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Popularizing the Internet

Traveling Companions Supporting the Good News

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Abstract

In popular science and technology writing, "boosterism" is prominent. Writers overwhelmingly describe science and technology in enthusiastic terms, thereby promoting the deficit or Public Appreciation of Science and Technology model (PAST). A crucial aspect of the PAST model is its pro-innovation bias: writers enroll chaperones in the texts, such as spokespersons, users, celebrities, witnesses, experts, and authorities, to support their claims. Both "boosterism" and pro-innovation bias constrain the public's critical understanding of science and technology. This study includes a detailed exploration of pro-innovation bias in the popularization of the Internet in the Norwegian press and how journalists use chaperones to support their claims. The author demonstrates that, in popularizing the Internet, pro-innovation bias manifests several other biases, such as individual-praise, pro-technology, individual-blame, technology-blame, and source biases.

Keywords: pro-innovation bias, science and technology communication, Internet, framing, praise, blame

Introduction

A pro-innovation bias reflects a dominant optimistic bias in modern society in favor of scientific and technological innovations (Flyvbjerg 2008; Gripenberg, Sveiby, & Segercrantz 2012; Kahneman 2011; Lovallo & Kahneman 2003). Rogers and Shoemaker described pro-innovation bias as far back as 1971, and thirty years later, Rogers (2003, p. 106) stated that "not enough has been done to remedy the problem." Pro-innovation bias implies that "an innovation should be diffused and adopted by all members of a social system, that it should be diffused more rapidly, and that the innovation should be neither re-invented nor rejected" (2003, p. 106). Gripenberg et al. (2012) suggested two principal reasons for this bias. The first is that the axiom "innovation is good" is taken for granted. The second is the separation of discourses on desirable and undesirable consequences. Flyvbjerg (2008) added a third reason: an actor often has no incentive to de-bias a specific forecast. Consequently, pro-innovation bias might also imply strategic misrepresentations, the purpose of which is to gain an advantage in competitive environments.

Pro-innovation bias is also prominent in science and technology communication and might historically be perceived as a fundamental dimension of the deficit or Public Appreciation of Science and Technology model (PAST) (Perrault 2013). Perrault

described three types of roles among science and technology writers: boosters, translators, and critics. The most common role, which is that of the boosters, corresponds to pro-innovation bias. According to Perrault (2013), boosters' "descriptions fall into two general categories: science writing as a celebration of the wonders of science and science writing as a cure for some perceived lack in the nonspecialist public" (p. 50-51). Boosterism has a long history in science and technology communication (LaFollette 1990). I prefer, however, to use the concept of "pro-innovation" instead of "boosterism," because this is a study of popular texts and not a study of the three mentioned roles of science and technology writers, including the fact that pro-innovation has a long history as an analytical concept. In her classical work *Selling Science*, Nelkin (1995) raised numerous crucial questions that were linked to pro-innovation bias. She discussed critical aspects, such as different public relations (PR) techniques, the media's problem of reliance on corporate sources of information concerning new technology, the celebration of progress, technological enthusiasm, and optimism (in short, the hype fascination). All of these aspects are accompanied by the fact that the public has an overwhelmingly favorable attitude toward science and technology, including a general belief in all types of technological fixes, which has evolved in parallel with the professionalization of science (Berman 1978). Nelkin's (1995) questions remain valid and critical. Therefore, I closely analyze how different framing devices are used to shape pro-innovation bias. I examine two research questions: (a) how are different actors or chaperones enrolled in popular texts to substantiate a specific framing in the portrayal of the Internet by the Norwegian press; and (b) how is a position transformed into a bias and how is such bias constituted?

