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Public Acceptance of Synthetic Biology

NSTC Interagency Synthetic Biology Workshop Rockville, MD Oct 16-17, 2019 Barbara Herr Harthorn, PhD Professor of Anthropology, UC Santa Barbara

Today's talk

Expert views

Intro

Public acceptance of synthetic biology?

Sociotechnical integration

Experts and the lay public

Expert intuitive ideas about the lay public

Case #1

• The problem of public acceptance will be solved by increasing science education—True or False?

- The problem of public acceptance will be solved by increasing science education (aka *'public deficit'* idea)
 - Partially true at best; relationship between knowledge and perceived risk is complex and dependent on many other mediating variables, and often goes the other way
 - In syn bio case, Hart (2013) found more information increased risk not benefit views
 - Empirical question, need research to address

Expert intuitive ideas about the lay public

nature International weekly journal of science

specials

comments on this story

nature news home

Published online 9 December 2008 | Nature | doi:10.1038/news.2008.1290

opinion

News

news archive

Stories by subject

- Science in culture
- Policy
- Physics
- Chemistry

Stories by keywords

- Nanotechnology
- Public
- Survey
- Attitudes
- Opinion
- Religion
- Deficit model

This article elsewhere

Fearing the fear of nanotechnology

Hard data could help dispel scientists' preconceptions about the public, argues Richard Jones.

features

Richard Jones

Nanoscientists have always had a degree of nervousness about the way that public opinion of their science might unfold.

This unease is underpinned by a set of preconceptions about people's reactions to new technologies in general. Some of these assumptions have now been tested by three studies published in Nature Nanotechnology, which survey public attitudes to the science^{1,2,3}.



news blog

nature journa

Expert intuitive ideas about the lay public

Case #2

• The lay public need detailed technical knowledge to form *well-founded* judgments about the risks and benefits of new technologies.

True or False?

 The lay public need detailed technical knowledge to form *well-founded* judgments about the risks and benefits of new technologies

True or False?

- Clearly untrue and important to acknowledge
- Ex: iPhone
- Our public deliberations on a range of topics (nanotechnologies, geoengineering, energy system change, shale oil and gas development, climate change) demonstrate the social intelligence of diverse publics as they grapple with new technologies and their often conflicting potentials for societal benefit and harm
- Knowledge about the technical risks is also vital; just not sufficient.

Expert intuitive ideas about the lay public

Expert intuitive ideas about the lay public

Case #3

 Talking only about the potential benefits of the technology is best to persuade acceptance and avoid *producing* risk ideas and fear among the lay public

True or False?

- Talking only about the potential benefits of the technology
- Complicated/False—risk signal positively correlated with nano RP in our experimental work, but other variables, particularly application and source of message, are much more powerful predictors
- AND evidence from our nano case shows that **betrayal effect** is very powerful; if you first hype the technology and then risk events happen, you end up with higher risk perception (and eroded trust)
- More stable preferences are formed when you present:
 - alternative perspectives
 - range of possible outcomes
 - no hidden values (biases)—including the bias that you must achieve acceptance
 - quantify risks
 - quantify benefits

Expert intuitive ideas about the lay public



Responsible Research & Innovation: EU cross-cutting framework for an ethical innovation system

- Anticipatory—works to incorporate ethical practices 'upstream,' early in research and innovation
- *Participatory*—inclusive public and other stakeholder participation
- *Reflexive*—reflection on S&E actions and impacts
- *Responsive*—incorporates change in response to the above

"bring issues related to research and innovation into the open, anticipate their consequences, and involve society in discussing how science and technology can help create the kind of world and society we want for generations to come"

Earlier iterations: Technology Assessment (TA) (Rip, Misa, & Schot 1995) and Anticipatory Governance/participatory TA (pTA) (Guston & Sarewitz 2002; Marris & Rose 2010); RRI (Owen, Bessant & Heintz 2013)

Public acceptance of synthetic biology



Public participation why involve the public?

- Normative/ethics—right thing to do
- Useful thing to do
 - Instrumental (e.g., gain trust, cooperation)
 - Substantive (e.g., useful local knowledge)

Terms & definitions

- *Risk*--most often defined by two factors:
 - probability of harm
 - magnitude of harm

(where harm refers to threats to humans and things they value)

- Risk perception (RP) refers to "people's beliefs, attitudes, judgments and feelings, as well as the wider social or cultural values and dispositions that people adopt towards hazards and their benefits"
- *Risk acceptance in RP terms refers to* the risk vs. benefit judgment (RvB), i.e. do the risks outweigh the benefits, the benefits outweigh the risks, or are they about the same?

