Chapter 11
Scientific Sources and the Mass Media: Forms and Consequences of Medialization

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11.1 Introduction

The "medialization of science" concept comprises two complementary observations: first, increasing media attention for science, and, second, adaptation to or even anticipation of media criteria within science as a response to the increasing necessity of legitimating science by means of public communication (Weingart 2001: 244–253). This chapter is mainly concerned with the latter aspect of how science adapts to the conditions of media communication and the resulting consequences, the empirical evidence quoted coming from two biomedical research fields that undoubtedly attract media attention: stem cell research and epidemiology, however. The analysis in this chapter will show the forms of medialization in the routine interactions between two types of scientific communicators serving as media sources – individual scientists and PR departments of research organizations – and journalism. Furthermore, possible consequences of medialization for the public constructs of science, for the research process, and for the science-policy relationship will be addressed.

The main theses are, first, that as media sources individual researchers and research organizations have institutionalized a communication approach towards the mass media that implies strong anticipation of media criteria, and, second, that anticipation of media criteria, strategic orientation and organizational involvement systematically affect the public construct of science, have repercussions on the research process, contribute to the governance of science and also increase the political impact of scientific expertise.

There has been a long discussion about the relationship between science and journalism which has generally been analyzed as relationship between individual

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S. Rödder et al. (eds.), *The Sciences' Media Connection – Public Communication and its Repercussions*, Sociology of the Sciences Yearbook 28,
DOI 10.1007/978-94-007-2085-5_11, © Springer Science+Business Media B.V. 2012

scientists and journalists. Many commentators and communication researchers diagnosed "gaps," "tensions," "barriers" or miscommunication such as inaccuracies, and lack of motivation and communication skills on the part of scientists (e.g., Willems 1976; Dunwoody and Ryan 1985; Singer 1990). If the social context was included in the analysis it was mainly the scientific communities and their norms that were taken into account – and mostly seen as a factor impeding the involvement of scientists in public communication. However, not only the phenomenon of "media stars" among scientists (see Weingart 2001: 262–272) but also the prevalence of routine interactions of scientific sources and the widespread satisfaction of scientific sources with the media coverage of their own research (Peters et al. 2008a) suggest the need for a reassessment of the science-media relationship. In this reassessment, the significance of contexts for the science-media relationship other than the still important scientific communities (see Chapter 8) has to be considered, namely research organizations as employers of scientists and high-ranking journals as publishers (see Chapter 17).

The empirical evidence used to support the arguments of this chapter is mainly drawn from an international mail survey of 1,354 biomedical researchers in France, Germany, Japan, the United Kingdom and USA regarding their relations with the mass media, and 45 semi-structured face-to-face interviews with public information officers from research organizations in France, Germany and the United Kingdom. A detailed description of the methodology of the mail survey, including an analysis of response rate and sampling bias, can be found in Peters et al. (2008a, supporting online material). The overall response rate was 43 percent; we found no indication of a strong sampling bias. The methodology of the survey of public information officers is explained in Kallfass (2009: 103–110).[1]

11.2 Media Relations of Scientists and Research Organizations

There are many reasons for media interest in science, which can be stimulated by events inside and outside science: a new scientific discovery or finding, an innovative technical or medical application, a problem requiring scientific explanation, or an issue of science governance. The media actively monitor science by linking

[1] Both surveys are part of the project "Integration of scientific expertise into media-based public discourses (INWEDIS)" (see Peters et al. 2008c; Peters 2009) which was supported by a grant from the German Federal Ministry of Education and Research (BMBF) in the research program *Knowledge for Decision-making Processes – Research on the Relationship between Science, Politics and Society*. The survey of scientists was conducted in collaboration with Dominique Brossard, Suzanne de Cheveigné, Sharon Dunwoody, Monika Kallfass, Steve Miller and Shoji Tsuchida. The semi-structured interviews with public information officers were conducted by Monika Kallfass (see Kallfass 2009). The conclusions in this chapter are based on the author's secondary analysis of the interview transcripts and do not necessarily match the interpretations of the primary researcher.

into inner-scientific communication, regularly reading *Science* or *Nature*, for example, or they look for scientists with specific expertise by turning to PR departments of relevant research organizations. The media are also the target of communication initiatives that originate in science itself: researchers chatting with journalists about their latest research during scientific conferences, or universities issuing press releases about scientific "successes," for example. In one way or another, individual researchers are usually involved in all these public communication processes, but the initiative for making something public may come from very different actors inside and outside science: the media, research organizations' PR departments, sponsors, publishers, or science critics. This section looks at the interdependencies of science and the media focusing on the "science side" of that relationship. Throughout this chapter the term "media" is used as an abbreviation meaning "journalistic news media," irrespective of the technical dissemination channel such as print, broadcasting or Internet.

11.2.1 Institutionalization

In all five countries and both research fields studied in the INWEDIS survey, biomedical researchers consider the impact of their media contacts on their career generally to be mostly positive, neutral or balanced, but hardly ever negative (Peters et al. 2008a). Furthermore, when they receive feedback on specific media appearances by colleagues, other journalists and superiors, this feedback is mostly positive with little variation between countries and research fields. Less than one percent of the respondents reported "mostly negative" feedback. This is even true when focusing on responses from colleagues. One may speculate, of course, that "visible" scientists are not directly criticized because of their media visibility but that such criticism is spread like rumors behind their backs. However, it is unlikely that researchers grossly misjudge the impact of factors supporting or damaging their own career. We thus have to acknowledge that actors and mechanisms influencing the allocation of career-relevant resources – jobs, promotions, institute budgets, research grants, acceptance of publications in high-impact journals – in part respond positively to the media visibility of scientists and thereby effectively express a normative expectation that scientists should be prepared to interact with the media.

