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Expectations and beliefs in science communication

Learning from three European gene therapy discussions of the early 1990s

Abstract: There is widespread agreement that the potential of gene therapy was oversold in the early 1990s. This study, however, comparing written material from the British, Danish and German gene therapy discourses of the period, finds significant differences: over-optimism was not equally strong everywhere; gene therapy was not universally hyped. Against that background, attention is directed towards another area of variation in the material: different basic assumptions about science and scientists. Exploring such culturally rooted assumptions and beliefs and their possible significance to science communication practices, it is argued that deep beliefs may constitute drivers of hype that are particularly difficult to deal with. To participants in science communication, the discouragement of hype, viewed as a practical-ethical challenge, can be seen as a learning exercise that includes critical attention to internalised beliefs.

Keywords: science communication ethics, emergent technologies, overselling, hype, realism, scepticism.

In the early 1990s, exaggerated expectations of gene therapy were widespread, and the gene therapy discourse was characterised as hyped. This enquiry, viewing hype as a practical-ethical science communication challenge, asks what and how we can learn from that particular discourse that might serve to promote moderation in future discourses on seemingly emergent technologies. Some tentative answers to aspects of that question are suggested.

Drawing on a comparative study of material from three European varieties of the gene therapy discourse of the early 1990s, attention is directed towards science communication practices as outcomes of the interplay between actors such as scientists, journalists, politicians, ethicists, commercial companies and various organisations. Such interplays vary from one place to another, and the three discourses exhibit different features: Gene therapy was not universally hyped.

Against that background, the possible significance of basic, culturally rooted understandings of science and scientists is explored: Overselling presupposes demand. The demand for promises and certainty from science varies with time and, even within Europe, across geographical boundaries, and is likely to be influenced by different basic assumptions or internalised beliefs about science and scientists. In everyday exchanges such beliefs are taken for granted and, thus, remain tacit. Cross-cultural comparison, however, may make them stand out as possible issues for critical enquiry. That, in turn,

might further reflection on science communication routines. Here, therefore, I explore different basic assumptions about science and scientists that can be traced in the material.

Below, brief introductions to concepts, approach, material and theme are followed by summaries of some basic features of the text bodies. Different assumptions that seem to have been underlying the various discourses are then presented, discussed and tentatively connected to different science communication logics. The final analysis concerns the possible promotion of moderation in science communication, viewed as a challenge that is shared by all participants in science communication. Critical attention to basic assumptions and beliefs, I suggest, may be crucial to that endeavour.

LEARNING FROM PAST DISCOURSES

Any attempt to deal with over-optimism in science communication is hampered by the fact that over-optimism, overselling and, in particular, hype are contested concepts.

Contested concepts

From one perspective, the notion of hype appears as a device deployed in boundary work as a means of exclusion (Gieryn, 1999; Hillgartner, 1990; Stewart, 2005). The notion is seen as a *rhetorical device* for making normative statements that may serve to deny something or somebody the epistemic authority of science.

From another perspective, descriptive studies of hype as a *social phenomenon* have concluded that hype ‘corresponds to a particular phase in the career of innovations’ and is characteristic of ‘the early or opening moments of resource and agenda building’ (Brown, 2003).

From yet another perspective, hype appears as a thick concept – neither purely descriptive nor purely normative (Williams, 1993) – and as *practical-ethical challenge* to participants in science communication: Hype, thus, is taken to constitute a problem that it might (only) be possible to deal with deliberatively. That is the perspective of this article. It uses the notion of hype in science communication, stressing connotations of excitement and intoxication (Chambers, 2006), to denote intended or unintended deception, produced by exaggerated claims about the potentialities of scientific projects. The possible adverse effects of such claims include: False hopes and fears may be instigated. One in four of the Scottish text units¹ in this study, for instance, contain promises to cystic fibrosis patients. They were ultimately disappointed. Moreover, attention may be diverted from pressing problems; cash-burning in the shape of impracticable projects may be inspired; citizens may be left without opportunities to

¹The material contains documents such as journalistic background articles, letters to the editor, book reviews etc. Each document constitutes a text unit.

evaluate the possible uses and limitations of scientific projects; and the reputation of science may suffer (see also Brown, 2003).

The definition is not exact, and exaggerated claims cannot be diagnosed exactly at the time they are made. Hype cannot be ruled out, and there are no technical solutions to the problem either, but practical deliberation remains an option for dealing with it. That includes attempts to understand how exaggerated expectations might come about.

Although there may be only ‘a thin line between authentic belief in the future potential and mere rhetoric of “selling” a particular line of research to politicians and the public’ (Nowotny, Scott & Gibbons, 2001, p. 38), hype is here taken to be compatible with authentic belief. Actually, as will be discussed below, such belief might constitute a particularly challenging aspect of hype in science communication.

