Chapter 4
Issue Selection in Science Journalism: Towards a Special Theory of News Values for Science News?

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4.1 Introduction

"Why is our breakthrough not in the news?" This is perhaps one of the most frequently asked questions concerning the media among scientists and their public relation officers: The research results were perfect, the competitors in Europe, the US and Japan are shocked, the rest of the scientific community is impressed; and what do the media do? They ignore it! – However, instead of an alleged "ignorance" of the media, the decision to ignore the "breakthrough" may be the result of a news selection process perfectly reasonable from the point of view of journalism.

To answer the question what news is, journalism schools and editorial offices worldwide provide simple answers which are common sense among journalists: "News is what's different" or the "man-bites-dog-formula" are probably among the best known. However, originally these simple formulas have been developed mainly for the classical sections of the media. Also most of the journalism theories are based on empirical research in general journalism (especially in political journalism). In contrast, the development of science sections and science journalism was widely separated. And for a long time, science journalism was more influenced by the world of science itself than by general journalism (Rensberger 2009). Therefore, it seems to be reasonable to validate general journalism theories for the special field of science journalism from case to case. Concerning especially the news selection processes in science journalism, several authors have pointed to the need of an empirically grounded reconstruction of these processes (Hömberg 1996; Schäfer 2007). Science journalists also report about special news selection processes in their sections as did Illinger:

> Different from the political section where the daily agenda is often determined by the actual events the science editor has to dig in a rather disordered box of news if he does not like

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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_4, © Springer Science+Business Media B.V. 2012

> to rely completely on the agenda of the big scientific magazines; and when there is not the hurricane of the century whirling at the American coast [. . .] (Illinger 2005).

But why should a theory of news values matter for a practitioner in the media? Isn't it true (as one of the reviewers of this article supposed) that "reporters continue doing what they do with or without us (scholars, editor's note) looking over their shoulders"? First of all, we have the strong feeling that any debate about the own way of working is a good starting point for self-reflection. This is true for medical doctors doing surgery as well as for pilots and many other professions. So why should we renounce such attempts of reflection as an element of quality management in journalism which plays a fundamental role in democracy? If such a theoretical reflection and observation gets systematically connected with journalistic practice and education, there should be a good chance to produce a next generation of journalists being used to looking over their own shoulders. And with regard to well established media and their journalists in charge, there may be some good news in the bad news of the recent "media crisis": In an era of newspaper dying and media fragmentation, a notable amount of journalists cannot afford to do business as usual. In a conference with about 20 editors-in-chief from German mass media,[1] we have noted more demand for scientific advice and answers in a dramatically changing media world than probably ever before. This is especially true for questions on how (that is, by which means) to attract readers, listeners and spectators. Such a question is closely related to a theory of selection processes.

A deeper reflection of selection processes is also interesting for science communicators and scientists in all fields in order to give them a better understanding of how the media work and to improve their communication. The question why different scientific disciplines achieve a different degree of media attention is not the basic topic of this article. However, it is a frequently asked question by scientists and science communicators, for example, when they are confronted with rankings of the most popular disciplines in the media (see Table 4.1). We believe that internal factors in journalism are part of the answer.

In this work, we try to shed light on the selection processes in science journalism from three different angles. First, we describe observations from the journalistic practice as well as from science journalism teaching and propose a simple

Table 4.1 Top three science issues covered in leading nationwide German newspapers in two periods of 13 weeks each (rounded to full percent; complete ranking in Elmer et al. 2008)

Scientific issue	Articles (sample 2003/2004)	Scientific issue	Articles (sample 2006/2007)
Medicine	455(28%)	Medicine	703(29%)
Biology	209(13%)	Environment	366(15%)
Technology	187(11%)	Biology	333(14%)

[1] "Journalistische Qualität in der Krise," Dortmund University, Jan. 2010; http://idw-online.de/en/news352415.

heuristic model for the selection of science topics.[2] Afterwards, we describe the existing theory of news values for *general* journalism. In the last part, we try to transfer the general theory to science journalism and test the applicability of an adapted "science news value theory" empirically by combining guided interviews and a content analysis. Finally, we propose further steps to examine the proposed model as well as the adapted catalogues of news factors for science coverage.

4.2 Favourite Topics in Media Coverage of Science

Regarding the top fields of science covered by the media, there are typical patterns which seem to be internationally consistent. Altogether, medicine/health and biology dominate science coverage worldwide (Bauer 2000; van Rooyen 2002; Bucchi and Mazzolini 2003). In a long-term study of the *New York Times*, health, medicine, and behavioural science are constant among the best-selling topics, with maximum values of some 58% (Clark and Illman 2006). According to our own recent data for German broadsheets, their top list is as given in Table 4.1.

Although the detailed rank order is strongly dependent on the definition of every field, such rankings raise questions concerning explanations for these differences in science coverage. One of the few studies that compare the coverage of different scientific fields concludes that, so far, there is no convincing explanation for the different degrees of medialization (Schäfer 2007). While Schäfer focuses on differences between the epistemic cultures of the scientific fields themselves,[3] we argue that this perspective needs to be complemented by studying the journalistic perspective and the decision making processes of journalists: Are there certain factors especially dedicated to medical or biological issues which make them – on average – more attractive for journalists (and their readers) than other fields of science? Are some topics, regardless of their detailed content, less attractive because already their "price tag" causes negative associations (e.g., the "complicated" chemistry that everybody hated at school)? Are journalists on average more familiar with certain

[2] The term "science journalism" is used in the sense of "reporting on (natural) sciences, medicine and technology" (see Wormer 2008) regardless whether the reporting is done by specialised (science) journalists or others.

[3] Aside from the concept of different epistemic cultures of science, we are convinced that some rather simple parameters should also have an influence on the amount of science coverage in the media: For example, the total scientific output in biomedical research is higher than in, let's say, archaeology (in terms of number of scientists and scientific publications). Therefore, in this case, the amount of coverage is in line with the expected situation because larger fields get more awareness in the media than smaller ones. Concerning the journalists themselves, we could also confirm (at least for Germany) a dominance of science journalists with a background in biology who may have a tendency to prefer biological and (bio-)medical issues. Among other explanations, such aspects are at least one part of the story on why these disciplines are nearly always at the top list of the most covered topics.

issues because of their educational background making these issues more attractive for them? Schäfer (2007) puts the matter in a nutshell: "A reliable empirical reconstruction of the news factors in science coverage is still missing."