The Internet has often been envisioned as a technological utopia framed by the rhetoric of hope (Flichy 2007). However, in popular discourse, three master narratives are identified: utopian narratives containing the *pro-innovation position*, dystopian narratives containing the *anti-diffusion position*, and technology-as-risk narratives containing the *control position* (Hetland 2012). These three master narratives represent attempts either to domesticate new media technology or to alienate oneself from it (Aune 1996; Hartmann 2009; Silverstone & Haddon 1996). Perrault (2013) described two other roles apart from the booster role, namely, the roles of translators and critics. Perrault claimed that "the idea of the popular science writer as translator avoids some of the drawbacks of the booster role, but is still problematic" (p. 57). This role creates an image of neutrality, whereas information is neither disembodied nor neutral. Translators position their writing within the Public Engagement with Science and Technology model (PEST). The third role is that of the critics: "these writers tend to emphasize a gatekeeping function (asking questions about the science itself) or a public service function (providing readers with the information they need to make up their own minds)" (Perrault 2013, p. 58). Perrault called this model the Critical Understanding of Science (and Technology) in Public or CUSP. The technology-as-risk narratives containing the control position provide examples of both the PEST and the CUSP models (Hetland 2012). Selecting the Internet as a case study in science and technology communication has one crucial advantage: it provides a unique wealth of information simply because the mass media has extensively covered it, whereas the public increasingly uses it in most aspects of life. Thus, one might claim that, in science and technology communication, the Internet is an "exemplar" that might establish a reference point or constitute a

paradigmatic case (Flyvbjerg 2006). The Internet represents both an innovation in itself and a cluster of accompanying innovations (Abbate 1999). In 1973, Norway was the first country outside the US to adopt ARPAnet, the predecessor to the Internet (Daling & Thomassen 2006). In the present study, the issue is not whether the Internet, as an innovation, actually has high relative advantage (Rogers 2003), but how the Norwegian press has presented the narratives about the Internet from 1995 to 2006. During this twelve-year period, the pro-innovation position was dominant in 68.7% of the stories and the control position in 31.3%, whereas the anti-diffusion position was more or less absent from press reports. Two factors make Norway an interesting case study on the traditional media's portrayal of the Internet. First, in 2009, 90.9% of its population used the Internet – one of the highest penetration rates in the world. Second, in 2008, Norway's average circulation of paid-for daily newspapers was 570.6 per 1,000, which is one of the highest average circulation rates in the world (Leckner & Facht 2011). These are valid reasons to assume that the majority of Norwegians encountered the Internet through daily use and as newspaper readers during the period under study.

In the next section, I discuss the theoretical framework and a conceptualization of pro-innovation bias. Among the critical issues is how praise and blame frame a particular position. This is followed by the methodology section and the presentation of findings. The final section summarizes the findings and points to further research possibilities.

Theoretical and Conceptual Issues

To study pro-innovation bias in popular narratives about the Internet, I adopted the model that William A. Gamson and his colleagues constructed (Gamson & Lasch 1983; Gamson & Modigliani 1987). In connection with a selected theme, a particular use of concepts is established. From a large inventory of possible reference frames, expressions, metaphors, paradoxes, and so forth, a smaller repertoire is selected. The purpose of the model is to analyze how this repertoire is used to describe particular aspects of a phenomenon. The model has two principal constituents: *frames* and *positions* (Gamson & Modigliani 1987). Metaphors, exemplars, catchphrases, depictions, and visual images are framing devices, whereas roots, consequences, and appeals are reasoning devices for a more general position (Gamson & Lasch 1983). However, the selection of facts, context, and examples are also important for the framing process (Reese 2010) as well as how chaperones – spokespersons, users, celebrities, witnesses, experts, and authorities – are enrolled in the text to support claims. Morgan (2011, p. 30) defined chaperones as "the people who act as knowing or unknowing companions" for traveling facts. Facts that stand alone might be perceived as weak; therefore, it is important to have allies that support claims or attack those who could explicitly oppose these claims (Latour 1987). In his book, Latour argued that scientific and technological development could be appropriately understood by considering it as a negotiating process in which cooperation is built by recruiting external interests from the cultural field and new collaborators in the field of nature or technology. Chaperones are often witnesses or instrumental to claims that journalists make; they are necessary for facts to travel effectively, even if claims might be false. Chaperones might also be sources; however, sources include a larger inventory of persons (including anonymous sources), publications, and other records.

