Gender, Race, and the Complexities of Science and Technology
A Problem-Based Learning Experiment

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Class Place & Time: MIT Bldg 2, Room 151 **EXCEPT** for 1/29 in 32 room 144 (map) & 5-8pm
Thursday 1/29 thru 5/14, semester break (no class) 3/19 & 3/26
Class listserv: grst@googlegroups.com
Course wikipage: http://sicw.wikispaces.com/GRST09 -- bookmark this site to check on updates, links to handouts, etc.

Description
What can we learn about science and technology—and what can we do with that knowledge? Who are "we" in these questions?—whose knowledge and expertise gets made into public policy, new medicines, topics of cultural and political discourse, science education, and so on? How can expertise and lay knowledge about science and technology be reconciled in a democratic society? How can we make sense of the interactions of living and non-living, humans and non-humans, individual and collectivities in the production of scientific knowledge and technologies?

The course takes these questions as entry points into an ever-growing body of work to which feminist, anti-racist, and other critical analysts and activists have made significant contributions. The course also takes these questions as an invitation to practice challenging the barriers of expertise, gender, race, class, and place that restrict wider access to and understanding of the production of scientific knowledge and technologies. In that spirit, students participate in an innovative, problem-based learning (PBL) approach that allows them to shape their own directions of inquiry and develop their skills as investigators and prospective teachers. At the same time the PBL cases engage students' critical faculties as they learn about existing analyses of gender, race, and the complexities of science and technology, guided by individualized bibliographies co-constructed with the instructors and by the projects of the other students. Students from all fields and levels of preparation are encouraged to join the course.

SECTIONS TO FOLLOW IN SYLLABUS

Additional material on Course Wiki, http://sicw.wikispaces.com/GRST09

- Objectives & Theory
- PBL Guided Tour, including examples of previous students' work
- Scenarios for Problem-based learning cases
- Resources II: Materials suitable for Provocative cases & Reading lists
- Evolving Annotated Bibliography (pdf version as of 9 May 09: GRST09Biblio.pdf)
- Notes on assignments, other expectations, grading system
- Signup page for bringing refreshments
- Links to student wikipages
- Evaluations and proposed further development

Overview

Despite the importance of science and technology in society, this realm remains relatively insulated from wider public deliberation. (There are, for example, fields of art and literary criticism, but “science criticism” is not a widely accepted enterprise.) With the goal of promoting a wider range of engagements in science and technology, this course stimulates interdisciplinary inquiry, pedagogical, conceptual and practical innovation, and epistemological self-consciousness through provocative PBL cases that put into play a variety of resources. These resources might include: the diverse interests, skills, commitments, and passions of the instructors and the students; annotated bibliographies, syllabi, and review essays—especially material contributed by feminist, anti-racist, and other critical analysts of science and technology; the rich personal and intellectual connections made easier in this internet age; and the instructors’ experience in stretching students beyond disciplinary and conceptual boundaries. The course project provides the opportunity for students to develop their own cases for teaching, prepare grant proposals for further inquiry or activist engagement, or construct syllabi around topics in feminist and critical studies of science and technology.

Throughout the semester we navigate between, on one side, our divergent, reticulating explorations of the implications that each of us sees in the cases and, on the other side, a disciplining of these explorations by building audiences and collaborations around individual and shared knowledges and tools. Both aspects of the course process are animated by a profound question of practice: “What can we do with the knowledge we generate for ourselves and others.” Of course, what can we do depends on who “we” identify with (which field, discipline, research project, social group, level of expertise…). The question also requires us to convince some audience of our knowledge claims and of the value of our questions for further inquiry. To that end students have to address the bodies of substantive knowledge most relevant to their individual inquiries (guided by review essays in anthologies/handbooks, original scientific literature and informants identified by the instructors) and to translate that knowledge into terms digestible by to the rest of us with different levels of expertise around diverse (sometimes divergent) bodies of knowledge.

The PBL approach taken in this course makes the rest of the syllabus look incomplete—it doesn’t meet conventional expectations of weekly topics, readings, and pre-defined assignments. Browsing the links on the wiki will give some feel for what might lie ahead, but the essence of the course is that we make the road as we travel. Of course, once we have done this once in the Graduate Consortium, we can show future students what happened last time. But even then each offering, each collaboration of students will result in a unique construction.

Resources I: Key Texts

Required:
Hackett, E., O. Amsterdamska, et al., Eds. (2008). The Handbook of Science and Technology Studies. Cambridge, MA, MIT Press.

Recommended as sources to borrow or refer to copies in the GCWS office (Bldg 16, Room 287):
Clarke, A. (2005). Situational Analysis: Grounded Theory after the Postmodern Turn. Thousand Oaks, CA, Sage.
Creager, A., E. Lunbeck, et al., Eds. (2001). Feminism in Twentieth-Century Science, Technology, and Medicine. Chicago, University of Chicago Press.
Law, J. and A. Mol, Eds. (2002). Complexities: Social Studies of Knowledge Practices. Durham, Duke University Press.
McNeil, M. (2007). Feminist cultural studies of science and technology. London: Routledge.

Requirements

A sequence of written assignments (which will average 800 words) and presentations on the PBL cases leading up to a final course project. Options for the course project include piloting PBL cases that students write (with the class serving as their students); a grant proposal (students get a chance to present drafts of grant proposals with the class serving as the jury); or a course syllabus. As the course evolves more detail about the assignments will be provided by email and on the course wiki (as links to the).

Participation requirements included active participation based on preparation between classes, interaction between classes through email, conferences on your assignments and projects, commenting on each other's drafts, and adding an annotated reference to the evolving wiki bibliography each week. It is expected that you will spend at least 6 hours per week outside class time reading, researching, and writing.

Grading: An unconventional assessment system complements the innovative pedagogy. The written assignments are commented on but not graded. Students receive the full grade for the assignment after they revise thoughtfully and resubmit in response to comments received on the initial submission. This system keeps the focus on interaction around written work and presentations that emerge from participation in the unfolding dynamics of the course. The assessment system also accommodates the contingencies of student's lives by allowing a fraction of assignments to be skipped without penalty. Students keep track of their submissions and revisions on an assignment checklist.

Written assignments and presentations (2/3 of grade)
(6 points for each assignment submitted and revised in response to comments and for each presentation made up to 54 points max, i.e., 9 of the 12 completed.)