4.3 Inside the Science Section: The Practitioner's Perspective

4.3.1 Time Dependent Selection Factors

Editors can "even decide differently in August than they did in July". This quotation of the former director of the Henri Nannen Journalism School and one of the most influential journalism teachers in Germany (Schneider 1986) illustrates that the work in the media has a highly dynamic component. Schneider refers mainly to the changing comprehensibility of different terms with which the reader is getting more and more familiar during a repeated reporting on a certain issue. However, the observation of a highly dynamic process is also true for the issue selection process: A topic interesting on one day can become unimportant the next day – and the other way around. From the practical perspective, it should be discussed if time dependent factors influencing the selection process of editors for science stories may be slightly different than for other fields of coverage (such as politics or sports). For this influence, at least two different time dependent effects can be distinguished.

4.3.1.1 Passive Background Effect (Crowding Out)

> Science rules our life, but politics (or what is considered to be politics) rules the first pages of the newspaper. [. . .] Therefore, science is taking place mostly on the first pages or in the top news only when a politician talks about science (Schütze 1996).

This observation of a journalist specialised in science politics may have changed only a little bit over time. But it is interesting to put it the other way around: Political news has the power to crowd out even the most interesting science news. In the internal hierarchy of the mass media, the political editors are usually the most powerful ones and, by far, most of the editors-in-chief are socialised as political journalists. This situation can kill the original front page position even of an exclusive science story.

On the other hand, a calm day without any notable news in politics increases the chance for science topics to appear at the front end of the paper. During such a day, the *news* editor may even come up by himself with a proposal to write about the lack of donors for organ transplantations. In such cases, the argument of a *science* editor that there is nothing new in this "news" would not help: The news (!) editor demands the story following the claim: "It's not new but interesting." If there is a lack of interesting events on the news market (that is, a background effect around zero), nearly any science story will be regarded as a timeless beauty. And in contrast to articles about politics or sports, the news editor can hope that only a few readers will realise that the chosen science "news" was actually not new.

Fig. 4.1 And politics takes it all: Political news can be the front-page-death even for the reporting on real scientific breakthroughs (picture by H. Becker; taken from Wormer 2006)

Interestingly, this, let's say, "passive background effect" on the selection process is widely ignored in studies dealing with science coverage. Indeed, the science section was clearly identified as a "delayed media section" (Hömberg 1989) installed only at the bottom of the classical sections. But hardly any communication researcher seems to consider that, in such a position, there are different rules for the selection of news than for the well established sections. However, at least in some media, the standing of the science section has improved during the last 15 years (Wormer 2006), becoming more than a "nice-to-have-section" (Illinger 2005). Concerning communicational studies, it should still be recommended to check any data for confounding news background. To put it in other words: "What other things happened on the news market the same day?" should become a more important question for studying the selection process for science news (Fig. 4.1).

4.3.1.2 Active Background Effect (Pulling In)

When the science editor from a nationwide newspaper presented the topics for the next science page in the daily editorial conference, he not only had to explain the meaning of the word "Tsunami"; he also had to justify that new scientific results of Tsunami researchers were newsworthy enough to select this "strange" topic for the next edition.[4] One month later, after Christmas 2004, when one of the biggest

[4] The corresponding article was published November 25, 2004.

Tsunamis in recent history had occurred in Asia, the editorial demand of articles about Tsunami research reached the limit of capacities of some science editors.[5]

The Tsunami example shows some of the patterns for the issue selection process in science journalism: The time dependent background factors of the news market can trigger a shift from classical *science* journalistic selection criteria ("real scientific news" from a conference as a trigger for reporting) to *general* news selection criteria. In the first case, the general actuality seems to be less important for science journalism; in the second case, the general news market creates a classical situation of actuality (despite of hardly any real *scientific* news). As our data indicate, even for some daily broadsheets, the distribution between "scientific" and "non-scientific" triggers for the reporting on science topics is not far from a 50:50 situation (Elmer et al. 2008).

4.3.2 Time Independent Selection Factors

Although the factors mentioned above clearly have a time dependent (i.e., a news market dependent) component, they also have timeless aspects that could improve the chance of a science topic to be selected in the media: Science news with any political aspect should always increase its importance for general journalists. The same is true for a scientific conference or a scientific publication (see Ten Eyck et al. 2001; Ten Eyck and Williment 2003; Elmer et al. 2008). However, especially in science journalism, topics can be selected even without any daily actuality.

A special situation that may help to identify rather time independent factors for the selection process is given in an editorial office which runs two different publications with two different time scales. One example is mentioned by Illinger (2006). Having been responsible for both the science section of a daily newspaper and a magazine, Illinger also had to answer the question which topics should be saved for the monthly magazine and which should be selected for the next day(s) in the newspaper. A question that he answered as follows:

> What we can illustrate opulently, is rather published in the magazine. The newspaper can react [. . .] much more on actuality. For the magazine [. . .] we are dealing rather with latent actuality. In principle most of the topics in the magazine could also be used for the newspaper; the other way round this is not true to the same extent. Articles for the magazine mostly need more human touch and a more narrative component than many newspaper reports that are more aligned to facts (Illinger 2006).

A method suitable for empirical research to figure out which rather time independent factors are important for the selection process is a situation where the factor "actuality" is constant for all topics. To a certain extent this is true for the weekly

[5] The fact that in the same year a best-selling author had published a novel also dealing with a Tsunami delivered an extra (cultural) angle for the reporting after the disaster (e.g., Wellershof 2005). Interview with Frank Schätzing, *Der Spiegel*, 1, 3.1.2005, pp. 114–115. www.spiegel.de/spiegel/print/d-38785544.html).

