

1 The Public Image of Genes

Genes in the Media

This chapter is about the public image of genes. But what exactly do we mean by “public”? Here, I use the word as a noun or an adjective vaguely, in order to refer to all ordinary people who are not experts in genetics. I thus contrast them with scientists who are experts in genetics – that is, who have mastered genetics-related knowledge and skills, who practice these as their main occupation, and who have valid genetics-related credentials, confirmed experience, and affirmation by their peers. I must note that both “experts” and “the public” are complex categories that depend on the context and that change over time. There is no single group of nonexperts that we can define as “the” public, as people around the world differ in their perceptions of science, depending on their cultural contexts. We had therefore better refer to “publics.” The differences among experts nowadays might be less significant than those among nonexperts, given today’s global scientific communities, but they do exist. Finally, both the categories of experts and publics have changed across time, depending, on the one hand, on the level of experts’ knowledge and understanding of the natural world, and, on the other hand, on publics’ attitudes toward that knowledge and understanding.

This brings us to another important question: What is the relation between experts and publics? A long-held view is the so-called deficit model. According to this, scientific knowledge and understanding are transmitted by the enlightened experts to the ignorant publics, in an attempt by the former

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to educate the latter. This is a view in which experts always have superior status compared to publics. However, this is far from accurate. Both the way science itself is conducted and the way its findings are communicated have never been completely separated from their social contexts. In general, one might argue that science and society do not simply interact, but are co-constructed; science is done within society and cannot be demarcated from it. Therefore, the communication of the conclusions of scientists to the various publics is not a linear process of transmission. Rather, it is a process of constant interaction and negotiation.

In her detailed account of the popular images of genetics throughout the twentieth century, media scholar José van Dijck has shown that there has never been a clear separation between science and its images, in the same sense that there have never been clearly separated scientific and commercial or public and private domains. Thus, she argued that the mediation of science has not been the outcome of interactions between demarcated communities: the scientists who command knowledge and the journalists who command its public representation. Rather, the mediation of science has been the outcome of interactions “between various professional groups, who are not merely facilitators or manipulators of expert knowledge, but who are themselves active participants in a public definition of science.” Images of science are never mere illustrations of scientists’ practices, nor are imaginations mere reflections of people’s anxieties about these practices. Rather, images and imaginations are rhetorical tools in the construction of a public meaning, which are intricately connected. Van Dijck described the outcome of this connection as “imagination,” noting that “Rather than a linear diffusion of knowledge, ‘imagination’ assumes a recursive circular transformation of knowledge.” This circularity describes the “multi-layered dissemination of genetic knowledge.” As media and film scholar Kate O’Riordan has nicely put it, “It might be helpful to take media audiences as publics orientated towards mediated technoscience, rather than seeing audiences as orientated towards the technoscience of genomics through media.” In short, knowledge about genes and genomes is not simply diffused from expert-producers toward the nonexpert-consumers through the media. Rather, the media actively participate in the public representation of this knowledge. With this in mind, let us now look at how genes have been represented in the media.

If you look at media headlines, you will find several accounts of how genes affect various aspects of our lives. The general message conveyed in many cases is that there exist “genes for” characteristics. That genes affect biological characteristics – such as the color of our hair, eyes, or skin – is not news, of course. What is news, and what often features in headlines, is that genes also affect behaviors or life outcomes. For instance, an article on the CNN website titled “The star gene: next generation celebrity” includes photos of famous parents and children such as Kirk Douglas and his son Michael Douglas, Judy Garland and her daughter Liza Minelli, Henry Fonda and his children Peter and Jane Fonda, Martin Sheen and his sons Emilio Estevez and Charlie Sheen, Jon Voight and his daughter Angelina Jolie, and many, many more. What might the title of this article imply? That there exists a “gene for” becoming a Hollywood star. Aren’t you tempted to think that, besides the morphological similarity that is evident in many of these parent–child cases, there is also something else, like acting talent, that runs in families? As the CNN article states, there is: the “star gene.”

