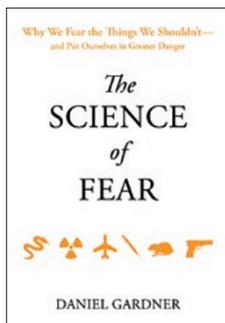


# BOOK REVIEW

## The fear factor



### The Science of Fear: Why We Fear the Things We Shouldn't—and Put Ourselves in Greater Danger

by Daniel Gardner

Dutton, 2008

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Reviewed by Alan McHughen

Biotechnologists, perhaps more than other scientists, are often puzzled as to why the public is so often anxious, if not outright suspicious, of their craft. “If only they knew the facts” is a common lament. As a result, biotechnologists may attempt to engage the public to explain the science and thereby mollify public wariness. Witness last year’s special issue of *Biotechnology Journal*, “Talking Biotech with the Public” (2, 1045–1188; 2007), and last June’s usually staid BIO International Convention including a session on public communication. But even after acquiring a reasonable understanding of the scientific facts, many people remain dubious and fearful. Clearly, there is more driving public anxiety than simply not understanding the technical details. Biotechnologists would benefit from understanding the complexities underpinning public fear—underpinnings not explained by science alone, and perhaps best explored by a nonscientist. In *The Science of Fear*, nonscientist Daniel Gardner teases out the fear factors rampaging through the anxious public persona, illuminating popular science phobia.

Gardner does not focus on biotechnology, but he does address familiar questions, including the long standing conundrum, “[T]he same person who doesn’t think twice about lighting up a Gauloise (cigarette) will march in the streets demanding a ban on products that have never been proven to have caused so much as a single case of indigestion.”

Molecular genetics is technically erudite and complex even for us scientists, but the mere thought of fallible humans messing with genetics conjures up scary images ranging from eugenics to so-called ‘Frankenfoods’. Opportunistic activists make a livelihood from scaring people about biotechnology, whereas there is little such cottage trade in instilling fear of astrophysics, mathematics or theoretical chemistry. And because the scientific community does not—and cannot—guarantee absolute safety of biotechnology or its products, the public infers a lack of confidence, a warning that fearsome disasters are inevitable.

True, scientists cannot prove that eating a genetically modified papaya will not harm the consumer. That disclaimer alone is sufficient to scare off many prospective consumers, who then happily eat a traditionally bred papaya similarly lacking any safety guarantee. In comparing the incorrectly perceived high risk of one food against the incorrectly perceived

low risk of the alternative food, consumers mistake the actual risk differential between their choices. Now, in the real world, the consequence of this dichotomy doesn’t usually matter, because both GM and non-GM versions of the papaya are safe, nutritious and unlikely to cause harm, so Joe Consumer is never forced to face and reconcile his confounding perceptions.

According to Gardner, radon gas kills some 41,000 people in Europe and the United States each year, in contrast to GM foods’ zero body count, yet people are far more afraid of GM foods than radon. Why? Because radon is ‘natural’, whereas GM foods are manmade, and therefore unnatural and inherently dangerous. In regard to papayas, the GM version is considered unnatural, while the traditional version is perceived as natural.

Gardner colloquially describes two human cognitive decision-making centers, Gut and Head. Gut, of course, from whence we get ‘gut reaction’ and ‘gut feeling’, is impulsive, emotional and subjective, whereas Head is logical, rational and objective. Gut is driven by emotions such as fear, and, if fear is a factor, the body follows Gut reaction with little rational analysis. Historically, all manner of fearmongering marketers (including anti-biotechnology activists) exploit Gut reaction, knowing they’ll make more sales and converts if people don’t look rationally and critically at what’s on the table. As Gardner shows, Gut doesn’t evaluate numbers and probabilities. A one-in-a-million chance of some personal catastrophe is a near certainty to Gut; the mere presence of a carcinogen—especially a synthetic chemical—at parts-per-billion concentration is a death sentence from cancer. Trying to hold a rational discussion with the fearful is futile, because the rational Head, overwhelmed by Gut fear, is rendered *hors de combat*.

These examples lead to Gardner’s not-so-stunning revelation: emotion trumps facts. Most of us who deal with the public already know that a ton of fact has no chance against a milligram of fear. So what do we do to overcome the fear and deliver accurate, factual information? Gardner suggests distinguishing the abstract statistic from the concrete, especially as applied to humans. In the context of agbiotech, saying 90% of farmers who try GM crop varieties choose to continue growing GM in subsequent years is less effective than saying “Nine out of ten farmers...” because the latter conjures up images of real humans, albeit in coveralls and with mud on their boots, who’ve made an informed choice, as opposed to the former, a mere intangible statistic. Almost forgotten in this exercise is the compelling veracity of the “nine in ten” or “90%” value. This is Gardner’s greatest gift to scientists: use the facts to buttress humans. The numerical superiority, the remote probability of harms, the confidence in the safety tests count almost nothing to the lay public in comparison to the impacts on real people.

Gardner reveals his nonscientific background on occasion, such as when he states, “Evolution has two driving forces: natural selection and mutation,” not quite connecting that these are two sequential components of the same driving force. But these are nitpicky criticisms, and certainly Gardner’s comprehension of science is much better than most non-technically trained journalists. *The Science of Fear* should be read by all scientists dealing with a questioning public, as it provides insights into the fear factors that preclude rational discussion of the real issues. But will it overcome and eliminate science phobia among the public? I’m afraid not.

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