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In the last fifteen years, testing has attracted much attention in science and technology studies. Most researchers have focused almost exclusively on testing in the laboratory, specifically designed test locations, and, for medical technologies, the clinic. What counts as testing has largely been described in terms of the activities of scientific experts. This is not to say that science and technology studies have completely neglected other institutional discourses. Journalistic texts have been a favorite research site for scholars in science and technology studies, particularly those seeking to understand the dynamics of public controversies on science and technology. Although most constructivist studies of science and media relations have treated journalistic texts as secondary to scientific texts, other scholars have dismissed this hierarchy. In this article, scientific texts and journalistic texts are considered equally important locations in which to analyze the testing of technologies. Based on a case study on the testing of a new contraceptive technology for men, the article shows that what counts as successful testing is not solely in the hands of scientific experts. In the case of male contraceptive technologies, journalists have contested the claims of scientific experts, particularly their claims about the cultural feasibility of the new technology.

Let me begin with a reflection on my own research practice. Last spring I had planned to begin writing a book on the constraints on the development of

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male contraceptive technologies. The subject of the first chapter was the testing of prototypes of this technology in the making. I had collected all the relevant materials, I thought, such as scientific articles reporting the results of clinical trials, minutes of the World Health Organization (WHO) (one of the main actors in the field of male contraceptive technology development), and interviews with reproductive scientists who had participated in the organization of the clinical trials. My preparations coincided with the release of a press bulletin by the WHO reporting the completion of a large-scale clinical trial on a hormonal contraceptive injection for men. This press bulletin received extensive coverage in the Dutch news media. My friends and family, who knew my interest in this new technology, sent me newspaper clippings, phoned me when there was a television program on the subject, and voiced their opinions on the trial of the new male contraceptive. A comparison of the journalistic accounts of the testing of the male contraceptive injection with the accounts given in the scientific texts I had collected made me aware that there was a striking difference between the representations of this technology in both types of texts. The popular press gave a completely different assessment of the success of the testing of the technology than did the scientific press, and this discrepancy made me aware of my own selective view of testing, which I had adopted from science and technology studies.

In the last fifteen years, testing has attracted much attention in science and technology studies. Both historians and sociologists of technology have emphasized the crucial role of testing to understand the dynamics of technological development (Constant 1983; MacKenzie 1989; Pinch, Ashmore, and Mulkay 1992; Pinch 1993). These studies focused almost exclusively on testing in the laboratory, specifically designed test locations, and, for medical technologies, the clinic. Due to this focus, what counts as testing has largely been described in terms of the activities of scientists, engineers, manufacturers, and clinicians. Testing, defined as "the processes in which the workability of a technology is established" (Pinch 1993, 26), thus seems to be restricted to the domain of scientific experts. In these studies, nonscientific experts figure only as witnesses or audiences to a test, or as guinea pigs or users of a technology.[1] In this way, science and technology studies have reproduced the still dominant hierarchy of institutional discourses by prioritizing the right of scientists to speak. Moreover, this approach has tended to favor one specific type of text as a unit of analysis: the academic journal article.

This is not to say that science and technology studies have completely neglected other institutional discourses. Journalistic texts have been a favorite research site for science and technology scholars, particularly for those

trying to understand the dynamics of public controversies in science and technology.[2] Although most constructivist studies of science and media relations have treated journalistic texts as secondary to scientific texts,[3] other scholars have dismissed the hierarchy of scientific and journalistic texts. They refuse to prioritize scientific reports as primary texts, and acknowledge the contribution of journalistic texts in the construction of scientific claims. Following this argument, I regard scientific texts and journalistic texts as equally important locations to analyze the testing of technologies. Where Collins (1987) and Gieryn (1992) have focused on the media as the site of the construction of knowledge claims, and Hagendijk and Meeus (1993) have analyzed the role of scientists and journalists in the closure of a controversy,[4] I will perform a symmetrical analysis of scientific and journalistic texts to understand the dynamics of testing a technology. What can we learn about the sociology of testing if we no longer restrict our analysis to or prioritize scientific texts? Based on a case study of the testing of a new male contraceptive, I will show that a focus on the scientific press and the popular press reveals striking differences in what counts as successful testing.[5]

Moreover, I will show how these discourses construe completely different images of the prospective user.[6] Ever since the demand for new male contraceptives was first articulated, people have questioned whether men would be willing to use a contraceptive pill or injection if it became available. This is an intriguing debate because it enables us to study the co-construction of a technology and its user. Recent studies in the sociology of science and technology have emphasized that users play an important role in technological development. Traditionally, users have been considered important actors in the diffusion and acceptance of new technologies. Technologies only work if they become accepted by users and embedded in society (von Hippel 1976, 1988). More recently, the attention in science and technology studies has shifted from the analysis of users in the sociological sense (i.e., identifiable persons as such involved in the diffusion of technologies) toward users in the semiotic sense. As Akrich (1995, 168) has suggested, "Innovators are from the very start constantly interested in their future users. They construct many different representations of these users, and objectify these representations in technological choices." In the development phase of a new technology, designers anticipate and define the preferences, motives, tastes, and competencies of potential users and inscribe these views into the technical design of the new product (Akrich 1992, 208). This semiotic approach challenges the view that users only enter the picture once a new technology has been introduced on the market. Innovators actively draw users into the very heart of technological development: the development phase. Although Akrich tends to restrict her analysis of representations of users to the role of innovators, scientific

experts are not the only actors who construct specific representations of the prospective user. In the case of male contraceptive technologies, journalists have played an active role in articulating and demarcating the potential users of this technology in the making.

For my analysis, I will systematically compare three different types of texts:

1. The scientific report of a multicenter clinical trial of a testosterone injection organized by the WHO and published in *Fertility and Sterility* in April 1996.
2. The press bulletin of this trial released by the WHO on 2 April 2 1996.
3. The media coverage of this trial in Dutch newspapers.

My empirical questions are as follows: What is on trial where? To what extent is the testing in the media, as represented in journalistic texts, similar to or different from the testing in the clinic, as represented in scientific texts? I will analyze these texts in a symmetrical way by focusing on the basic story line of these texts.[7] What type of account is given about what is going on in the testing of male contraceptives?