Participation and contribution to the class process (1/3 of grade)
(2 points gratis + 1 point each item completed, up to 26 max, i.e., 24 of the 33 items)

a. Participation in class meetings based on Preparation between classes (=13 items)
b. Annotated reference or resource (=person, organization...) added to the evolving wiki bibliography (each week except 1 & 13) (=11 items)
c. Email contribution to discussion on the course email listserv or exchange with the instructors (at least 5 weeks = 5 items)

d. Minimum of two in-person or phone conferences on your assignments and projects--one before session 5, the other before session 11; one with each instructor (= 2 items)
e. Work with another student commenting on each other's final project report
f. Assignment checklist kept up to date and submitted in week 11 or 12.

For more details, see Notes on assignments, other expectations, grading system

ACCOMMODATIONS: Sections 504 and the Americans with Disabilities Act of 1990 offer guidelines for curriculum modifications and adaptations for students with documented disabilities. The student must present any adaptation recommendations to the professors within a reasonable period, preferably by the end of the Drop/Add period.

Students are advised to retain a copy of this syllabus in personal files for use when applying for certification, licensure, or transfer credit.

This syllabus is subject to change, but workload expectations will not be increased after the semester starts. (Version 31 Jan. '09)

Sequence of Classes

Classes will begin with sharing of highlights of readings and annotations added to the wiki (except weeks 1, 14, and weeks in which there are presentations).

More details about preparation for the classes and the PBL cases will be provided through links on the wiki version of the course syllabus and by email.

The schedule is subject to change as we see how the "problem-based learning experiment" evolves.

Week 1, 1/29, Introductions

Instructors and Students identify personal, intellectual, professional interests and introduce themselves:

- a) in relation to the course title and description (worksheet); and
- b) by formulating questions in response to Paper Tiger video, “Donna Haraway reads national geographic on primates” (1989).

First look at “KAQ” (Knowledge claims-Actions that follow-Question for inquiry) framework for teasing out diverse inquiries, in this case inquiries based on students’ initial responses to the video.

Preparation for class 2:

- Complete "syllabus treasure hunt" to acquaint yourself with, and raise questions about, requirements, the wiki, and the syllabus.
- Read Case 1 (on wiki), “What can we learn from the Haraway/Paper Tiger video about ways to teach/engage others to interpret the cultural dimensions of science?”
- Use KQ part of KAQ to identify questions for further inquiry (Assignment 1).

Week 2, 2/5, Case 1. Probing each other’s KAQs

- Discussion of questions raised about requirements, the wiki, and the syllabus
- Check-in (=succinct reports) on findings from inquiry between classes
- Introduction to the A part of KAQ
- Workshop on generating questions, inquiring into them, and designing the resource guide required by case 1

- *bring laptop if you have one*

Preparation for class 3: Prepare Guides for teaching/engaging others to interpret the cultural dimensions of science (*Assignment 2, scrapped* -- see replacement in week 5).

Week 3, 2/12, Case 1 (completed). Presentation of Guides for Teaching/Engaging Others to Interpret the Cultural Dimensions of Science
(Presentation=Asmt. 3; Guide = Asmt. 4)
Pam DiBona, "Installation art as a means for engaging women in critical thinking about the cultural dimensions of science" PAD GRST09 Guidebook.pdf
Vanessa Munoz, "Coding: A Case & Tool for Cultural Interpretation of Science"
Sally Paddock, "Using metaphors to acquire, organize, and prioritize relevant scientific knowledge," GRST09Case1SP.pdf
Heidi Rademacher, "The Influence of Industry and Government on Research and Development"GRST09Case1HR.pdf
Carolyn Suchy-Dicey, "Feminist Epistemology and the Philosophy of Science"
Felicia Sullivan, "'Reading' Science: Strategies for critically interpreting science 'texts'" GRST09Case1FMS.pdf
Alison Van Vort, "Reading Science Through Literature"
Fangfang Wen, "A learning experiment about the understanding of cultural dimension of science for students who speak a foreign language"

Preparation for class 4: Read Case 2 (on wiki), "We look forward to being convinced that the guidelines will be met," read Werskey's article (referred to in the case), do warm up, complete initial KAQs, and post selections on the wiki (=Assignment 5).

Week 4, 2/19, Case 2 (cont.) Probing each other's KAQs & In-class research with coaching by the instructors.

- *bring laptop if you have one*

Preparation for class 5: Continue research and prepare work-in-progress presentations.

Week 5, 2/26, Case 2 (cont.) Presentations on work-in-progress towards next week's visit.(= replacement asmt. 2)

- (Preparing work-in-progress presentations, hearing yourself deliver them, and getting feedback usually leads to self-clarification of the overall direction of your project and of your priorities for further work.)

Preparation for class 6: Continue research and prepare presentations to the GCWS Panel.

Week 6, 3/5, Case 2 (completed.) Presentations to the GCWS Panel with Q&A on process and products
(Presentation=Asmt. 6; Product = Asmt. 7)

Alison Van Vort, Using literature of the 1920s and 1930s to think and talk about Science, Technology, Class, and Gender
Fangfang Wen, The Sexual Equality of Physics Educational Opportunity and the Sexual Differentiation of Physics Educational Results in China and UK, GSRT09FFWPhysicsGender.pdf
Felicia Sullivan, Creating New Spaces for Science GRST09Case2FMS.pdf
Heidi Rademacher, The Technology of Classical Instruments: Artifacts Representing Values in Gendered Design, GRST09Case2HR.pdf
Katie Plocheck, Capitalist Science and the Medicalization of the Gendered Body: A syllabus, GRST09Case2KP.pdf

Pam DiBona, New images of scientist-activists, GRST09Case2PDB.pdf
Sally Paddock, Aboriginals And Science: World-views, education, and community-level involvement, GRST09Case2SP.pdf
Vanessa Munoz, Changing Conceptions of Disease: Patient Experience & Health Advocacy
Rosalie Barnes, The Curriculum Car, GRST09Case2RB.pdf

(*The instructors decided to use the race and genomics case, rather than do the following:* 15 minutes will be taken at the end to decide as a group what to do for weeks 7-9—whether to take on a case or follow a curriculum sequence developed and presented to the GCWS panel by one of the students. As a backup if nothing emerges, instructors have prepared a case on science studies contributions to debates about race and genomics in biomedicine; see wiki.)

Preparation for class 7: Begin case

Week 7, 3/12 Case 3, Initial thinking by students, followed by mini-lectures by AF-S & PT on the intersection of genomics, gender, race, and STS

By 3/24, Progress report (by email) & check-in with instructors (by phone) about step 2 and ideas for guides.
Also, start final projects (instructions) and prepare paragraph overview of project by 4/2.