This finding seems rather strange given the classical and still widespread assumption that public visibility sets a scientist's reputation at risk because it conflicts with inner-scientific norms (e.g., Boltanski and Maldidier 1970; Goodfield 1981). If our thesis is true that media contacts by researchers are now institutionalized, we have to challenge the assumption that these contacts violate (effective) norms of the scientific community. A question on the possible motives of researchers for engaging in or refusing contacts with the mass media in the INWEDIS survey included three statements regarding the relevance of scientific culture and peer responses to media visibility as motivators for or against interactions with the mass media: compatibility of media contacts with scientific norms, concerns because of critical responses from peers, and expectations of enhanced personal reputation among peers (see Peters

et al. 2008a, supporting online material, table 8). The distribution of answers shows that about one third of the respondents consider "incompatibility with the scientific culture" to be a very or somewhat important concern that increases scientists' reluctance to agree to contact with the media; two thirds consider this concern to be not or not very important. For about an equal number of respondents (42 percent and 39 percent, respectively) "possible critical reactions from peers" and "enhanced personal reputation among peers" are very or somewhat important motives for rejecting or accepting media contacts. The impact of scientific norms on readiness to become involved in media interactions can best be described as ambivalent. This ambivalence is not only obvious on the aggregate level (i.e., coexistence of researchers with different perceptions of the encouraging or discouraging character of scientific norms in the same scientific community) but also exists on the individual level (i.e., respondents being concerned about possible critical reactions from peers and at the same time being motivated by the possibility of enhanced personal reputation among peers). Rather strangely, answers to both these items are not – as one would expect – negatively but (mildly) positively statistically associated ($\tau_b = 0.14$, $p \leq 0.001$) (see Peters et al. 2008a, supporting online material, table 10). The main variation between individual researchers is thus not the perception of a positive versus negative influence of scientific norms on their motivation to engage in media relations. Researchers rather tend to perceive scientific norms regarding media interactions as ambivalent and differ in the degree to which they rate them as more versus less relevant.

A likely explanation of the diagnosed ambivalence is that scientific norms and peer responses to media visibility are context-sensitive. It is probably dependent on certain conditions – situation, characteristics of scientist and type of newspaper or TV program, for example – whether scientific communities accept public visibility of their members. This conforms with the findings of Rödder (Chapter 8), who also diagnosed an ambivalent relationship between scientific norms and media interactions. She identified three reasons making media contacts acceptable among peers: (1) rooting in scientific substance, (2) contact resulting from media initiative, and (3) motivation by institutional contexts and goals.

Our mixed findings may be interpreted as resulting from the combined effect of a lingering latent skepticism about media interactions in the scientific community noted by Boltanski and Maldidier (1970), for example, and the increasing salience of justifying reasons in view of the *de facto* need to secure public legitimacy for science, comply with organizational expectations, or address possible "clients" of scientific expertise (patients, citizens, policy-makers) effectively by media communication. The practice of public communication seems to be changing from an exceptional activity requiring justification to a default activity that is accepted as an integral part of the research process (for evidence, see Section 11.3.2).

Research organizations are crucial in providing the economic means and organizational environment required for scientific research as a professional activity depending on the availability of jobs, labs, equipment, research infrastructures and favorable regulation framework. In order to secure the economic resources and political support necessary for their existence, research organizations have

to demonstrate their usefulness, excellence, and public support to their (public) funders. The general legitimacy problem of science (Weingart 2001) is thus transformed into a legitimacy challenge for research organizations that – in a media society – also has to be addressed by public communication. Almost all universities and other publicly funded research organizations in the major democratic knowledge societies have public communication departments that deal with "research" as a core organizational activity (besides teaching students in the case of universities, for example) and with "research results" as a major output. High-impact journals addressing a wider audience and also aiming at "impact" in the social environment of science, in particular *Science* and *Nature*, accompany each issue with extensive and elaborate public relations (Chapter 17). Large scientific associations, such as the American Association for the Advancement of Science (AAAS), and more specialized associations and bodies such as the British Science Association (see Chapter 12) and the German *Science in Dialogue* initiative, as well as many foundations worldwide, have programs to promote the public communication of science and technology. A large number of organizations are thus strategically shaping the relationship of science and the public – usually with the goal of intensifying contacts between the two realms and motivating researchers to engage in public communication activities. Taken together, these structures represent an important dimension of institutionalization of media relations on the organizational level.

The above-mentioned organizational contexts confront individual researchers with normative expectations regarding their interactions with the mass media that may differ from those of their scientific communities. Indeed, it is quite likely that individual researchers who depend on resources managed by these organizations – publication chances, jobs, budgets, research grants – somehow integrate these expectations into their role as researchers. Besides the interdisciplinary journals *Science* and *Nature*, whose criteria have to be considered by *scientists as authors*, *scientists as employees* of research organizations are subject to formal organizational policies regarding media contacts as well as to informal expectations on the part of peers, superiors, PR department and management. Interdisciplinary scientific journals also aiming at impact outside the peer communities of scientists, and research organizations that depend on public funding and favorable regulation are thus likely catalysts of a medialization of the scientist's role and effective protagonists of an institutionalization of media contacts by scientists as routine behavior.

The INWEDIS survey shows that media contacts among researchers are quite common and not the domain of relatively few highly "visible scientists" that represent the respective research fields in public. (The instances of highly visible scientists, some of them analyzed by Weingart (2001), may even present special cases in terms of motivation and media logic leading to them.) On average, 59 percent of the surveyed biomedical researchers, with little variance between the five countries included in the study, said that they had had contact(s) with the media in the past 3 years, about 30 percent of the respondents claimed six or more contacts within that time period (Peters et al. 2008a). Another indication of the institutionalization of such contacts is that subjective beliefs and attitudes regarding public communication

are only weak predictors of frequency of contact. Strong predictors are, in contrast, organizational leadership position (being principal investigator or institute director, for example), and scientific productivity (number of peer-reviewed publications). This is congruent with a French study that analyzed the yearly activity reports of CNRS scientists and found a positive correlation between scientific productivity and involvement in public communication (Jensen et al. 2008). Contrary to the perception of researchers surveyed by us, Jensen et al. concluded that the dissemination activities of the French researchers had no strong impact on their careers although the existing small effects tended to be positive too – in particular in the life sciences. A likely explanation of the difference in findings is that the crucial career factor is not the researchers' involvement in dissemination activities in general (which Jensen et al. correlated with career development), but that specifically the researchers' ability to generate media response is rewarded by research organizations.

To conclude, on the organizational level as well as on the individual level we find clear evidence of an institutionalization of interactions between science and the mass media. Almost all research organizations have developed departments specializing in public communication, in particular with respect to media relations. There is furthermore a public science communication infrastructure consisting of specialized organizations and programs that integrate scientists in their communication activities. With respect to public communication, scientists are obviously confronted with relevant expectations from different contexts – scientific community, the research organizations employing the scientists, scientific journals, and mass media – which are not always free from contradictions and ambivalences. The resulting role, however, seems to allow or even require scientists, especially leading scientists, to consider media interactions as part of their professional duties. As Schäfer (2008) argues, medialization of science is contingent and differs between research fields. Our conclusion is probably not equally true for all contexts and all research fields, but certainly for the "medialized" biomedical research fields on which this chapter focuses, and probably in other areas as well.

