Exploring the organizing and social properties of nanoscale materials in conversation

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Motivations and Backgrounds

- Proximal: College textbook publishing industry (1997-2006)
- Distal: A certain kind of knowledge transfer in the Middle Ages (Spain/France, 10th-13th centuries) (the nineties)

- Interest in the coordination of collaborative endeavors among partners who are performing as representatives of a host of heterogeneous organizations and institutions.
- Centered around technology products and technology development from basic academic research.

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The site of this research project

- NSF-funded Science, Technology, and Society Initiative in a state university

- Within the STS Initiative, one research group focusing on the societal implications of nanoscience

- A three-hour long roundtable meeting for launching the research group

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The theoretic-methodological framing/lens

- Summarized in the diagram circulating (**Figure 1.1 Purification and translation,** page 11.Bruno Latour (1993)*We have never been modern*. Cambridge, Massachusetts: Harvard University Press.
- Latour's contention in book: The clash between the **officiality of purities** and **the clandestinity of hybridities** is becoming more salient in our everyday life. The "technosocial" is a case in point.
- Latour's proposed solution is to acknowledge (theoretically/analytically) the existence of hybrids officially, too (i.e. in general, we may need lenses that don't take entanglements for granted or that are regarded as analytical "oxymora")

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Translation vis-à-vis Purification

- The practice of translation creates hybrids of nature and culture via sociomaterial networking. The second set of practices is purification. In the case of hybridities of the human/nonhuman, or nature/culture, forms, human beings are meant to be kept analytically separate from nonhumans through purification. In order for these two sets of practices to continue to be effective in defining society as "modern," they must remain separate.
- To maintain the purity of essences, to qualify as "being" (i.e. existing materially recognizable and semiotically meaningful), an entity must be either "human" or "nonhuman." *Culture and sociality are the sole affairs of humans whereas nature, science, and technology are the sole affairs of the purely nonhuman entities either under our control or on their way to becoming controllable.*

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So, from the lens to the empirics

- I want to illustrate some of the material-semiotic *micro*-instances of purification and hybridization being carried out by the roundtable participants sequentially (in chronological order) through two consecutive episodes (**1:** "**Defining nano**," and **2:** "**Regulating nano**")
- That is, my analytical account is built on the conversation in the order in which the humans gathered were conversationally unfolding the issues sequentially.

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The phenomenon of interest **via my empirical focus**

- **A concrete roundtable conversation on the societal implications of nanoscience** wherein I look discursively, in conversation, into organizing "non-human" technoscience by the humans in attendance, given that this technoscience effécts "impacts" "on" society.

- How is technoscience inscribed with and embedded within semiotic programs (i.e. how it is "spoken for") according to the speakers' interests and the institutional roles they are performing, **this roundtable case being the empirical focus of these observations on the discourse produced on the occasion.**

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Data and occasion description

- The proceedings were audio-taped, then digitized, and finally transcribed.
- The roundtable consisted of seventeen people, including myself, then a first-year doctoral student. The gathering represented a heterogeneous group of professional, institutional, disciplinary, and epistemological perspectives.
- The meeting was the kick-off forum for defining potential research agendas for the group.

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Analysis of the conversation segment

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Overview of this analysis 1 ~ Episode 1

First, specific conversational strategies that some roundtable participants employ in order to purify the "social" realm from a "techno-scientific" one.

(1) framing the discussion per the official disciplinary-epistemological technoscientific definition of nanoscience;

(2) invoking the definition of an expert (the bench scientist's) community of practice;

(3) creating an institutionally sanctioned obligatory point of passage when defining the research agenda of the roundtable

(4) reducing the life cycle of the nanoparticle-human interactions to that of R&D (i.e., up to the manufacturing stages);

(5) suggesting to leave out of the discussion scenarios involving nanoentity-human interactions by asserting that other communities of expertise (e.g. the legal and the regulatory communities) are already taking care of these other issues.