Other news articles make similar claims, reporting conclusions from research in genetics. For instance, an article in the *Financial Times* titled “Genes determine how young use internet and social media” reported that “Genes play an unexpectedly big role in determining how young people use the internet and social media, according to a large UK study of 16-year-olds.” Reporting on the same UK study, another article in *Science Daily*, under the title “Online media use shows strong genetic influence,” suggested that “Online media use such as social networking and gaming could be strongly influenced by our genes.” Genes have also been reported to impact financial success. This was suggested by an article in the *Daily Mail* titled “Being rich and successful really IS in your DNA: Being dealt the right genes determines whether you get on in life,” and by an article in *The Times* titled “Scientists find 24 ‘golden’ genes that help you get rich” (these two articles reported on different scientific studies). Could there be a “gene for” using social media or being rich?

And there is more. Did you know that your romantic life also seems to be affected by your genes? If you have a happy marriage, it may be due to your genes. “Key to a happy marriage? It’s in your genes, scientists discover,” an article in the *Telegraph* informs us. “This gene could be the secret to

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a happy marriage: study,” we read in the *New York Post*. Both of these articles reported on a study suggesting that people with a specific genotype (that is, a particular combination of alleles) were more likely to report higher satisfaction in their marriages. But what if your marriage is not a happy one? Again, genes may have the answer, because “Infidelity lurks in your genes,” according to the *New York Times*. This article reported on a study that found that “Women are more likely to cheat on their partner if they carry the ‘infidelity gene’,” as the *Daily Mail* also reported. And if you have no relationship at all, no worries! Companies like Gene Partner can analyze your DNA and find the perfect match for you because, as they state on their webpage, “Love is no coincidence!” What they do is “Matching people by analyzing their DNA.”

What is the message conveyed by media articles like these? Whether you have a happy, romantic relationship, an unhappy one, or no relationship at all may not be due to your choices or to those of your (actual or potential) partners. Whether you are rich or not may not be due to the hard work you did or did not do, or the circumstances you happened to experience or not experience. Whether your adolescent child spends a lot or limited time on social media may not be due to your parenting or to what they see their friends and other people doing. Whatever you did or did not do, whatever you could or could not do, may not be that important; genes are presented as the main causal factors for any of these life outcomes. The attribution of such outcomes to genes is actually a win–win situation. On the one hand, you are not to blame if you do not have a happy marriage, if you did not become rich, or if your child is addicted to social media, because there was nothing you could do – it is in the genes. On the other hand, other people or society at large are not to blame for how they treated you, for the opportunities they did not give you, or for the prevalent models that influenced your child, because there was nothing you could do – again, it is in the genes.

Several commentators have long argued that such media representations of genes can be misleading, and can perpetuate inaccurate conceptions about what genes are and, especially, what they can do. In 1991, epidemiologist Abby Lippman coined the term “geneticization” to describe the phenomenon of making overt attributions to genes:

Geneticization refers to an ongoing process by which differences between individuals are reduced to their DNA codes, with most disorders, behaviours and psychological variations defined, at least in part, as genetic in origin . . . Through this process, human biology is incorrectly equated with human genetics, implying that the latter acts alone to make us each the organism she or he is.

Quoting Lippman, biologist Ruth Hubbard presented a book-length account of several facets of our lives in which geneticization seems to prevail: our characteristics, disease, behaviors, education, employment, and more. In the afterword of that book she noted that

of course, everything that happens in our lives has a “genetic component.” But so what? The fact that everything we are and do involves genes in no way implies that knowing everything about their location, composition and the way they function will enable us to understand all of human health, and to predict, prevent, or control all diseases, and unwanted behaviors.

But why has so much power been attributed to genes?

Sociologists Dorothy Nelkin and Susan Lindee, in their analysis of the public representations of the gene, argued that “the gene of popular culture is not a biological entity. Though it *refers* to a biological construct and derives its cultural power from science, its symbolic meaning is independent from biological definitions. The gene is, rather, a symbol, a metaphor, a convenient way to define personhood, identity, and relationships in socially meaningful ways.” According to Nelkin and Lindee, the images and narratives of the gene in popular culture convey a message that they call genetic essentialism, which “reduces the self to a molecular entity, equating human beings, in all their social, historical, and moral complexity, with their genes.” According to them, “Today these narratives [of mass culture] present the gene as robust and the environment as irrelevant; they devalue emotional bonds and elevate genetic ties; they promote biological solutions and debunk social interventions.” This simply means that to a large extent who we are and what we do are largely determined by our genes; non-genetic influences such as environmental ones do not matter. This is a view of genetic determinism

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(though not explicitly defined as such) that is according to Nelkin and Lindee predominant in popular culture.