11.2.2 Professionalization

PR departments of research organizations, as I will call them in the following although they have different names (e.g., University Communications, Press Office, Media Relations, Public Relations, or even Corporate Communications) and different scopes of responsibility, have been introduced as a response to media interest in science. Strategic motives were, however, present from the outset. Borchelt (2008: 149) summarizes the public information offices' understanding of their task as "...making sure the public knows a lot about science or the scientists, but only the 'right' things the organisation thinks the public should know." A German survey of public information officers in 1983 found that they tended to subscribe to a partnership model of their own relationship with the media and a mediator role in the science-media relationship. Generally, they expressed strong and genuine attachment to both realms, science and journalism, downplaying the possibility

of a conflict of interest resulting from their organizational role. However, if they mentioned such conflicts they gave precedence to organizational interests above the journalistic ethics (Peters 1984).

While the INWEDIS survey of public information officers in 2007 did not show a completely different picture of science PR than that of the 1983 survey, some trends are nevertheless detectable. The public information officers interviewed still emphasized the need to anticipate media criteria in the selection of stories, to provide a good service for journalists seeking information and sources, and they would generally rank the long-term goal of maintaining trust among journalists above some short-term advantage scientists or management might think to gain by occasional secrecy or misinformation. However, the "proactive" strategic component has become more important in their work. This is evident by a change in the terminology they use to describe their work. Terms like "branding" and "marketing," adopted from professional corporate public relations, are now part of the routine vocabulary of public information officers. The strategic goals have become more specific (see next section) as opposed to the classical general goal of securing a "good public image," This might be seen as part of the general trend towards new (more corporate-like) models of organizational management in universities and other research organizations (see Maasen and Weingart 2006). However, public information officers in research organizations are still in search of a clear professional identity in the triangle of science, journalism and public relations, with two transitions having taken place from basic identification with science at the beginning to identification with science journalism, and finally identification with strategic PR. However, even today different orientations and approaches coexist and are often intermingled in ambiguous identities. Many public information officers in research organizations still tend to consider themselves as a kind of science "journalist" working outside the media but feeling themselves to be members of the journalistic profession. This is probably the case because most public information officers have received some kind of training in journalism or may even be former journalists. Many public information officers are members of journalists' associations such as the US *National Association of Science Writers* (NASW) or the German *Technisch-Literarische Gesellschaft* (TELI). Journalists' associations do not always wholeheartedly embrace public information officers as members since journalists are clearly critical of an interpenetration of journalism and public relations (e.g., Stollorz 2005). Unlike TELI, the *Wissenschafts-Pressekonferenz*, the other German association of science journalists, explicitly excludes public information officers from membership. The NASW nowadays accepts them as full members but still precludes them from the inner executive committee.

There are some indications of a growing professional identity of public information officers in research organizations, however, and that identity might be closer to that of the public relations profession than before, although many (but not all) public information officers still have reservations about seeing themselves simply as part of the general PR business. So far, professionalization in terms of institutionalization has lead to the evolution of a few specialized associations such as the German *Bundesverband Hochschulkommunikation* (established in 1969) and

the *European Universities Public Relations and Information Officers Association* (EUPRIO, established in 1986), rather than public information officers of research organizations joining existing PR associations like the *Public Relations Society of America* (PRSA) and forming a special section on science PR there.

The INWEDIS surveys of biomedical researchers as well as of public information officers included questions regarding the relation of organizational PR and researchers' media contacts. Generally, in academic research organizations the PR departments try to motivate researchers to interact with the media using various means, even creating a competition among institutes, as the quote from a university public information officer shows:

> [. . .] we analyzed the distribution [of media clippings] for the whole of last year by faculty and institute. [. . .] Well, this analysis is now even being discussed in the president's office. The statistics will also be made available to the faculties. And then they will see for themselves: 'Aha, we are lagging behind the others.' And I think that this will increase the input [of the PR department] quite a lot (translated).

In many instances, the PR department is involved in creating contacts between researchers and the media, e.g., by press releases or by forwarding journalistic inquiries reaching the PR department to researchers. They furthermore try to increase the scientists' understanding and acceptance of science journalism and its selection and quality criteria that differ from those within science. Although researchers are also directly addressed by the media, for example, on the basis of high-ranking publications or talks at conferences, or they address journalists themselves, a large proportion of media contacts by researchers, perhaps the majority in some fields, are initiated by the PR departments or at least with their involvement. 62 percent of the respondents of the INWEDIS survey of biomedical researchers in the five countries covered confirmed that they had interacted with the PR department of their organization within the last 3 years.

Most academic institutions do not aim at strongly controlling scientists' individual interactions with the media, but, organizational policies differ in that respect. On average, about half of the respondents of the INWEDIS survey confirmed that they would not have to ask somebody in their organization if they wanted to talk to a journalist, 35 percent said that they "would have to seek approval" before talking to a journalist. Of course, the need to ask somebody before talking to a journalist is much higher for junior than for senior researchers; Junior researchers are also more often uncertain about the organizations' rules regarding media interactions. Still, about a third of the researchers at the highest management level (dean, director, department head, CEO) said that they would have to seek approval. While there are hardly any differences between countries in that respect, researchers in private or government-controlled research organizations, and – to a lesser extent – those in (university) hospitals, are generally less free to talk to the media without prior approval than researchers in universities and public non-university research institutions. (The latter category comprises different types of research organizations with different media policies.) Most researchers surveyed knew or expected that receiving organizational approval for talking to a journalist "would be easy." This shows that organizational

rules of getting approval before media contacts are not so much intended to prevent such contacts as to allow cautious supervision by PR departments to make sure such contacts are not going to violate the organization's interests.

As an indication of the rank and power of the PR departments within research organizations we asked those researchers who indicated that they needed organizational approval for media interactions whom they would have to ask – their superiors, the PR department or some other department. On average, 45 percent of the respondents needing approval for media contacts said that they would have to ask the "person or department responsible for public communication (e.g., public relations department)," 52 percent needed approval from their "superiors (e.g., dean, department head, head of organization)." There are remarkable country differences in responses to this question, indicating different degrees of influence of a centralized organizational public communication policy on media interactions of scientists (Fig. 11.1). In the United States and the United Kingdom, PR departments tend to have a more influential position than in Germany, France and Japan.