At the same time, the pro-innovation position travels with less support, especially within a pro-innovation climate (Borup, Brown, Konrad, & Lente 2006; Flyvbjerg 2008). The pro-innovation climate varies over time. Such variation might be linked to changes in the perceived usefulness of, for example, a specific technology. Therefore, public opinion might change from one period to the next. Today, an overall pro-innovation climate exists in Norway. The 2010 Eurobarometer, which included Norway for the first time, provided one example of this climate. The survey found that, among 32 European countries, Norway displayed the greatest optimism toward eight selected technologies: information and communication technology, biotechnology, space exploration, solar energy, nuclear energy, nanotechnology, wind energy, and brain and cognitive enhancement (Gaskell et al. 2010). This optimism is also reflected in the civic epistemology of which Norwegian science and technology policymaking is part (Jasanoff 2005).

Examining how chaperones are used in texts to promote a specific frame and/or position is critical. Entman, Matthes, and Pellicano (2009) claimed that Gamson and colleagues (Gamson & Lasch 1983; Gamson & Modigliani 1987) defined framing as the central organizing idea or storyline, whereas their definition specified what frames generally do, which includes defining problems, diagnosing causes, making moral judgments, and suggesting remedies. These two genres of definitions belong to different phases of the framing processes, because framing processes occur at "four levels: in the culture; in the minds of elites and professional political communicators; in the text of communications; and in the minds of individual citizens" (Entman et al. 2009, p. 176).

When does a position turn into a bias? Entman (2007) understood bias along three dimensions. The first dimension is "distortion bias," which applies to news that distorts or falsifies reality. The second dimension is "content bias," which implies that the text favors one side instead of presenting an impartial viewpoint. The third dimension is "decision-making bias," which implies that the writer's understanding of an issue is distorted. Entman (2010) distinguished between two primary sets of decision-making biases, of which the "media's catering to audiences as consumers in the marketplace" (p. 394) is of special interest in the case of the Internet. He also distinguished between slant and bias, stating that the term "media bias" only applies when slant holds over time.

Therefore, biases exist in two interrelated aspects of frames: (a) the psychological biases by which all communicating parties might be influenced – in Entman's (2007) terminology, decision-making bias; and (b) the frames that the communicator sponsors, which in Entman's (2007) terminology includes distortion and content biases. Entman (2007) stated that bias is under-theorized in spite of its crucial implications for political power and democracy. In terms of the first aspect of bias, "one of the most scrutinized psychological biases is the tendency to evaluate negative information more strictly than positive information" (Dan & Ihlen 2011, p. 372), which often leads to an optimistic bias (Kahneman 2011). The reader's decision-making bias might, therefore, "create consonance and dissonance even where none actually exists" (Baum & Gussin 2007, p. 26). When it comes to the second aspect of bias, news stories constitute a critical arena for framing contests in which different sponsors compete for their preferred frames (Dan & Ihlen 2011).

In the present study, praise and blame constitute pivotal framing devices for specific biases; in addition, an important part of pro-innovation bias is to side with the informa-

tion provider. Having studied science and technology communication since the 1940s, Bauer and Gregory (2007) described science and technology communication as developing from communicating scientists with an educational mission to PR for science and technology. The first part of this period was captured in the "Ingelfinger rule" of 1969, which was an embargo to keep scientific results out of the media until they were published in peer-reviewed journals (Toy 2002). The second part of this period was marked by an increasing influence of PR in science and technology journalism. However, PR activities were often "invisible"; journalists using PR material often did not bother to cite their sources because "journalists don't want to disclose their dependency on public relations" (Göpfert 2007, p. 222). PR for science and technology implies the promotion of both scientific and corporate institutions to different publics. In this process, information subsidies play a critical role in capturing the attention of news media and journalists. Earlier studies of information campaigns illustrated that campaigns included both information subsidies to selected media channels and other strategies, such as lobbying to mobilize public opinion, politicians, and the policy agenda in favor of intended outcomes (Bauer & Bucchi 2007). A strong indication exists that "information subsidies influence not just which topics are covered by the media (first-level) but also how these topics are described (second-level)" (Ragas, Kim, & Kiousis 2011, p. 258).

