

Scientists in the public realm: Communication models, social contexts and practices

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Abstract

The paper presents selected results from a series of matching online surveys of altogether more than 5,000 scientists in Brazil, China, Germany and the United States regarding

their attitudes, preferences and experiences related to the public communication of science and technology. The first part focuses on the involvement of Brazilian scientists in science communication. Remarkable is their positive relationship with the mass media, indicated by frequent contacts, positive experiences and perception of benefits. Social media are less used by Brazilian scientists for communication with the public, though. The second part looks at Chinese scientists' attitudes towards science outreach and their understanding of their role as information source for journalists. Chinese scientists show a preference for organized science outreach and are relatively reserved about mass media. Compared with German researchers, Chinese scientists are in some respects less inclined to accept expectations of journalists towards them. In the third part, the roles of scientists as "information sources" of journalists and as "authors" of posts in new online media (blogs and social networks) are compared. Using results from surveys of German and US neuroscientists, some factors are discussed that are likely to influence the preference of scientists for old or new media. So far, in both countries more neuroscientists prefer to talk to journalists than to write in new online media.

Introduction

Although mediators such as science journalists, public information officers and other professional science communicators play an important role in public science communication, scientists as the producers of scientific knowledge are inevitably involved – as information sources for journalists, authors of popular texts, science bloggers or speakers in public events. Scientists' activities in the public realm are crucial for putting science in a broader social context, making it relevant and accessible to citizens and to actors from politics and civil society.

The panel session "Scientists in the public realm: Communication models, social contexts and practices" focuses on the role(s) of scientists in public communication of science. This paper summarizes in three sections the three contributions to the panel session: "Interactions of scientists and journalists in Brazil" (Luisa Massarani), "Chinese scientists' attitudes towards outreach and journalism" (Fujun Ren, Jie Ren and Huiliang Zhang), and "German and US neuroscientists as 'sources' and 'authors' in PCST" (Yin-Yueh Lo and Hans Peter Peters).

The analyses presented in the three sections share a common empirical database: online surveys of altogether more than 5,000 scientists in Brazil, China, Germany and the US, implemented 2011-2014, with similar questionnaires which were translated into the respective languages. The surveys in Germany and the US were conducted by a team of the Research Center Jülich, the survey in China as collaboration of the Jülich research team with the China Institute for Science Popularization (CRISP), and the survey in Brazil as collaboration of the Jülich research team with the Museum of Life of the Oswaldo Cruz Foundation.¹ Besides the large general surveys of scientists from a broad spectrum of disciplines in Brazil, China and Germany, three smaller surveys of German and US neuroscientists are used in the last section. The samples were constructed by random selection from a list of authors of scientific publications (Germany, USA), or from national databases comprising holders of research grants from the National Natural Science Foundation of China (NSFC) and the National Council for Science and Technology (CNPq) in Brazil, respectively. The response rates vary from 17% (USA) to 34% (Germany). All samples are composed of scientifically productive scientists, many of them high-ranking.

Interactions of scientists and journalists in Brazil

In the last decade, Brazil has tried to motivate scientists to communicate their research to the public. Illustrative of these efforts is the creation, in 2003, of a Department for Popularising Science and Technology at the Ministry of Science, Technology and Innovation. Since then, the Department has been responsible for helping to design a policy for science communication in Brazil, including funds for calls aiming to support science communication projects.

Besides the funds, some initiatives tried to sensitize scientists for communicating with the public. The National Council for Science and Technology (CNPq), linked to the

¹ All surveys were conducted using the SoSci Survey platform (<https://www.soscisurvey.de/>) which offers its service for academic survey projects free of charge. We gratefully acknowledge the continuous support of the provider of that platform, Dominik Leiner. We also thank Petra Degen for programming the online questionnaires and for her technical support in implementing the surveys.