The observation that some phases of innovation are likely to be particularly hype-prone is useful to deliberations on the discouragement of hype, seen as a practical-ethical challenge, on a case-by-case basis. The observation that such terms as hype, overselling and over-optimism may be used as rhetorical devices to distribute blame or praise serves as a reminder against purely normative interpretations of the terms.

Impaired judgement due to an impaired sense of reality is assumed to be the overall effect of (successful) hype – so-called genohype (Holtzman, 1999), of course, included – and to be, at the same time, a driver of hype. This observation, frustratingly, introduces another thick and contested concept:

The concept of realism has a long and troubled history of being courted, embattled, interpreted and re-interpreted in multiple and conflicting directions. It is also crucial to different understandings of science and its epistemic authority. Science, it has been argued, ‘often stands metonymically for credibility, for legitimate knowledge, for reliable and useful predictions, for a trustable reality’ (Gieryn, 1999, p. 1). Science, in short, is widely considered to constitute the epitome of realism. But how widespread is that understanding, and how might it affect the conditions for the exercise or discouragement of hype in science communication? More on that follows.

In science communication, realism is seen as a fragile quality in need of continuous care. Such care, in turn, may be supported by understanding of how over-optimistic claims came about and gained momentum in particular cases. Here, the gene therapy discourse of the early 1990s has been singled out because it has actually been characterised as hyped (“Gene therapy oversold”, 1995; Marshall, 1995c), and because it is sufficiently close in time to appear relevant to current exchanges, but also sufficiently remote to facilitate enquiry into past expectations concerning developments in a future that has now become the present.

Learning by comparison

Gene therapy is the (attempted) treatment of diseases by means of the transfer of genetic material into patients, and was, in the early 1990s, surrounded by great expectations, which have, as yet, only been realised to a limited extent².

The prospects of gene therapy were exaggerated, but not to the same extent everywhere. In an initial comparison of the public gene therapy discourses as they played out in selected newspapers in three different, European environments, 1991/92-1996, these discourses were found to be surprisingly different. Some contexts seemed less hype-prone than others.

It has been argued that the ‘kinds of explanations that take hold in a society reflect cultural beliefs’ (Nelkin & Lindee, 1999, p. 128). Along related lines, a wide-ranging comparison of encounters with biotechnology in the USA, Britain and Germany (Jasanoff, 2005) has demonstrated how different political cultures respond differently, by way of different decision-making processes and choices, to the possibilities offered by the life sciences (Jasanoff, 2005, p. 255). In dialogue with that comparison, the present, much more limited study shares the aim of understanding, rather than causally explaining Western heterogeneity and the influence of norms of seeing and believing on knowledge-related practices (Jasanoff, 2005, pp. 11, 290, 267). It is an important difference that the present comparison focuses on *imagined* rather than *actual* possibilities offered by the life sciences. It is not concerned with decision-making and choices, but with different expectations of what those sciences might offer in the future: the assumed shapes of knowledge to come. Thus, it enquires into priming rather than framing aspects of science-related discourses and, broadly speaking, moves in the grey and messy borderland between ontological assumptions and epistemologies³.

More specifically, it is suggested that tendencies toward over-optimism in science communication might be linked to different basic science-related assumptions. The possible identification of such kinds of difference, then, might serve to direct critical attention to understandings that have a bearing on science communication routines.

The core material constitutes 889 text units from newspapers – 421 British (including 76 Scottish), 210 Danish and 258 German. When searching as far back in time as the early 1990s, material is not always readily accessible; the material from 1991, therefore, is uneven and broadsheets are, in general, more strongly represented than tabloids, but the material is deemed sufficiently widespread for the above purpose.

² For instance, a few children with rare, monogenic immuno-deficiencies called SCID have been treated successfully. Likewise, a couple of patients with an inheritable form of blindness have regained some ability to see (Johnson, 2009; Kohn & Candotti, 2009).

³ The English concept of *science*, the German concept of *Wissenschaft* and the Danish concept of *videnskab* express different ideas of knowledge. The possible connections between basic science-related assumptions and different language areas – as distinct from national cultures (Jasanoff, 2005, p. 11) – deserve attention.

Close and repeated readings of the material have drawn on general inspiration from such fields as discourse analysis – with its notions of dominant and vacant positions of speech – and combinations of rhetorical and cultural analysis (Jack, 2010; Sontag, 1990; Stewart, 2005).

The text body contained references to a wealth of other written sources, including official and semi-official reports. To broaden and nuance the picture and avoid the sole reliance on material from newspapers, some of those sources have been included as secondary material (Bundesärztekammer, 1995; Clothier, 1992; Department of Trade and Industry, 1996; Gesellschaft für Humangenetik, 1996; Hjorth, Koch & Nørby, 1995; Nielsen, 1995; Schmitt, Hennen & Petermann, 1994; Science and Technology Committee, 1995; Sundhedsministeriet, 1995).