Sources: Pidgeon et al. 1992; Slovic 2001;Kasperson et al. 2003; Bodemer & Gaissmaier 2015

The Nested Influence Diagram for Risk Perception



Source: <u>https://ec.europa.eu>environment>integration>research>newsalert.pdf</u> from Renn & Rohrmann 2000a

Contextual factors in emergent risk perception

- Context matters a great deal
- Very low public awareness—survey data show 17-25% awareness in US
- But syn bio innovation is much farther 'downstream' in terms of development, potential for scale up than nano
 - Discrepancy between public awareness and potential rapid scale up make addressing public participation urgent
- Risk governance highly predictive of public trust, which in turn is highly predictive of greater tolerance for risk
- Media coverage—signal amplification, focus on dystopic or miraculous

Social scientist intuitions about the lay public and nanotechnology acceptance

Case #1: nanotech deliberations in US and UK comparing public views on nanotechnologies for energy and for medicine. Anticipated :

 Medical technologies like 'lab on a pill' for cellular cancer diagnosis and treatment would be seen as widely beneficial and hence would be more acceptable.

- Medical technologies would be seen as more acceptable.
 - Energy technologies → unmitigated positive views (no risk info uptake)
 - Medical technologies → highly ambivalent views—high perceived benefit, with high social risk due to distributive justice issues, and unresolved human enhancement issues

Social science counterintuitive findings

Pidgeon, Harthorn et al. 2009 Nature Nano 4

Social scientist intuitions about the lay public and nanotechnology acceptance

Case #2: nanotech survey research in US on 'nanotechnology' general category. Anticipated results:

- Public risk concerns would focus on media-driven concerns about CNTs, sunscreens, environmental contamination, human health hazards OR
- Technological characteristics that escalate RP: novel, invisible, uncontrollable, scientific uncertainty re: risks, no way to know if exposed, ubiquitous, involuntary exposure
- In the absence of a risk event, public views would anchor in biotech/GM or S&T attitudes more broadly

- Public risk concerns would focus on mediadriven concerns
 - Wrong. Prominent risks public concerned: Inequality & justice (re: both benefits and risks); new technologies as job loss (or inaccessible benefits);"greedy corporations" putting profit ahead of public safety or benefit
- Multiple risk object characteristics will cause amplification of risk:
 - Wrong. Low awareness of nano and largely benefit-centric views, persisted in spite of escalating media coverage and some plausible 'risk events' incl. regulatory debate
- In the absence of a risk event, public views would anchor in biotech/GM or S&T attitudes more broadly
 - Partially true. People did draw on S&T ideas, but also on many sources and imagined futures to make sense of 'nanotechnologies'

Social science counterintuitive findings

Sources: Scheufele et al. 2007 Nature Nano; Conti, Satterfield & Harthorn 2011; Harthorn et al. 2011

Social scientist intuitions about the lay public and synthetic biology acceptance

Case #3: Focus groups with US publics on **synthetic biology**. Anticipated results:

- Negative views would dominate, due to GM and declining trust in science, industry, and government
- People would be primarily be concerned about the moral threats posed by 'creating synthetic life'

- Negative views would dominate, due to GM and declining trust in science, industry, and government
 - Wrong. Views have been mixed but primarily benefit-centric [these should be seen as conditional]
- People primarily concerned with moral threats
 - People mainly concerned about safety, containment of new forms from possible environmental dissemination
 - Lack of trust in containment promises or reversible switches
 - And unhappy about public bearing the risks so a few tech people could get rich
 - Not concerned about biosecurity issues

Social science counterintuitive findings

working assumptions about public risk and benefit perceptions of synthetic biology

- Benefit perception and risk perception both important, but increasingly *trade-offs* essential to understand (and can't assume what they are)
- Safety as risk issue
- Important not to frame in moral term to the exclusion of other evidence-based concerns
- Natural/unnatural 'synthesized'
- Scientific uncertainty re: risks, characteristics
- Ambivalence prevalent—low RP NOT = pro-tech; conditional support not same as 'acceptance'
- Justice & trust key; power and inequality concerns pervade
- Technology itself less likely than applications to drive perception
- Perceiver characteristics (demographics, past experiences/exposures, privilege) important
- Environmental risk seen as collective; health risk individualized
- Some applications unlikely to find support in any case: food additives

Source: Harthorn, Satterfield & Pidgeon 2019 in press

In sum, my definitive answer to predicted public acceptance (or not) of synthetic biology?

It depends

It's complicated

Sociotechnical integration



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Harthorn, Satterfield & Kandlikar 2019- work in progress