The surveys in Germany and in the US were supported by grants from Volkswagen Foundation and from the Federal Ministry of Education and Research (BMBF), Germany. We would like to thank Alben Spangenberg for her contributions to the German survey project.

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science ministry, created an advisory committee for science communication with the objective to initiate and implement both practical activities and research.

CNPq also created, in 2012, a section to make science communication activities visible in its national online platform (Plataforma Lattes) that contains the curriculum vitae of Brazilian scientists. The CVs stored in this database are crucial for scientists applying for grants and fellowships from CNPq.

The survey of Brazilian scientists (n=956) in 2013 gives an up-to-date account of the interactions of Brazilian researchers with journalists and their involvement in other public communication activities, including their use of the new online media.

Results show that scientists rate their relations with the general mass media mostly positive, expecting a beneficial impact on their reputation – similar to what has been reported for the major 'old' science countries.

65% of the surveyed scientists affirm to have participated actively in an event for the general public such as a talk, a panel discussion or a science exhibition. About 80% of the interviewees report at least one contact with the media in the past three years. 70% of those said that they never refused to give information to journalists who wanted to interview them; the remaining scientists had rejected some journalistic requests in the past but hardly anybody had refused all requests from journalists.

Mostly, scientists are interviewed by journalists who work for newspapers (66%), followed by journalists from TV (26%). Scientists rate their relation with the media positively: 67% say that having their research covered by media has a positive impact on their reputation among the scientific colleagues. Further 21% affirm that it is partly positive and partly negative, whereas only 2% consider it negative.

About two thirds (68%) of the respondents describe their contacts with journalists in the last three years as mostly good, and 23% report good and bad experiences, relatively balanced. Only 4% indicate that their experiences were mostly bad (Figure 1). Almost half of the respondents (45%) find that their contacts with the media tended to be useful, and the other half said that they were neither useful nor damaging. For 25% of the interviewees, talking to the media can even make it easier to get more funds for their research; 28% believe that writing on a topic interesting for the general media can sometimes make it easier to get a paper accepted by a scientific journal.

Evaluation of contacts with journalists in the past three years

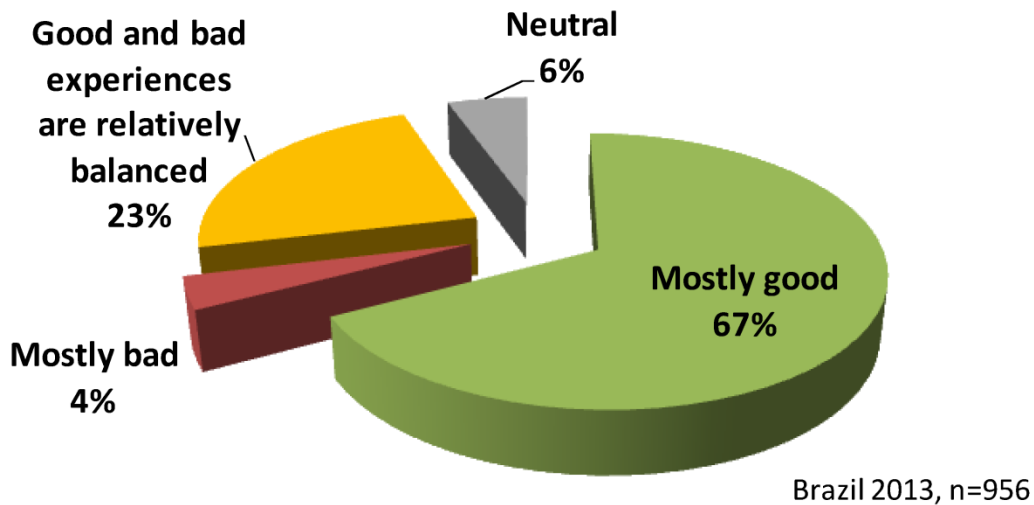


Figure 1. Evaluation of own media contacts in the past three years.