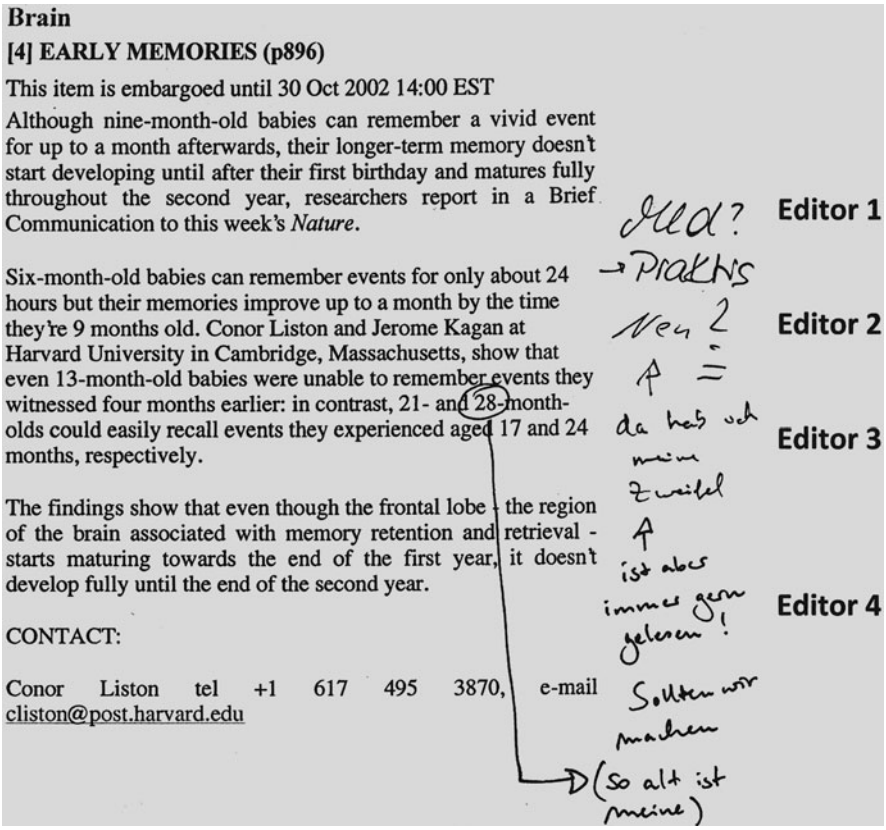

Fig. 4.2 Press releases from scientific magazines with a fixed embargo time would be an interesting research object to study the selection processes in the media. In this case we present an insight into some of the personal criteria noted by four different science editors from a nationwide German newspaper who are selecting news from a *Nature* press release. (For anonymisation the initials of the editors in the original document were replaced by "Editor 1–4"; Editor 1: "Short news?" Editor 2: "Is it really new?" Editor 3: "I have some doubts here." Editor 4 (with a daughter in the same age as mentioned in the press release): "But it is always loved by the readers! It should be done."). (Picture taken by H.W.)

press releases from magazines such as *Nature* or *Science*: Most of the offered news has the same embargo time (Fig. 4.2).

Our practical experience and observation of many hundreds of such standard selection processes as well as the discussions in editorial conferences should allow some hypotheses on the main factors used by journalists. Furthermore, such factors are also recommended to journalists in journalism teaching (for interns in the editorial office, at journalism schools and universities as well as in handbooks for journalistic practice). Regarding all this, the following simple model for the selection of science topics in the media is proposed (Table 4.2).

However, the weighting of each factor in the proposed model is not quantified. For example, in some cases, a very high *surprise-factor* alone may be sufficient for

Table 4.2 A simple heuristic model for the selection process of science news. In addition, the (scientific or general) *actuality* has to be considered. With regard to the realisation (journalistic production) of an issue, the *possibility of visualisation* and – however, less specific for news than for longer stories – the *narrative factor* (fairy tale approach: "I tell you the story of. . .") have an important influence

Importance factor	Surprise factor ("Astonishment")	Usability factor
Political, economic, social, cultural, ethical, and/or scientific importance	New/different than thought before; exotic ("cocktail-party-suitable")	Advice for daily life (medical, technical. . .)

the selection of a certain topic (although its *importance factor* as well as its *usability factor* could be zero). In some other cases, an average score for all three factors may be a reason for publication. Furthermore, the model has some other problems with regard to its prognostic power: Whereas the elements of the *usability factor* and the *surprise factor* should be rather easy to identify for a given audience, the factor of *importance* seems to be less well-arranged. As La Roche (1999) already pointed out: "Abstract importance is not enough to make news." Especially the definition of "importance" has to be determined with regard to different systems of reference. In this context, one important question is how significant the "scientific importance" of a certain event in the selection process of the mass media is in comparison to other fields of reference (such as the political importance playing a major role in the classical theory of news values).

4.4 The Theoretical Perspective of News Values: From General Journalism to Science Journalism

In journalism theory, four concepts of news selection have achieved a broader acceptance: gatekeeping, framing, news bias, and news values.[6] In this chapter, we can only focus on the theory of news values. Starting with a brief introduction of the well established concept, we will discuss former attempts to apply this general approach especially on science coverage.

4.4.1 The Theory of News Values

The theory of news values, also called the *concept of news factors*, describes why a topic is newsworthy and therefore published by the media. An event has several characteristics ("news factors") such as *geographical proximity*, *unexpectedness*, or

[6] Others such as cognitive and socio-psychologist concepts are also interesting but rare in the literature. For a short introduction to the different concepts, see the International Encyclopaedia of Communication (Donsbach 2008).

prominence (*reference to elite persons*). The total news value increases with the number of news factors that are accumulated by an event and also with the intensity of these factors.[7] If the resulting total news value of an event is higher, its chance to be selected for publication will be better. In this "model of two components" (number and intensity), journalists price the impact of each of these news factors more or less conscious (Kepplinger and Weißbecker 1991). It is proven that topics with a higher total news value obtain on average more space in the publication than topics with a lower news value. The term "news value" first occurred in 1922, when Walter Lippmann published his book *Public Opinion*, including some remarks on the news selection by journalists.

Østgaard (1965) was the first to classify news factors; he also postulated that a topic has to overcome a "news barrier" (a fictional value according to the used grade systems of news factors). Galtung and Ruge (1965), Norwegian peace researchers like Østgaard, codified twelve news factors in an analysis of the coverage of three foreign crises. The German communication researcher Schulz (1976) enlarged the catalogue of news factors up to 18 selection characteristics; he also operationalised the news factors and introduced a multivariate value scale, and he included formal aspects as position and extent of the publication. Staab (1990) extended the model by a back coupling effect: News factors are not just explaining news selection decisions. They are both results and a means to an end at the same time: When an editor has identified a certain news value, he may also have the tendency to underline this certain value in his article. As a result, the news value in the final article may be stronger than it was in the original event.

For more than three decades, the theory of news factors has been used for the analysis of news selection in the media's coverage especially of politics, foreign affairs or in non-specific news broadcasts. But this concept obviously does not describe the selection of *science* news sufficiently: For the last 20 years, journalism researchers have suggested several times that science journalists may have special selection criteria or at least that the criteria may be different in different sections (e.g., Hömberg 1987; Staab 1990; Ruhrmann 1990; Peters 1994a; Ruhrmann 1997; Milde and Ruhrmann 2006). However, empirical data are rare so far.

4.4.2 News Factors in the Context of Science Journalism

The probably most extensive considerations concerning news factors important for science journalism go back to Ruhrmann (1990, 1997). Ruhrmann examined especially the media coverage of genetic engineering where he identified three aspects: (1) the novelty of an event, respectively the probability of a risk, (2) the scientific-technical or social relevance of a technological development or the extent of its perils, (3) the common uncertainty of the gene technology's risk context.

[7] For the intensity, a grade system in four steps (between 0 and 3) is often used and was also applied in this work. Other authors use different scales, e.g., from 1 to 5 (Ruhrmann and Göbbel 2007).

