



Establishing Expertise in Public Deliberations on Nanotechnology

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The Problem

Nanoparticles and nanotechnology products are actively used throughout industry and academia, and in many consumer products. However, the potential health and environmental effects of nanomaterials have not been thoroughly researched. Historically, the public has not been involved in the development of new technologies though they are affected greatly by its effects.

CNS Research

The Center for Nanotechnology in Society studies the social implications of nanotechnology research, and in particular how the public understands nanotechnology. Using a series of public deliberations on nanotechnology hosted in 2009, CNS analyzes many different aspects of how the public communicated about nanotechnology.

New Analysis

This project focused on how participants in the 2009 deliberations used various forms of expertise to communicate about nanotechnology. The most common types of argument used by the participants were personal experiences, analogies, hypothetical situations, and appeals, and were used either for or against nanotechnology, research, or regulation. By organizing all of the arguments made by the participants, the project endeavors to find patterns in how the public communicates about nanotechnology.

In 2009 the Center for Nanotechnology in Society held a series of deliberations with members of the general public. In these deliberations, the participants were given a short presentation on nanotechnology, and encouraged to read various articles on nano-ethics, applications, and research. The goal of this research is to understand how the participants communicated their perceptions of nanotechnology to others, and how they related the issues to their own lives.

The Sample:
Representative of Santa Barbara's Various ethnicities, ages, education, and income
10-15 people per day
6 days of deliberations
2 Topics: Health & Human Enhancement and Energy & Environment
3 Groups: Mixed-sex, All-Male, All-Female

Nanotechnology Risk/Benefit Deliberations

Initial Large-Group Discussion

"Nano" Article Reading

Final Large-Group Dialogue

Pre-Discussion Survey

Presentation on Nanotech Risks and Benefits

"World Café" Small-group discussion

Post-Discussion Survey

The Pre-Survey provided background data on the age, race, education, and income level of the participants

By comparing the questions from the pre and post surveys, we were able to gauge how significantly the participants' opinions changed as a result of the deliberations.

The Sample

Coding

The deliberations amassed over 400 pages of transcripts and many hours of audio to read, analyze, and code. The actual coding process took several weeks, in which researchers would read through the entire set, develop a coding methodology, and re-read and edit the transcripts.

Argument Types

This project used a coding methodology based on the participants' demonstrations of expertise. Our goal was to understand how the public asserted expertise on complex and uncertain matters such as the risks and benefits of nanotechnology. Therefore, when participants used their personal and professional experiences to assert expertise about nanotechnology, the argument was coded as a Personal Experience.

Personal Experience

Telling a story from their life that influences their perception of nanotechnology
Example: "I was executive vice-president of the Canadian Primary textile industry... we always had the bottom line in view but we were very responsible in setting these standards and self-policing... we got the support of various government departments"

Hypothetical Situation

Arguing against a potential scenario that could occur as a result of nanotechnology
Example: "If you are photosynthesizing instead of eating what does that do to your digestive system?"

Appeals

a request or reference to a certain perspective or value
Example: "... if we don't have any more technological advances we're all gonna die" - Appeal to Consequences

Analogies

showing a similarity between the features of two things
Example: "... it might just be a shell game where you cleaned the water, you cleaned the air, but then it might create new problems"

Pro-Technology
Or
Anti-Technology

Pro-Regulation
or
Anti-Regulation

Pro-Research
or
Anti-Research

The Pre and Post Surveys asked questions about prior knowledge of nanotechnology, level of comfort with the issues, and perspective on the risks versus the benefits. This allows the researchers to quantify how much the participants' perspective on nanotechnology changed as a result of the deliberations.

The race, gender, income, and education level of each participant is also noted in the Pre-Discussion Survey, and is added to the aggregated data. This information allows researchers to look for patterns in the types of arguments used by the different sub-groups.

Entering Participant Data

Background information for each participant added in

Argument	Female	Male	Grand Total
Analogy to Antibiotics	1	1	2
Analogy to Asbestos	2	5	7
Analogy to Avian Flu	0	2	2
Analogy to GE foods	0	3	3
Analogy to Healthcare	0	1	1
Analogy to Pharmaceuticals	0	2	2
Analogy to the Internet	2	4	6
Analogy to TV	1	1	2
Appeal to Consequences	19	44	63
Appeal to Ethics	26	20	45
Appeal to Ignorance	4	4	8
Appeal to Probability	3	0	3
Appeal to Progress	12	18	30
Appeal to Tradition	30	8	38
Hypothetical	36	53	89
Personal Experience	67	81	148
Professional Experience	12	15	27
Grand Total	215	262	477

Women & Men
One goal of the research was to find significant differences in how men and women communicate about nanotechnology. The hypothesis was that women share personal experiences more often than men when discussing the risks and benefits of nanotechnology. Our analysis found more instances of personal and professional experiences being used to assert expertise by men than by women.

Limitations
The project is still at a very early stage, so the number of significant findings is still small. Given the short duration of this internship, there was little time to read very much primary text and develop a unique methodology to properly analyze the transcripts. Some of the limitations of the study were that not every single utterance could be categorized into the four major categories, and often it was unclear what the participant was arguing in favor of.

Sorting & Analysis

Conclusions

Future research
Coming research may analyze the flow of arguments throughout the conversations to see how participants' opinions influence each other, and may also look for patterns in the backgrounds and dispositions of the participants prior to the study. It may also be beneficial to note the subject-matter of each argument to see which subjects are the most controversial.

Whites & Non-Whites
Questions often arise as to whether different races have different perspectives on technology and other things. With this data, we can examine whether there are significant similarities in how whites and non-whites understand and assert expertise on nanotechnology, either for or against Technology, Research, or Regulation. If there are significant patterns, this may lead to greater understanding of how certain sub-sectors of the public perceive the risks and benefits associated with nanotechnology.

Group	Direction	Non-White	White	Grand Total	
All Female	Ambivalent	1	0	1	
	Anti-Regulation	1	0	1	
	Anti-Research	5	1	6	
	Anti-Tech	6	18	24	
	Pro-Regulation	14	12	26	
All Female Total	Pro-Research	6	7	13	
	Pro-Tech	28	20	48	
	All Female Total	61	58	119	
	All Male	Ambivalent	4	3	7
		Anti-Regulation	2	5	7
Anti-Research		19	51	89	
Anti-Tech		2	9	11	
Neutral		7	17	24	
All Male Total	Pro-Regulation	0	1	1	
	Pro-Research	14	7	21	
	Pro-Tech	14	7	21	
	All Male Total	67	162	229	
	Mixed Gender	Ambivalent	1	0	1
Anti-Regulation		1	3	4	
Anti-Tech		11	26	36	
Pro-Regulation		6	23	29	
Pro-Research		7	7	14	
Mixed Gender Total	Pro-Tech	22	56	78	
	Pro-Tech	7	1	8	
	Pro-Tech	7	1	8	
	Pro-Tech	7	1	8	
	Pro-Tech	7	1	8	
Grand Total	Mixed Gender Total	57	114	171	
	Grand Total	185	334	519	