Testing in the Scientific Article

Prior to the 1970s, women were the main focus of reversible birth control technologies in the twentieth century. The introduction of men as targets for the development of contraceptive technologies in the late 1960s thus meant a rather revolutionary shift in focus in the contraceptive world. It required an organizational infrastructure that was not yet in place. As I have described elsewhere, the main actors who took up the challenge to create conditions required for the development of new male contraceptives were not private sector agencies, but public sector organizations such as the WHO. The WHO has been, and still is, one of the main actors in promoting and coordinating research in the area of new male contraceptives.[8] In 1972, this international health organization established a new branch specifically devoted to reproduction: the Special Programme for Research and Development and Research Training in Human Reproduction (HRP). Since its foundation, the HRP has established several task forces, each devoted to a specific contraceptive technology, among them the Task Force on Methods for the Regulation of Male Fertility (Male Task Force). Because the pharmaceutical industry has been very reluctant to invest in contraceptive R&D since the early 1970s, the WHO had to build an alternative R&D network outside the traditional pharmaceutical industrial channels.[9] One of its first efforts was to establish a

worldwide laboratory network for the synthesis of suitable contraceptive compounds (Oudshoorn 1997a). The second effort consisted of the organization of two large-scale clinical trials.

The scientific report of the second trial, in which 400 men participated in nine countries in Europe, Asia, and the United States, was published by the WHO Task Force on Methods for the Regulation of Male Fertility in the April 1996 issue of *Fertility and Sterility*. The publication is written in a style characteristic of the scientific genre. The article adopts the passive voice, and the researchers are absent in the text (they figure only in a footnote that mentions the principal investigators at the fifteen centers in the nine countries that participated in the trial). The realistic effects of the text are created by the inclusion of descriptions of methods, subjects, and instruments and the inclusion of tables and references to previous trials. The opening paragraphs are quite intriguing. The publication, titled "Contraceptive Efficacy of Testosterone-Induced Azoospermia and Oligospermia in Normal Men," opens with an abstract followed by a paragraph with a legitimation of the development of new male contraceptives and a paragraph that describes the previous WHO multicenter trial and the hormonal prototype that was selected for the trial.

> Reversible male contraceptive methods, comparable in efficacy to female methods, would allow more men to participate in regulating the couple's fertility. Despite their limited effectiveness or reversibility, up to one third of contraceptive couples rely on currently available methods that involve men. The new male methods closest to practical implementation are hormonal contraceptives. (WHO Task Force on Methods for the Regulation of Male Fertility 1996, 821-22)

The fact that the WHO had chosen to open this publication with an articulation of the need to develop new male contraceptives suggests that the authors may believe that the usefulness of this technology, even after more than twenty-five years of extensive publications, still needs to be argued. Remarkably, the WHO does not specify the contexts in which new male methods are needed. Instead of specifying the need for new male methods, the WHO has chosen to anticipate possible criticism of the need for new male contraceptives, which suggests that men will never use them. They claim that up to one-third of "contraceptive couples" already use male methods, despite their "limited effectiveness."[10] According to the WHO, there already exists a huge audience that is waiting for a new method.

The opening text of the WHO publication includes another intriguing message for the reader. The authors emphasize that the prototype of the tech-

nology that is on trial (a weekly intramuscular injection of 200 mg testosterone enanthate) should not be considered as a practical contraceptive method. The prototype used in this trial was selected because of "its safety, reversibility, and efficacy in suppressing spermatogenesis" (WHO 1996a:822) and not because it was expected to be effective in a practical way. Again, the authors of the text anticipate possible criticism concerning the acceptability of the new male contraceptive method.

The introductory text thus reveals the WHO's apparent perception of the contested nature of the technology. The technology is contested in two ways: (1) the need for a new male contraceptive method and (2) the acceptability of the specific method on trial (a weekly hormonal injection).

Let us take a closer look at the body of the text. What are the most important topics in this report? Since the authors put so much emphasis on the need and acceptability in the introductory text, the naive reader would expect to find a more detailed analysis of the need for new male methods and the acceptability of the method. A further discussion of the need for new male methods is, however, absent from the text. The acceptability of the method is indeed discussed in the text, but it takes up only a minor part of the article.

The authors describe how the acceptability of the method was assessed in three different ways:

1. Monitoring the possible side effects of the injection
2. Monitoring psychological reactions to the injection
3. Organizing group discussions to assess the experiences of the participants and their partners.

Central to the assessment of the acceptability of the hormone injection, however, was the monitoring of side effects. The effects of the injections on variables such as weight, testis size, blood pressure, liver function, and cholesterol and hormone levels are described in two paragraphs and one table on the last two pages of the article. The assessment of the psychological reactions to the injection and the assessment of the opinions of the participants, are even less central in the text. The psychological reactions are mentioned in two sentences in the section on results (WHO Task Force on Methods for the Regulation of Male Fertility 1996, 825) and in six sentences in the discussion section (p. 828), with the following conclusion:

> The low incidence of psychological reactions is consistent with the lack of behavioral changes in a placebo-controlled study of healthy normal men given

> T enanthate and contrasts with reports of psychological disturbances among anabolic steroid abusers. (p. 828)

The results of the group discussions are deemed worthy of only four sentences, which conclude that "the study underlined the acceptability of an injectable method, particularly if based on longer injection intervals" (p. 828). A more extended report of the assessment of the experiences of the participants and their partners was published in a separate article under the name of an author (Ringheim 1996), *not* under the name of the WHO.[11] More information on the acceptability of the injections can be gleaned from the section on discontinuations, where the authors note that fourteen men stopped injections because of psychological changes (changes in mood or aggression) and twenty-one men (5.1 percent) stopped the injections because they disliked the injection schedule; dislike of the frequency of injections or pain was mentioned by nine men. The high compliance of the participants is presented as evidence to show "their commitment to share responsibility for family planning" (p. 828). Acceptability and side effects are thus not important topics in the text, in terms of both devoted space and content. In the abstract of the publication, the authors announce that they monitored only minimal short-term side effects. In the discussion session, they conclude that long-term effects (on prostate or cardiovascular disease) "can be determined only by appropriate long-term surveillance when such methods are widely used in the community, as for female hormonal methods" (pp. 828-29).