Thus, the information value of the reported event and its associated risks should depend at least in part on the well known news factors *unexpectedness* ("exclusiveness of the event"), *potential harm* ("probability of damage"), and *establishment* ("duration since the incidence or observation of an event"), as well as *composition* ("variance of the event and topic"). At the same time, Ruhrmann indicated: The *recipients'* perception of risk communication uses other criteria, namely the criterion of the "social rationality". This includes "simplicity of events and risks" (the equivalent of Østgaard's news factor *simplification*), "personal relevance of risks" (equates the news factor *involvement/range*, measured by the number of people affected), and "credibility of persons and institutions" (which is the news factor *influence*).

Later, Ruhrmann (1997) hypothesised that a scientific event becomes news more easily the more the following conditions are given: the event is self-contained ("development of the event"), the event is sudden (i.e., news factor *unexpectedness*), the event is important and has consequences for the total population (i.e., news factors *damage*, *success*, and *involvement/range*), the event's consequences are negative (*damage*), the event is controversial and conflict-riddled (i.e., news factor *controversy*), and the scientific elite is involved (i.e., news factor *influence*, sometimes also *prominence*). According to this hypothesis, a distortion of the media reality is not astonishing: Science journalists report on "spectacular discoveries, laureates, and marketing opportunities but the daily routine of scientists, the merit of competitors, or the background of research promotion remain unknown" (Ruhrmann 1997). Relating to risk communication, this means: Rare and extraordinary risks are preferred, average risks of everyday life are neglected.

Although risk communication and genetic engineering are only a special segment in science journalism, many of his conclusions seem to be in line with the experiences in journalistic practice (see above). From this point of view, it can be predicted that many *conventional* news factors should indeed be transferable to the science coverage of the media (see Wormer 2010). Another indicator for an overall conformity of these factors could be the observation that science journalism is becoming more and more science *journalism* (instead of *science* journalism), i.e., practitioners see themselves as science *journalists* rather than *science* journalists (see Ruß-Mohl 1987). Especially in recent years, science journalism often has not been limited anymore to a kind of "nature protection area" (that is, for example, hidden in newspaper supplements) at the back end of the newspaper (see Elmer et al. 2008). Therefore, *non*-science editors have to deal with science news using their own (general) news criteria. The other way around is also true: All kinds of journalists, including science journalists, are socialised in editorial offices with a tendency to big newsroom concepts which limit the former frontiers between different departments. This again influences the selection process by science journalists (see Donsbach 2004).

Nevertheless, there is some evidence that some of the news factors in the existing catalogues may be rather unimportant to science journalists (see below). Vice versa it is natural to ask if science journalists use news factors which are more or less unique for the science section in the media. Of course, *conventional*

news factors are obviously used by every journalist, independent from the field of coverage; these news factors are conventional exactly for this reason because they are cross-departmental. But what about news factors which do not make sense to journalists anymore behind the boundary of a certain editorial department?

This article aims at filling this research gap by combining the practitioners' perspective and the insights from the general news value theory with an empirical study of issue selection processes in science journalism. Our basic working hypothesis for the empirical study can be summarised as follows:

H1: In principle, the well established theory of news values should be applicable to science coverage, too (see Wormer 2010).

H2: The general theory of news values will *not* be applicable sufficiently to science coverage without a number of considerable adaptations of the existing framework. These could be in detail:

1. The exact definition of some news factors is incomplete because former study authors have only considered aspects which lie beyond the world of science but rather in the political, economic or cultural systems.[8]
2. Some news factors are hardly applicable because they anticipate an interpretation which is rather unusual for a science journalist.[9]
3. Some news factors such as "demonstration" are unnecessary because they refer to events which may belong to daily life in politics but not in science.
4. Some news factors specific to science media coverage may be missing in the general catalogue and cannot be included easily in existing news factors so that discrete new news factors need to be generated. Candidates are, for example, *scientific proximity* and *scientific relevance*.

4.5 Development of a Revised Catalogue of News Factors and a First Empirical Test

4.5.1 A Draft Catalogue of News Factors for Science Coverage

For the creation of a first draft catalogue of news factors specifically applicable to science journalism, we have chosen a systematic approach based on four maxims:

[8] For example, in the classical definition, the factor *influence* is defined according to "a person, group or organisation with political, economic or cultural power"; "scientific power" would not be taken into account.

[9] For example, applying the classical factor *reference to elite nation* science journalists would probably not have in mind the "military power" or the "foreign trade of the country where the reported event took place" but rather indicators such as the "scientific importance" of this country.

1. The draft catalogue should stay as close as possible to the common theory of news values and to the well established news factors.
2. The draft should consider Ruhrmann's (1990, 1997) thoughts about news factors especially important in science coverage.
3. The draft should be linked to the journalistic practice (see Section 4.3)
4. Each news factor should be operationable with appropriate standardized data, i.e., data for several countries that are collected by one institution with one definition following a common standard instead of information from different sources that are not comparable.[10]

Following these principles allows a traceable adaptation of existing catalogues as well as a highly intersubjective coding procedure for future studies applying this draft. Furthermore, the strict orientation on existing catalogues enables us to compare existing data in the literature with new data to be collected.

4.5.1.1 Analysis of Existing Catalogues of News Factors

First, an extensive literature analysis of the history and development theory of news values starting from Lippmann's publication in 1922 was performed. Then, a table with an overview of the most important and most popular versions of the theory of news values was generated (based on the model of Ruhrmann and Göbbel 2007). The table considered concepts of the theory of news values of the following scientists: Østgaard (1965), Galtung and Ruge (1965), Schulz (1976), Schulz (1977), Staab (1990), Eilders (1997), Ruhrmann et al. (2003), and Ruhrmann and Göbbel (2007). This chart showed when a news factor was renamed or separated into two distinct factors or newly introduced, etc. Every single news factor from the table as well as its extensive coding definition was surveyed in detail with regard to its applicability for science news. Afterwards, testing our working hypothesis we identified some factors which should be valid for science news with no or only a minor adaptation of the existing definitions in the classical catalogues. Examples include:

– *Geographical proximity* is one of the oldest news factors. As country borders are quite objective, no adaptation was necessary: It can be assumed that a political journalist as well as a science journalist in Berlin or London would prefer to select an event that took place in France instead of an event in Brazil.
– In its classical form, the definition of the news factor *influence* only includes "the political, economic, cultural or sportive power of a person, a group of persons or an institution" (see Ruhrmann et al. 2003; Ruhrmann and Göbbel 2007). By using

[10] Useful data collections are offered e.g., by the OECD or published in the CIA World Factbook which provides information on the people, government and further items for more than 250 world entities.

this definition, even influential scientists would not necessarily be considered. Hence, the definition had to be extended to *scientific power/influence*.[11]
- The classical news factor *range* is defined by the question whether "nobody", "a few people", "a professional group", or "all citizens of at least one nation" are directly affected by an event (see Ruhrmann et al. 2003). But for the coverage of medical issues this definition seemed to be too narrow. For example, which disease would affect every citizen personally at the same time? Thus, different diseases were classified according to their incidence or cases of death per year (with cardiovascular diseases and cancer on the top).[12]
- *Actuality* is also a classical news factor that has an additional dimension in science coverage: General news events which need a scientific explanation (e.g., natural disasters or political events) can trigger actuality. This seems to happen with increasing tendency (see Elmer et al. 2008). But genuine scientific events, such as journal publications or conferences, can also trigger (science) coverage.