An indicator of the "professionalization" of media contacts at the individual level is the participation of scientists in communication training courses. Many research organizations, professional associations, foundations and funders (such as the EU) offer such training courses to improve the researchers' communication skills in public communication, in particular in media communication. On average, 31 percent of the surveyed biomedical researchers indicated that they had participated in a communication training workshop of some kind; 11 percent said that this had been training specifically for communication with the "mass media." Again there are considerable country differences indicating a higher professionalization of media interactions for the Anglo-Saxon researchers (Fig. 11.2). British and US American researchers tend to have received formal training for media contacts more often than their colleagues from Germany, France and Japan. This might indicate a higher perceived relevance of media contacts and thus a stronger medialization, but it

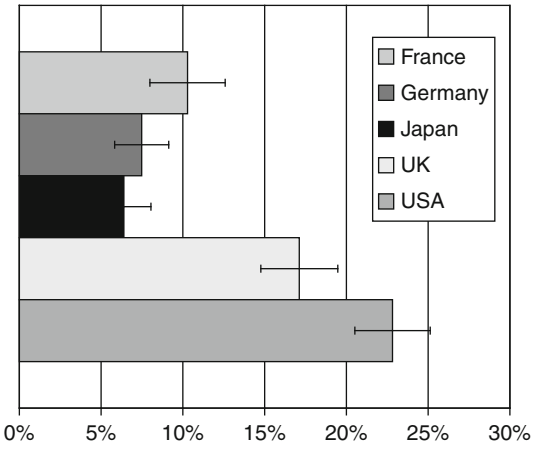

Fig. 11.1 Proportion of biomedical researchers requiring approval from their PR department before talking to the media
Source: INWEDIS survey of scientists

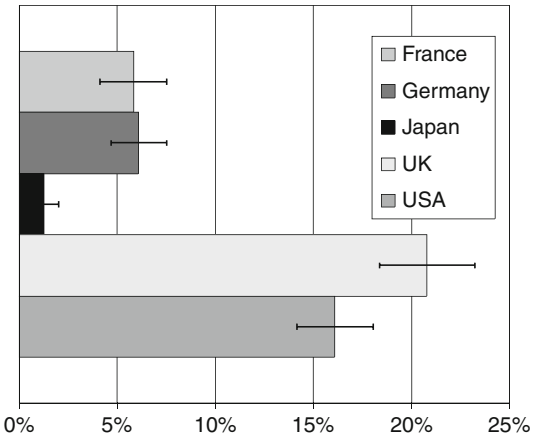

Fig. 11.2 Proportion of biomedical researchers having received media training
Source: INWEDIS survey of scientists

may also reflect a stronger desire to learn strategies of how to deal with journalistic inquiries while regaining control of coverage rather than simply adapting to journalistic expectations.

11.2.3 Strategic Utilization

Based on the almost unanimously expressed conviction that media visibility – as long as it is not negative – serves organizational interests, the public information officers try to increase the volume of media coverage mentioning their organization. However, providing the media audience with information about science serves as a means rather than the actual end of their communication activities, as the quote taken from Peters (1984: 92) illustrates:

> So I have a very special motivation for doing that. The astronomer has to make his sovereign understand what he does; otherwise he doesn't get any money. That was always the case. We have to explain to the people who give us money [what we are doing]. And in a democracy this is the people represented by politicians. The final goal is that mainly politicians, politically relevant people, do not consider what we are doing to be complete nonsense. [. . .] It makes no difference to us that in doing so we have to inform the entire proletariat [*sic*!] who are entitled to vote. If it was only about public information we would not be so motivated. In that case we would have decided to become teachers. No, for [us] PR work is about information, because without public information we won't get any money, and therefore the appropriate channel is quite clear (translated).

The cynical attitude towards the general public expressed in this quote is clearly not typical of public information officers, but the strategic reasoning of addressing politics as the main sponsor of academic research via the mass media thus utilizing their ability to increase recognition by relevant target groups such as political decision-makers, and to designate organizations, activities and results as "relevant" to the wider society, is quite obvious and was also observed by other scholars (see Borchelt 2008: 152; Nelkin 1987). Anecdotal evidence as well as the

INWEDIS survey of decision-makers (Petersen et al. 2010) suggests that in view of medialized politics the implicit media effects model of public information officers underlying this strategy is probably valid.

As Borchelt (2008: 149) notes, "publicity" as the main goal in the initial phase of PR is important but not sufficient to legitimate an organization; and current approaches of PR largely follow the "explanatory PR" model. Legitimation is based on matching the relevant challenges and organizational profile. The logic of strategic organizational communication is thus twofold: First, to demonstrate by public visibility, activity profile and achievement record that an organization is best suited to meet a certain challenge or a portfolio of challenges (i.e., "branding" the organization respectively); and, second, to increase the public salience of those challenges by means of agenda setting. The challenges can be rather general such as excellence of research or excellent study conditions, or specific such as dealing with an increasing rate of dementia, adapting society to climate change, or finding the Higgs boson ("the God particle"). Borchelt (2008: 152) sees the need for yet another phase of science PR dealing with the management of the "trust portfolio," i.e., managing the relationship between an organization and its societal environment using a more symmetrical communication approach. Today, in this respect science still relies on the high general trust it enjoys in Europe and the USA in contrast to political and economic institutions. Specific efforts to manage the trust portfolio thus seem only necessary in areas of public controversy.

Besides the universal goal of legitimating the organization by means of publicity and branding, public information officers in the INWEDIS survey mentioned several specific goals that can be grouped into three categories: marketing, political communication, and public education. Depending on their type, research organizations operate in several service markets and have to survive the competition there. Universities offer places for students, university hospitals offer advanced medical diagnosis and therapies to patients, and many research organizations offer R&D services to industry and other clients. Public science communication thus becomes a means of support for *marketing* these services by establishing an organization's name as a "brand," recognized and valued in these markets. Research organizations' involvement in *political communication* can be based on organizational self-interests of securing political support in terms of, for example, funding, siting of research facilities, or favorable regulation, as in the case of the German law on importing human embryonic stem cells. Sometimes, however, the goals of research organizations' involvement in political communication are not based on their self-interest in a narrow sense but on political goals related to their expertise – the lobbying of the German cancer research center in favor of a stricter Government policy protecting nonsmokers may serve as an example. Finally, the goal of *educating the general media audience* regarding their health-related behavior, for example, was also mentioned occasionally.