Overall, most PR activities are source biased. The status of the source, the number of sources, and the context of the claims are also relevant. Thus, to capture the reader's attention, framing processes and the enrollment of chaperones are crucial. Chaperones, in the form of spokespersons, usually advocate ideas and interests and very often have an agenda with a pro-innovation bias, which frequently leads the communicator to "side" with the innovation provider and blame non-adopters (Lievrouw & Pope 1994; Rogers 2003). Consequently, pro-innovation bias favors the source over the receivers. In addition, it is often synonymous with a pro-technology bias and a preference for technology-push strategies (McCurrey 2000). Several authors, therefore, identify a link between a pro-innovation bias at a micro-level and a pro-innovation climate and culture that favor adoption for its own sake or facilitative factors that help promote and sustain innovations (Bardini 1994).

Rogers (2003) stated that if the pioneer research had been sponsored not by promoters but by users (or non-users), the nature of diffusion research might have been structured quite differently. Wyatt (2003) identified four groups of non-users: resisters, rejecters, the excluded, and the expelled. She emphasized the need to understand non-users as well as users and to avoid blackboxing them into one category. The blackboxing of non-users commonly occurs in the mass media, which mostly perceive non-users as either old-fashioned and outdated or unfortunate and excluded. Kline (2003) and Wyatt (2003) argued that viewing resistance to technology from a functionalist perspective reinforces the promoters' framing of success. Therefore, pro-innovation bias has a renowned counterpart, the individual-blame bias, which consists of blaming the individual for not adopting a certain innovation rather than searching for a system to blame (Rogers 2003). Often, non-adopters or late adopters are blamed individually for not adopting an innovation, or for being traditional or irrational.

In the following sections, I examine how different actors or chaperones are enrolled within popular texts to substantiate a specific frame and position. I also analyze how pro-innovation bias manifests several other biases.

Method

The database that I used in the present study consisted of 2,772 newspaper clippings about the Internet from the paper editions of the following newspapers: the morning edition of *Aftenposten* (1,334), *Dagbladet* (813), and *Dagsavisen* (625). *Aftenposten* is Norway's largest newspaper and has been described as independently conservative. *Dagbladet* is Norway's second largest tabloid newspaper and has been described as liberal. *Dagsavisen* is the former party organ of the Norwegian Labor Party, although, in the past few years, it has been described as independent. My aim was not to compare the three newspapers, but to select three newspapers covering the breadth of the Norwegian press, both politically and journalistically. From 1995 to 1996, 40.2% of the population over the age of 13 read one or more of the three newspapers included in the investigation (42.2% in 1996-1997).

The criteria for selecting an "Internet article" corresponded with those used by Bader (1990) in her case study of articles on research. One of her criteria was that roughly half of the article should discuss the object of her study. One of my criteria was that the Internet should be a central theme of the article. This meant that at least half of every article should have dealt with one or more sets of prospects or problems concerning the Internet. In addition, the selection of articles was based on the following criteria: (a) the article should have a word count of at least 200, (b) the Internet should be mentioned in the headline or in the introductory text, and (c) the text is written by a journalist – all types of journalists, not solely "science and technology" journalists. Excluded from the text corpus are short news reports, as well as editorials, debates, and longer feature articles with a mix of positions.

Whenever possible, the articles were collected from electronic sources: (a) *Aftenposten,* for the entire period, (b) *Dagbladet,* after January 1, 1998, and (c) *Dagsavisen,* after February 1, 2002. For the missing periods, I conducted the collection manually. Whereas I did not have a full overview of the total article population, it was possible to use *Aftenposten* as an indicator. For this newspaper, all articles were coded in the electronic source according to their topic. The selected articles represented 32% of the total population. For the period covering 1995 to 1999, 47% of all the articles in *Aftenposten* met the selection criteria for the study. This proportion declined to 27% from 2000 to 2006. Perhaps, the principal reason for this was the increase in the proportion of articles with fewer than 200 words. These comprised 37% of all articles in the first period and 48% in the second. The second reason for this was use of the term "Internet" as one of the selection criteria. During the period that I studied, the term "Internet" was increasingly replaced either by its shortened version, "net," or by terms that were more specific. A smaller control study of these articles did not offer new information. Therefore, it is reasonable to assume that I have identified both the diversity and the changes in the period under study. By including all of the articles that satisfied specific criteria, I could combine a qualitative textual analysis with a quantitative approach. Approximately a third of the data was double-coded for the variables in focus. The intercoder agreement coefficient, calculated using Holsti's (Holsti 1969) method, yielded a range of 96.1% to 97.7% for the three items (position, chaperones, praise and blame). When coding a position, I did not distinguish between slant and bias because pro-innovation bias is consistent over time (Entman 2010).