Aside from such adaptations of existing news factors, some *news factors specific to science coverage* were proposed (mostly on the base of the practitioner's experience), e.g.:

- In addition to the news factors *geographical proximity*, *political proximity*, *economic proximity*, and *cultural proximity,* a new factor called *scientific proximity* was corollary. The new factor was defined – among other aspects – by considering scientific cultures and favourite research areas of a country.
- The news factor *composition* – so far only used by Galtung and Ruge (1965) – seemed to be important for science journalists, too: "We only have medical issues today, thus we also need some physics" is a well known argument in editorial conferences. In such cases, the news barrier would be reduced for certain topics.
- Another factor that seemed to be more important in science coverage than in the reporting on political topics is the *astonishing* aspect (see *surprise factor* in Section 4.3).

[11] As a consequence, the adapted definition of the news factor *influence* is given by: "political, economic, cultural, sportive or scientific power of a person, group, or institution." Our proposal to operationalise "scientific power" is as follows: 0 = no influence, e.g., a student; 1 = low influence, e.g., a PhD student; 2 = high influence, e.g., a professor or the scientific leader of a national research project; 3 = largest influence; e.g., leader of an international research group.

[12] By using this approach, the potential concern of a population regarding a certain disease is rated in a first approximation as equivalent to the mortality. This approach has the big advantage of being highly objective. However, in reality this selection process may be distorted at least in some cases by the subjective perception of a news editor. For example, editors are likely to over-estimate the impact of diseases such as HIV/Aids (about 650 deaths in Germany in 2008; Robert-Koch-Institut 2008) in comparison to diseases such as diabetes mellitus (20,000 deaths per annum; Statistisches Bundesamt 2009).

– Furthermore, the *intention* of the author, the aim that the author wants to achieve with the publication, is considered as a news factor for our empirical test.[13]
– Following Peters' (1994a) "four-stage hierarchy of access to the public", an essay written by a scientist or an interview could increase the total news value. Thus, the factor *expert's impact* on the publication is considered, too.[14]

In addition, the news factor *relevance* was re-introduced. This item occurred for the first time in the list of Galtung and Ruge (1965) and became interpreted as *range*, the number of affected people. We have defined *relevance* here as "intensity of damage or benefit" of an event (considering the outcome and not only the number of people involved). Initially, we had calculated this news factor with an index of the sub-criteria *political relevance*, *economic relevance*, *scientific relevance*, and *relevance to recipients and society*. However, it turned out in the pre-test that a high intensity in *scientific relevance* was often counterbalanced by non-existing *political* and *economic relevance* resulting in barely differing sums for different articles. Hence, it was decided that each sub-criterion should become an independent factor.

Finally, 29 news factors were derived inductively following the procedure described above, building a draft catalogue of factors for a subsequent empirical examination (Table 4.3).[15]

Table 4.3 News factors for the first draft of a prospective theory of news values specific to science journalism

Draft catalogue of news factors adapted on the basis of existing theories and journalistic practice	
Geographical proximity	Geographical distance from event country to publication country
Proximity of the politics of science[a]	Similarity between event country and publication country with regard to their political handling of science and research
Economic proximity	Similarity between event country and publication country with regard to their economic systems and their economic relations
Cultural proximity	Similarity between event country and publication country with regard to their language, religion, and culture
Scientific proximity[b]	Similarity between event country and publication country with regard to their scientific culture

[13] For example, the intention of an investigative report may be more attractive for a science journalist than a general news piece and thus increase the news value of this publication. The scale for the operationalisation follows Peters' (1994a) categories for the different kinds of science communication (popularization, clarification, and scientific controversy) and was complemented by the controlling function (Peters 1994b).

[14] With *expert's impact* we aim at the question whether a scientist appears in the media report just with a single quote or as an interview partner or even as a guest author.

[15] The entire codebook with all detailed definitions of the individual factors can be requested from the authors.

Table 4.3 (continued)

Draft catalogue of news factors adapted on the basis of existing theories and journalistic practice	
Reference to elite nation[a]	Status of the event country within the scientific community according to their science and engineering S&E article output
Reference to elite region[a]	Status of the event region within the publication country
Reference to elite person[a]	Political, economic, cultural or scientific power of a person, group, or institution ranked by its position in the hierarchy
Prominence[a]	Degree of notoriety of a person/institution independent from its power/position in hierarchy
Personalisation (reference to persons)	Inclusion of persons and importance for the reported circumstances
Controversy	Contrasting of differences in opinions
Aggression	Threat or use of violence with the aim to hurt or to damage
Demonstration (protest march)	Collective representation of goals
Unexpectedness	Extent to which an event was not expected
Range (number of affected people)[a]	Number of people participating in an event or affected by the event
Continuance	Establishment/period of time the media is already following a topic
Involvement of the publication country	Reporting about an event because it takes place with the participation of the publication country
Presentation of feelings	Display of human feelings via issuing gestures or facial expressions
Sexuality/eroticism	Verbal and pictorial presentation of sexuality/eroticism or allusion to it
Availability of graphical material	Extent to which an event becomes news just because pictures or figures are available
Scientific relevance[b]	Importance of an event for the scientific progress
Relevance to recipient/society[b]	Importance of an event for the recipient of the article or even the society in total
Economic relevance[b]	Importance of an event for the economy
Political relevance[b]	Importance of an event for politics or legislation
Composition[b]	Mix of topics within a distinct science page and the whole issue of a newspaper/broadcast etc.
Astonishment[b]	Extent to which an event causes amazed reactions (“Aah!”)
Expert’s impact[b]	Extent to which a scientist becomes involved in the publication and gets access to the public
Actuality[b]	Reason for the selection of an event at the present moment (coming from the general news situation, the research operation or both)
Intention[b]	Type of Science communication

[a] Definition of this classical factor slightly adapted to make it applicable for science coverage
[b] Newly introduced factor

4.5.2 Sample and Methods for the First Examination of the Draft Catalogue

To examine whether the developed model of news factors specific to science journalism is reasonable, a quantitative method and a qualitative method were used in a triangulation approach: a content analysis on the one hand, and guided interviews on the other.[16]

For the selection of the analysed media, the goal was to get a homogenous sample of comparable media that offer a notable amount of science coverage. Therefore, four German nationwide quality daily newspapers were chosen: *Frankfurter Allgemeine Zeitung* (*F.A.Z.*), *Süddeutsche Zeitung* (*SZ*), *Die Welt* and *Frankfurter Rundschau*. As the profile of the last one is slightly different, the *Frankfurter Rundschau* was just used for a pre-test of the applicability of our framework. Furthermore, in order to get a first hint for an international applicability in different media systems, the French daily *Libération* was selected as well.[17]

For the guided interviews, we included the responsible editor for the science sections in each of the selected newspapers. Thus, four plus one people were consulted for an approximately one-hour-interview each. During the conversation, the editors were first asked to which aspects they pay attention when selecting a topic. Afterwards, they were confronted with the draft of the adapted catalogue of news factors and its definitions in order to assign every item certain significance from their personal point of view. Finally, the science editors were asked whether they would see the need to go beyond the adapted catalogue by adding other factors which had not yet been included in the list. The recorded interviews were transcribed and then clustered with the text analysis software MAXQDA.