The section on discontinuations also contains a specific representation of the potential user as the group of men who are willing to share responsibilities for contraception with their partners. The WHO thus constructs the image of the responsible caring man.[12] By adopting this image, which clearly conflicts with hegemonic cultural representations of men, the WHO embraced a project that is potentially much broader than the development of a new technology. The endeavor to make new male contraceptives includes the articulation and defense of new representations of masculinity. Reproductive scientists working on male contraception had to uphold the image of the caring man. In their texts, they rejected the idea that men were not willing to use a new contraceptive by arguing that men have always played a large role in family planning. The opening paragraph of the article in *Fertility and Sterility* exemplifies this advocacy role of scientists, where the authors emphasize that many people already rely on the use of male contraceptives.

The most important topic in this publication, however, is neither the user nor the acceptability, nor even the efficacy, of the new male contraceptive method. The authors of the *Fertility and Sterility* publication describe how the contraceptive efficacy of weekly testosterone enanthate injections had

already been tested in a previous trial organized by the WHO in the late 1980s and published in *The Lancet* in 1990. The most important topic in the *Fertility and Sterility* publication was a redefinition of the criteria for assessing the contraceptive efficacy of contraceptives for men. The authors report how, in the first trial, the WHO had faced the problem that weekly injections could not completely suppress sperm production. In 30 percent of the men, the sperm concentration went to very low levels, not to zero. This observation presented a major stumbling block in the development of hormonal male contraceptives. If testosterone cannot always switch off sperm production completely, and if azoospermia (the condition in which sperm concentrations in the semen are reduced to undetectable levels) is considered the sole criterion to conclude that a man is no longer able to fertilize his partner, hormonal methods can never be made into effective and safe contraceptives.

The question crucial to the further development of hormonal male contraceptives was as follows: Could men with low sperm concentrations also be infertile? The second large-scale WHO trial was of crucial importance for the continuation of the whole endeavor to develop male hormone contraceptives. The major conclusion drawn in the *Fertility and Sterility* publication was that the clinical trial indicated that men in whom sperm concentrations were reduced to three million or less per milliliter of semen were no longer fertile. Or, as the authors conclude in the discussion section:

> The level to which sperm output must be reduced by a hormonal method to ensure adequate contraceptive efficacy has remained uncertain, and an expert consultation in 1977 was divided whether azoospermia or severe oligospermia was necessary. A previous multicenter study demonstrated that hormonally induced azoospermia provided reliable and reversible contraception up to 12 months, but it was considered appropriate to examine the contraceptive efficacy in the 30% of men who remained oligospermic. The present study, using the same hormonal regimen, has demonstrated that 98% of men can be suppressed to azoospermia or oligospermia and such suppression provides effective contraception. . . . Although the study was not testing a method, these findings enhance the prospects for hormonal contraceptive methods for men since many potential regimens readily can achieve such levels of spermatogenic suppression. (WHO Task Force on Methods for the Regulation of Male Fertility 1996, 827)

The testing of a hormonal contraceptive method thus led to a redefinition of (artificially induced) infertility. Before the trial, only men in whom sperm production had been reduced to zero (or undetectable levels) were considered as infertile. After the trial, men with low sperm concentrations also became considered as infertile.

The strategy to redefine the boundaries of fertility enabled the WHO to adjust the criteria for assessing the contraceptive efficacy of a method. Based on this trial, the WHO now claimed that hormonal methods that suppress the sperm production to three million or less per milliliter are highly effective and safe contraceptives. So, the most important news of this trial was the rescue of the trajectory of the development of hormonal contraceptives for men.

Testing in the Press Bulletin

On 2 April 1996, the WHO sent a press release to over 2000 addresses by fax, e-mail, and post. It was also made available to news agencies and wire services attached to the United Nations in Geneva (J. Khanna, faxed correspondence, 21 August 1996), and not without success. The WHO press bulletin resulted in worldwide media coverage. But why should scientists bother to communicate with the media? Why is the press so important? As has been described by other scholars in science and technology studies, the introduction of new technologies requires cultural interventions to create demand for and acceptability of the new technology (Knorr-Cetina 1993). This implies that there is much cultural work to do for scientists who want to introduce a new technology, especially if the technology is a cultural novelty. The development of new male contraceptives is definitely a cultural novelty. Innovation in the field of male contraceptive technology has been absent from the R&D agenda of scientists and industry for a long time. Since the 1950s, scientists successfully introduced thirteen new contraceptive methods for women, whereas the contraceptives available to men are by and large the same as they were 400 years ago (Davidson et al. 1985). The media provide, in principle, a very appropriate tool for cultural interventions; they reach the public, the professional community, and industry. Scientists in the field of male contraceptive research are aware of the importance of the media in creating cultural acceptability for their technology. Two quotations illustrate this, one from Geoffrey Waites, the former manager of the WHO's Male Task Force, and another from William Bremner, one of the pioneers in male contraceptive research at the University of Washington in Seattle.