Enrollment of Chaperones and the Shaping of Pro-Innovation Bias

The enrollment of chaperones within texts plays a critical role in the framing process. Ubiquitous authoritative resources for journalists include not only science advisors but also spokespersons, users as lay experts, and public authorities. Four categories of chaperones are defined in the present context: (a) spokespersons, including PR personnel and people speaking on behalf of companies or organizations; (b) users, including both highly skilled (lay experts) and novice users; (c) experts, including scientific researchers from independent research and development institutions, colleges, and universities; and (d) authorities, including opinion leaders and representatives from law enforcement, politics, and the public service. The maximum number of chaperones in one article was nine. To analyze how chaperones contributed to framing positions, I compared the pro-innovation position with the control position. Table 1 shows the four principal categories of chaperones and how they appeared in popular texts about the Internet.

Table 1. *Enrollment of Chaperones*

	Chaperones, percentage							
Position	Spokes-persons	Users	Experts	Authorities	Total	N	Percentage of articles with chaper-ones	Average number of chaper-ones per article
Pro-innovation	60.1	16.3	12.7	10.9	100	2645	75.4	1.84
Control	36.4	12.9	12.7	38.0	100	1486	81.6	2.10

Frequently, a close connection existed between those who appeared as chaperones within the texts and those who appeared as sponsors. Of the total number of chaperones assuming the two positions, spokespersons were most prominent in the pro-innovation position, whereas authorities were more prominent in the control position (Table 1). The stronghold of spokespersons within the pro-innovation position demonstrates the importance of PR activities and indicates a strong source or content bias. A larger number of stories within the control position, compared with the pro-innovation position, contained chaperones as well as a higher average number of chaperones. This might be linked to the fact that the control position was more dramatic and controversial. Consequently, journalists substantiated their claims by enrolling more chaperones and enrolling them more often.

Both the literature and the stories showed that praise and blame were crucial elements in framing the two positions. In many stories, writers substantiated the pro-innovation position by praising the technology, the actors, and the numerous futuristic expectations (Table 2). Furthermore, at the opposite end, writers substantiated the pro-innovation versus the control position by either blaming the actors and/or the technology for hindering the diffusion of innovations or blaming the actors and/or technology for not controlling undesirable activities on the Internet. Finally, in the last group of stories within both positions, the stories combined the elements of praise and blame. Therefore, also within the pro-innovation position the reader experiences blame, underlining that numerous factors hinder the diffusion of innovations.

Table 2. *Chaperones as Vehicles for Praise and Blame*

	Praise and blame, percentage			
Position	Praise or neutral	Praise and blame	Blame	Total
Pro-innovation	73.3	19.3	7.4	100
Control	4.6	19.5	75.9	100

When stories were told and retold, chaperones were critical in lending credibility to these stories. One example was a story about Internet use in schools. This story covered three researchers reporting their findings, one teacher, and one student. The researchers reported that three of four junior high school students found that the teachers' qualifications were limited in relation to using the Internet. All of the other interviewees confirmed this. Their position was that the teachers needed appropriate qualifications to realize the full potential of the Internet (*Aftenposten*, February 30 2000, p. 20). Within the pro-innovation position, the more the stories included single-minded praise of the technology or of its users, the more they were predominantly supported by internal chaperones (spokespersons and users). The number of external chaperones increased when the stories dealt with both praise and blame. Apart from the obvious reason that internal chaperones were more loyal and, thus, largely limited their support to praise, the stories might have thrived and traveled better with a combination of praise and blame. The pro-innovation position displayed considerable expectations. The solutions lay in the future. The narratives emphasized what would happen and under-communicated what had happened. What had transpired was always more modest than the expectations. This paradox might be described as a trivialization process. Because stories were future oriented, they presented the new technology as a driving force in a positive development toward progress. Resistance to or criticism of new media technology was, therefore, rapidly turned into an attempt to restrict the liberating force of the technology; both content bias and decision-making biases were therefore important in those texts.