A few very basic quantitative analyses, aimed at gaining an overview of proportions and tendencies regarding features such as sources, promises and qualifications, have been cautiously undertaken. Due to ambiguities – statements, for instance, that treatments could not be expected sooner than in five to ten years, were mostly counted as qualifications, but might as well be seen as promises – even fewer of those quantifications are reported below, and more often than not the use of exact figures is avoided. To emphasise the interpretative quality of the study, observations, illustrated by examples, are mainly provided in narrative form.

VARIATIONS ON A DISCOURSE

In the early 1990s in Europe, the expanding fields of biotech research and enterprise were facing a crisis of legitimacy. Groups of citizens had raised concerns regarding gene technological approaches relating to agriculture and food production. Plans to allow the patenting of outcomes from biotech research gave rise to protests. At the same time, however, the mapping of the human genome led to the identification of DNA sequences relating to various monogenic disorders. Hypothetically, that new knowledge could be used for therapeutic purposes and might relieve humankind of hitherto untreatable diseases, boost the legitimacy of biotech research and provide the growing biotech industry with new business opportunities.

In 1995, after a period of great excitement, the American authorities signalled an about-turn, warned against over-optimism and called for more caution (Leiden, 1995; Marshall, 1995a, 1995b; Ross et al., 1996; Varmus, 1995), but prior to that, clinical trials aimed at testing the safety of various gene therapeutic approaches gained momentum in the USA and were emerging in Europe. There, gene therapy became an object of ethical concern (Group of Advisers, 1994) – and it became an object of pride to follow the American lead. Britain – not least Scotland – aspired to become ‘world-leading’; Denmark was “lagging behind”⁴, as was Germany.

⁴ Double quotes indicate translation from Danish or German text units.

In Britain, Denmark and Germany, the issue appeared in books, radio, television, in the work of official committees, at public meetings – and in newspapers. It appeared in news articles, in background articles on biotechnology in general and on specific diseases, in interviews and obituaries, in the business and the sports sections, in book and film reviews and in letters and commentaries. In just above half of the 889 text units from newspapers, gene therapy was the main topic.

National trials, including plans to begin such trials, were common actuators of articles. Other frequent triggers included scientific meetings, committee reports and new books and films. Public meetings, organised by newspapers (Germany) or by public authorities (Denmark) constituted yet another motivator. The influence of press releases and the like from institutions, patient associations and other organisations and companies cannot be discerned from the material.

No opponents of gene therapeutic approaches to the treatment of serious diseases appear in the material. It is, nevertheless – taken as a whole – marked by campaign approaches which were carried out, not least, by key journalists with a strong commitment to gene therapy as a good cause in need of defence: Gene therapy was seen and spoken about – some times in the shape of critiques – as a means to gather support for gene technology in general. In particular in material from the British and one of the German newspapers, the issue is often introduced as a symbol of hope in the opening or closing paragraphs of text units on other issues.

As distinct from somatic gene therapy, germ line therapy was, as a rule, discounted in newspaper articles and in committee reports. It was described as unrealistic due to technical unfeasibility (Denmark), due to its complexity (Britain), or because it was illegal (Germany). Against that background, statements about somatic therapies aimed at the body cells of individual patients acquired a down-to-earth appearance of technical feasibility, straight-forwardness and moderation. The use of exact figures and of the present tense when technical information was conveyed, contributed to providing somatic gene therapy with presence as an existing, rather than a hypothetical, technology. Against that background, the assumption gained plausibility that the description of a DNA sequence was the decisive step towards treating diseases that could be linked to that particular sequence. The assumption was particularly prominent and hardly ever questioned in the British and the Danish material.

Statements about gene therapy and its prospects were mainly made by representatives of the medical and natural sciences appearing as sources in journalistic articles and/or as authors of commentaries and letters. In each country, a handful of native scientists were recurring, even dominant, participants in the national discourse. Viewing the text body as a whole, scientists do, indeed, as a group, appear as 'co-producers of hype' (Bubela & Caulfield, 2004), acting in concert with other active participants in science communication.

To our topic, some of the most significant differences relate to the presence or absence of a possible antidote to hype: doubt. The absence of sceptical questions, it has been concluded, is a widespread feature of science journalism (Maesele, 2012). In the present study, comprising not only journalistic material but also, for instance, a good many letters and commentaries, the absence of doubt, although also a striking feature, is not evenly distributed. Using the presence of qualifications as a marker of openness to doubt, approximately six out of ten German text units, seven out of ten Danish text units and eight and a half out of ten British text units do not contain any kind of qualification concerning the prospects of gene therapy.

The British publications

Searches using LexisNexis Academic and Nexis UK and the search term ‘gene therapy’ resulted in 421 British text units from newspapers (1992-96), including 76 Scottish (1992-95). National newspapers fully covered (1992-1996) include *The Daily Mail*, *The Guardian*, *The Independent* and *The Times*, including Sunday editions and *The Observer*. *The Mirror* is included from mid-1995.