> Well, you have to be an advocate all the time. In the way that I think is not necessary if you are working with females. It is well accepted that the responsibility and the consequence of failure are there on the female, so it's obvious that the work there is relevant. But there are areas of prejudice and areas of vested interest in science which are serious constraints for the development of this technology. (Waites, interview, February 14, 1994)

> It takes a lot of salesmanship, it takes a lot of giving talks and talking loudly. And to some extent getting information out to the public. So I'm glad to see that you are writing something about it. We try to be fairly available when we get called up by the newspaper, or the magazines, or the radio. We have to talk about it because it's a very poorly understood area, of course by the public and even by professional people. (Bremner, interview, October 19, 1994)

In this context, it can be understood that the WHO decided to release a press bulletin to communicate the results of its large-scale clinical trial to the media. Press bulletins are an interesting though often neglected type of document in the study of science-media relations (Hagendijk and Meeus 1993); interesting because they represent what the scientific community (scientists, or, in many cases, university press offices) considers the most relevant news it wants to communicate to the public. What was the news the WHO wanted to bring to the public? To what extent was this message different from the message it communicated to the scientific community? The press bulletin, under the headline "WHO Completes International Trial of a Hormonal Contraceptive for Men," opens as follows:

> A major breakthrough in the development of a new contraceptive for men is reported today in the results of a four-continent, two-year clinical trial published by the World Health Organization in the journal *Fertility and Sterility*. (WHO Press Office 1996)

Compared to the presentation of the results of the trial to the scientific community, the press bulletin adopts a completely different strategy and tone. Now the results of the trial are presented as "a major breakthrough in the development of a new contraceptive for men." In the *Fertility and Sterility* publication, the results were presented as merely the testing of a prototype that was still far from a new male contraceptive method. The opening paragraph further emphasizes the effectiveness of the new contraceptive (98.6 percent) "which is comparable to the effectiveness of hormonal methods for women such as the oral contraceptive pill." The validity and importance of the news is created by an emphasis on the extensive testing of the technology (two years in four different countries), the involvement of the WHO and its respectful and powerful allies (the World Bank and the United Nations, who are mentioned as the cosponsors of the Human Reproduction Program of the WHO in the concluding paragraphs of the bulletin), and a reference to the scientific journal in which the results are published. The credibility and importance of the news is further enhanced in the second paragraph of the bulletin by the inclusion of a quotation from the director of the WHO Human

Reproduction Program, Giuseppe Benagiano: "The findings in the WHO study have brought us a step closer to developing a hormonal contraceptive for men." The message for the public is not the testing of a prototype (as it was presented to the scientific community), but the testing of a very promising, highly effective new male contraceptive that can bear comparison with the golden standard in contraceptive methods: the oral contraceptive pill for women.

Another important topic in the press bulletin is the need for new male contraceptives. In the third paragraph, the authors articulate the need for the new technology. Here, the WHO tells a story similar to the one it told the scientific community. It legitimates the development of new male methods in terms of the need to "expand the options available to couples who wish to plan their families" (WHO Press Office 1996). The remaining text of the two-page press bulletin is devoted to an explanation of the trial that describes the centers in which the trial took place, the characteristics of the participants, the treatment with hormones, the criteria to assess the efficacy of the treatment, the results of the trial ("only four pregnancies occurred"), and an homage to the participants.[13] The participants are presented as the heroes of the story, and this may serve to legitimate the need and demand for new male contraceptives in the eyes of readers:

> The willingness of men to volunteer for the recently completed study, and other similar WHO-supported studies in the past, as well as their motivation and commitment to continue with the protocol of weekly injections, demonstrates the interest in—and demand for—a reversible male contraceptive of this type. (WHO Press Office 1996)

The press bulletin thus represents the prospective user in a manner similar to that of the *Fertility and Sterility* publication. Both texts represent the users as men who are willing to share responsibilities for contraception with their partners.

Compared with the trial participants and the users, the specifications of the artifact are less central in the text. Only in the section that describes the details of the trial is the reader told that the new contraceptive for men is a weekly injection. The headline and the first three paragraphs do not mention the delivery system of the contraceptive. In the concluding paragraph, the WHO further reflects on the fact that the contraceptive is an injection and informs the reader that "the need for weekly injections by the use of testosterone enanthate, is considered a drawback" (WHO Press Office 1996). However, this constraint is presented as a technical problem that can easily be solved. The reader of the press bulletin is told that the WHO is studying longer acting contraceptives with a three- to four-month interval between the injections.

The press bulletin thus tells an optimistic story about a major breakthrough in the development of new male contraceptives. Topics that are featured in the *Fertility and Sterility* publication, such as possible health risks, psychological effects, and the cultural acceptability of the new method, are not included in the press bulletin. There are thus important differences in the ways in which the WHO communicates the findings of the trial to the scientific community and the media. These differences can be understood in terms of the differences in audiences of the two texts. Whereas the *Fertility and Sterility* publication is aimed to communicate the test results to the scientific community, the press bulletin is aimed to reach the public at large. Press bulletins can function as an important tool to convince audiences other than the scientific community of the workability of a technology. In the case of male contraceptive technologies, it is not only the public that has to be convinced of the importance of this new technology; another important actor, the pharmaceutical industry, must be convinced as well. As described elsewhere, industry is still reluctant to invest in the development of male contraceptive methods (Oudshoorn 1997a). It is therefore not surprising that the WHO should adopt a more optimistic and glamorous style for the press bulletin. The press bulletin can thus be read as an attempt to use the media as a tool to articulate the technical and cultural feasibility of the new male contraceptive by emphasizing the effectiveness of the technology and the motivation and commitment of the participants in the trial.

Testing in the Mass Media

To what extent have the media played a role in enhancing the technical and cultural feasibility of the new technology? At first glance, we may be tempted to conclude that the media have indeed contributed to the demonstration of the workability of the technology. The WHO press bulletin resulted in worldwide media coverage including local and national radio, television, and newspaper reports in Europe, the United States, and China.[14] However, the content of the news articles shows a more gloomy picture. The media, at least in the Netherlands, did not reproduce the optimistic story of the press bulletin.[15] To the contrary, the story lines of the Dutch newspaper articles is completely different from the story line of the WHO press bulletin.

Whereas the WHO press bulletin tells the story of a very promising, highly effective new male contraceptive in which men are the heroes, the news media tell stories in which side effects and pain are the most important topics and in which men are portrayed as the victims. Journalists put the trial results to another test. This time it is not the artifact that is on trial, but the potential

user. In this testing, journalists enroll a new type of expert. In contrast to the *Fertility and Sterility* publication, individual men and women are cited as experts, and scientists merely figure as commentators on public opinion. Two examples from Dutch national newspapers will illustrate this difference. On 10 April 1996, *De Telegraaf*, one of the major Dutch daily newspapers, published an article by two (female) journalists in the section titled Woman, which opens with a lead text in which a man tells the reader that he cannot appreciate a male contraceptive injection: "I already have a fat belly. Who can guarantee that those hormones won't give me breasts?" The article includes the opinions of three other men and one woman, and their pictures with captions that show their negative attitudes toward the new male contraceptive (Ketting and Wieringa 1996, T17). Another leading Dutch newspaper, *De Volkskrant*, used its special column in which well-known Dutchmen are asked to give their opinion on a topic of the day to discuss the pros and cons of a male contraceptive pill. This article presents a curious set of people (eight men and two women) who are considered to have a valuable opinion on this issue: three writers, one actor, a television programmer, a football player, a politician, and three medical professionals who are presidents of medical professional societies (de Vries 1996).