Media coverage of the Internet before 1995 was sporadic. In 1995, the three mentioned newspapers placed the Internet on the media agenda. The Internet was high on the media agenda from 1996 to 2000, falling to a lower level after 2000. The popular discourse concerning the Internet did not fluctuate in cycles of hype and disappointment (Fenn 2007), but followed the five stages in the innovation-decision process (Hetland 2012):

1. Knowledge (1995-1996). The public was exposed to the Internet in the trigger year, 1995; the press coverage reached its first peak in 1996 and the media balance was +48. Internet access reached approximately 17% and daily Internet use was approximately 5%.

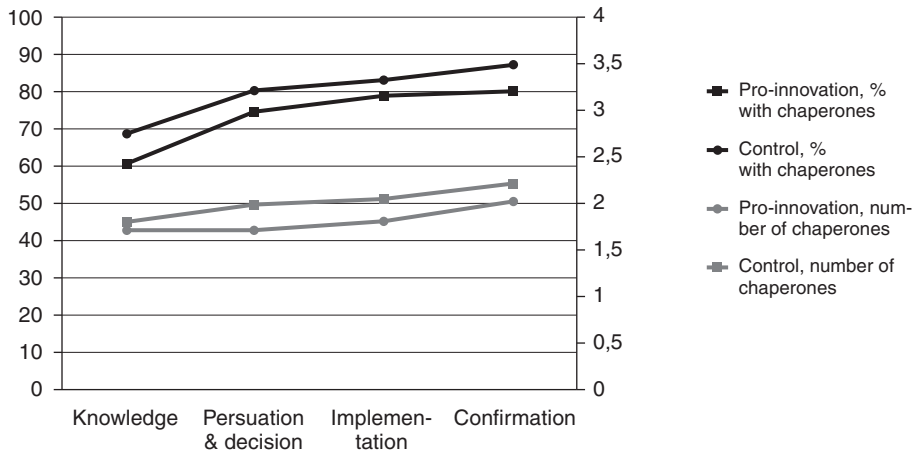
2. Persuasion and decision (1997- 1998). The press coverage was moderate; the media balance was +30. Internet access reached 36% and daily Internet use reached 10%.

3. Implementation (1999-2000). Press coverage had its second trigger year and peaked at a media balance of +54. Internet access reached 63% and daily Internet use reached 27%.

4. Confirmation (2001- 2006). Press coverage fell to a lower level; the media balance was +20. Internet access reached 88% and daily Internet use reached 60%.

During the course of these five stages, the share of articles with chaperones and the average number of chaperones increased within both positions (Figure 1).

Figure 1. *Articles with Chaperones and the Average Number of Chaperones in Articles with Chaperones*



The growing number of chaperones illustrates an increasing "expertization": journalists seek external voices to comment on or illustrate ongoing activities. This increase might be part of an overall trend of interpretative and investigative journalism. However, it might also be part of the process of diffusion of innovation, where technologies become mature and domesticated. Domesticated technology enables more interpretative and investigative journalism. One is most likely to be experiencing two converging processes, as both interpretative and investigative journalism grow in importance, and more mature and domesticated technologies qualify the same type of journalism. The diversity of chaperones at least makes it more likely that both lay people and experts are represented when journalists try to predict the future. The negotiation process becomes visible in the mediation of science and technology by how chaperones are enrolled in the texts. Contemporarily, as chaperones allow themselves to be enrolled, there is also cooperation that is either poor or nonexistent. Thus, the negotiation process moves along a continuum, from those who resist to those who more than willingly allow themselves to be enrolled (Table 3). In the following sections, I discuss the four situations that manifest a pro-innovation bias.

Table 3. *Manifesting Pro-innovation Bias*

	Resistance	Cooperation
The field of culture	1. Chaperones who do not cooperate; stories are dominated by individual-blame bias.	3. Enrollment of new chaperones; stories are dominated by source- and individual-praise biases.
The field of technology	2. Artifacts that do not cooperate; stories are dominated by the technology-blame bias.	4. Enrollment of new artifacts or properties; stories are dominated by source- and pro-technology biases.