Non-journalistic commentaries or letters constitute approximately one out of ten text units. The total number of writers comes close to a hundred. Ten journalists appear frequently, but none are dominant.

Most sources are British or American. References to foundations or/and charities – almost (Danish) or completely (German) absent in the other countries – are made in roughly one out of eight text units and are conspicuous particularly in the Scottish material. Politicians are almost absent.

The discussion peaked in 1993 and 1994. The American about-turn in 1995 generated a handful of articles marked by clear qualifications. A stronger emphasis on speculative aspects is a feature of the 1996 material. A particularly strong emphasis on aspects relating to national prestige and business opportunities is a defining feature of the Scottish material.

The bulk of the material – whether originating in broadsheets or tabloids, and from across the political spectrum – is marked by a high degree of optimism regarding the prospects of gene therapy, continually described as ‘revolutionary’ and ‘pioneering’, accompanied by regular ‘breakthroughs’ and ‘firsts’ and, now and again, connected to ‘celebrations of British skill’. Typically, the ‘pace of progress’ is described as ‘remarkable’ and related to ‘tremendously increased possibilities to do good’ and to expectations that ‘[g]ene warfare could completely change health care over the next few years’ or ‘lead to this form of therapy replacing chemotherapy on many forms of cancer within three to five years’.

Qualifications are made in roughly one out of seven text units (none of them from the tabloids). More than half of those qualifications are weak statements to the effect that there is still some or a long way to go; or they are limited to specific diseases.

Within this highly optimistic context, qualifications easily acquire the quality of insignificant side-remarks and, in some instances, seem to be of an almost ritual nature and are at least partly negated in the following text. For example: ‘some disappointments lie ahead [...] but [...] a revolution in medical treatment could be at hand’.

Optimism was also a feature of official reports (Clothier, 1992; Science and Technology Committee, 1995), but the usage was more moderate, and critique was offered of media sensationalism, including the frequent claims about breakthroughs.

The German publications

The 258 text units from German newspapers and journals (1991-1996) were retrieved, using the search term ‘*Gentherapie*’, from the archives of individual publications. Five publications are covered: *BILD* (tabloid); *Die Zeit* (weekly); *Der Spiegel* (weekly); *Frankfurter Allgemeine Zeitung, FAZ*; and *Süddeutsche Zeitung, SZ*.

The number of writers comes close to a hundred, but in *FAZ* one journalist contributed more than one third of all text units. Politicians participated to some extent in the discussion, mostly as writers of commentaries. British and, in particular, American scientists were frequent sources, and half of the German text units – compared to one fifth of the British and the Danish – contain a reference to gene therapy in the USA.

Close to one out of seven text units were letters and commentaries.

The discussion peaked in 1995.

The German material differs in many respects from the remainder of the material. Some of those differences can be related to differences between media and journalism models (Hallin & Mancini, 2004). Written sources are more frequent as are direct references to scientific journals; and there is more journalistic analysis and interpretation.

Taken as a whole, the German material contains more qualifications – in approximately four out of ten text units – and specific promises are rare. But the general approach differed from publication to publication.

The tabloid *BILD* was highly optimistic. Eight of the twelve text units from this paper are front page stories of a sensationalist vein. Two are brief items announcing “good news”.

The conservative *FAZ* was also highly optimistic, but not sensationalist. More than one third of the 86 text units were written by a single dedicated science journalist, campaigning for gene therapy with frequent and specific references to scientific articles.

SZ, Die Zeit and *Der Spiegel* (105, 36 and 13 text units, respectively) generally approached gene therapy as a political issue in the classical sense: an issue for critical enquiry and discussion, to be supported by background information. The latter concerned, not least, events surrounding the development and regulation of gene

therapy in the USA. Leaving room for varying degrees of moderate optimism, doubt concerning the prospects of gene therapy was a shared feature, as was attention to vested interest and possible risks. From 1992 onwards, disappointment, due to over-optimistic expectations, was a recurring theme.

Official and semi-official documents were marked by a distinct wariness towards eugenic frames of thought (Bundesärztekammer, 1995; Gesellschaft für Humangenetik, 1996). Cautious optimism concerning the possible development of gene therapies for the treatment of serious diseases was mixed with warnings against over-optimism (Schmitt et al., 1994).

The Danish publications

Using the *Infomedia* database and the search term “*genterapi*”, a search generated 196 text units from Danish newspapers, 1991-1996. Two major broadsheets (*Berlingske Tidende; Politiken*), two major tabloids (*B.T.; Ekstra Bladet*) and a weekly (*Weekendavisen*) are fully covered. A manual search, limited to the period March to October 1995, in the archives of the daily *Information* – influential in science discussions, but not represented in *Infomedia* 1991-1996 – brought the number of Danish text units to 210.