A comparison of this testing in the media with the testing in the clinic reveals a remarkable difference between the criteria used for the testing of the new male contraceptive. Whereas the redefinition of the criterion to assess the efficacy of contraceptive methods was the major criterion for testing in the clinic, the testing in the media focused almost exclusively on the acceptability of the new technology. Dutch newspapers emphasized that it is very likely that both men and women will reject this new technology. Women are portrayed as opponents of male contraceptives because they do not trust men in matters of contraception. In *De Volkskrant*, a female writer concludes:

> "It is a great invention that will please feminists in theory and ideology. But the injection will hardly be used in practice, I think. Women don't trust men with this, they want to keep it in their own hands. Imagine that you have to control your partner: 'Darling, did you take your injection?' . . . I'm afraid that this is again a feminist victory that is good for nobody." (quoted in de Vries 1996, 17)

Under the headline "Where Are the Cheers for the Buttock-Injection?" a journalist in *Haagse Post/De Tijd* informs his readers that the male injection may be as reliable as the female pill, but simultaneously raises the question: "How reliable are men?" The journalist cited the results of a nine-year survey of the female visitors to a Dutch family planning clinic to convince readers

that women will never accept this technology. Eighty percent of the women said "no" to the idea of a new male contraceptive because they did not trust their partners with contraceptives (Leclair 1996).[16] The involved journalists are convinced that the majority of (Dutch) men will never use male contraceptive injections. Here, the criterion is not trust, but pain. In contrast to the WHO press bulletin (in which pain is not mentioned at all; it was only described in *Fertility and Sterility* as one of the reasons why some volunteers stopped with the injections), journalists emphasize the painful nature of injections in the buttock. All three leading national Dutch newspapers (*De Telegraaf*, *Trouw*, and *De Volkskrant*) construct the image of a painful technology and oversensitive men, using headlines such as "The Injection-Pill for Men Is Reliable but no Fun" (*Trouw*) and "No INJECTION in My Buttock" (*De Telegraaf*). The article in *De Telegraaf* also includes a photo of a man trying to inject himself. Journalists construct this image by quoting the opinions of the "men/women in the street" (*De Telegraaf*) or well-known Dutchmen (*De Volkskrant*):

> "They need a weekly injection in the buttock? Oh, you can forget it. There is no man who will do that. Men are very over-sensitive to injections." (female writer quoted in de Vries 1996, 17)
>
> "Terrible. A hypodermic injection. I don't like to do that any more. . . . Imagine me sitting there in a waiting room with all these men who can already feel the pain in their buttocks." (male actor quoted in de Vries 1996, 17)
>
> "An injection is painful and men are ten times more sensitive to pain than women, I have been told. So, I don't see a breakthrough for a male contraceptive." (a male physician quoted in de Vries 1996, 17)

In *Haagse Post/De Tijd*, the journalist chooses the role of participant observer of the discussions among his colleagues and fellow journalists:

> Although the male participants in the trial were enthusiastic about the buttock-injection, Dutch men don't seem to like the idea at all. Giggling, they discussed the side effects that the guinea pigs (those poor guys) had to endure in the trial. (Leclair 1996, p. 10)

The editors of the *Algemeen Dagblad* even made their female colleagues believe that the new male contraceptive would have a negative impact on the

national economy, since men would have to stop working for one hour a week to get their injections (Leclair 1996).[17]

These journalistic texts contain specific representations of the prospective user. In their texts, Dutch journalists represent the user in terms of unreliable and oversensitive men. By constructing these images, journalists simultaneously reproduce and contest hegemonic, cultural representations of masculinity.[18] The portrayal of men as unreliable corresponds to hegemonic views of masculinity that emphasize the unreliability and disinterest of men toward contraception.[19] These texts thus confirm and legitimate the hegemonic view of gender roles in which the responsibilities and risks of contraception are delegated to women. The image of oversensitive men, however, does not resemble any hegemonic view of masculinity; to the contrary, dominant cultural representations of masculinity portray men as brave and strong (Connell 1995). By representing men as oversensitive to pain, journalists embrace the incorporation of hegemonic feminine representations in which women rather than men are portrayed as the sensitive, weaker sex.

Two newspapers also add other images of men that go beyond hegemonic representations of masculinity. *De Volkskrant* presented two advocates of new male contraceptives: a football player on the Dutch national team and a physician. It suggested that weekly injections are no problem at all, and that there are men who want to have control in matters of contraception (de Vries 1996). In two cases, the journalists explicitly articulate new male identities. *De Volkskrant* chooses to illustrate the article about the opinions of well-known Dutch men and women with a photo of a shaving apparatus next to a strip with pills (de Vries 1996). The journalist in *Haagse Post/De Tijd* predicts (although with an ironical undertone):

> Within a couple of years there will be contraception pills and plasters for sale at each drugstore. There is no doubt that the advertisement boys will find a nice marketing strategy: black plasters taped on sexy muscular upper arms or carelessly stuck on a shaggy stubbled chin. (Righart 1996, 12)

These texts thus show another set of representations of the envisioned user and masculinities: users are represented as men who want to have control over reproduction. The visible use of contraceptives (the black plaster) is presented as a way to fortify a sexy, masculine image.