Week 8, 4/2 Case 3, Presentations of guides (Asmt. 8; guide = asmt. 9; see case, point 3)

Sally Paddock, "Strengths and Dangers of Developing a Market for Genome Diversity Mapping: Considering the Literature from Indigenous Perspectives and Communities"
Indigenous Genomes.pdf
Heidi Rademacher, "Bioethics and Genomics: Representation in Popular Culture"
revisedGRST09HERcase3.pdf
Felicia Sullivan, Conversations about Genes: navigating personalized DNA testing and sequencing, GRST09Case3FMS-revised2.doc
Fangfang Wen, Genetic Technology: Opportunities and Challenges for Female Miao Minority's Race and Gender Reconstruction GRST09Case3WFF.pdf
Pam DiBona, "Genome v. Phenome: Environment-gene interactions and interpretation of personal genome analysis", PADcase3.ppt
Katie Plocheck, "Genome Sequencing and Dimensions of Race and Identity",GRST09KPCase3.pdf
Vanessa Munoz, "Race, Genetics and Health"

Week 9, 4/9 Case 3, Presentations of guides (continued) and synthesis activity.
Work-in-progress presentations for final projects

Weeks 9-12, 4/9 (see above), 4/16, 4/23, 4/30. Presentation of drafts of grant proposals, teaching cases, syllabi, curriculum units, etc.
(The class will act as a jury to review and ask questions on any grant proposal. Presenters of cases/ syllabi/units should use their time slot for a mini- activity and discussion.)
(Presentation =Asmt 10).
Preparation for classes 9-12: Prepare as requested by the pre-circulated materials from the presenters.

Week 10, 4/16 (two-three volunteers needed for presentation, with expectation that your project will not be as developed as for students who present later)
Sally Paddock, "Independent Power Projects Community Workshop" GRST09FinalSP.pdf
Fangfang Wen, "Learning Technology and Diverse Students: A Classroom Resource Guide for School Teachers" GRST-09FinalWFF.pdf

Week 11, 4/23

Pam DiBona, "Culture and Conditions: Toward Visual Depictions of Women in Science", prep for Pam's presentation, GRST09FinalPAD.pdf
Felicia Sullivan, Syllabus: "Creating Science & Technology Policy from the Grassroots Up"GRST09FinalFS.pdf

Week 12, 4/30
Draft report due on product = Asmt. 11
Peer commentary due on draft by email by 5/4
(Heidi Rademacher, "Women in Art and Music at the Intersections of Science and Technology" (a syllabus) GRST09FinalHER.pdf
Vanessa Muñoz, Research proposal: "On a Scale of 1 to 10: Nurses Assessing Patients' Pain in the Emergency Department" GRST09FinalVLM.pdf

Week 13, 5/7. Final presentation + Taking stock of course: Where have we come & where do we go from here?
Katie Plocheck, Thesis proposal: "Exploring the role of Reproductive Technologies in Gay-Parented Families in the United States" GRST09FinalKP.pdf
"Dialogue process" to collectively review what we have learned about what the course set out to do.
Written course evaluation, GRSTeval.doc

5/10. Submission by email to both instructors of course projects, revised in response to comments on drafts, and uploaded on the wiki (Asmt. 12).

Gender, Race, and the Complexities of Science and Technology: An Interdisciplinary Experiment

Home Page for course

Objectives

We expect that students will enter this course with different levels of preparation in science and technology, in interpretation of the dynamics of science and technology, in feminist, anti-racist, and other critical theories, and in collaborative, reflective processes of inquiry and exchange. By the semester's end, students should have:

• experienced and appreciated a "developmental" model of teaching/learning, which aims not for a common final standard of work, but to guide and support each student to develop or improve as much as they can given their background and current circumstances;
• learned and practiced tools for engaging with provocative cases designed to stimulate interdisciplinary inquiry and exchange;
• clarified and pursued their particular interests in teaching, research, or activism around the complex production of science and technology;
• acquired resources, tools, guides to help navigate a manageable number of substantive bodies of knowledge in interpretation of the dynamics of science and technology, especially using feminist, anti-racist, and other critical frameworks;
• synthesized these knowledges into resources for future students and others in the form of reports from cases, annotated references, and additional cases;
• initiated ongoing patterns of subverting barriers to wider access—for themselves and others—to the production of scientific knowledge and technology; and
• explored the theoretical and practical implications of the question "What can we do with the knowledge we generate for ourselves and others?" with respect to engagements with/in the complex production of scientific knowledge and technology.

Theory and method

The instructional method has five aspects:

1. Case- or problem-based learning, which begins from a scenario in which the problems are not well defined. Students brainstorm so as to identify a range of problems related to the scenario and choose which of these they want to investigate and report back on. The problem-definitions may evolve as students investigate and exchange findings with peers. If the scenario is written well, most of the problems defined and investigated by the students will relate to the subject being taught, but instructors have to accept some "curve balls" in return for a) student engagement in self-invented inquiry; b) content coverage by the class as a whole; and c) increased motivation for subsequent, more-focused inquiry (see "inverted pedagogy" below).
2. Interdisciplinary Coaching. In the case-based learning, the instructors facilitate the brainstorming and student-to-student exchange and support, coach the students in their individual tasks, and serve as resource persons by providing contacts and reading suggestions drawn from their longstanding interdisciplinary work and experience.
3. Inverted pedagogy. The experience of case-based learning is expected to motivate students to identify and pursue the disciplinary learning and disciplined inquiry they need to achieve the competency and impact they desire. (This inverts the conventional curriculum in which command of fundamentals is a prerequisite for application of our learning to real cases.)
4. KAQ framework for inquiry and exchange (sicw.wikispaces.com/FrameworkForExchanges) "Probing each others' thinking (as well as one's own) by asking about

- Knowledge claims: "How do you Know that? -- What's the evidence (e.g., from a Scenario used to initiate an exchange), assumptions, and reasoning?"
- Actions: "What knowledge claim(s) does this Action follow from?" "What problem raised in the Scenario does that Action relate to?" "Which people or group would be taking this action?" "Which people or group would this Action seek to change?"
- Questions: "How will you investigate this questions?" "Will your method of research best

enable you to find this out?"
- If your thinking needs to be clarified or spelled out, go back and revise accordingly.
- If there is a knowledge claim stated or implied in your response or in anyone else's that warrants an exchange of its own, state the claim explicitly and succinctly."