The total number of writers comes close to seventy, but a small group of contributors were pivotal to the discussion. Three journalists authored one third of the journalistic text units. One out of five of all references to sources were to three persons, two scientists and one ethicist. Most sources were Danish, and when not, they were mainly drawn from the USA or the UK. Politicians participated to some extent, mostly as writers of commentaries.

The share of non-journalistic text units, such as letters and commentaries is larger (roughly three out of ten) than in the British and German material. The Danish material also contains a larger share (two out of three) where gene therapy is the main topic and there are more leading articles.

Except for the small sample from *Information*, mirroring the scepticism displayed in parts of the German material, strong optimism concerning the prospects of gene therapy is a general feature of the material, whether originating in broadsheets or tabloids, and across the political spectrum. A “revolution” was taking place. The development was “miraculous”. Gene therapy was “the ultimate technology”. The discussion reached its climax in 1995, engulfing scientists, journalists, ethicists, politicians, public authorities and patients’ organisations in a shared experience of expediency: a cure-all appeared to be close, and decisions on its use seemed urgent. Characteristically, a 1995 consensus conference looked forward to the use of gene therapy in the health care system as either a supplement to ordinary treatments or a “miracle-cure” (Nielsen, 1995).

The general belief in the prospects of gene therapy was accompanied by mutually reinforcing utopian and dystopian visions. As in the British material, scepticism was rare. As in the German material, critique – in the Danish case appearing, in particular, in non-journalistic commentaries – was not. To one pole, gene therapy served as a symbol of progress, supported by science. To the other pole, the seeming eugenic opportunities, taken to extend far beyond the treatment of serious diseases, served as a symbol of potentially destructive forces in science that could threaten human dignity. The expressions of concerns were sufficiently frequent to infuse a couple of scientists with the idea of marketing a specific reproductive technique as an alternative to gene therapy.

Disappointment due to over-optimistic expectations was mentioned now and again from late 1994 onwards. In 1996, transparency in science and the role of science in democratic societies became prominent themes.

DIFFERENT ASSUMPTIONS ABOUT SCIENCE AND SCIENTISTS

In this study of three European gene therapy discourses of the early 1990s, a few publications – comprising a little more than half of the German text body – deviate from the general picture of exaltation. There are no indications that any singular group was responsible for the presence or absence in the various discourses of excessive belief in fast approaching gene therapies. Rather, in each context scientists, journalists and other groups appear to have been working in concert. This interpretation, in turn, directs attention to different, culturally rooted beliefs and expectations that may have been influencing the different tones of those interplays.

The material contains abundant and very different characterisations of science and/or scientists, indicating the existence of different understandings of a more fundamental nature. The British material was dominated by an understanding of science, represented by scientists, as the epitome of realism. In those publications that tended to talk down the prospects of gene therapy, however, scientists from the field of gene therapy were often depicted as potential dreamers, prone to become over-enthusiastic.

The epitome of realism?

The understanding of science, represented by scientists, as the epitome of realism seems to constitute a cultural trait which is – or was – dominant in some, but not all European contexts.

Science in the British material appears predominantly as an impersonal force for good, represented by scientists. Science is ‘the enemy of illusion’, and is connected to increasing ‘power’, ‘precision’ and ‘control over the processes of life’, facilitating the ability of humans to ‘reverse nature’s fate’ or succeed in ‘cheating nature’. Science is

also beyond human scale: ‘If success has not been achieved in the past ten years, so what? A decade is ludicrously short’.

Scientists are ‘levelheaded’, ‘curious’, ‘observant’, concerned with ‘laborious factuality’ and inclined toward ‘the experimental method’ and ‘altruistic reasons’. Scientists also carry traits of the ‘wizard’, including an ability to connect with impersonal, natural forces – a capacity for ‘wonder’ and ‘awe’ of the ‘beauty’ of universal mechanisms. Scientists belong to a particular group and may feel that they have ‘more in common with their colleagues in Japan or Cuba or India’ than with many ‘non-scientists’ in their own country.

According to the Science and Technology Committee (1995), society should be grateful to scientists. But science has enemies, represented in the newspapers by ‘the anti-science lobby’, ‘the doom-mongers’ and groups carried on by ‘wilful nescience, blind faith and emotional overspill’. Moreover, politics, religion, the general public and the media all, to some extent, represent opposites of science. Political processes are ‘muddy’ and ‘not open’. Religion is ‘squaring up for a fight with science’, but science ‘will win’.

To the fearful general public, tending to be ‘baffled by complex ethical dilemmas’ and marked by the absence of ‘DNA-literacy’ or ‘genetic literacy’ or ‘scientific literacy’, ‘facts are less important than perceptions’. Genetic engineers have ‘encountered apathy and uninformed hostility from the public’ and the media. There is reason to ask whether writers are ‘demonising the new genetics’ but also, after the American 1995 about-turn, to characterise excessive belief in the prospects of gene therapy as ‘the popular myth of gene therapy’.