1. Chaperones who do not cooperate. One crucial reason for the absence of cooperation is that actors might have found the costs of cooperation to be excessive. Therefore, the relationship between utility and cost was often problematized in the stories. Potential customers would not pay for something that, in their opinion, entailed negligible utility. Therefore, numerous critical voices focused on the absence of utility. Customers asserted that central actors did not understand their needs. Although news existed about those who reached their target groups on the Internet, experts said that

> for all the others, who are not yet reaching their target groups in this way, it is nevertheless important to start running. If they wait right up until all the others have reached their goal, they will get there too late. (*Aftenposten*, November 20, 1995, p. 22)

Through the "tyranny of urgency," the stories emphasized the significance of cooperation in overcoming all obstacles in question.

In July 1996, *Aftenposten* stated that "[m]en dominate the Internet" (*Aftenposten*, July 7, 1996, p. 27) and that "[m]en are three times more likely to use the Internet than women." The popular image of innovators in the press was closely linked to the traditional "diffusion of innovations" model. The article stated that different information providers had considered more "women-related content" and more "content aiming at children and young people" to engage new user groups. When actors were described, individual-blame bias was prominent in this category of stories. Those who were not innovators were often described in a concerned manner. The position taken in these stories was that this was an important area for action and both content bias and decision-making bias were prominent.

2. Artifacts that do not cooperate. In the hybridization processes that the Internet is undergoing, not all artifacts cooperate. Two factors were central during the years that I studied. The first related to all the successes of the new media technology, which exceeded expectations. The result was an overload, and in the worst case, it was a total collapse. The capacity of the new technology was exceeded by its success. The second factor related to a lack of technological standards. The solution was to develop new technology and to establish technological standards. As an example, one story stressed that before one can begin to market Internet telephony, "the technology ought to be so standardized that we would be able to call as many people as possible." Standards were central and were used to explain the failure to launch different services. Under the heading "Slow start for secure electronic transaction" (SET), Europay confirmed

that SET experienced initial problems: "There were several reasons that the system did not take off. We hoped to better collaborate with the banks. We have also experienced technical problems with the client-side certificate distribution" (*Aftenposten*, September 6, 1998, p. 25).

Thus, the technology-blame bias usually focused on the technology itself, on strategic collaborators within the socio-technical systems, and on examples of mismatches between expectations and reality. The technology-blame bias displayed both content and decision-making biases.

3. Enrollment of new chaperones. In the public discourse, it is considered important that many actors, including non-traditional ones, be given the opportunity to participate. The dissolution of various monopolies and the liberalization of the market were seen as fundamental preconditions for generating development marked by innovation. Strategic cooperation between actors in the market rapidly became part of the daily news. Cooperation was established between Internet service providers and content suppliers. The aim was to exploit the existing potential of the market. In addition, news emerged of numerous unexpected alliances. The new technology made old and well-established actors suddenly interested in one another. The user side also mattered. Different forms of cooperation were established between users and suppliers. We heard stories from disabled people who said that their Internet friends did not know they were disabled. Thus, the Internet enabled like-minded people to interact without making disability relevant. In this way, new media technologies were presented as tools for recreating intimacy and interpersonal contact. The feeling of being involved in a revolution was central in this connection. Prime Minister Gro Harlem Brundtland stated the following in February 1996:

> If the number of Internet subscribers increases at the same rate as today, there will be as many Internet users in the year 2003 as the whole of the world's population. Even if such a development is simply hypothetical, this picture illustrates the extent of this revolution at precisely this moment. (*Dagsavisen*, February 9, 1996, p. 9)

Not surprisingly, the source and individual-praise biases were highly prominent among the stories in this category. These biases displayed both content and decision-making biases.

4. Enrollment of new artifacts or properties. A stream of news stories tells of new artifacts being enrolled in networks. One critical argument for new artifact enrollment was the possibility of lowering the prices of existing services. In some cases, users were offered the technology at no cost or for a symbolic payment. This was connected to the fact that central actors wished to overcome the problems associated with an installed base. Thus, it might have been profitable to donate parts of the technology. Aside from the enrollment of modern technology, old solutions received new meanings on the Internet. Electronic newspapers were a central example in this context. In an October 2000 interview, an entrepreneur producing short animated Internet films stated the following:

> Yes, it is expensive to be an innovator, but if we want to be part of it, it is necessary to be early. Over time, the technology will be available to everybody. When that happens, we will be well established with long-term experience as content

> providers… In the near future, we will likely drive along the information superhighway with no speed limit. (*Dagbladet*, October 14, 2000, p. 44)

Source bias, together with pro-technology bias, was prominent within this category. These biases displayed both content and decision-making biases.