The news media coverage of the WHO press bulletin in the Netherlands thus shows a conflicting set of representations of masculinity, rather than an articulation of the need and acceptability of new male contraceptives.[20] We thus may conclude that the media did not play a role in enhancing the cultural feasibility of new male contraceptives, at least not in the Netherlands.[21]

Conclusions

In this article, I have argued that the testing of the feasibility of a technology is not solely in the hands of scientific experts. The news media must be considered as an important actor in the construction of the feasibility of a technology. The development of a new male contraceptive shows that there are important differences between the scientific press and the popular press as sites of testing. First, there are differences in testing in terms of the subjects, the aims, the criteria, and the experts. On trial in the scientific text and the press bulletin were the artifact and the trial participants. On trial in the news media were the potential user and, very remarkably, the partner of the potential user. The aim of testing in the scientific press was the technical feasibility of the technology; that is, the redefinition of the criterion to assess the efficacy of male contraceptive methods. The testing in the media focused almost exclusively on the cultural feasibility of the new technology; that is, the need and acceptability of injectable contraceptives for men. Although acceptability was also a major topic in the scientific report and the press bulletin, the newspapers applied different criteria to assess the acceptability of the contraceptive on trial. In the scientific article and the press bulletin, the criteria for acceptability centered on the incidence of side effects and the psychological reactions to the injection. In the media, the criteria to assess the acceptability were the reliability of men in the use of contraceptives and the pain caused by the injection. Finally, there was a major difference in who was to be considered as the experts in the testing. The experts in the scientific text and the press bulletin were reproductive scientists, clinicians, and the WHO. The experts in the media were lay people, both men and women.

Second, scientific and journalistic texts present completely different accounts of the technical and cultural feasibility of the technology:

1. In the context of a scientific report in an international journal that specializes in reproductive research, the technology is represented as (a) a prototype that is still far away from a new male contraceptive method and (b) a technology that does not yet have an acceptable form, but this problem can be solved in a technical way (by synthesis of a testosterone compound that permits longer intervals between the injections).
2. In the context of the WHO press bulletin, the technology gains in status. It is represented as (a) a major breakthrough in the development of a new contraceptive for men, (b) a highly effective new contraceptive comparable to the contraceptive pill for women, and (c) an important contribution to equal sharing of contraception between the sexes. (As in the scientific report, the WHO

proposes hormonal compound improvements to solve the technology's acceptability problem.)

3. In the context of the Dutch media, the technology is portrayed as a (a) painful technology and (b) a technology that will face problems to become accepted by many men and women.

Finally, scientific and journalistic texts show completely different representations of the prospective user. In the scientific report and the press bulletin, users are represented in terms of men who are willing to share responsibilities for contraception. In the media, users are primarily represented as oversensitive, unreliable men who will never use a contraceptive injection. These representations of users are not innocent. On the contrary, they can function as tools to enhance the cultural feasibility of a technology, as exemplified in the texts of the WHO, or they can be used to denounce the viability of a new technology, as occurred in journalistic texts. Journalists have used representations of masculinity to argue that new male contraceptives would never be accepted by men and women.

These different accounts of male contraceptive technology show that what counts as a successful test is not solely in the hands of scientists or merely defined in scientific journals. News media can play an important role in shaping the fate of test results (Hagendijk and Meeuw 1993; Ashmore, Mulkay, and Pinch 1989).[22] Whereas scientists rely on the replication of experiments to accept or refute scientific claims, journalists have the powerful tool of literary replication, as Secord (1989) has called it (see also Gieryn 1992; Collins 1987). News media can shape scientific claims by replicating or contesting the results of experiments in newspapers. In the case of the testing of male contraceptive technology, the media (at least in the Netherlands) refused to replicate the test results. Although the WHO press bulletin resulted in widespread media coverage, Dutch newspapers contested the scientific authority of the WHO by providing an alternative testing of the new technology. This is a rather exceptional practice because newspapers more often adopt the role of uncritically reproducing what scientists tell them.[23] "Breakthroughs" in the biomedical sciences frequently receive considerable media coverage, which usually give a simplified and promising picture of what has been claimed (Fox and Swazey 1992).

The question that needs to be answered, therefore, is why journalists departed from this journalistic routine. How do Dutch journalists come to be competing with the WHO in the construction of claims about the feasibility of a technology? Is it the low status of the science in question that facilitates a

deconstructive attitude among journalists, as Collins and Pinch (1979) and Collins (1987) have suggested?[24] Although reproductive sciences are not among the top ten of high-status sciences, the alliances with established and respectable organizations such as the WHO indicate that this field is definitely not positioned in the lower ranks of the spectrum of respectability.[25] Moreover, not all the scientific claims of the WHO trial were subjected to a critical deconstruction in the media. Journalists only contested the claims on the cultural feasibility of the male contraceptive injection. The technical feasibility of the contraceptive method was not questioned. So, if the low status of the field does not explain the contesting attitude of the media, what can account for it? I suggest that the news coverage of the testing of this male contraceptive technology can be ascribed to previous criticisms on contraceptive technologies that have created a climate in which the media has already been educated about questioning the promises of contraceptive technologies. Ever since the introduction of the first oral contraceptive for women in the early 1960s, the women's health movement has informed the media and the public about health risks and abuse of female contraceptives (Seaman and Seaman 1978; Gelijns and Pannenborg 1993). The contesting attitude toward male contraceptives is, however, different from that toward female contraceptives, in terms of both the origin and the content of the criticism. In the case of male contraceptives, criticisms are voiced by the media rather than by (women's) health advocates. Moreover, criticism about female contraceptives has been focused particularly on health issues and fertility control as symbolic of institutional power over women, whereas male contraceptives have been criticized as being incompatible with gender roles and identities. This case study thus suggests that scientific claims that clash with hegemonic representations of gender are likely to become subject to deconstruction by the media. As Lyotard (1984; cited in Gieryn 1992, 221) has suggested, "The discourses of stories, histories, myths, biographies, legends, and tales of the future" are important resources in defining "what has the right to be said and done in the culture." Following Lyotard, Gieryn's (1992) study of the role of the media in the cold fusion controversy showed that narratives are important resources in assigning credibility to scientific claims. Gieryn points to an important role of the media. News media can function as gatekeepers to decide which stories can or cannot be told in today's culture. By contesting the results of the WHO clinical trial, journalists refused to reproduce the scientific discourse on new gender roles and identities for men. The story of the caring man obviously did not fit into the journalists' favorite tales of the future.