Characterisations of the public as driven by fear and/or by religious emotions and/or by conservative opposition to progress also appear in the Danish material, but are not frequent; and science and scientists are rarely characterised directly. Commentaries of a dystopian vein, however, indicate the existence, not dominant but present, of an understanding of science – which shares the absence of doubt with the dominant optimistic approach – as a potential force for evil.

Science and scientists in general are hardly ever characterised directly in the German material. Characterisations of the general public are equally rare. Indirectly, however, excessive beliefs in the prospects of gene therapy are linked to supposed traits in scientists. A typical reference to scientists “of a realistic leaning” from the field of gene technology indicates that realism should only be expected from some representatives of the field. Along related lines, *schwärmerisch* (easily carried away) is a rather prominent topos in *Der Spiegel*, *Die Zeit* and *SZ*. It comes with connotations of inflammability and an impaired sense of reality, as do a good many other characterisations from those publications: Scientists are “dreaming”; they are “spinners”; they present “fantasies”; they are “electrified”, “febrile” and “intoxicated”; they “speculate”; they are carried on by “wishful thinking” and “researcher optimism”.

On top of that, they also tend to exhibit “daring” and “thirst for action” and to be “hotly racing on”.

In short, a peculiar trait of these parts of the text body is that tendencies towards excessive fascination (Primas, 2002) are attributed, even in some cases by scientists, to scientists. On that assumption, then – highlighting those connotations of the notion of hype that relate to excitement and intoxication – scientists appear as potential sources of over-optimism. The basic assumption appears to be that scientists share ordinary human dispositions which may make them captives of their own imaginations: Rather than representing the epitome of realism, they may become obsessed, lose their capacity for self-criticism and make inflated claims, based on authentic beliefs in the potential of their projects.

Similarly, ordinary human motivations are ascribed to scientists. In particular in text units concerning the commercial aspects of gene therapy, social ambition and desire for financial gain are presented as significant drivers of the propagation of the prospects of gene therapy. That, however, is not particular to, but more widespread in the German material.

While only scant attention is paid to commercial aspects in the Danish material, roughly thirty German and thirty British text units focus on such facets. Five out of six of those German text units – originating in *Der Spiegel*, *Die Zeit* and *SZ* – are marked by critical attention to financial and social ambitions in scientists for “glory and financial support”. Some directly address the issue of overselling, referring to, for instance, “the sounding of horns”, “the showcase example”, the adornment with “laurels in advance” and “confidence trickery”.

One out of six of the British text units on the commercial aspects of gene therapy pay critical attention to the desire for gain. Particular to the British critique of those aspects is the apparent assumption that desire for gain is somehow alien to and represents a pollution of science. Science has been ‘hijacked by big money’, and the life sciences are ‘no longer engaged in the delivery of benefits to humankind’ or governed by ‘an unbiased assessment of human need’ but by ‘the hope of making money’.

Biology and eschatology

Suggestions concerning the time horizon within which the prospects of gene therapy might be realised differ hugely. Actual figures, ranging from three to fifty years – with a preference for five to ten years – are quite frequent in the British and Danish texts, but appear less in the German material. Other references to the future, also less frequent in the German material, indicate the presence of (unlimited) beliefs in science as a limitless enterprise. Having little if anything to do with chronological time, those references seem, rather, to express an eschatological notion of the future (Jonas, 1984), signifying a state of technological perfection.

Using examples from the British material to illustrate the mainstream approach, gene therapy constituted ‘the treatment of the future’, ‘the solution of the future’, a move ‘into the future’; and into ‘a new type of society’; ‘a new world’, ‘a different species’. This ‘Fourth revolution of Medicine’ would ‘wipe out disease’; was ‘a weapon to change the world’ and would facilitate ‘total control of reproduction’ and ‘increase intelligence’. In ‘the era of gene therapy’; ‘life could begin at 100’; or at least there would be ‘an average life expectancy of 100 years, thanks to gene therapy eliminating dementia, cancer and Aids’; or gene therapy might even ‘expand lifespans to 150 years’. Now that scientists had ‘unlock[ed] the key to mortality’; it was time to ponder such questions as: ‘Could genetic engineering create a master race of children with perfect personalities and features?’; and concerning the ‘body of the future’: Would ‘science deliver what nature never could – perfection?’ Positive answers might be supported by the fact that scientists were about ‘to build “perfect” genes’.

Along related lines, expectations that gene therapy might, in the long term, free mankind altogether of diseases and even ageing are a feature of more than thirty British text units, compared to a handful of Danish and two German examples, both from *BILD*.

Similarly, the presentation of ordinary human features, personality traits and behaviour as possible future candidates for gene therapy is widespread in the British material (less so in the Scottish than the English, though), including: Addiction (alcoholism and other varieties); ageing; aggressiveness; appearance (in general, including eye colour); baldness; creativity; criminality; giftedness (in general and specifically in the sense of musicality and mathematical ability); height; impulsivity; intelligence (in general); memory; novelty seeking (linked to anti-social behaviour); personality (in general); religiosity; sexual orientation (with particular focus on homosexuality); and social skills (in general). One out of eight British text units contain such references. The tendency was sufficiently strong for the Science and Technology Committee (1995) to address the issue of genetic fundamentalism, warning against it without dismissing possible future uses of gene therapy to treat, for instance, personality disorders.