Brazilian scientists are still not very active using social media as a science communication tool: 63% said they never put information related to their research on a website, blog or social network site for the general public in the last 12 months. However, 73% of the respondents affirmed to be a member of a social network, mostly to be in contact with their friends and relatives (80%) or to keep them informed about general political, cultural and other public issues (64%).

Social networks are also a tool for some of them to be informed about public issues related to science in the area of their expertise (62%) or to communicate professionally with other scientists (65%). Less than one third (30%) has a website in which they provide information about their research or on issues related to their area of expertise.

Chinese scientists' attitudes towards outreach and journalism

The following paragraphs give a brief account of Chinese scientists' attitudes, preferences towards and assessments with respect to science outreach in different phases of research (project application, mid-term of research, after accomplishment of research).

The data was gathered in an online survey of 1512 Chinese scientists from a wide range of disciplines. The key findings are summarized in four items:

(1) *Attitude towards outreach activities*: Chinese scientists generally think very positively about science outreach. 92% of the surveyed scientists showed a positive attitude towards engagement in outreach while doing research (Figure 2).

Participation in science communication apart from research work?

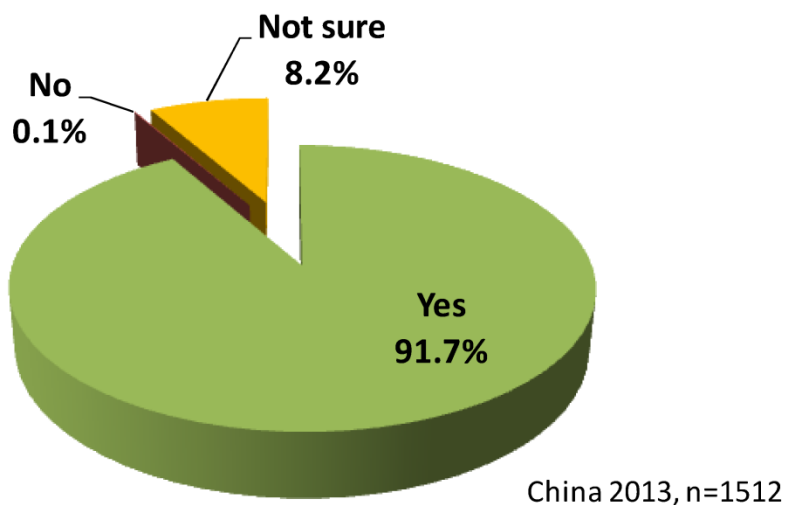


Figure 2. Attitudes of scientists regarding engagement in outreach.

(2) *Contents, targeted audience and preferred kinds of outreach activities*: 62% of the scientists believe that the development and findings of research should be disseminated. 88% believe that "the youth" should have a top priority as outreach audience. And 72% of the respondents prefer to engage in open, interactive outreach activities in labs of colleges, universities and institutes. However, there was some variation with respect to different phases of research. For example, during the project application phase, 54% of the scientists and researchers want to focus on the dissemination of related scientific knowledge.

(3) *Preferred organizer of outreach activities*: While 72% of the scientists and researchers want to participate in outreach activities organized by colleges, universities and

institutes, only 21% prefer to engage in outreach activities organized by the media. This indicates a reluctant attitude of Chinese scientists towards the media.

(4) *Problems when doing outreach*: 50% scientists and researchers argue that the lack of the time and venues is the main problem, 48% scientists and researchers argue that missing support in terms of funding is the main problem, while 41% scientists and researchers argue that there are no science outreach activities in their universities and institutes.

The questionnaires of the surveys in China and Germany included two questions with 8 items each about scientists' perception of their own role with respect to interactions with the media, and about what they expect from journalists. The respondents expressed their agreement or disagreement with these items on 5-step rating scales – the endpoints labeled "completely disagree" (-2) and "completely agree" (+2), respectively. The following analysis is based on a comparison of Chinese and German scientists' mean responses (see tables below).