By linking Knowledge and Action, this framework promotes the emphasis of one strand of science and technology studies since the early 1980s on examining what it takes in practice to establish knowledge or make technology reliable.

5. Internet facilitation. The internet makes it easier to explore strands of inquiry beyond any well-packaged sequence of canonical readings, make rapid connections with experts and other informants, and develop evolving archives of materials and resources (e.g., presentations to the class, new cases, annotated bibliographies) that can be built on by future classes in the GCWS or elsewhere for future students and others (see http://sicw.wikispaces.com/GRST).

To the extent that a theoretical framework can do justice to the diversity of inquiries that emerge in case-based teaching, it might take the form of a conversation between four angles on gender in relation to science and technology. (Equivalent levels can be articulated for differences that refer to race, ethnicity, or European descent vs. other othernesses.)

1) Under-representation of women in science and in technological design; Obstacles to and underrecognition of their contributions; Possibilities for women's standpoint to address aspects of the world underrecognized by men.

2) Biases in knowledge and technologies that claim to represent progress, efficiency, or other universal interests, but in practice promote the unequal social status of men over women.

3) The pervasiveness of gender-like dualisms in which one category is subordinate to the other and complex spectra are purified into dichotomies; The suppression of ways these conceptual schemes are troubled by multiplicities and hybrids.

4) The contribution of gendered resources among the heterogeneous resources that knowledge-makers link together over time as they construct and reconstruct established knowledge and reliable technologies. A very significant source of resources has been the existence of a feminist movement(s) based on a broader set of social and personal concerns, which continues to bring attention to issues about science and technology from the previous three angles (Keller 2001).

The course process is intended to exemplify this theoretical "quadrangulation" as we address the tension between, on one hand, disciplined knowledge/analysis/inquiry and action that often invokes a limited set of themes to orient us as we move forward and, on the other hand, the more open (transdisciplinary, gender-bending?) engagements with the unruly contexts in which knowing and acting are always already embedded.

Gender, Race, and the Complexities of Science and Technology

Scenarios, Inquiry, exchange, and reports from Cases

General Framework for Exchanges and Inquiry

Specific Points for GRST Exchanges and Inquiry *this page, not yet available, will present the framework in steps as appropriate for this specific course*

Case 1: “What can we learn from the Haraway/Paper Tiger video about ways to teach/engage others to interpret the cultural dimensions of science?”

Case 2: “Case-based learning as a productive approach to generating wider engagement in the production of science and technology"

Case 3: "Is the new genomics reconfiguring race and gender?

A case FYI (, which won' get used this semester): “Race resurgent, Race reconstructed: Responses to developments around genomics and biomedicine”

Resources II

Materials suitable for Provocative cases (to be annotated on the wiki and to be supplemented)

Braun, L., Fausto-Sterling, A., Fullwiley, D., Hammonds, E. M., Nelson, A., et al. (2007) Racial categories in medical practice: How useful are they? PLoS Med 4(9): e271.doi:10.1371/journal.pmed.0040271
Butler, O. (1993) Parable of the Sower (selections TBA). Four Walls Eight Windows
Centro de Estudos Sociais (2005) Identifying Trends in European Medical Space: Contribution of European Social and Human Sciences. Coimbra, Portugal: Centro de Estudos Sociais.
Cohn, C. (1987). "Sex and Death in the Rational World of Defense Intellectuals." Signs 12: 687-718
Fujimura, J. & T. Duster (eds.) (2009) Social Studies of Science special issue on Race, Genomics, and Biomedicine, available online for free until April 2009, http://sss.sagepub.com/content/vol38/issue5/.
Harvey, D. (1995). "Militant particularism and global ambition: The conceptual politics of place, space, and environment in the work of Raymond Williams." Social Text 42: 69-98.
Paper Tiger TV (1989) "Donna Haraway reads national geographic on primates" New York: Paper Tiger TV.
Werskey, G. (2007). "The Marxist Critique of Capitalist Science: A History in Three Movements?" http://human-nature.com/science-as-culture/werskey.html (viewed 7 Mar 07).

Reading lists

Reading List 1, syllabi
http://pages.slc.edu/~krader/gender/syllabus-fall%202001.htm
see gender & race courses at http://www.stim.uiuc.edu/courses.html (and/or locate this -- http://www2.uiuc.edu/unit/STIM/gender.html on a web archive)
http://www.hssonline.org/teach_res/publications/publications.html#women

Reading List 2 (to be pruned & supplemented, then added to annotated reading list on the wiki)

Abir-Am, P. G. (1996). Women in modern scientific research: A historical view. Unesco World Science Report, Beijing.
Adams, E. R. and G. W. Burnett (1991). "Scientific vocabulary divergence among female primatologists working in East Africa." Social Studies of Science 21(3): 547-560.
Cartwright, L. (2000). Community and the public body in breast cancer media activism. Wild Science: Reading Feminism, Medicine, and the Media. J. Marchessault and K. Sawchuk. London, Routledge: 120-138.
Casper, M. J. (1994). "Reframing and grounding nonhuman agency." American behavioral scientist 37 (6): 839-856.
Clarke, A. (1990). A social worlds research adventure: The case of reproductive science. Theories of Science in Society. S. E. Cozzens and T. F. Gieryn. Bloominton, Indiana University Press: 15-42.
Dugdale, A. "Keller's Degendered Science: Notes and Discussion." Thesis Eleven 28: 117-127.
Epstein, Steven (2004) Bodily differences and collective identities: the politics of gender and race in biomedical research in the united states" Body and Society 10(2-3). 183-203
Fausto-Sterling, A. (1987). "Society writes biology/ biology constructs gender." Daedalus 116(4): 61-76.
Fausto-Sterling, A. (1989). "Life in the XY Corral." Women's Studies International Forum 12(3): 319-331.
Fausto-Sterling, A. (2000). Sexing the Body: Gender, Politics and the Construction of Sexuality. New York, Basic Books.
Fausto-Sterling, A. (2003). The Problem with Sex/Gender and Nature/Nurture. Debating Biology: Reflections on Medicine, Health and Society eds. UPDATE. W. Simon, J. Birke and L. a. G. Bendelow.
Fuller, S. (2000). Thomas Kuhn: A Philosophical History for Our Times. Chicago, University of Chicago