The Danish list of such possible future candidates for gene therapy is less expansive, yet it includes ageing; aggressiveness; body size; eye, hair and skin colour; criminal behaviour; homosexuality; and intelligence. Also in the Danish case, references to such traits appear in almost one out of eight text units.

Biorhetoric (Lynch, 2009) is, however, almost absent in the German text body which contains only two examples of references made in earnest to ordinary human features, personality traits and behaviour as possible future candidates for gene therapy. Both appeared in *BILD* and include: Aggressiveness; baldness; hair colour; height, intelligence and weight. The promotion of the prospects of gene therapy in *FAZ* focused strictly on the treatment and prevention of serious diseases, indicating strong, but not

limitless beliefs in science. In other publications, suggestions that gene therapy might serve purposes of human perfection, or be used to correct behavioural traits were now and again ridiculed. *Der Spiegel* even dedicated a special issue to enquiry into the complex relationship between modern medical science and magical endeavours and mysticism.

	British publications	German publications	Danish publications
<i>Text units</i>	421, incl. 76 Scottish	258	210
<i>Non-journalistic material</i>	10 per cent	15 per cent	30 per cent
<i>Writers</i>	100	100	70
<i>Concentration?</i>	10 journalists frequent, none dominant	In one paper, one journalist authored one third of the text units	Three journalists authored one third of the journalistic text units; 20 per cent of references to sources were to three persons
<i>Another player: Ref. to foundations and charities</i>	12 per cent, more frequent in Scottish material	none	almost absent
<i>Participation by politicians</i>	Almost absent	Some	Some
<i>Gene therapy main topic</i>	Almost half	Almost half	Two thirds
<i>The prospects of gene therapy: Qualifications</i>	15 per cent	40 per cent	30 per cent
<i>The prospects of gene therapy: Optimism</i>	High	Moderate	High
<i>Critique</i>	Rare	Frequent	Frequent (mostly in non-journalistic material)
<i>Utopian and dystopian visions</i>	Utopian visions frequent	Rare	Polarised: Utopian vs dystopian
<i>Ref. to gene therapy in the USA</i>	1 out of 5	1 out of 2	1 out of 5
<i>Ref. to overselling and disappointment</i>	Almost absent prior to mid-1995	From 1992 onwards	From late 1994 onwards
<i>Characterisations of scientists</i>	Scientists in general seen as level-headed	Scientists rarely characterised	Scientists often taken to be easily carried away
<i>Personality traits as possible gene therapy candidates</i>	1 out of 8	2 out of 258	1 out of 8

Table 1. Variations on a discourse: The three text bodies exhibited many different features. All figures are approximate and refer to estimated shares of British, German and Danish text units, respectively (each document of the material – whether for instance a journalistic background article, a letter to the editor or a book review – constitutes a text unit).

Different science communication logics

Recently, a rethinking of ‘the paradigm of science communication’ has been called for (Maesele, 2012). Actually, there seems to be traces in the material of two such

paradigms or logics – and more might be around – which can be seen as expressions of different ‘culturally specific knowledge-ways’ (Jasanoff, 2005, p. 255) and connected to different journalism models (Hallin & Mancini, 2004). Each logic, in this interpretation, condenses assumptions about science, scientists and the public into a set of science communication norms (see also Meyer, 2013). The respective merits and challenges of such possible science communication logics deserve attention, but here only aspects of relevance to the issue of hype are presented.

One is the logic of popularisation, founded on an understanding of science as the epitome of reason and realism, which should be communicated *to* a public of non-scientists. Science communication is the transmission *of* science to a public of non-knowers, assumed not to be susceptible to intellectual appeal. There is a radical division of sceptical labour: sceptical questioning is the prerogative of the scientific community and its disciplines. Dramatisation, sensation, fascination and simplification are features of science communication, often carried out by journalistic conveyors.

The popularisation logic predominates in the text body as a whole, with a good many variations of limited relevance to our concern. With its general absence of sceptical questioning and its abundant references to revolutions, breakthroughs and firsts, the British material appears as an archetypal example, emphasised by statements that the public should be taught that ‘science is good for you’, that science should be sold as ‘fun’, and that it should be considered a task to show non-scientists that ‘science can be interesting and exciting, not just boring and difficult’. In one instance, science communication is characterised in directly demeaning terms: ‘I’m a sort of pornographer of science. The role of being a communicator of science is far more ignoble than being a scientist. But someone has to do it’.