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Overview of this analysis 2 ~ beginning of Episode 2

- Second, my analysis intends to **bring to visibility representations of a less reducible, hybrid "techno-social" realm,** being also spoken for in the course of the roundtable conversation.
- In the case of Episode 2 (and others), hybridization tends to happen discursively via contestations and counter-contestations to the claims expressed by certain participants at certain moments:
- ***How does it happen specifically?*** In contesting the claims, participants bring to visibility broader actor-networks for consideration in defining the "societal implications of nanotechnology," thus opening for examination the relatively purely-defined (black-boxed) actor-networks **of technoscientific officialdom**.

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Clandestine-poetic hybridities at the outset

The following comment made by the facilitator of disputes among scientists opened up the roundtable conversation.

[Episode 1: "Defining nano"]

- *[S]omeone commented yesterday about people using the same term to refer to different things. And at the outset of a conversation like this, where you look at a term like nanotechnology, it reminds me of, in the beginning of one of Foucault's works he cites Borges, who talks about the Chinese dictionary definition, and you have these incoherent, unrelated things, that are linked …and I wonder if we remembered that with respect to a conversation about nanotechnology, of doing exactly the same thing, so that people would be speaking about something in terms of the implications of or regulations of nanotechnology, and they may not even be talking about the same thing 'cause it's such a disparate range of…materials and research areas that are included under that heading. Is there a need for any kind of clarification?*

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Purification strategy 1: Framing the discussion per the official disciplinary-epistemological technoscientific definition of nanoscience

[Communication scholar] There is an official definition promulgated by the National Nanotechnology Initiative , which really doesn't solve the problem.

[Facilitator of disputes among scientists] Yes. I know, I've seen that definition; I'd rather go with Borges.

[General laughter from all in the room.]

[Facilitator of disputes among scientists] At least it's poetic!

[General laughter.]

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Purification strategy 2: Invoking the definition of an expert (the bench scientist's) community of practice

[State-level EPA official] *I think this also came up at this workshop a couple of weeks ago and that for what it's worth* ***that the laboratory researchers in Bio and health and others, microelectronics, said that they prefer to use the term*** **engineered nanoparticle** ***to at least focus on the places where humans are manipulating the size of particles that they are producing and therefore*** *[five seconds of clear tape, 29:55-30:00] …characteristics. I don't know if that helps or not but I know in the world of engineering a lot of times you see … not an engineered particle per se…*

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Purification strategy 3: creating an institutionally sanctioned obligatory point of passage when defining the research agenda of the roundtable

Purification strategy 4: reducing the life cycle of the nanoparticle-human interactions to that of R&D (i.e., up to the manufacturing stages)

[Technology transfer officer] *Yesterday I thought [a former captain of industry] did a wonderful job in framing that argument or perhaps more accurately framing the dilemma, because nanotechnology, its definition, is this irrational abstraction and it basically addresses all things small or the ways in which you make these things very small, so [it encompasses] both the processes and the products, so from the material sciences perspective you can't separate the two, but in fact maybe from [University Campus 1's] perspective, there is a selfish definition that I can try to insert here …: How you make a small particle, how you…[how] did you make this small feature, what that particle with a small feature is, so from that selfish standpoint, the people on this campus are probably more interested and the issues around the processes than they are on the particle. We may not want to accept that restriction but that's just a statement of that.*

[Roundtable facilitator] *Well I think we should get a sense of the range…*

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Purification strategy 5: Suggesting to leave out of the discussion scenarios involving nanoentity-human interactions by asserting that other communities of expertise (e.g. the legal and the regulatory communities) are already taking care of these other issues

[Technology transfer officer] *I'm thinking in terms of in terms of process now, not so much the science. Yesterday we heard a perspective that regulatory agencies are all working on this stuff, I think this is something you can all believe, in in industry, at least these last 10 or 15 years, it's called "quality management," "Six Sigma," and processes like that [are] taking hold in industry, when you're facing that dilemma, you do something like a Pareto analysis, "what are either either my biggest problems or what I perceive to be the biggest problems," and you tackle those things first instead of trying to tackle all the world's problems.*

[Transitioning to Episode 2: Regulating nano]

[State-level EPA official] *I might move us in a… I might lead on a different path… what we are all talking about is assuming that there is general oversight and coordination of research on focusing on specific areas, such as toxicity or some kind of umbrella coordinating where the greatest risks are, and where the bulk of research should focus, and in a strategic manner, and for what I understand, something like that doesn't exist in a coordinated way like that, and I think that that's one of the themes that came up yesterday that we [may want] to address today*

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Contestations: rendering visible other—relatively more hybrid—actor-networks

The last excerpt above already illustrates an instance whereby micro-purifications performed by a human representative of technoscientific actor-networks (the campus TTO) are contested by a representative of official environmental actor-networks (the state-level EPA officer).