Notes

1. In this context, the work of MacKenzie (1989) on the testing of the ballistic missile is an exception because he included nonexperts (the manned-bomber lobby in the United States) in his analysis.

2. The issues addressed in the science and media literature include the public understanding of science and the ways in which newspapers influence communications and debates within science itself (see Lewenstein 1995 for an extensive review of the science and media literature).

3. See Hagendijk and Meeus (1993) for this criticism of the asymmetry in studies of science media relations.

4. For a similar approach to the study of controversies, see Engels, Pansegrau, and Weingart (1996).

5. In this article, I restrict my analysis to symbolic representations of the testing of new contraceptives for men. See Oudshoorn (1997b) for a more detailed analysis of the material work that was involved in testing practices in the clinic.

6. For other studies on the construction of users by scientists and engineers, see Woolgar (1991) and Akrich (1992, 1995).

7. My analysis is based on a quantitative and qualitative assessment of the texts in which I have focused on the following topics: the thematic structure of the text (more specifically, the organization of topics dealt with in the text), the information presented in the various sections of the text, the space devoted to a particular issue (how many accounts deal with a given issue), and the strategies used to present the information. I have used the analysis of these topics to reconstruct how these elements contribute to the overall story or story line of the text. I have borrowed the term story line from Hagendijk and Meeus (1993, 394), who have made a similar symmetrical analysis of journalistic and scientific texts of a public controversy over a claim about a possible cure for AIDS.

8. From the late 1960s, research and funding for male contraceptive research was included in the programs of other agencies as well, most importantly the Population Council, the U.S. National Institute of Child Health and Human Development, and the Agency for International Development, all U.S. public sector agencies. The pharmaceutical industry, one of the most powerful actors in the world of female birth control technologies, did not jump on the bandwagon of male contraceptive R&D. See Oudshoorn (1997a) for a further analysis of the relations between public and private sector agencies in the development of male contraceptive technologies.

9. Due to the success of the pill, industrial R&D of new contraceptive agents became a booming business, attracting major American and European pharmaceutical firms to this new area of drug development (Gelijns and Pannenborg 1993, 216). The first clouds in the apparently blue sky appeared when reports began to circulate about the health risks of oral contraceptives, most notably increased risks for cancer and diseases of the circulatory system (Seaman and Seaman 1978). Both consumer advocates and the women's movement criticized the introduction of the pill and suggested that reproductive science and industry had shown inadequate concern for the health of women (Gelijns and Pannenborg 1993, 227; Seaman and Seaman 1978). The strong public demand to reduce health risks had two major consequences that eventually led to a decline in industrial activity in contraceptive R&D in the 1970s. First, the concern about health produced an enormous increase in the number of liability suits, initially against U.S. manufacturers of the Dalkon Shield intrauterine device and later against manufacturers of oral contraceptives.

Nowadays, the liability costs in the field of contraceptives are higher than for any other drug category (Djerassi 1989, 357). Second, the public demand to reduce health risks led to more stringent rules and procedural regulations for the production and approval of new drugs. These changes in the drug regulatory system made contraceptive R&D into an area of innovation with a high risk of failure (Gelijns and Pannenborg 1993). The first efforts to include the development of new contraceptives for men in the R&D agenda can be traced back to the early 1970s. Due to advocacy of political leaders in India and China and women's health advocates in the United States in the late 1960s, scientists gradually took up the study of male contraceptive methods (Oudshoorn 1999).

10. The representation of users as contraceptive couples can be understood in the context of the changes in family planning policies that were made during the United Nations International Conferences on Population and Development of the last two decades (Sheila Jasanoff, personal communication). The United Nations conference in Mexico in 1984 was the first conference that mentioned the importance of including men in family planning. The Mexico Action Programme emphasized the need for new male contraceptives and better information and education to stimulate men to participate in family planning (United Nations 1984). In 1994, the United Nations conference in Cairo also emphasized the need for developing family planning programs to "enable men to share more equally in family planning" and the need to develop new male contraceptives. In addition, the Cairo conference called for research on "male attitudes toward sexuality and procreation" (United Nations 1994). The affirmation that family planning activities should reach out to men nicely fitted into the change in perspective first put forward in Cairo toward recognizing "individual reproductive rights" rather than demographic concerns as the goal of family planning programs. These international conferences exemplify the shift toward including men in family planning that has taken place over the last two decades. This shift in discourse implied a reordering of gender relations that included a construction of new representations of male and female roles and identities. Contraceptive couple is one of these representations meant to reconcile a focus on men in family planning with the reproductive rights of women. A representation of users in terms of contraceptive couples defines family planning as a relational issue rather than a competition between the reproductive rights of individual women and men. See Oudshoorn (1997c) for a further analysis of the symbolic and material work that was needed to change family planning discourse toward including men.

11. The fact that the article published in *Fertility and Sterility* did not include a detailed discussion of the assessment of the acceptability of the method may also reflect publication practices in the field of reproductive sciences where trial results on acceptability and efficacy (or other technical aspects) are usually published in separate journals. However, the WHO's decision to claim authorship of the efficacy article and not the acceptability article indicates that the organization is less interested in the latter. Moreover, the WHO press bulletin of the trial refers only to the publication in *Fertility and Sterility*.

12. This image is very similar to representations of the prospective users in feminist discourses, particularly the user representations of feminist advocates of new male contraceptives. This similarity in discourse is not a coincidence. Over the last two decades, sociologists of science have debunked the ivory tower image of science as an autonomous, independent world that operates apart from the rest of society. Instead, sociologists suggest that scientific discourse should be viewed as the result of "the collective work across worlds with different viewpoints and agendas" (Fujimura 1992, 169). In the case of male contraceptive research, reproductive scientists were not operating in isolation from available ideas and sociopolitical arrangements. They built their field in dialogue with Eastern governments, most notably China and India, and feminists in the Western world. The similarity of user representations in feminist and scientific

discourse can thus be understood as the result of alliances between the worlds of feminists and scientists (Oudshoorn 1997b).