The final sample for the content analysis of the selected newspapers contained one stratified week randomly selected out of the first half of 2009, following the suggestions of Riffe et al. (1993). Every issue was scanned completely because a former study clearly indicated that a remarkable amount of science coverage can be found outside the science section. Every article containing scientific content in at least half of its length was encoded (following the "50+ percent scientific content" rule already applied in Elmer et al. 2008; see also Bucchi and Mazzolini 2003).[18] In total, 192 articles were classified as science journalistic coverage (*F.A.Z.*: 31, *SZ*: 59, *Welt*: 82, *Libération*: 20). These articles were encoded following the codebook.

[16] The empirical part is mainly based on a master thesis which was realised by F.B. and supervised by H.W.

[17] This approach has a kind of explorative character on the international level because, as a literature review showed, there is a lack of a scientific discussion about both news values and science journalism in France. Nevertheless, the French data will be considered only partly in the following analysis.

[18] Some older studies use definitions such as "An article is regarded as science coverage if a scientist or a scientific institution is mentioned in the first paragraph" (e.g., Böhme-Dürr and Grube 1989: 450). Although such definitions may be easier to apply, they are rather outdated because in the era of "narrative writing" many stories start with a colourful introduction, the story of a patient, etc. and switch to the scientific issue only in a later paragraph.

Afterwards, every news factor was analysed individually using the data analysis software SPSS. By combining the results of the content analysis with the information derived from the guided interviews, the extensive catalogue of 29 news factors was reduced to the most important factors.

4.5.3 Results

It could be confirmed *empirically* that some definitions of classical news factors were incomplete to describe the selection of science news. One example: Following the classical definition of the news factor *influence*, 41 of 192 (21.4%) articles noted people or institutions with (political, economic, or cultural) power. But within the 151 remaining articles in which none of the three categories of influence were noted, 116 dealt with people or institutions of notable *scientific* power. This is not surprising for science topics, but it is rather surprising that "scientific influence" has not been included in the theory before.

Another interesting question was whether the results of the guided interviews (self-perception of the editors) and the content analysis would be consistent. Here we found an ambivalent picture (see Table 4.4). In some cases, the most important news selection criteria were identical with the news factors that showed up the most or with the highest value in the analysed article. But in other cases they did not. On the one hand, the factors *unexpectedness* and *composition* were mentioned as two of the most important news selection criteria by the science editors as they were at the top of the ranking of the news values encoded in the content analysis. On the other hand, the editors stated the news factors *range* and *relevance to recipients/society* as one of the most important selection criteria while the average score of both news factors was low in the analysed articles. Furthermore, the news factor *astonishment* (derived from the practical approach) was rated high in both the top list of the science editors and the ranking of news values in the articles.[19]

All available information for each news factor was compared with the results of a survey of 43 executive news editors in the general news business (Ruhrmann and Göbbel 2007). Interestingly, the interviewed science editors often seem to focus on other news factors than the 43 news journalists in the former study. For example, *involvement of Germany* was the second most important criteria for the non-specialised journalists (Ruhrmann and Göbbel 2007); in contrast, the interviewed science editors in our study estimated the involvement of German scientists as "nice to have" at most.[20] *Prominence* and *geographical proximity* seem to be rather important in general news coverage, too, but not in the science coverage of nationwide quality newspapers. One exception from these differences was

[19] Although this result is striking it should be kept in mind that the sample was not representative for all kinds of media, which is especially true for the guided interviews.

[20] However, the French science editor interviewed in our study declared the involvement of France as a "must have" for an event to be selected.

Table 4.4 Comparison of the results derived from the content analysis and the guided interviews with a survey in the literature (including an accentuation of correspondence with the simple heuristic model and the principal component analysis)

	Opinion survey with 43 German executive news editors (Ruhrmann and Göbbel 2007)		Opinion survey with the head of science departments of F.A.Z., SZ, and Welt		Content analysis of science coverage of F.A.Z., SZ, and Welt	
Rank	News factor	Average score	News factor	Average score	News factor	Average score
1	Range (number of affected people)	4.26	Unexpectedness[a]	2.67	Unexpectedness[a]	2.41
2	Involvement of Germany	4.00	Range (number of affected people)[a,b]	2.67	Economic proximity	2.10
3	Negative consequences/damage/ failure	3.79	Scientific Relevance[a]	2.67	Composition	2.02
4	Unexpectedness	3.72	Relevance to the recipients/ society[a,b]	2.67	Reference to elite nation	2.01
5	Differences of opinion/controversy	3.67	Composition	2.67	Proximity of the politics of science	1.86
6	Positive consequences/benefit/ success	3.65	Trigger	2.67	Astonishment[a]	1.81
7	Prominence	3.33	Graphical material[a,b]	2.50	Scientific proximity	1.71
8	Geographical proximity	3.30	Intention[a,b]	2.50	Reference to elite region	1.70
9	Personalisation (reference to persons)	3.26	Controversy[b]	2.33	Trigger[a]	1.63
10	Continuance	3.26	Astonishment[a]	2.33	Reference to elite persons[b]	1.47
11	Visualise	3.15	Political relevance[a]	1.83	Prominence	1.46
12	Reference to elite region	3.14	Personalisation[a]	1.67	Involvement of Germany	1.45
13	Reference to elite nation	3.07	Continuance	1.67	Cultural proximity	1.44
14	Violence/ aggression	3.07	Economic relevance[a]	1.67	Geographical proximity	0.99
15	Demonstration (protest march)	3.07	Involvement of Germany	1.33	Scientific Relevance[a]	0.91
16	Availability of graphical material	2.95	Presentation of feelings	1.33	Range (number of affected people)[a,b]	0.84

Table 4.4 (continued)