[Science policy scholar] *I think that the other thing you have to be aware about is that there's a lot of people have a vested interest in so I guarantee you that the gov't is giving out millions and millions of dollars to researchers and industry that are not doing nanotechnology based on the NSF research. So there's an awful lot of people that are doing micro-based research and essentially before they're doing… they usually gets stuck… Around the NIH… So there's this huge pot of money out there and that causes a certain amount of ambiguity so there's ambiguity on the science side and certainly there's ambiguity on the side of the NGOs that they use, later use, the definition for… since their purpose is to get public attention, there's a lot of ambiguity in the interface between science and the public. The public really doesn't understand so I think it's, I wouldn't say, we can obviously trying towards a, towards a possibly [ ] a precise definition but a lot of the really interesting interactions between science and the public, and science and the government happens because there's ambiguity and because that there is a vested interest … I think we have to…*

[Science policy scholar] *Strategic ambiguity: to get more money, to get more attention, to be able to leverage gov't, one thing or another, but it's important to understand the the dynamic that driving people not to define it, so if we can come up with the definition I would think, I hope it's this group who would publicize some of the dynamics of why in fact people don't want to define it*

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Contestations, cont.

[EPA science advisor]*I liked what [the TTO] said about processes, how to define them differently based on the process, and with regard to strategic ambiguity and that thing, I care about what the public knows, and more importantly, I care about what the regulatory agencies that are responsible for the government, so even though I like "processes," I don't know what that final product is specifically, so having the appropriate characterizations of the product would be absolutely essential, …any other characterization responsibilities associated with regulation can't do without it: process won't matter, it's going to be the end product that's coming out that's going to be the…, so I don't know whether this part of my response [is] not in terms of how you want to define things, … but it's the end-product that I am going to need it*

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Counter-contestations and counter-purifications

- The technology-transfer officer counter-contested this disorienting representation of hybridity by subjecting the "irrational abstraction" to further disciplining. Already he had semiotically endowed his argument with institutional legitimization (the purification practice of assembling—linking—the "real," technical meaning of nanosciece and nano-materials to rhetorical resources such as yesterday's trustee's "wonderful job in framing … this irrational abstraction," or aligning today's campus initiative on societal effects with the already specified NSF-NSEC actor-network technoscientific program, of which professional community of practice he is part, and for whom he is a representative at the roundtable meeting).
- [Technology transfer officer] *I think that there's a way to address that as well, or at the least to address these irrational abstractions. And maybe it's to separate where nanotechnology is used to make a bulk object that just has very fine features on it, which it should be, from the safety health safety environmental health standpoint, reasonably benign. Ah, now, what does a silicon chip with micrometer scale lines on it versus a silicon chip with nano-meter scale lines on it, it shouldn't be any different from those safety environmental standpoints. And separate that from making nano-sized particles, [making] functionalized nanoparticles, because now we're talking of something that is really the size, sub the size of the cell, and can adversely interact with the human, animals, things in environment.*

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Concluding remarks

- Purification and hybridization practices were observed in a sort of oscillatory motion, that is, alternating between one and the other practice. The oscillation also happened in the opposite direction, as in the cases where proposed "clandestine" hybrid forms were subsequently subject to disciplining of specific kinds.
- The chosen conversation segment might thus be analytically organized or re-narrated as statements from human representatives and the contestations to these representatives of certain disciplinary perspectives, realms of professional activities, and/or communities of practice. In the context of their contestation, these "contesting" human representatives were "material vectors" translating the inscriptions of their disciplinary understandings, praxes, and objectives into what nano "is about" societally, or how it plays out, is playing out, or might play out "in" human affairs.

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Discussion

This is a work in progress. I'd appreciate feedback from the audience right now or any other time in the future.

Thank you!

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