(1) *Scientists' perception of their role regarding interactions with the media*: The first question included items indicating scientists' agreement or disagreement with presumed expectations of journalists towards scientists with whom they have interviews. The comparison of the mean scale values in the table below shows that Chinese scientists tend to be less "media-oriented" than their German counterparts as their agreement with journalistic expectations is somewhat lower in five of the eight items. However, the responses of Chinese scientists to most items are not completely different from those of German scientists. They show that scientists in both countries are willing to cooperate with the media but have some reservations regarding the media's interest in the scientist as person and their presumed expectation that scientists talk about unpublished work.

	China	Germany
With media contacts, scientists should . . .	(n=1512)	(n=863)
. . . use catchy phrases that can be quoted verbatim by reporters	1.41	0.79
. . . play along if journalists are not only interested in scientific results, but are also interested in them personally	-0.30	-0.15
. . . communicate their results and expertise in an entertaining manner	-0.11	0.99
. . . relate their research to the everyday experience of the media public	0.91	1.31
. . . use their expertise to criticize political, economic, and other decisions affecting society or make practical suggestions for action	1.00	1.05
. . . if asked, provide information about current research or research that has not yet appeared in scientific publications	-0.42	-0.27
. . . if asked, speak openly about problems, such as misconduct on the part of researchers or controversial research practices	0.54	0.96
. . . not share internal scientific differences of opinion with the general public	-0.49	-0.16

A striking difference exists with respect to scientists' readiness to "communicate their results and expertise in an entertaining manner". Compared with German scientists, Chinese researchers seem to prefer a less entertaining (more serious) approach. In contrast to the general trend of stronger media-orientation of German researchers, Chinese scientists are more prepared to use "catchy phrases", however.

The assumed journalistic expectation that scientists "should play along if journalists [...] are interested in them personally" is mildly rejected by German scientists and somewhat more strongly rejected by Chinese researchers. If journalists are attempting to shift public attention from science to scientists as persons, in the view of most Chinese scientists this will violate the golden mean of the Confucian school calling for modesty. Chinese scientists believe that just as a tall tree catches the wind, a high-profiled person is

liable to be attacked. Therefore, even great scientists will be cautious and low key in front of a camera.

Chinese and German scientists both see the necessity of revealing to the media and to the general public misconduct on the part of researchers, controversial research practices, and internal scientific differences. However, German scientists are more inclined to agree that scientists, if asked, should "speak openly about problems, such as misconduct on the part of researchers or controversial research practices", while their Chinese colleagues agree stronger that scientists should "share internal scientific differences of opinion with the general public".

(2) *Scientists expectations of journalism*: The second question included items about what scientists expect from journalists. The answer pattern shows that in 6 of the 8 items there is hardly any difference between Chinese and German scientists in what they expect of journalists (see table below). In particular, scientists in both countries similarly and strongly expect from journalists that they consult "the scientists they have interviewed prior to publication in order to avoid making factual errors", that they "report about research methods and processes" and that they "support scientists in educating the general public".

	China (n=151)	Germany (n=863)
Journalists should . . .	2)	
. . . consult the scientists they have interviewed prior to publication in order to avoid making factual errors	1.78	1.87
. . . compromise scientific accuracy in what they report	-1.31	-0.52
. . . select their interviewees from science based strictly on the criterion of professional reputation	1.21	0.53
. . . only report on research results that have already appeared in scientific publications	0.54	0.47
. . . only ask scientists about topics on which they have done research themselves	0.88	0.64
. . . support scientists in educating the general public	1.47	1.53
. . . acknowledge that scientific expertise is more credible than the knowledge of practitioners based on professional experience	0.24	0.19
. . . report about research methods and processes so that the general public can understand the reasons for scientific claims	1.29	1.42

