular rhetorical strategies exploited to promote science, we should not forget that most genuinely popular literature shared an overriding characteristic: content had to be entertaining more than educational, since only a small proportion of the general population had a real interest in science or other academic subjects. The failure of several popular British science magazines, such as *Discovery*, which were unable to balance the demands of self-education and entertainment illustrate this point. Paralleling this were constant press complaints that the BBC's radio 'talks' by experts were too dull for the ordinary listener. Magazines not protected from commercial pressures, including *Conquest* and *Armchair Science*, moved steadily 'downmarket' over the course of time in a desperate effort to maintain circulation. In the end they became little more than general magazines with a small and trivial science content, featured alongside fiction, humour, popular entertainment and fashion content. The scientific community had nothing to do with such productions and would have almost certainly regarded them with distaste.



Further Reading

P. Bowler: *Science for All: Scientists and Popular Science Writing in Early Twentieth-Century Britain*, Chicago 2009

P. Bowler: *New Initiatives in Popular Science Publishing in Early Twentieth Century Britain*. In: A. Schirmacher (ed.), *Communicating Science in 20th Century Europe*, Berlin 2009

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A.Nieto-Galan: Los públicos de la ciencia. Expertos y profanos a través de la historia, Madrid 2011.



Science Popularisation as Cultural Hegemony

In the context of the 2012 Berlin workshop, the topic of cultural hegemony emerged in various forms: whether in the discussions of science popularization and the shaping of ideology (Gavroglu); 'popular science' as a cultural dispositif (Schirrmacher, Bowler); scientists' professional authority versus journalists' and media producers' expertise (Lehmkuhl, Häusermann, Boon, Bergeron, Raichvarg, Tabernero, Azzouni); the case of 1930s British 'scientific intellectuals' promoting a 'defence of science' agenda (Desmarais); science popularization and strength of the scientific community (Simoes); education, hygiene and political propaganda in radio and films (Silva, Wurm); and finally the constellation of science popularization, the media and the making of the modern nation (Hochadel, Herran, Papanelopoulou, Zasztowt, Pallo, Goban-Klas, Katz-Kimchi).

The Gramscian legacy

Beyond exploring cultural hegemony within these specialized areas of the history of science, scholars have also demonstrated in recent decades renewed interest in the life and works of Antonio Gramsci (1891-1937), one of the first major thinkers in the 20th century to develop a theory of cultural hegemony.

The majority of Gramsci's extraordinary intellectual output stems from the years 1926 and 1937, during which he was detained in Mussolini's prisons. In this period, Gramsci wrote in total 32 notebooks, which make up his famous *Quaderni dei carcere* (Prison notebooks). Across the span of over 3,000 handwritten pages of his *Quaderni*, Gramsci elaborated on concepts such as hegemony and consent, political and civil society, popular literature, folklore, subaltern social groups, etc. Moreover, he devoted considerable effort to define and analyse intellectuals and their role in society.

Gramsci's concept of hegemony

According to Gramsci, mere physical coercion and repression were insufficient explanations for the maintenance of political stability. Rather, he postulated, the so-called civil society - with its institutions ranging from education, religion, family, mass media, to the microstructures of everyday practices - contributes to the production of meaning and values; these, in turn, direct and maintain spontaneous consent of the various strata of society.

Hegemony was a ruling tool for any class or group to exert and reinforce cultural, moral and ideological leadership over subordinated, weaker groups and communities. Gramsci conceived of hegemony as a dynamic force in a continuous process of contestation, assertion and reassertion.

Role of Intellectuals

Intellectuals, in Gramsci's view, conceptualized the direct reproduction of an effective hegemony. For capitalist, industrialized societies, this included new professionals, judges, experts, teachers, civil servants and scientists. From these groups emerged what Gramsci designated as 'organic intellectuals.' In Gramsci's words:

Every social group, coming into existence on the original terrain of an essential function in the world of economic production, creates together with itself, organically, one or more strata of intellectuals, which give it homogeneity and an awareness of its function, not only in the economic but also in the social and political fields.

Revisiting 'Popular Science'

Since the mid-1980s, scholars have engaged with the term 'popular science', in historical contexts ranging from early modern period to early 20th century industrial societies. The works of scholars such as Robert Darnton and Roger Chartier, James Secord, Johnathan Topham and Roger Cooter all reevaluate the popularization of science, its inextricable relationship to practices of science production and its shifting meaning for historical actors.

With respect to these reconsiderations of the nature and role of science popularization, I suggest that Gramsci's work on folklore and popular culture - while conceptualized in the context of an early 20th-century working class - can be extended in productive ways to the late 20th-century mass media society. In this context, radio, TV and film emerge as the new mediators between elite and popular science; lay audiences emerge as the potential intellectuals who shape expository practices in the media. It remains yet to be determined, though, how we can define 'popular science' in this science on the air era. Here, Ludwik Fleck's notion of the dynamic circulation of knowledge between esoteric and exoteric circles may prove to be particularly useful.

Conclusions: Science popularization as cultural hegemony

Science popularization, a fundamental part of 20th century culture, cannot be separated from important issues regarding scientific authority and their influence on social and political control. With their expository practices in different media, professional scientists as well as science popularisers played a significant role in the public arena of various political and cultural contexts, for the sake of their scientific authority, academic hegemony and social recognition. Their aims and motives, in co-evolution with the aims and motives of the dominant political regime and its elites, help us to analyse the ethical status of experts and professionals as potential intellectuals at large in our contemporary societies.

Further Reading

A. Nieto-Galan: Antonio Gramsci Revisited: Historians of Science, Intellectuals and the Struggle for Hegemony, *History of Science* xlix (2011), 453-478.

Recent Activities

Manchester ICHST 2013:

»Is it the medium? Ways of communicating science in 20th century Europe« (J.-B. Gouyon/A. Schirmmacher, org.)

ESF Exploratory Workshop, Berlin 2012:

»Putting Science on the Air in Europe, 1920s to 1980s«
(A. Schirmmacher, org.)

Workshop Max Planck Institute for the History of Science, 2010:

»20th Century Science Communication in Europe: The Political and Cultural Context« (A. Schirmmacher, org.)

Barcelona ESHS 2010 - Symposium S-39:

»Representations of Science and Technology in the European Daily Press« (A. Simoes/F. Papanelopoulou, org.)

Lisbon HoST Workshop 2010:

»Ciência e Tecnologia para o povo« (T. Saraiva, org.)

Budapest ICHST 2009 - Symposium S-53:

»Communicating Science in 20th Century Europe: Comparative Perspectives« (A. Schirmmacher/L. Zasztowt, org.)

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