13. The fact that the occurrence of pregnancies is used as a criterion to determine the efficacy of contraceptive methods for men has been a highly controversial issue in the early years of clinical testing. In the 1970s, the WHO was very reluctant to cooperate in clinical testing of contraceptives for men because there was too much risk involved for women. The reproductive scientists, who wanted to begin the clinical testing of hormonal contraceptive compounds, spent ten years trying to convince the WHO of the need for clinical trials (Alvin Paulsen, personal communication). In the 1970s and early 1980s, sperm counts, rather than pregnancies, were used as criteria. The men and women who participated in the trials had to keep using other contraceptive methods during the trial. The development of contraceptive agents with a higher efficacy in suppressing sperm production, and thus a lower risk of pregnancies, made the occurrence of pregnancies more acceptable. However, the monitoring of pregnancies during the testing of contraceptives for men is still a precarious issue. If the number of pregnancies is higher than expected, the clinical testing is ended. See Oudshoorn (1997c) for a further analysis of the practice of clinical trials in contraceptive R&D for men.

14. The WHO collected more than 150 newspaper articles and television and radio programs in the United States, Europe, and China that reported the results of the clinical trial.

15. Due to practical considerations, I have restricted my analysis to Dutch newspapers, including four of the five leading national daily newspapers in the Netherlands, *Algemeen Dagblad*, *De Volkskrant*, *Trouw*, and *De Telegraaf*, and one weekly journal, *Haagse Post/De Tijd*. These newspapers reach large audiences in all socioeconomic classes of the Dutch population and cover the major political currents in the Netherlands. *Trouw* and *De Volkskrant* traditionally aim at the more progressive, left-wing-oriented public, whereas *Algemeen Dagblad* and *De Telegraaf* are mainly targeted to audiences with more conservative, right-wing political preferences. *Haagse Post/De Tijd* attracts both progressive and conservative readers. All journals can be portrayed as "serious" newspapers; I have not included the tabloid press in my analysis. The media coverage of the WHO trial consisted of two types of texts. Most newspapers devoted a short article in their news section to report the news of the completion of the testing of the new male contraceptive technology. These texts basically summarize the main results of the test, as described in the WHO press bulletin. The newspapers also included longer articles in their "background to the news" sections. I have decided to focus specifically on these background articles because they provide a much richer source to study the role of nonexperts in the construction of scientific claims. Such articles do not just repeat the news as it is formulated in scientific press releases or national or international news agencies, but relate the news to much broader contexts than indicated in these sources. Remarkably the journalists, with the exception of *Haagse Post/De Tijd*, were women.

16. The journalist might as well have used another more recent survey reporting that 67 percent of Dutch women stressed the need for new male contraceptives (Vennix 1990).

17. Most strikingly, the discussion in the media focused particularly on the fact that the contraceptive is an injection. This is rather peculiar, since injections are widely accepted as a mode of administration for the treatment of all kinds of diseases. The negative attitude in the media may be related to the fact that injections are used as a contraceptive (by presumably healthy people) rather than a medication for an illness. Moreover, journalists focused much attention on the site of the injection. The contraceptive was frequently described as the "buttock injection," and the very act of injecting the contraceptive in the buttock is represented as a somewhat embarrassing activity. One may wonder whether an injection in the arm would have evoked similar reactions in the media.

18. Connell (1995, 79) describes hegemonic masculinity as a cultural construction that does not necessarily need to correspond to the actual personalities of the majority of men: "The number of men rigorously practicing the hegemonic pattern in its entirety may be quite small." Moreover, hegemonic masculinity does not mean total cultural dominance of these representations; alternatives may exist but are subordinated. As Connell (1987, 186) has suggested, hegemonic masculinity is always constructed in relation to subordinated masculinities (and in relation to women).

19. See Gilmore (1993) and Stycos (1996) for a further analysis of cultural views of the relationships between masculinity, contraception, and fertility.

20. The *New York Times* (7 April 1996) covered the WHO press bulletin and concluded that "men might not relish the discomfort." Criticism on the painful nature of the contraceptive injection was also voiced by the Associated Press (International News Section) that quoted two experts who described the technology as "a painful injection in the buttock" and "an effective contraceptive, the only drawback being the painful method." The *New York Times* also covered the WHO press bulletin and quoted the head of the Association of the British Pharmaceutical Industry: "Giving millions of men a high dose of a potent steroid strikes me as unacceptable." Several radio reports in the United States voiced a similar message. *Good Day Wake Up*, broadcast by WNYW in New York, quoted a spokesperson of Marie Stopes International, a major international family planning organization, who concluded that "this research still has a long way to go. . . . Getting men to take responsibility will be the real test." Finally, CNN devoted a program to the results of the clinical trial. The highlight of this program ran as follows: "Officials at the World Health Organization say a pill form of a male contraceptive is unlikely in the near future. Experts believe cultures will have to change before men will take the hormones."

21. This is in sharp contrast to the media coverage of reproductive technologies for women, particularly in vitro fertilization technologies, where the media have played a crucial role in the articulation of the need and acceptability of this technology (Kirejczyk 1996, 217).

22. The fact that the Dutch pharmaceutical company AKZO Organon has recently initiated the testing of a hormonal contraceptive pill (not an injection) indicates that the discussions in the media had a definite impact on the R&D agenda (Nieuw optimisme over mannenpil 1997).

23. In the Netherlands, most national journals have a special section on science, with stories that summarize the scientific claims reported in journals such as *Science* and *Nature*.

24. Collins and Pinch (1984) have suggested that journalists only deconstruct scientific claims of fringe sciences; that is, sciences at the margins of the spectrum of respectability. In this view, mainstream sciences are less likely to become subjected to a contest for authority in deciding the credibility of scientific results. Or, to quote Collins (1987, 709), "Only when the subject matter is fringe science will the production team [journalists] offer their own substantive contribution to the debate, or their own expert comments."

25. See Clarke (1998) for a detailed analysis of how the reproductive sciences have gained credibility and status by focusing on fundamental research and, in the case of contraceptive R&D, high-tech approaches.

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