Legitimacy-related motives of media contacts are also dominant among individual researchers, although probably not so much focused on the organizations' benefit as on that of their own research, research field or career. Positive motivators that are rated very or somewhat important by most respondents are "A more positive public attitude towards research" (93 percent), "A better educated general public"

(92 percent), "Influence on public debate" (85 percent) and "Increased visibility for sponsors and funding bodies" (77 percent) (see Peters et al. 2008a, supporting online material, table 8). The motive of "a better educated general public," which could be interpreted in different (even emancipatory) ways, has to be considered in connection with the statement "If the public only knew more about research, it would be more positive about science." This core belief of the so-called deficit model of public science communication, according to which a knowledge deficit produces negative attitudes towards science and a scientifically better informed public would have more positive attitudes (see Sturgis and Allum 2004), is held by a majority of respondents (71 percent). The most likely interpretation of the strong motive of helping to educate the public therefore is that researchers expect benefits in terms of a more positive public image of science.

The biomedical scientists surveyed in all countries and across several indicators rate their own encounters with the media overwhelmingly positive (Peters et al. 2008a, b). This is rather surprising given the many analyses pointing to communication problems between science and the media mentioned in the introduction. There are some indications that scientists' assessments of their interactions with the media have become more positive in recent decades. Peters et al. (2008b: 270–272) point to several possible explanations for the (increasingly) positive evaluation. As one of the likely reasons they mention a change in the salience of scientists' satisfaction criteria – resulting, first, in greater acceptance of media rules and, second, in a move away from accuracy-oriented criteria deriving from the scientific focus on "truth" towards strategic criteria of beneficial impact, i.e., publicity and positive coverage. The positive assessment of their interactions with the media would thus not in the first place indicate scientists' satisfaction with the "content quality" of media stories about their work, but rather satisfaction with their expected impact in terms of creating positive recognition and mobilizing support. The adaptation of scientists to public communication has resulted in a gradual shift from a communication model viewing public science communication as a popularized "extension" of inner-scientific communication, in which the criteria of inner-scientific communication still apply, even if in a reduced form because of the requirement of comprehensibility for a lay audience, towards an effect-oriented model of strategic communication – similar to that of PR departments – which implies acceptance of the media logic. With respect to medialization, a crucial question is to what degree this model of strategic public science communication also modifies inner-scientific communication and research processes, or, in contrast, reinforces the boundary between inner-scientific and public communication (see Chapter 17).

11.3 Consequences of Medialization

The previous sections provided strong evidence that science responds to and actively seeks to stimulate media attention. Science has developed an institutionalized interface to the mass media consisting of public relations strategies of research organizations, foundations, scientific associations and journals, and also of a set

of norms, motivations and interaction routines of the majority of researchers, who are nowadays generally prepared to talk to journalists about their research, and of a number of highly "visible scientists" representing disciplines or research fields in a broader sense. Motivated by a number of organizational goals and individual motivations of researchers, above all by such goals related to the survival needs of scientific organizations and research fields in a media society, the "medialization of science" has intended and unintended consequences for the social environment of science, and possibly also for science itself. In the following, three aspects of these consequences are discussed: effects on public constructs of science, repercussions on the scientific process, and effects on the science-politics relationship.

11.3.1 Public Constructs of Science

The most obvious consequences of the increasing anticipation of media expectations by scientific sources, increasing salience of strategic criteria, and increasing influence of organizational communication concern the media constructs of science. Four likely effects of medialization on public constructs of science are: (1) overemphasizing the immediate practical utility, (2) downplaying the scientific logic and autonomy, (3) focusing on the competitive character, and (4) framing scientific advances as organizational output. Public communication thus becomes part of the competition between research organizations (see Münch 2009).

(1) The major selection principle in the journalistic observation of science is that scientific events have some relevant meaning for the general media audience, i.e., relevance outside science (e.g., Kohring 2005). While this does not preclude basic research from news coverage (as public relevance can be constructed in many ways), an easy way of capturing the attention of non-scientists for scientific events is referring to their practical implications in terms of applications (e.g., medical therapies) or scientific expertise relevant for policy issues (e.g., climate change). Furthermore, showing the use of research results for innovative technologies or as decision-related expertise allows scientific communicators to refer to generally accepted cost-benefit considerations when trying to demonstrate the value of research performed in their organization. Although this is not the only legitimating argument that research organizations can put forth, it is probably the most straightforward one. In comparison, the persuasive effect of possible alternative arguments stressing the cultural value of science, its excellence, its contribution to national prestige or (speculative) indirect and future benefits of basic research is more limited in reach. The public information officers interviewed in the INWEDIS survey therefore confirm a preference for "applied research" in their communication activities, as in the following quote:

> [. . .] not all press releases concern scientific results but there is always a demand for result-oriented press releases, particularly since we naturally select those [topics] that are as close as possible to practical application. All the topics close to basic research

> are not so easy to communicate. But those close to practical application are in great demand (translated) (Kallfass 2009: 142).

The typical way scientific sources in public communication create public relevance thus tends to reinforce a utilitarian construct of science.

(2) According to Borchelt (2008: 152) "managing the trust portfolio" is the major current challenge of science PR. Among other factors, deference to authority and a shared culture are usually considered to increase trust. As deference to authority might be generally decreasing in our societies, the demonstration of a shared culture is the obvious alternative strategy: portraying scientists as ordinary people with similar interests, lifestyles and values to those of non-scientists, showing that research organizations cultivate general social values such as gender equality, and suggesting that researchers and research organizations are motivated by valued social goals such as health, safety, environment, justice, for example, and not just by genuine search for truth. However, at least at the micro-level, the culture of scientific research is very different from everyday culture or from the culture of industrial companies. Research goals are often incomprehensible to non-scientists and their relationship to public values obscure. Many hours of work are invested in researching and preparing a manuscript that might then be rejected in the peer-review process, or – if the researcher is really lucky – is maybe read and cited by a few dozen colleagues. Viewed from the outside, the culture of science is strange in many respects. In order to adapt to normative public expectations regarding shared goals and values, there might be a temptation to present research to the media in such a way that deceives the audience about the esoteric, unfocused and erratic character of science and its demand for autonomy, and rather present it as an activity that conforms to general social routines, values and norms.

(3) In her analysis of media constructs of stem cell research, Jung (Chapter 6) identified a meaning pattern "science as sport," among others, that in several variants seems to be rather widespread in public science communication generally (e.g., Nerlich 2009). Many news stories and press releases rely on framing research results or new instruments as "victories" that make the researchers or the research organizations appear as the winners of a competition between countries, research organizations or researchers who have discovered, acquired or produced, for example, the lowest temperature, the highest pressure, the fastest computer, the deepest hole, or the first anti-proton. This framing of science is in tune with legitimation and persuasion needs since strategic arguments of different kinds can easily be constructed: Individual researchers and research organizations can demonstrate excellence by claiming a "victory," and national representatives of science can point to the unfairness of political regulation by referring to the competitive disadvantages of the German "team" arising from such a "handicap." The press release from the German Research Foundation (DFG) in favor of less strict regulation of imports of human embryonic stem cell lines may serve as example:

> In recent years, international stem cell research has produced important new findings. [. . .] Because of the legal framework, scientists in Germany can currently only make a limited contribution, however. [. . .] Cancellation of the deadline regulation would considerably improve the competitiveness of German scientists in the field of stem cell research (DFG, 10 November 2006, translated).