Concluding Discussion

Studying science and technology communication through a case study of how the Internet has been communicated in the mass media has been revealing, not least because this new media technology provides rich opportunities to study numerous aspects relating to the PAST model and pro-innovation bias. The selected case provides rich information on how pro-innovation bias plays a critical role in science and technology communication, not the least because the case involves a multiplicity of chaperones. The first research question focused on how chaperones were used to substantiate pro-innovation bias in Internet communication. Bias was understood along three dimensions. Content and decision-making biases prevailed in relation to communicating about the Internet, whereas distortion bias was more difficult to detect because, in this study, the focus was on the texts, rather than how they were produced. Regarding content bias, source bias played the most crucial role in favoring one side rather than providing an impartial presentation. Regarding the decision-making bias, individual praise and blame, as well as praising and blaming technology, framed the understanding of new technology as the key driver toward economic growth and progress.

To summarize, pro-innovation bias in communicating about the Internet manifested the individual-praise, pro-technology, individual-blame, technology-blame, and source biases. Generally, the analysis contributed to a more integrated understanding of how bias was shaped and framed. Pro-innovation bias is prominent in science and technology communication. However, this prominence also reflected that pro-innovation bias was a crucial part of public discourse. Therefore, pro-innovation bias was also a manifestation of Western society's strong pro-growth bias. Many of the economic, ecological, and social challenges confronting us today are caused by both intended and unintended consequences of this bias. Pro-innovation bias is also a critical domestication strategy that is used to predict and shape the future. As such, pro-innovation bias is a fundamental part of the deficit model, as "science boosters tend to see popular science writing as a form of public relations" (Perrault 2013, p. 5) exemplifying a "missionary zeal" approach to science communication.

The traditional media played a crucial role in domesticating new media technologies. Whereas the control position was substantiated by applying four control strategies (Hetland 2012), the pro-innovation position was consequently substantiated by employing five biases, making diffusion of the Internet appear to be inevitable.

The second research question aimed to explore the path from positions to biases. Entman (2010) described a process that progresses from a situation in which the position is framed as one of several possible positions to a slanted presentation, and finally, to a biased presentation. The underlying assumption is that the unbiased position is the ideal position from which one can distinguish the biases. However, Gripenberg et al. (2012) presented strong empirical evidence that pro-innovation bias in technology communication represents the "typical" situation. This is also substantiated by the

present study. Generally, a position is turned into a bias by using praise and blame as critical framing strategies. In turn, praise and blame are substantiated by accompanying chaperones who are, therefore, essential vehicles for a specific bias because they often favor the information providers. On a more philosophical level, it is well known that people praise and blame both individual actors and assemblies of actors. People usually only praise inanimate objects because they do not have free will. The present study illustrates that technology might also be blamed for not fulfilling the expectations of chaperones who adhere to pro-innovation bias. In contrast to the control position, the pro-innovation position adopted a more homogeneous framing, thereby contributing to reaching a mutual understanding of the same problem. This mutual understanding is a critical factor in promoting the new media technology.

Pro-innovation bias constrains critical debates about how new technology affects society and about the possible undesirable consequences of the same technology. Perrault (2013) argued that science and technology communication has a twin duty: to inform and educate about science and technology on the one hand, but also to probe and criticize it on the other. Pro-innovation bias prevents the performance of both duties. Therefore, I propose three research pursuits of relevance to future studies on pro-innovation bias in science and technology communication: the framing of public discourse; the integration or separation of consequences; and how chaperones are used to handle complex issues. First, how does pro-innovation bias frame public discourse? Studying the roles of the range of chaperones that accompany pro-innovation bias is critical. How do chaperones lend credibility to pro-innovation bias and how are they selected? Second, how is the public discourse on the desirable and undesirable consequences of science and technology integrated or separated? What hinders a more critical understanding of science and technology in the mass media? Third, how do chaperones, accompanying both the pro-innovation and control positions, contribute to separating complex issues into well-ordered and manageable components?

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