	Opinion survey with 43 German executive news editors (Ruhrmann and Göbbel 2007)		Opinion survey with the head of science departments of F.A.Z., SZ, and Welt		Content analysis of science coverage of F.A.Z., SZ, and Welt	
Rank	News factor	Average score	News factor	Average score	News factor	Average score
17	Political proximity	2.91	Sexuality/eroticism[b]	1.33	Personalisation[a]	0.83
18	Presentation of feelings	2.86	Expert's impact[b]	1.33 (1.0)	Relevance to the recipients/society[a,b]	0.67
19	Economic proximity	2.81	Geographical proximity	1.00	Intention[a,b]	0.65
20	Reference to elite persons	2.70	Scientific proximity	1.00	Continuance	0.59
21	Cultural proximity	2.63	Reference to elite persons[b]	1.00	Graphical material[a,b]	0.57
22	Sexuality/eroticism	1.53	Prominence	1.00	Controversy[b]	0.52
23	–		Proximity of the politics of science	0.67	Expert's impact[b]	0.38
24	–		Reference to elite nation	0.67	Presentation of feelings	0.33
25	–		Reference to elite region	0.67	Economic relevance[a]	0.28
26	–		Demonstration (protest march)	0.67	Political relevance[a]	0.13
27	–		Economic proximity	0.33	Aggression[b]	0.09
28	–		Cultural proximity	0.33	Sexuality/eroticism[b]	0.05
29	–		Aggression[b]	0.33	Demonstration (protest march)	0.00

Ruhrmann and Göbbel (2007): $N = 43$ German journalists responsible for a general news media programme; Scale: 1 = news factor not important, 2 = slightly important, 3 = partly/partly, 4 = quite important, 5 = very important. Own Study: N = 3 interviewed science editors responsible for the science department and $N = 172$ articles; Scale: 0 = news factor with no or very low value, 1 = low value, 2 = high value, 3 = highest value

[a] News factors with a counterpart in the heuristic approach (importance, surprise, usability, actuality, possibility of visualisation, narrative factor; see Section 4.3)

[b] News factors important according to the principal component analysis (see Section 4.5.4)

found for the factors *unexpectedness* and *range (number of affected people)*: Those gained a high popularity both among the polled news editors (by Ruhrmann and Göbbel) and the science editors (our study). According to our interviews, the newly introduced news factors *scientific relevance*, *composition*, *actuality*, *intention*, and *astonishment* outperformed many of the well established news factors. Furthermore, following the explicit opinion of the news editors, no other specific news factors had to be added.[21] A comparative overview of the ranking by Ruhrmann and Göbbel (2007), the results of our guided interviews and the results of our content analysis are given in Table 4.4. In this overview, it is also highlighted which factors are strongly related to the simple heuristic model and which factors are exposed following a principal component analysis.

4.5.4 Reduction of the Draft Catalogue of News Factors

In order to simplify the application and the practicability of the concept, we examined whether the extensive catalogue of 29 news factors might be reduced to its most important criteria.[22] These criteria could be:

- news factors mentioned by the science editors as top news selection items in the list,
- news factors that showed up often or with high intensity in the content analysis,
- news factors that vary the most in their encoded intensity (identified with a principal component analysis[23] related to the results of the content analysis).

Building the intersection from these three perspectives, the following 14 news factors seem to be those with the highest impact on the news selection processes in science coverage (Table 4.5):

4.5.5 Summary and Limits of the Results of the Empirical Analysis

Although we have tried to synthesise the results of the guided interviews and of the content analysis into a reduced catalogue of news factors, there are considerable discrepancies between the results of both methods. In some cases,

[21] Asked whether they miss a criterion in the catalogue, the journalists mentioned rather an "anti-top list" of scientific fields: They only specified topics that *barely* have a chance to be selected for publication, e.g., "chemistry" or "research policy" instead of saying which topic will be selected *in any case*.

[22] According to Kepplinger (1998) renouncing a broad differentiation and specification of the catalogue of news factors would mean that the explanatory power of the theory of news factors would fall far short of its possibilities. However, it is a mistake to believe that a theory divided into small sections always delivers more knowledge; furthermore it will be less applicable with regard to the scientific and journalistic practice anymore.

[23] This method of multivariate statistics finds out which items (*news factors*) contribute the most to the total variance (*total news value*) (see Brosius 2006).

Table 4.5 The adapted and reduced catalogue

14 News factors with the highest impact on the selection process of science news (alphabetic order)	
Astonishment	Political relevance
Composition	Range (number of affected people)
Controversy	Reference to elite persons
Economic relevance	Relevance to recipients/society
Graphical material	Scientific relevance*
Intention	Actuality (Trigger)
Personalisation	Unexpectedness

*Scientific journals are the fundamental basis to encode the news factor *scientific* relevance in case the science coverage was triggered by the publication of a scientific paper. This was especially confirmed by the science editors in our survey. Thereby we may say that the reputation of a certain journal strongly determines the value of this news factor. Because of this close connection we renounced a factor of its own for "scientific journal."

these discrepancies may already be explained by a different self-perception of the science editors concerning their selection criteria and the real selection process itself (by themselves or another science editor). However, it also has to be kept in mind that a content analysis can only register "constructed news factors", i.e., the existence of a news factor or its intensity could be different in the newspaper (output) than it was in the original material (input) that the editors used in the selection process.[24] Furthermore, our sample was both rather small and highly specific to the genre of a "quality newspaper". The comparison of *F.A.Z.*, *SZ* and *Welt* on the one hand, and *Libération* on the other, already indicated that the data gained by encoding news factors are not sufficient for a complete interpretation of news selection: Contrary to the German science editors, the science editors of *Libération* do not have their own page and cannot decide on their own which scientific news will be published; it depends on the editor-in-chief of the newspaper who does not have the same estimation of certain news factors. Thus, one always has to keep in mind the context, the time dependent requests (see Section 4.3) and the country-specific or media-specific framework requirements.

Finally, it should be mentioned that the proposed catalogue of news factors is not a simple "check list": It will not automatically help science journalists to pick the "right" story; every medium has its own "pattern" of news factors. The theory of news values is a device for researchers to uncover this "pattern". However, many elements of such a catalogue are used like a list of ingredients in a cook book on journalism teaching or handbooks and therefore show up in the simple heuristic model as well.

[24] For example, the value of the news factor *influence* may be different in the published article and in the basic material if the science journalist has interviewed a further scientist during his investigation. When this scientist is higher in the hierarchy than the scientist mentioned in an original press release the news factor *influence* would become stronger in the reporting than it was before.