Using the "sports" pattern shifts the focus of public communication from scientific processes and results to scientific "performance" relative to competitors. It also hides the patterns of cooperation across borders of research organizations and countries that are typical of science (see below). In the end, professionalism as the dominant structure of science is downplayed and a business-like market-competition model of science is proliferated.

(4) For organizational PR it is crucial that scientific achievements are attributed to one's own organization. Scientific achievements, which according to the mainstream view of the sociology of science are created by creative individuals in the intellectual context of scientific communities, are "appropriated" by research organizations, framed as their achievements and marketed as their output, as shown in the following quotes from public information officers:

> In terms of Public Relations work we aim to celebrate the successes and the achievements of the University [. . .].

> [. . .] but there are mass media that quite intentionally do not mention the originator, [. . .] this is then completely worthless for me – [for example] a story 'Scientists have discovered [. . .]'. No, it must read '[Scientists] of the <name of organization> [. . .]', only then is it of any use to me (translated).

The result is a construct of science in which research organizations become the originators of knowledge, and research becomes a straight production process of transforming financial inputs into knowledge as output. Another likely consequence is that research infrastructures tend to be emphasized to the detriment of intellectual resources since research organizations can plausibly point to their provision as a specific organizational merit.

To summarize, adaptation to public expectations in science communication because of strategic needs and the increasing influence of organizational communication goals tend to promote a public image of science as a directed process of efficient production of socially relevant knowledge as the output of research organizations that compete (like companies) in a global market. There are, of course, limits to the consistency of such a construct because the goals of science communicators may vary, and several compromises have to be made to maintain the credibility of the advocated construct. Furthermore, journalists have access to inner-scientific events (e.g., publications, congresses) enabling them to challenge the self-presentation of science towards the media, and deviations from a business-like construct of the scientific process may be particularly newsworthy. Nevertheless, the esoteric and erratic character of science, its cross-boundary cooperation patterns, the reliance of its proper functioning on a certain degree of autonomy, and the importance of creative individuals as researchers may be understated. One may

argue that promoting such a public construct of science will do no harm but rather will contribute to the public legitimacy of science. However, portraying science as if it were always guided by a well-structured plan may create or reinforce exactly such expectations in the social environment of science and might finally motivate governance measures with the aim of "improving" science in this respect. The public construct of science – advocated by the self-presentation of science in public communication – may well have unintended consequences for the expectations of the societal environment of science and the resulting governance processes in that it undermines, for example, the legitimacy of scientific autonomy.

11.3.2 Repercussions on the Research Process

To empirically prove repercussions of anticipated media responses on the research process and its output (i.e., knowledge and publications), to measure their strength and assess their consequence for scientific quality is rather difficult. While case studies might provide conclusive evidence for the individual cases investigated they are not able to determine how common such cases are. Representative surveys of scientists, on the other hand, depend on scientists' perceptions of media impacts on the research processes, and the researchers' answers may furthermore be biased by social desirability effects thus making them reluctant to admit the relevance of anticipated mass media responses for scientific decisions. Further research is thus needed to better understand the conditions under which medialization of the research process is likely to occur, and its impacts on the direction of science and the characteristics of scientific knowledge. In the following, we present some limited evidence that researchers do sometimes anticipate media responses when making scientific decisions – first, from a "case study" based on information from a university public information officer who had co-operated with a researcher to increase the public impact of his research; second, from our surveys of scientists and public information officers.

In the early 90 s, Sean B. Carroll, a genetics researcher at the University of Wisconsin-Madison, who studied the genes determining the development of body patterns, in particular the development of insect wings and their color patterns, decided to switch the model organism he and his team used for their research from the usual drosophila to butterflies. According to Terry Devitt, Director of Research Communications at University Communications, University of Wisconsin-Madison, this change of model organism was partly motivated by expected higher public impact of research on colorful and admired butterflies as compared to research on uncharismatic fruit flies[2]:

> You can imagine it is much easier to make news if you have found the genes that govern pattern and color in butterflies than in fruit flies. I believe Sean recognized that in advance. I also believe that helped ensure the paper would publish in a high-profile journal. The capacity of a paper to generate news is not lost on journal editors (Devitt 2007).

[2] I want to thank Terry Devitt for sharing that information with me, and for agreeing to be quoted.

Carroll's research was published in the science section of the *New York Times* (5 July 1994) and in *Science* (22 January 1999) as well as in other scientific journals and mass media. In both cases, the publications made use of attractive graphics showing the butterfly's wing. Devitt's comments quoted above show that he believes that taking the criteria of the mass media into consideration will also increase the chances of publication in a high-ranking scientific journal (see Chapter 17). He also argues that the anticipation of mass media criteria by Carroll in his research did not at all compromise the quality of the science or the functioning of the research process:

> In short, Sean made an interesting and important discovery that was amplified by his choice of animal model. I don't believe the science was changed or publication was delayed in any way by a chance to make news (Devitt 2007).

Rather than adopting the antagonistic model of media orientation and science orientation advocated by Weingart (2001) and Franzen (Chapter 17), for example, Devitt, along with probably most members of the science-related public information profession and media-oriented scientists, justifies using the attention criteria of the mass media in scientific research by a kind of "synergy model": The combination of quality of science and anticipation of criteria of media attention produces the highest "impact" in the public but also in the scientific realm.

The INWEDIS survey of scientists included a question about the anticipation of media response by researchers when making decisions in the research process. We assumed that scientists would be reluctant to admit such influences as they might contradict scientific norms. In order to minimize the social desirability effect and encourage the respondents to report their relevant observations, we did not ask about the respondents' own decisions but about their knowledge of colleagues who "because of anticipated media publicity" modified decisions such as choosing or avoiding particular research questions, methods, funding sources or collaborators, or timing of publication. The answers have thus to be considered with caution. They are not necessarily based on first-hand knowledge about the decision situation the respondents had in mind when answering the questions, but rather reflect the empathic attribution of criteria and motives to decisions by their peers. Furthermore, we used an introductory text in the question with the aim of making media influences appear more "natural." The results show that a majority of the biomedical researchers surveyed feel that in their scientific community decisions during the research process are (partly) influenced by media criteria (Fig. 11.3).