Press.
Fullwiley, Duana (2007a) Race and genetics: attempts to define the relationship. Biosocieties 2, 221-237
Fullwiley, Duana (2007b) The molecularization of race: institutionalizing human difference in pharmacogenetics practice. Science as Culture 16:1, 1-30.
Haraway, D. (1985). "Manifesto for Cyborgs: Science, Technology, and Socialist Feminism in the 1980s." Soc. Rev. 80: 65-107.
Haraway, D. (1989). Primate visions: Gender, Race, and Nature in the World of Modern Sciences. New York, Routledge.
Haraway, D. (1991). The promises of monsters: A regenerative politics for inappropriate/d others. Cultural Studies. L. Grossberg, C. Nelson and P. A. Treichler. New York, Routledge: 295-337.
Haraway, D. (1994). "A game of cat's cradle: Science studies, feminist theory, cultural studies." Configurations 2(1): 59-71.
Haraway, D. J. (1988). "Situated knowledges: The science question in feminism and the privilege of partial perspective." Feminist Studies 14(3): 575-599.
Harding, S. (1991). Whose Science? Whose Knowledge? Thinking From Women's Lives. Ithaca, Cornell University Press.
Jackson, C. (1995). "Radical environmental myths: A gender perspective." New Left Review 210: 124-142.
Jenson, J., S. d. Castell, et al. (2003). "‘‘Girl talk’’: Gender, equity, and identity discourses in a school-based computer culture." Women’s Studies International Forum 26(6): 561-573.
Jordanova, L. J. (1986). Naturalizing the Family: Literature and the Bio-Medical Sciences in the Late Eighteenth Century. Languages of Nature: critical essays on science and literature. L. J. Jordanova. London, Free Association Books: 86-116.
Keller, E. F. (1988). "Feminist perspectives on science studies." Science Technology Human Values 13: 235-249.
Keller, E. F. (1989). "Just what is so difficult about the concept of gender as a social category." Soc. Stud. Sci. 19: 721-724.
Keller, E. F. (2001). Making a difference: Feminist movement and feminist critiques of science. Feminism in Twentieth-Century Science, Technology, and Medicine. A. Creager, E. Lunbeck and L. Schiebinger. Chicago, University of Chicago Press: 98-109.
Kohlstedt, S. G. and H. Longino, Eds. (1997). Women, Gender, and Science. Chicago, Osiris, University of Chicago Press.
Krauss, C. (1993). "Women and toxic waste protests: Race, class and gender as resources of resistance." Qualitative Sociology 16(3): 247-262.
Laskett, B., S. Kohlstedt, et al., Eds. Gender and Scientific Authority. Chicago, University of Chicago Press.
Longino, H. E. (1997). Feminist epistemology as a local epistemology. The Aristotelian Society, Supplementary Volume 71, The Aristotelian Society: 19-35.
Love, R. (1989). The Total Devotion Machine and Other Stories. London, The Women's Press.
Marchessault, J. and K. Sawchuk, Eds. (2000). Wild Science: Reading Feminism, Medicine, and the Media. London, Routledge.
Montoya, Michael J. (2007) “bioethnic conscription: genes, race and Mexicana/o ethnicity in diabetes research” Cultural Anthropology 22:1 94-128
Rapp, R. (1995). Risky business: Genetic counseling in a shifting world. Articulating hidden histories. R. Rapp and J. Schneider. Berkeley, University of California Press: 175-189.
Richards, E. and J. Schuster (1989). "The feminine method as myth and accounting resource: A challenge to gender studies and social studies of science." Soc. Stud. Sci. 19: 697-720.
Rocheleau, D. (1991). "Gender, ecology and the science of survival: Stories and lessons from Kenya." Agriculture and Human Values 8(1): 156-165.
Schiebinger, L. (1993). Nature's body : gender in the making of modern science. Boston, Beacon Press.
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Gender, Race, and the Complexities of Science and Technology

Main wikipage for the course

Bibliography, with links to Annotations

Guidelines & Instructions

Insert citations in alphabetical order by first author under the heading below, "General Bibliography."
Include keywords in brackets after the reference.
Contribute annotations by linking the citation to a wikipage name GRSTyyzz, where yy is the first author's name and zz is the year, then adding the annotation into that wikipage.
Annotations should convey the article’s key points as well as its connection to the student’s own inquiries and interests.
Guidelines about joining the sicw wikispace and for a link to a place to practice (a "sandbox").

example
McNeal, A. (n.d.) How to Read a Scientific Research Paper--a four-step guide for students and for faculty. Retrieved on August 23, 2007 from http://helios.hampshire.edu/~apmNS/design/RESOURCES/HOW_READ.html
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Keywords

(To enable searches of this bibliography, select keywords from this list and list them in brackets after the reference. Feel free to add keywords to this list--in alphabetical order.)
A: action_research, art_science, abortion, ancestry
B: “bad”_science, biology, black_women, bioethics, black_bodies_in_medical_experimentation
C: colonialism, culture_of_science, cultural_reconstruction, commodification, cultural_science, critical_analysis_of_the_history_of_technology_and_science
E: education, eugenics
F: feminist_perspectives
G: gmo_critique, gendered_technology, genome_phenome, genetic_testing, global_impacts_of_technology
H: human_animal, historical_examination_of_the_intersection_of_race_and_sexuality
I: industrial_influences
L: linguistics, literacy
M: multicultural_interpretations, music technology, medical_industrial_complex, musical_technolgy, Medical_sociology
N: nonhuman_communication, nature_nurture
O: objectivity_strong
P: personal_genomics, privacy
R: race, representation, reproduction, reproduction_politics, race_&_reproduction, reflexivity_strong
S: science_and_morality, science_and_politics, scientific_ethics, scientific_objectivity_subjectivity, science-as-power, STS, STS_History, science_literacy, scientist_activist, social_change, scientific_racism, scientists_in_media
T: technototemism, Tips_for_Students, technical_politics, technology_and_classical_music, technology_and_culture
W: women_knowledge, women_in_academia, women_in_science

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Gender, Race, and the Complexities of Science and Technology

Notes on assignments, other expectations, grading system

including

- Assessment and grading System
- guidelines for written assignments & presentations
- guidelines for participation and contribution to the class process
- other processes used in the course
- ***If you are reading a printed version of this, visit the actual wikipage, http://sicw.wikispaces.com/GRSTNotes, for live links.***

Assessment and grading system

If the points for writing and participation add up to 80 (which gives an automatic B+) the rubric to follow is used at the end of the course to add points (to move above a B+).
For each quality "fulfilled very well" you get 2 additional points. If you "did an OK job, but there was room for more development/attention," you get 1 point.