Country differences exist regarding the importance of the reputation of scientific information sources interviewed by journalists, and the expected accuracy and preciseness of media coverage of science. Regarding these aspects, Chinese more than German scientists expect journalists to act according to typical scientific norms. Both Chinese and German scientists object to journalists compromising scientific accuracy in what they report, but Chinese scientists express this objection to a much stronger degree. While Chinese and German scientists pay attention to the professional reputation of interviewees, more Chinese than German scientists agree that journalists should select their interviewees from science based strictly on the criterion of professional reputation. Being relatively conservative, the Chinese scientific community wants to be represented in public by scientists with "noble character and high professional reputation", as a Chinese

phrase says. The belief that scientists with high reputation can do a better job of science communication is widely held in China.

US and German neuroscientists as 'sources' and 'authors' in PCST

The raise of new online media (e.g. blogs and social networks) may change the role of scientists in public communication of science. One may expect that the new media which enable direct access of scientists to the wider public reduces science's dependency on science journalism and become an attractive alternative channel of science communication. Conventionally, the role of scientists in the "old" journalistic media was that of a "source"; the new online media allow scientists relatively easily to adopt a role as "author" creating and disseminating their own content.

Based on three surveys of neuroscientists in Germany and the United States, conducted between 2011 and 2014, the analysis in this section focuses on four factors likely to be relevant to scientists who consider possible advantages and disadvantages of the "source" and "author" role.

(1) *Perceived quality of journalistic coverage*: Scientists may be critical of science coverage produced by journalists, and that may motivate them to become authors. A survey of 241 German and 216 US neuroscientists (2011-12) showed a mixed evaluation of the media coverage about their research field. While only 14% of the respondents assessed the coverage as often hostile towards science, almost two third said that the coverage is not comprehensive enough. More than one third assessed the coverage as being frequently incorrect, and about the same proportion did not believe that journalists usually work with credible scientific sources. However, by far most scientists report positive experiences from their own media contacts: 67% of the German and 81% of the neuroscientists rated their media contacts "mostly good", and in both countries about 70% are mostly satisfied with the quality of media reporting based on interviews with them. A significant minority of scientists thus sees deficits in media coverage of science that might motivate them to become authors; but the majority of scientists assess their personal interactions with journalists quite positively.

(2) *Assumed control over coverage*: Relying on journalists to communicate with the public implies that scientists have only very limited control over coverage. They may

explain the message that they want to convey to the public to the journalist, but in the end the journalists select topics and sources, write the stories and decide on which statements of their interview partners they use and in which way. Surveys show a strong demand of scientists to maintain control over how their information is used in the journalists' stories. For example, in the survey mentioned above, 98% of the neuroscientists expected from journalist to "consult the scientists they have interviewed prior to publication in order to avoid making factual errors", while only 22% of the German and 33% of the US neuroscientists believed that journalists in most cases comply with that demand. Missing control over journalistic coverage is thus a possible motivation for scientists to assume the author role themselves and to get rid of journalists and their possible distortions of the scientists' messages by inaccuracies and biases.

(3) *Perceived impact of "old" and "new" media:* Scientists communicating with the public have certain goals in mind such as improving the public's scientific literacy or influencing climate change policy. The expected efficiency of different media in reaching these goals will influence scientists' decisions on how to communicate with the public. A survey of 257 neuroscientists in Germany and the US in 2011 by Allgaier et al. (2013) showed that relatively few neuroscientists used blogs and social networks while almost all respondents used journalistic media (in print, on air or online). Nevertheless, many neuroscientists (particularly in the USA) perceived a strong impact of new online media on public opinion and policy-decisions, but even more scientists presumed a strong impact of journalistic media. Younger researchers used the new media more often than older researchers, and also more often expected them to have a strong impact. Scientists thus assume that both old and new media have impacts on public opinion and decisions by policy-makers, but more scientists expect such effects of the old (journalistic) media.