In all five major knowledge societies studied, the surveyed biomedical researchers assumed that scientific decisions of different kinds (see Fig. 11.3) would be influenced by anticipation of media response. On average, 64 percent of the surveyed biomedical researchers claimed to know colleagues who had been influenced by media criteria in at least one of the six types of decisions mentioned in the question. While there are some statistically significant country differences regarding research methods, research collaborators, and presentation of papers at conferences, country differences of the aggregate measure ("One or more of the

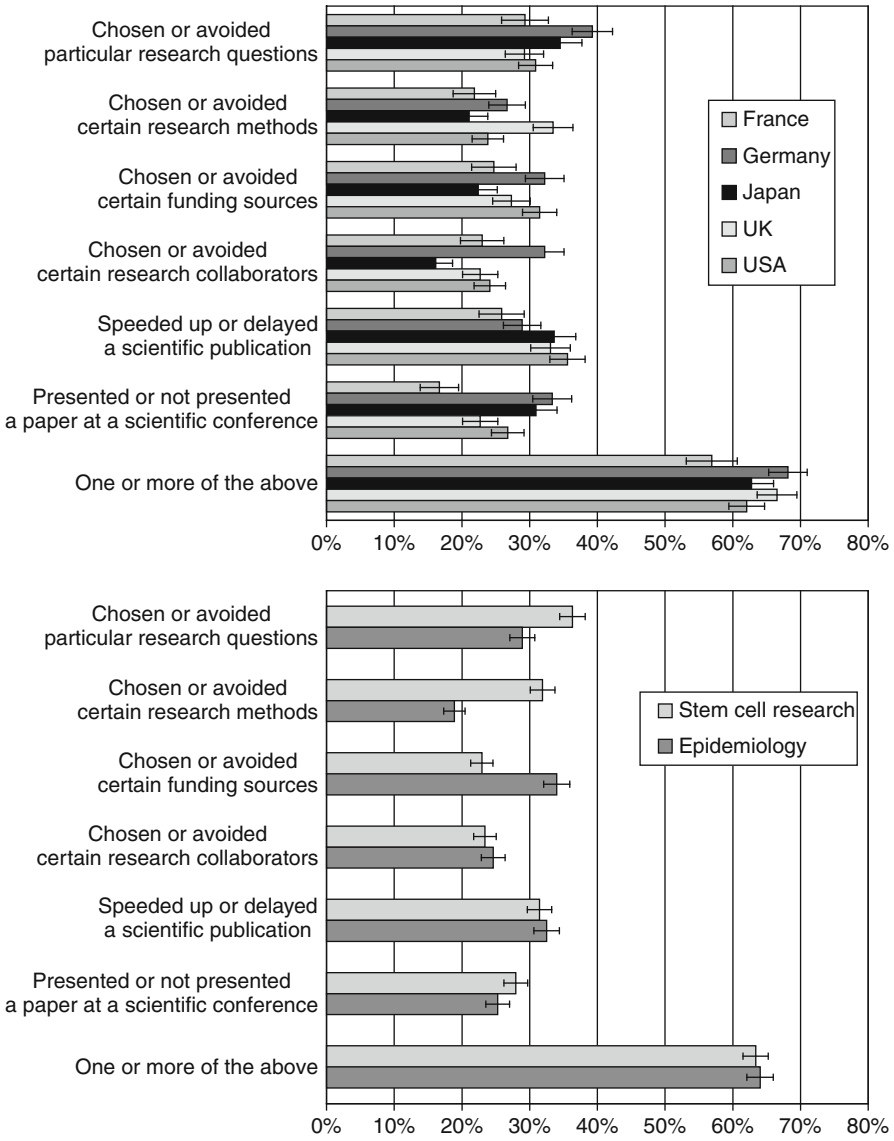

Fig. 11.3 Proportion of respondents assuming that colleagues have modified decisions in the research process in anticipation of media response. The question read: "Scientific decisions are sometimes influenced by factors outside science, such as the availability of funding, the organization's research agenda, or the usability of results. Another factor could be the anticipation of positive or negative media publicity. The statements below pose some possible effects. (Check all alternatives that apply.) Because of anticipated media publicity, scientists I know have . . ."
Source: INWEDIS survey of scientists

above") are not significant ($F = 1.80$, df $= 4$, $p = 0.13$). However, there is an interesting pattern of statistically significant differences between stem cell research and epidemiology. Stem cell researchers claim more media influence on decisions about research questions and methods while epidemiologists claim more media influence on the selection of funding sources (all $p \leq 0.01$, t-test). In view of the respective public images of stem cell research and epidemiology (see Chapter 6), this pattern could suggest a plausible interpretation, supporting the assumption that the scientists' responses to that question are indeed meaningful and not just arbitrary. It is quite likely that the particular sensitivity of stem cell researchers to media criteria related to research questions and methods is a consequence of the public controversy about the use of human embryonic stem cells and the choice between research strategies focusing on adult or embryonic stem cells. The specific sensitivity of epidemiologists regarding funding sources, on the other hand, probably results from the endangerment of trust caused by industry funding of epidemiological studies.

According to the INWEDIS survey of public information officers, almost all research organizations closely monitor the media coverage of their own organization and of relevant other subjects. This effort shows that media coverage is important to them and is probably a factor considered in decision-making. One of the respondents gave an example of such an influence. The respondent said that critical media coverage of industry funding regarding research on tobacco risks led to a new organizational policy for research collaborations:

> And that has resulted in a new code of ethics that prohibits money being accepted from the tobacco industry. That wouldn't have happened without the media. They would have said: '[I] don't care where the money comes from'. So, this actually has had an impact (translated).

This quote shows, as argued above, that organizations are sensitive to media coverage and thus serve as effective mediators of normative public expectations to researchers.

11.3.3 Science-Politics Relationship

As we have argued elsewhere, making use of a general thesis of Imhof (2006) regarding stakeholder strategies in the "media society," the medialization of science can plausibly be understood as a consequence of the medialization of politics (Peters et al. 2008c). The argument is therefore that political developments lead to a modification of the science-media relationship which in turn modifies the political effects of mediated science. Insofar as public visibility of science is affected by the adaptation of science to the media and its orientation towards legitimation goals, political effects of "mediated" science may be plausibly attributed to the medialization of science.