- 1. A sequence of assignments paced more or less as in syllabus (and revisions timely),
- 2. often revised thoroughly and with new thinking in response to comments.
- 3. Project innovative, well planned and carried out with considerable initiative, and
    - 4. indicates that you can extend tools and processes from the course to your specific situation so as to better “subvert the barriers of expertise, gender, race, class, and place that restrict wider access to the production of scientific knowledge and technology.”
- 5. Written assignments and project report clear and well structured,
    - 6. with supporting references and detail, and professionally presented.
- 7. Active, prepared participation and building class as learning community, including
    - 8. probing of other students’ KAQs,
    - 9. leading or participation in student-led activities, and
    - 10. contributions to the email listserv and evolving annotated bibliography.

Overall course points are converted to letter grades as follows: A > 95%, for A- 87.5-94.5, for B+ is 80-87.4, for B is 72.5-79.5; for B- is 65-72.4; for C+ is 57.5-64.5; and C 50-57.4%.

Rationale for the Assessment system

The different assignments are commented on and one or both instructors may request that you revise & resubmit. If neither instructor requests this of the original or a resubmission, then the assignment is graded "OK." An automatic B+ is awarded for 80% (approx.) of written assignments OK and participation items fulfilled. The rationale for this system is to keep the focus of our teaching/learning interactions on your developing through the semester. It allows more space for students and instructors to appreciate and learn from what each other is saying and thinking. Our goal is to work with everyone to achieve the 80% satisfactory completion level. Students who progress steadily towards that goal during the semester usually end up producing work that meets the criteria in the syllabus for a higher grade than a B+.

Assignments

Assignment 1 on Haraway case
Assignment 2 -- see replacement below

Assignment 3, presentation of Guide (see Haraway case)

Assignment 4, Guide (Haraway case).

- This guide should not simply be a printout of powerpoint slides you might use in your presentation, but something that stands alone without need of the spoken narration and interaction with audience that is possible in a presentation.

Assignment 5, KAQ worksheet on Werskey Case

New Assignment 2, work-in-progress presentation

- The idea of this is to move your project on the Werskey case forward. It's definitely not supposed to be a dry run for next week implying that your inquiry should be finished by tomorrow and just get touched up in the following week. And any visual aids should be prepared without diverting too much time from your inquiry (see suggestions below). Please send them to PT by email so we can have them loaded on the laptop and ready to go when we get to the classroom.
- How can a W-I-P presentation move your project ahead? When you prepare to give a presentations, when you hear yourselves speak your presentations, and when you get feedback, it usually leads to self-clarification of the overall argument underlying your inquiry and the eventual written product. This, in turn, influences your research priorities for the remaining tim Presentations 2/3 of the way through this project must necessarily be on work-in-progress, so you'll have to indicate where additional research is needed and where you think it might lead you. There may or may not be time for extensive discussion, but you can learn from the rest of the group writing notes to provide appreciations, suggestions, questions, contacts, and references. You can also learn from compare-contrast with the other students' W-I-P presentations.

- Ways to prepare visual aids without diverting your time away from your ongoing inquiry? These days I use pdf's not powerpoint for all my talks, in part because of bad experiences with some images not showing up when ppt files got shown on a different operating system. But mostly because I can write and revise outlines in word and then when I'm ready, I change the font size, "print" as a pdf, and I'm ready to go live. I don't get distracted by animations, backgrounds, fade-ins and other non-essential features of a talk. Even if you don't take this tip, try to make one introductory slide that captures the overall structure and logic of your inquiry. This might be enough of a visual aid that you can talk to that slide and not have to prepare many others. If time is short and you print clearly, you might make that "slide" as a handout and skip the electronic version altogether.

Assignment 6, Presentation to GCWS panel to address the challenge in the Werskey case.

Assignment 7, Product (Werskey case).

- The product should not simply be a printout of powerpoint slides you might use in your presentation, but something that stands alone without need of the spoken narration and interaction with audience that is possible in a presentation. The length is for you to determine. You can make copies for fellow students and guests OR upload the file as a link to your talk title. (Ask for help if needed to do this.)

Assignment 8, Presentation of guide on 4/3 (see case, point 3)

Assignment 9, Guide

Final project

- Each of you will be given half of one class in weeks 9-12. The class will act as a jury to review and ask questions on any grant proposal. Presenters of cases/syllabi/units should use their time slot for a mini- activity and discussion. As soon as we have a sense of what kind of final project will be most useful to you, we will work with you on how to prepare instructions/ expectations so the rest of us can prepare for your session. We will need some of you to volunteer for the early weeks, so everyone will take into account that these presentations will be very much work in progress (see comments above on the value of work-in-progress presentations).

- Paragraph overview of final project due by 4/2 -- earlier of you are prepared to present on 4/9.

additional instructions on final projects to be added

Participation and contribution to the class process

a. Participation in class meetings based on Preparation between classes

- incl. punctuality, succinct sharing at the start of class of highlights of readings and annotations added to the wiki, no cell phone calls

b. Annotated reference or resource (=person, organization...) added to the evolving wiki bibliography (each week except 1 & 14) (=12 items)

- Annotations should convey the article's key points as well as its connection to the student's own inquiries and interests. Examples will be provided. To contribute annotated references to the evolving bibliography, sign in to the sicw wiki (see button to the top right) then click on the preceding link and then click on "edit this page." After you have made the addition, click on save to save it (or cancel if you want to discard the change). (Before you can sign in, you need to join the sicw wiki; see instructions.) See guidelines for bibliography annotations.

c. Email contribution to discussion on the course email listserv or exchange with the instructors (at least 5 weeks = 5 items)

- Interaction between classes is especially important in this course because we are based on different campuses and because of the evolving nature of the PBL experience

d. Minimum of two in-person or phone conferences on your assignments and projects--one before session 5, the other before session 11; one with each instructor (= 2 items)

- These are important for checking in, taking stock, getting a recharge, ensuring timely resolution of misunderstandings, and opening up significant issues about one's relationship to the course material and objectives. If you are falling behind, conferences are especially important.

e. Work with another student commenting on each other's final project report. CC the feedback to the instuctors.

- Try to define the kinds of response you need (Varieties of responses).

f. Assignment checklist kept up to date and submitted in week 12 or 13.

- (Downloadable) Keep track yourself of your assignments and revisions submitted. Show us the checklist in time to resolve discrepancies (in session 12 or 13, no later).

Other Processes in the Course

Syllabus treasure-hunt
This exercise -- to be completed before session 2 -- acquaints you with the different dimensions of the syllabus, requirements, and on-line materials.