However, not all agree with the view that genetic determinism messages are widespread in popular culture. Rhetorical criticism scholar Celeste Condit, and her colleagues, conducted a systematic analysis of 653 magazine articles published during the twentieth century in the USA, in order to assess whether or not they conveyed messages about genetic determinism, defined as “the assignment of exclusive influence over human outcomes to genes.” They divided the twentieth century into four periods, having found that different metaphors about genes predominated in each of these periods. According to their analysis, the messages conveyed in magazines have not been more deterministic in more recent times than in the past. Nor has determinism ever been the most prevalent message, as there have been more statements about an influence by both genes and environment than about the influence of genes alone in all periods (Table 1.1). Therefore, genetic determinism was not the prevalent message in magazine articles in the twentieth century, at least in the USA, according to this study.

Another study analyzed how the gene concept has been presented in major national newspapers from the USA, the UK, France, and Norway. Science communicator Rebecca Bruu Carver and her colleagues analyzed how the gene was represented in 600 randomly selected, gene-related articles published between July 2005 and July 2008. The framework they used distinguished between the five following ways of framing the gene concept: (1) symbolic, referring to an abstract or metaphorical representation of inheritance; (2) deterministic, referring to a definite causal agent that might even act against environmental factors; (3) relativistic, referring to a predisposing factor; (4) materialistic, referring to a discrete physical unit; (5) evolutionary, referring to the central object of evolution, a marker for evolutionary change, or a factor that interacts with the environment. Carver and colleagues found that there was no overrepresentation of the deterministic frame as it was found in only one-sixth of the articles (Table 1.2). The authors concluded that older accounts of genetic determinism largely concerned symbolic representations of the gene concept, whereas actual claims of genetic determinism were not common in public discourse. In other words, recent newspaper

Articles with statements	1919–1934		1940–1954		1960–1976		1980–1995	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
No influence by genes (or pro-environment)	7	5	1	1	0	0	0	0
Influence by both genes and environment	79	54	44	61	60	61	60	66
Influence by genes only (or against environment)	45	34	27	38	39	40	31	40

Columns do not add to the total number shown or to 100 percent because some articles may include more than one or none of the statements.

Source: Adapted from *The Meanings of the Gene: Public Debates about Human Heredity* by C. M. Condit. Reprinted by permission of the University of Wisconsin Press. © 1999 by the Board of Regents of the University of Wisconsin System. All rights reserved.

Table 1.1 Genetic determinist statements in magazine articles published in the USA during the twentieth century

accounts in the USA, the UK, France, and Norway of what genes are and what they do have not been overtly deterministic.

Other science communication scholars have explored the representations of genetics in popular culture, especially in novels and films. Science communication scholar David Kirby has analyzed several science fiction films produced during the twentieth century, focusing on their treatment of eugenics. According to his analysis, during the first period (1900–1929) many films uncritically accepted “the eugenicist’s conception of humanity’s tainted animal heritage,” while at the same time warning that any attempt to alter human nature is either doomed to fail or to create soulless monsters such as those in *Frankenstein* and *Dr. Jekyll and Mr. Hyde*. The second period (1930–1949) is characterized by the same ideas, with films having two

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Frame	Symbolic	Deterministic	Relativistic	Materialistic	Evolutionary
Percentage Example	31.8 "I have inherited the shopping gene from my Mom."	16.2 "Researchers have found the gene for breast cancer."	13.5 "Genes increase risk of developing cancer."	25.6 "NPC is caused by a mutation in a gene on chromosome 18. Children with the disease have inherited two copies of the abnormal gene."	12.9 "Comparison between human and ape DNA reveals that some human and ape genes evolved very swiftly."