According to the INWEDIS survey of 40 German political and/or administrative decision-makers in the biomedical field (see Petersen et al. 2010), politics in science-related fields pays close attention to journalistic accounts of science

and scientific knowledge. The analysis of the interviews revealed several mechanisms by which journalistic accounts of science become politically effective: (1) media visibility is widely interpreted as a "relevance cue" pointing to the necessity of responding or the possibility of relating one's own activities to the events covered (the basis of the agenda-setting effect), (2) journalism pragmatically recontextualizes science exposing its possible practical uses and regulation demands thus making it compatible with the political logic, (3) media coverage provides a repertoire of facts, arguments, metaphors and symbols originating from science for convenient use in political rhetoric, and (4) decision-makers use stories of trusted media and journalists in forming their personal opinion about science-related policy issues.

Two cases of political effects of medialization of science can be distinguished: first, the (de)legitimation of scientific practices, goals, applications and use of public resources, and, second, the application of scientific expertise in policy fields such as health, risk, environment and global climate change, for example. In the first case, science itself is the governed field and scientific actors are thus stakeholders; in the second case science as expertise contributes to the governance in other policy fields.

Within politics, non-negative media visibility of actors and initiatives is interpreted as an indicator of political success, since media attention suggests relevance for their voters. Accordingly, media visibility of research findings, research fields, research organizations, research institutes or research projects serves as a cue that these are in some way or another meaningful for the media audience and political actors might improve their public image if they respond to public science and relate their own political activities to it. That is the assumption underlying the publicity strategies of scientific communicators. They calculate that their political addressees might be inclined to support successful – i.e., marked as "relevant" by media visibility – research and research organizations in order to increase their own political standing. Of, course, by the same mechanism negatively framed science in the media might also stimulate science governance activities with the goal of increasing congruence between scientific practices and public expectations.

While there are several ways of constructing public relevance, linking scientific knowledge and research results to existing policy issues, or creating new challenges to politics by identifying new risks, for example, is a very effective way of attracting journalistic attention and presenting oneself as addressing wider societal goals. Pointing to the need of scientific communicators to connect science to extrascientific issues in order to meet journalistic selection criteria, and to its reception in the context of medialized politics, Petersen et al. (2010: 869) argue "that scientific expertise in the mass media is observed by political decision-makers and effectively enters the policy-making process." They consider mass-mediated scientific expertise as an important mechanism for increasing its political impact – as a complement to the many direct ways of science-policy interactions (e.g., expert commissions, reports or hearings). One may even go a step further and hypothesize that this mechanism of constructing public relevance by relating it to policy-making does not only lead to public communication of expertise, but even stimulates its creation. Journalism tends to pragmatically re-contextualize science and integrate

it with case-specific knowledge (see Spinner 1988), and thus motivates scientific sources to anticipate this demand.

11.4 Discussion

The analysis of the orientation of individual and organizational scientific communicators towards the mass media has resulted in evidence of medialization of science in the sense that scientific communicators anticipate media criteria and media routines. On the individual and organizational level, we found indications of institutionalization, professionalization and strategic utilization of media communication motivated above all by the goal of securing public legitimacy and thus societal support for science. We also found some evidence that the orientation towards media criteria is not limited to public communication contexts but competes or intermingles with scientific norms and routines, thus constraining scientific autonomy. The question that still remains open is whether concrete examples of repercussions of media criteria on research processes and results can be found, are these isolated exceptions perceived by peers as a violation of scientific norms and mobilizing sanction mechanisms of the scientific community, or are they "tips of the iceberg," i.e., visible indicators of a mostly hidden but rather general trend of changing (or corrupting) scientific norms? It seems useful to distinguish different possible "shells" of medialization from the surface of public self-presentation to the core of knowledge creation in future studies of medialization. On the outer shell, public communication behavior of scientific communicators would be guided by media criteria, in the medium shell scientific publication, research processes and allocation of resources would be affected, and in the inner core scientific knowledge itself, i.e., the scientific construction of facts and theories, would be modified by the aim of increasing their compatibility with media criteria of newsworthiness. The empirical data presented in this chapter show medialization effects in the outer and medium shell; but it cannot prove effects (or their absence) in the epistemic core of science.

The implications of medialization for scientific autonomy may be ambivalent, however. In analogy to the concept of "symbolic politics" (Sarcinelli 1987), one might assume that there is a growing differentiation between the presentation of science in the media and the actual processes in science, and a limitation of medialization effects to the presentation. According to Merten (2000), the very essence of public relations is the construction of a "desirable reality." Besides the possible effect of a diffusion of media criteria from the outer shell towards the core of knowledge production, self-presentation of science to the media by efficient public relations (in a broader sense) showing its conformity with media criteria may actually result in a defense of scientific autonomy, in that it hides its esoteric and erratic nature that might otherwise give rise to provocations in the social environment and stimulate governance activities. The "branding" concept in the self-description of organizational science PR may be understood in a similar way. The ascription of symbolic properties matching public expectations to the media image of organizations makes their appreciation relatively independent of their "real" inner

properties. In the same way as consumers are expected to respond to the quality promise of a "brand" in making purchase decisions, rather than examining the quality of the specific products they intend to buy, citizens and decision-makers are expected to respond to the corporate "brand" of a research organization rather than to critically examine and interfere with actual processes and outcomes in detail. Establishing a "brand" for research organizations that meets public expectations may thus mean relieving research organizations of specific external demands. Our data does not allow us to answer the question of which of the two possible effects – shielding against external influences or transferring media criteria to inner-scientific decision-making – is dominant; very likely the answer would vary with the kind of science-society relationship.

While Weingart (2001), focusing on science, sees mostly the negative impacts of medialization and points to risks for scientific autonomy and quality, from a science governance perspective an alternative – more positive – view on the medialization of science is also possible. Scientific autonomy is limited by several societal influences such as collaborations with industry and the medical system, and science and technology policy, for example. Each form of science governance in one way or another has to interfere with decisions made by scientists and research organizations and thus limits their autonomy regarding the setting of research priorities, use of public resources, acceptance of research methods and research findings. One might view the medialization of science as an informal governance mechanism, based on the potential of the mass media to legitimate or de-legitimate research. Whether medialization is more intrusive (and corruptive) than other forms of science governance that are based on criteria of political or civil research funders, economic utility or the principles of "New Public Management" still remains to be shown. Since the media refer to the expectations and values of their audience in their observation of science, the media-based governance mechanism might even be considered to be participatory in nature, involving the "public" in an indirect way in the governance of science.

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