(4) *Autonomy and initiative in public communication:* For most scientists, interviews are initiated by journalists who contact them, not the other way round. Public information departments of universities also play a role in stimulating media interest. Many scientists wanting to communicate with the public do not generate media interest on their own or receive organizational support in their attempt to gain visibility, however. For them, personal websites, blogs or social networks may be a welcome opportunity to enter the public realm on their own initiative and without depending on others' criteria of selec-

tion. This may be especially true for younger scientists in earlier career stages. In both countries, the frequency of media contacts is statistically associated with holding a leadership role or not. While 47% in the highest leadership group (institute directors etc.) reported more than 5 contacts in the past 3 years, this was true for only 17% of the medium group (project leaders, group leaders etc.). Not a single neuroscientist without a leadership role had so many media contacts. The new media function by self-selection rather than selection by journalists and press officers; they may thus be particularly attractive to junior researchers.

A small-scale online survey of 65 German and 73 US neuroscientists in 2014 provides some limited empirical evidence regarding neuroscientists' preferences for different ways of communicating with the public. More respondents in both countries preferred "talking to journalists from the media who report on science" than "writing [themselves] for websites, blogs, or social networks or producing [their] own podcasts and videos" (Figure 3). Overall, more neuroscientists thus prefer a role as information source for journalists than prefer becoming an author in the new media. However, in both countries – but particularly in Germany – many scientists preferred face-to-face interactions with members of the public over media communication. The relative preference for the "source" role compared to the "author" role in mediated communication is stronger in Germany than in the US, and stronger among senior than junior neuroscientists. The latter difference may reflect the general habitual affinity of younger people with the new online media ("digital natives") but also the relative disadvantage of junior scientists in getting access to journalistic media which may motivate them to look for alternative ways of communication.

Neuroscientists' preferences for different ways of communicating with the public

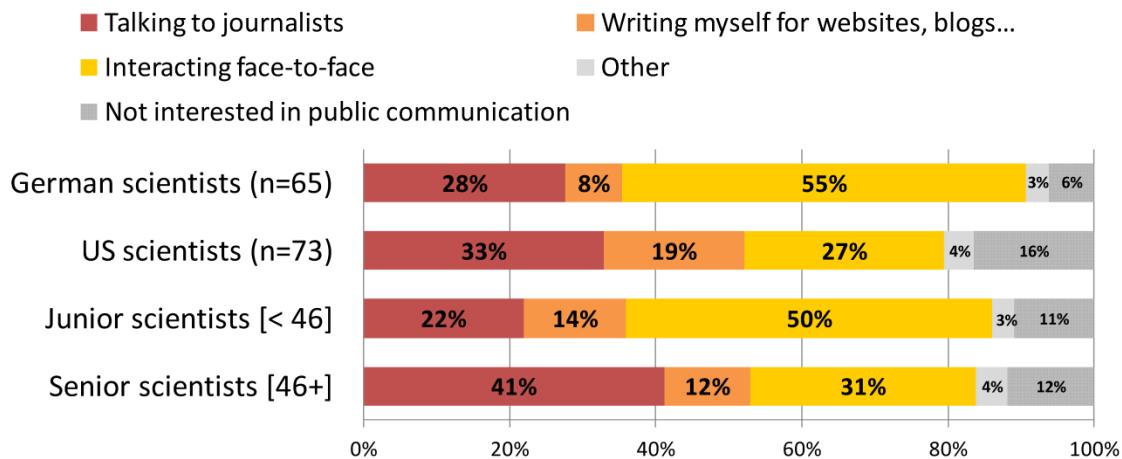


Figure 3. Preferred ways to communicate with the public.

The big question is whether the "source" role of scientists will become less and less important over time and in the end maybe disappear along with journalistic media at all. The arguments and evidence presented above, complemented with considerations regarding time constraints, communication skills and intended audiences, do not unequivocally lead to the conclusion that scientists want to abandon their source role and embrace the author role. We may rather expect a continuing co-existence of scientists' preferences for both "source" and "author" roles in PCST (Peters 2013).

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