Submission of Writing in a Professional and Instructor-friendly manner

Submit two copies of each assignment during class typed on standard 8.5" x 11" paper, using at least 1" margins, a standard 10- or 12-point font such as Times or Helvetica, and (preferably) one and half line spacing.

If you have to submit work by email, before attaching it to the email, rename your file so it begins with your initials. (Otherwise, it can get lost in the typical morass of attachments and it might take longer to get a response than if you had waited for the next class.)

All pages should show your name and the page number. No need to use a cover page.

Proofread your work for spelling, grammar, punctuation, and coherence of paragraphs--Each paragraph should have one clear topic that is supported and/or developed by what is in it.

If writing is difficult for you, arrange assistance from a fellow student or a professional editor -- do not expect the instructor to be your writing teacher.
Recommended:

- as guides to writing and revising: Peter Elbow, Writing with Power; Daniel, et al. Take Charge of Your Writing
- as a guide on technical matters of writing scholarly papers: Turabian, A Manual For Writers (in library's reference section).

Links to Student Wikipages, GRST '09

Main wikipage for the course on Gender, Race, and the Complexities of Science and Technology

Sally's Inquiries
Felicia's Inquiries (FMS)
Carolyn's Inquiries
Vanessa's Inquiries (VLM)
Alison's Inquiries (AVV)
Pam's inquiries (pad)
Heidi's Inquiries (HER)
emily's inquiries
Fangfang Wen

Evaluations and and proposed further development

15 Apr 09

Notes on proposed developments in the course

0. The same course description and structure would be retained because the approach is working well this time and we want a chance to build on that.
1. More word-of-mouth publicity to recruit additional students with the expectation that a fraction will withdraw once they appreciate that the course requires an equal commitment to their required courses, thesis preparation, etc.
2. Require group work in one of the instructor-designed cases (so as to fill out the students' experience of the range of approaches to teaching using PBL cases).
3. Establish a routine of reflection/synthesis/feedback in the last 10 minutes of every class.
4. Incorporate required common readings at a few selected points in the semester, following or followed by mini-lectures by the instructors.
5. Other, as indicated by end-of-semester stock-taking session and evaluations.

22 May 09

Synthetic statements by students

Write out neatly a synthetic statement (1 or 2 paragraphs) evaluating this course. (You might build on/ build in your comments from the other pages.) Please make comments both to help the instructors develop the course in the future and to enable some third party (e.g., GCWS or potential students) appreciate the course's strengths and weaknesses. (Imagine a reader who may not have time to wade through the items on the other pages.)
(For full evaluations, see GRSTfinalevalCOMPILED.pdf)

About PBL: I do think that for STS, creativity is very important. PBL entitles students the right to create their own research without too much limitation. Students may become narrow minded, however how to balance lectures with PBL may be a good question to explore. About the class: I love this class. Presentations and discussion let everyone get the equal opportunity to participate in this class. We have diverse students in our classroom, and this is important to build an inclusive classroom. About the teaching: This course teaches students how to learn the learning and how to change what they know into what they are wondering.

The course provided a space to think about issues both in an academic way and in an applied way. Critical questions about our social worlds were brought up. Opportunities to do work rather than just absorb information. The strengths of the course are that instructors really created a space for us to develop our own line of inquiry. This is a huge challenge – allowing yourself to follow important questions. I'm sorry I cannot write more – please see the rest of my evaluation (above)

This course was challenging, inspiring, and fulfilling in many ways. The pedagogy, diversity of students and their strengths and interests and their professors' expertise and day-to-day support was invaluable.

I would highly recommend GRST to any student, regardless of STS background. The self-steering nature of the course is an ideal setting for the knowledge seeking graduate student. The diversity of topics, professors, and a refreshing course made a great experience!

I was given the space to pursue my own interests without being nervous about quality. (This allowed us to take risks!) I was introduced to research, scholars, books, materials, and ideas that I was not aware of. And this allowed me to find connections with my own innate interests. I was challenged to do better work all the time, as we were asked to do revise and resubmits. Having individualized, evolving bibliographies was the best part, and the professors worked with each of us on these throughout the week.

Breaking apart the typical format and rhythm of most graduate learning environments is hard. Knowledge in core disciplines must be gained and “standards” of an academic profession imparted. But where is the joy and love of learning that made us all want to be students for as long as we can be? This class brings the exploration and inquiry back. It feels messy at times and frustrating and stressful, but what gets produced is amazing and deep and diverse and makes you want to know – “What’s next?” Who committed to higher learning wouldn’t want to participate in a course like this?

During this course I have been challenged in ways that I thought were impossible, but that I had been craving in my home graduate program. People often talk about grad school being a place where you really begin to produce your own knowledge, but I had yet to do that apart from initial work I had begun (outside of classes and under no supervision) on my thesis. This class opened the door for me to be a producer and a thinker of my own knowledge that I had sought out. It has really changed me as a “student”, and I’m so grateful I was given the opportunity to work with Peter and Anne to do it.

Theme: We* need to clear mental space so that thoughts about an issue in question can emerge that had been below the surface of our attention. (*teachers as well as students)

Guided (topic-based) freewriting
In a freewriting exercise, you should not take your pen off the paper. Keep writing even if you find yourself stating over and over again, "I don't know what to say." What you write won't be seen by anyone else, so don't go back to tidy up sentences, grammar, spelling. You will probably diverge from the topic, at least for a time while you acknowledge other preoccupations. That's OK—it's one of the purposes of the exercise. However, if you keep writing for seven-ten minutes, you should expose some thoughts about the topic that had been below the surface of your attention—that's another of the aims of the exercise. Reference: Elbow, P. 1981. Writing with Power. New York: Oxford U. P.

Continue for 7 minutes where this sentence leads off:
"When I entertain the possibility of 'challenging the barriers of expertise, gender, race, class, and place that restrict wider access to and understanding of the production of scientific knowledge and technologies,' the questions/ ideas/ experiences that come to mind include..."

Initial personal/professional development planning (use carbon paper; draw from Freewriting)

	skills and weaknesses	interests (related to the course themes..)
...that I bring to this course		
....that I would like to leave with at the end		

Ideas about the path to bridge to then from now…

KQ worksheet

The KAQ framework is intended to highlight the interplay between Knowledge, inquiry (Questions), and ideas about possible social Actions. This interplay between K, Q, and A will be developed as the course proceeds.
For now, we focus on K and Q: As you view the video (or look back at your notes after the class), use this sheet to record your responses to Haraway's interpretations of science using the prefixes:

K for Knowledge claims or interpretations made by Haraway that strike you, e.g., "Koko represents universal man," AND for any others Knowledge claims or interpretations YOU might make in response to Haraway or the class discussion.