This logic, including some of its premises, has been criticised for decades (see for instance Hilgartner, 1990) and may – because it discourages sceptical questioning in public exchanges on science-related issues – serve to further rather than prevent over-optimism. It leaves scientists with either the whole responsibility for the prevention of hype, because they are the knowers, or with no such responsibility, because communication is not their business.

Because of its awe of science as an impersonal force represented by scientists, the logic comes with the risks of demonisation and polarisation: Awe of science as a force for good may easily turn into awe of science as a force for evil; and scientists may easily come to be seen as holders of malign rather than benign knowledge power (Meyer, 2006). There were indications in the Danish material of such hostile about-turns.

There were some dissenting voices in the British material. The case was made, for instance, that scientists would have to learn to listen to critique from other groups in society. That argument, however, might more easily be fitted into the logic of science discussion which appears to have been informing those publications, three German and

possibly one Danish (indicated by a spot test only), that tended to criticise rather than contribute to the exaggerated expectations. In continuation, it appears, of European traditions of intellectual public discussion and journalism (Meyer & Lund, 2014), they seem to have been assuming that their audiences were interested in and capable of dealing with scientific developments as public affairs on a par with other such affairs. Approaching developments relating to gene therapy like any other complicated, societal issue, the sceptical probing into the realism of, and the motivations and interests behind projects, was called for. Science communication was practised as communication *about* science-related issues.

Statements to such effects were made at a public meeting on the science-media relationship, comprising scientists and editors, and organised and subsequently reported by SZ. During the exchanges, ideas of “a separate code of ethics” for scientists were dismissed. There was no reason, it was argued, why scientists should not apply “the same moral standards” as “butcher[s]” in their shops or “GP[s]” in their clinics. Critique was made of a scientific “bunker mentality”. The task of “sounding out scientists” was presented as a basic journalistic task. Journalists should explain, but also “illuminate the darker sides” of scientific projects. Science journalists, being in positions that enabled them to “look in different directions”, seemed more suited to dealing with that sort of task than “specialists in their laboratories”. Journalistic activity of that kind, however, often resulted in angry reactions from scientists who were “not always conscious of their own emotionality” when “accusing the media of creating panic”.

THE BENEFITS OF DOUBT

Realism in science communication is a fragile and contested quality. In societies pervaded by continuous scientific and technological development, prospects of technological achievements are announced every other day, and there is no way of establishing whether current expectations concerning future outcomes of scientific projects are exaggerated. Some phases of innovation have been observed to be more hype-prone than others (Brown, 2003), but the occurrence of those tipping points that turn reasonable belief in science and scientists into rigid belief systems or downright superstition (Gadamer, 2001, p. 552), thus preparing the ground for hype, is hardly directed by general rules.

The discouragement of hype, viewed as an ethical science communication challenge, is, in other words, in need of continuous, deliberative attention. That challenge, it has been argued here, is shared by all participants in science communication and concerns the discouragement of over-excitement and inflated expectations.

The case has also been made that such inflationary processes, in turn, may be generated or curbed, to some extent, by different beliefs and basic assumptions; by different understandings of science, present as tacit premises in different cultural

contexts and science communication logics: Deep beliefs should be counted among the possible drivers of over-optimism in science communication and might be particularly difficult to deal with.

Further empirical and theoretical enquiry seems warranted. Comparisons of European discourses that took place two decades ago do not, of course, tell us anything about the present states of affairs in various parts of Europe. They do, however, suggest that different cultural contexts within Europe may harbour and be influenced by different basic assumptions about science and scientists. Serving as unspoken premises, such assumptions may co-shape, in unpredictable ways, those encounters with actual science which, in turn, trigger different political cultures into re-shaping themselves (Jasanoff, 2005). More specifically, it has been argued here that such cultural traits may be more or less conducive to over-excitement in science communication; and it has been suggested that limitless beliefs in science, coupled with an understanding of science – represented by scientists – as the epitome of realism might constitute a fertile breeding ground for overselling and hype, and hamper the exercise of reasonable doubt.

But how then, might the benefits of doubt, based on a reasonable belief in science and scientists, be extended to science communication in general? The recommendation that the scientific norm of organised scepticism (Merton, 1968) be expanded from the scientific community and its disciplines to encompass all participants in science communication is easily made (Meyer & Sandøe, 2012), but cannot be commanded into general use: It conflicts with deeply rooted cultural beliefs that are connected to traditions for radically separating science from society and, thus, are at odds with understandings of science as a societal institution (see also Longino, 2002). Awareness, however, that there are different understandings around might turn internalised beliefs into objects for critical enquiry and exchange; it might promote cultural self-awareness (Jasanoff, 2003, p. 290).

Such awareness, combined with the adoption of the discouragement of hype as a shared challenge, might be helpful in more than one respect: Concerted, practical efforts, requiring the conscientious cooperation of scientists, journalists and other participants in science communication, might, at the same time, actually further cautious approaches and serve as a learning exercise to science in society and to societies pervaded by science.

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