Source: Carver, R. B., Rødland, E. A., and Breivik, J. (2013). Quantitative frame analysis of how the gene concept is presented in tabloid and elite newspapers. *Science Communication*, 35(4): 449–475.

Table 1.2 Gene frames related to article topic (600 articles)

main themes: initially “mad evolutionist” characters who design evil experiments to show humanity’s connection to the animal world, and later Nazi-like mad scientists who aim to create super soldiers. The films of the third period (1950–1969) are characterized by concerns about a nuclear war and the subsequent effects of radiation, with very few films making any reference to DNA. During the fourth period (1970–1989), films focus extensively on genetic engineering and recombinant DNA technology, with the latter representing the most important threat. Finally, films during the last period (1990–2004) suggest that identity resides in genes and that any attempts to alter the genome would fundamentally change it. Despite the differences in the main themes and messages of the films of these periods, Kirby concluded that they almost uniformly convey the message that our fundamental nature lies within our genome, with the implication that this nature could be improved by genetic engineering. However, these very same films are critical toward any such kind of intervention by technological means. In this sense, the message conveyed is that the genome is sacred and so we should refrain from making any changes to it because we would thus alter its authenticity.

Film and literature scholar Everett Hamner has provided a detailed analysis of science fiction novels and films from the 1960s to very recently, identifying three kinds of narratives: (1) genetic fantasy, in which a new finding or tool is considered in distant-future or super-hero stories with the aim of commenting on the current situation; (2) genetic realism, where science fiction inspires technically detailed and plausible scenarios; and (3) genetic meta-fiction, where the fantastic and real are blurred. According to Hamner, genetic fantasy emerged first during the 1960s and the 1970s, when speculation about genetic recombination was popular. Genetic realism grew out of genetic fantasy after the Human Genome Project, during the 1990s and the 2000s, when technologies related to genes had advanced. Finally, genetic meta-fiction emerged more recently from the other two genres, describing a self-awareness about gene testing and editing. Hamner noted that these three narratives did not replace one another but rather overlapped, resulting in a cumulative rather than a successive trend. Differences notwithstanding, Hamner showed that in novels from all three genres there is a tendency to resist genetic determinism, for instance, by highlighting human uniqueness even in the case of clones, by rejecting the notion that genes determine fate,

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or by also considering the role of environment and culture as well as chance and choice. Overall, the idea of genetic determinism exists in science fiction novels and films, but it is often questioned.

How about television? Film scholar Sofia Bull has analyzed the representation of genetics in TV series and shows such as *CSI* and *House*, as well as various documentaries, sitcoms, and genealogy reality shows in the USA and the UK. Her main conclusion has been that in the beginning of the twenty-first century, notions of uncertainty and complexity, and ideas about the modifiability of biological processes and bodies, have gradually come to coexist with the older, established essentialist, determinist, and reductionist notions about DNA. As Bull argued, and showed with various examples, television functions as a cultural forum on genetics that stages multifaceted negotiations between long-standing essentialist ideas and the new genetics. For instance, genealogy TV shows convey the message that kinship and ancestry are ultimately located in, and determined by, genes. Bonds between “blood relatives” are overemphasized as they are considered to be more *real* or *true* than other social affiliations. This is based on an essentialist and determinist understanding of the genome as containing the blueprint of both identity and relatedness. However, on several occasions, programs also present insights from research in epigenetics (see Chapter 6) that highlight the complex and dynamic nature of genetic ancestry. Bull concluded that “Although essentialist perspectives have remained prominent on television, particularly across forensic crime procedurals, genealogy TV and family-centric reality shows ... distinctive elements of television’s visual form, narrative structure, production, distribution and reception has made it a key site for gradually imagining a more complex and indeterminate (molecular) world.”

Overall, one can conclude that whereas ideas about genetic determinism and genetic essentialism (and sometimes genetic reductionism) exist in the media, they are not the predominant ones and tend to coexist with ideas about complexity and multicausality, especially in the era of genomics. There exist, of course, individual cases where the impact of genes is exaggerated, as in the examples that I presented in the beginning of this section, but these are not the only ones. Let us now see what people’s beliefs about genes can be.