4.6 Conclusions and Forecast

In this work, we have analysed issue selection processes in science journalism in three steps: Starting with the practitioner's perspective and a simple heuristic model, in a second step, the classical theory of news values was adapted with regard to some specialities in science journalism. In a third step, this adapted theory was tested in two ways: by guided interviews with leading science editors as well as by a quantitative content analysis (including a principal component analysis). As a result, the proposed new catalogue could be refined and compared with the simple heuristic approach as well as with former classical catalogues. Our results clearly indicate that a certain adaptation of the classical theory of news theory for science journalism is reasonable. However, the question may be to what extent such an adaptation is useful.

The science section did not belong to the classical departments in the media. Therefore, it is not surprising that catalogues and codebooks of the classical news theory were developed only alongside departments such as politics, culture or economics. In our study, it could be confirmed that simply applying these catalogues and definitions may cause misleading results for science coverage. Furthermore, in our empirical tests, some newly introduced factors specific for science journalism outperformed many of the classical ones.[25] This brings us to the conclusion that the classical catalogues have to be regarded as incomplete and not sufficient to describe the selection processes in science journalism precisely. However, our first empirical testing also shows that *classical* news factors are relevant in science journalism, too. One explanation for these findings may be the fact that our content analysis has included articles that were triggered by the general news and not only by scientific events such as conferences or publications. A hypothesis for further research thus is that an only slightly adapted classical catalogue is suitable for the part of science journalism triggered by general daily news. In contrast, there is considerable benefit of an adapted and extended catalogue for describing the selection of classical science stories mostly triggered by scientific publications and conferences.

In this context it is an interesting question for further research how significant the factor *scientific relevance* is for the selection process in both types of science journalism. On the one hand, a recent publication or a scientific conference still strongly influences the selection process of science journalists. On the other hand, the perspective of the general audience seems to be of increasing importance for the selection by science journalists. This second tendency may be further amplified in the modern structures of the media (with all kinds of editors literally in the same

[25] It cannot be discussed here why the newly introduced news factors *scientific* relevance, *composition*, *actuality*, *intention*, and *astonishment* have overtaken lots of the well established factors (especially according to our interviews). However, two spontaneous explanations should be given: Science is often seen as a kind of entertainment (sometimes its editors are even part of the "miscellaneous" section in the media) which may explain the importance of the factor *astonishment*. One reason for the high attention to a good mix of topics (*composition*) might be that, in science journalism, usually fewer general topics are predefined than in the coverage of politics or sports.

"newsroom") which may level the difference between different sections. However, the stronger orientation to a broader audience is not only positive in terms of opening the world of science to science distant people: At the same time, it includes the danger that many really new and scientifically really important but not mass-popular science news will be ignored even by quality media and therefore will not get the public awareness they need. The question is then: Who will tell society what is really going on in science?

4.6.1 Further Research Needed for a Final Catalogue

Although we are convinced of the usefulness of an adapted and completed catalogue of news factors for science coverage, our data does not allow us to decide whether the proposed 14 factors should be the final choice. It is an open question whether the prognostic power of this catalogue would be significantly better than a prognosis based on the simple heuristic model. To answer such questions, we propose an input-output analysis with adjusted time dependent factors (see also Section 4.3.1). Therefore, in a first step, the theoretical news values of different topics in the press releases of leading journals such as *Science* and *Nature* could be analysed. In a second step, the number and amount of the related media publications as a result of the editorial selection processes could be measured.[26] As our current empirical data is still limited on quality daily newspapers, such examinations should also include other media. In this context, a further examination and differentiation of single factors would also be interesting. With regard to the practical perspective, it should be tested if a differentiation of *relevance for society* and *relevance for the individual ("usability")* in two discrete news factors would be useful.[27] Further attention should also be given to the factor *graphical material* which was regarded as very important especially in the guided interviews with the science editors. Interestingly, the editors mentioned a selection preference linked to the scientific field to which an event such as a publication belongs (which is in line with some of our ideas given in Section 4.2). It would be a challenge for further research to answer the question whether "a general news value estimation" could be constructed for different disciplines. Among others, that could be one tool to analyse in detail why there is a lack of some scientific topics in the media. In any case, the findings from the guided interviews are only one example for the benefit of the practical and the

[26] This is also reasonable because this work has not analysed the effect of the components "news factors" and "selection criteria" on the amount of coverage (the dependent variable in the model of two components).

[27] Both aspects were already separated in the simple heuristic model. One reason for that is our observation that science and medical reporting, on the one hand, has often a very personal component (i.e., an individual usability (*Nutzwert*), e.g.: "Where do I get this treatment? Is it harmful for me?"). On the other hand, the same treatment may be discussed in the context of exploding costs of the health system which is relevant for society as a whole but less important for the personal health question of an individual patient.

theoretical perspective going hand in hand in our work in which the practitioner's view was already the basis for the adaptation of existing classical catalogues of news factors.

4.6.2 Lessons to be Learned for Research Outside the Science Sections

Aside from the question of a specific selection process for science journalism, some of our results raise the question in how far the classical news theory is still up to date. Some aspects which we have identified as especially important for the selection process of science coverage may also be of growing importance in general. One example is the already mentioned factor *graphical material* which seems to be of increasing importance in a crossmedial world (from a picture gallery in the online edition to YouTube and other social media). Therefore, selection criteria for pictures and other graphical material and their influence on the selection of a story should be further analysed (maybe even thinking of a kind of "picture value theory" in the future). For the classical newspapers, there is evidence that it is of decreasing importance how "new" a selected topic really is. "Put more (elements) of a weekly newspaper into the daily newspaper!",[28] i.e., more background information instead of daily news, has been the motto of the editor-in-chief of the *Süddeutsche Zeitung* for more than 15 years (see Wormer 2006). Meanwhile, the front page of this paper's weekend issue has become remarkably similar to the German weekly *Die ZEIT*: Instead of political news, a rather timeless (often science) topic with a corresponding picture is featured prominently on the front page. That the front page of a classical *news*-paper renounces "news" (daily actuality) at the top may be taken as an indicator to question some aspects of the classical theory of news values: Is it still adequate to work only with a one-dimensional approach of "news"? Or should it be replaced by a multi-dimensional view with "first class fast news" reported in the online news section in the internet and "second class fast news" for the print edition? Different from the times of Lippmann (1922) and Galtung and Ruge (1965), editors nowadays do not only have to *select* a topic, but also need to decide on *which platform* the news should be placed (e.g., print or online?). Such "crossmedia strategies" considering print (TV, radio) and online together may also influence the news selection process for the classical media. These are some reasons why we think that a further engagement with issue selection in science journalism can inform and stimulate studies of other sections of the media.

Acknowledgments Both authors contributed equally to this publication. However, F.B. is especially responsible for the empirical part, H.W. primarily for the development from the practical perspective. We like to thank the alumni-society of our Institute (EX! e.V.) for financing the travel costs for the guided interviews.

[28] The original German quote is: "Mehr Wochenzeitung in die Tageszeitung!".

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