Q for Questions opened up that you would be interested in pursuing if you had a chance, i.e., What more do you want to know about any Knowledge claim or interpretation? e.g., In what sense is the late 20th century a "mythic time"?

(Make a carbon copy so the instructors can take away a copy as well.)

“What can we learn from the Haraway/Paper Tiger video about ways to teach/engage others to interpret the cultural dimensions of science?”

In this playful video on National Geographic coverage of primates, feminist historian and cultural analyst of science, Donna Haraway, advances many interpretations on issues that range from Big Oil’s response to decolonization to the sexuality of primate researchers. The video was made soon after she had completed the research for her book, Primate Visions (1989), but the video does not make evident the archival evidence or methodology of interpretation, including her criteria for selecting what aspects of the wider social context are relevant. Not surprisingly, therefore, the interpretations in the video provoke reaction from viewers—how can she support that claim?

In this case, we want you to turn any reactions you have—positive as well as negative—into a genuine inquiry into cultural interpretation of science. How does one link some aspect of science to some aspects of the social and cultural context? Does interpretation follow the same or different rules of evidence and reasoning from scientific claims? Where do questions come from? Where do interpretative themes come from? How do metaphors work in science? How does the outside social context get inside the science—indeed, is this the right image of what is going on? And so on.

By the end of this case, we want you to prepare two-page “Guides for teaching/engaging others to interpret the cultural dimensions of science.” The audience you should envisage for these guides are graduate students like you were 2 weeks ago (before you started the course) who seek ideas, examples, and other resources to help them teach or engage others (now or in the future) around this topic. (Feel free to imagine a specific group of people -- the "others" -- that would be being taught or engaged, such as the ones you lead in discussion sections.)

There is no assumption that the guides will be about how to teach using the Haraway/Paper Tiger video, only that the video stimulates our inquiry about cultural interpretation of science. But before you draft these guides we’ll work together to stimulate each other’s thinking about the specific interpretations that Haraway puts forward as a way into the more general issues of formulating cultural interpretations of science. The steps ahead before our next session are given in assignment 1.

Students' Guides for teaching/engaging others to interpret the cultural dimensions of science, 2009

Assignment 1

Main wikipage for the course on Gender, Race, and the Complexities of Science and Technology

Preparation

1. Read case.
2. Review the notes you took while watching the video during class.
3. If needed, supplement these notes by listening to the sound track.

Part A

By Monday 2/2 email both instructors:

- a. At least 5 Knowledge claims of Haraway's in the video or of your own related to the case.
- b. At least 5 Questions that you would like to inquire into related to video and the case.

These will be posted to a wikipage so you can see what others have contributed.
Optional: If you are comfortable and confident using a wiki, post them yourself.

During the week email queries and requests for assistance and clarification to the instructors, who will try to respond before session 2.

Part B

Bring to session 2, two printed copies of:

- a. The results of your inquiries. Include inquiries that did not yield answers yet.
- b. Append any new Knowledge claims and Questions that have arisen relevant to the case and how to teach/engage others to interpret the cultural dimensions of science.

Expected: 800 words.

Also, email a copy to Anne_Fausto-Sterling@brown.edu before class.

During session 2 we will build on these initial inquiries with a view to preparing focused presentations for week 3.

Pam DiBona
GRST09 Assignment 1

Installation art as a means to engage women in critical thinking about the cultural dimensions of science: A Guide

Introduction

Critical thinking about the cultural dimensions of science – i.e., awareness of and questioning around the social contexts of the scientific pursuit – is a critical component of modern life, where admonitions and lamentations of governments, scientists, and educators regarding "public understanding of science" (and perceived lack thereof) are restricted to science content and output ("formal science"). How is one to pass judgment on reports of the latest discoveries when the conditions surrounding them are at best a footnote, and at worst the proverbial man-behind-the-curtain, pulling the levers but seemingly unconnected.

This Guide is designed to help you, as a facilitator, engage women in critical thinking about these issues. The author believes that interactive installation art, a contemporary form of visual art, can be an effective medium for communicating about the context of scientific pursuits, with the following objectives:

- Opening discussion about the often-mysterious practice of science.
- Engaging women in questioning the basis of science information.
- Allowing women to draw their own conclusions about outcomes of formal scientific investigations.

The following sections make the case for taking this approach for this audience.

Why women?

The chosen audience, women who are not formally trained as scientists and who do not consider themselves to be scientifically oriented, is a broad and special one. Females represented more than half the voters in the 2008 presidential election (53 percent v. 47 percent male voters) (Women's Media Center, 2008), and – in spite of increasing reallocation of household responsibilities to fathers – women carry out more housework (Lang and Risman, 2007) and, it follows, are more likely to hold the onus for science-related decisions in the household, everything from whether to purchase antibacterial soap to assessing the risks and benefits to their daughters of the vaccine against HPV (human papilloma virus, one cause of cervical cancer).

At the same time, women are more likely to report discomfort with science content, and their perception of the culture of science elicits awe or fear rather than questioning (Barr and Birke 1998, p.50; Haynes 1994).

In reality, women already hold science knowledge, yet it is not recognized as such by society (see e.g., Hackett et al., pp. 516, 620), or even by the women themselves (Barr and Birke, 1998, p.49). Once women realize that they hold this knowledge, they are empowered for give-and-take with the existing power structure around science (Barr and Birke, 1998, p.139).

Why art?

Visual art is a logical means for engaging new audiences in questioning the culture of science. Arnheim (1977) asserts that "truly productive thinking in whatever area of cognition takes place in the realm of imagery" (p.v). Stephen Pinker (1997) explored vision as a cognitive practice, stating that interpretation of visual cues cannot happen without integrated and advanced cognition (pp 294-298). Visual cues are universal and can be archetypal. In a classic art text, "Ways of Seeing" (Berger, 1977), details visual codes carried through Western art and into modern advertising that call up universal messages.[1] These messages are even more commonly delivered to our contemporary media-saturated public. Some examples (and classic art-history examples) relevant to our topic:

> "The romantic use of nature (leaves, trees, water) to create a place where innocence can be refound. [sic]
> The poses taken up to denote stereotypes of women: serene mother (madonna), free-wheeling [career woman] (actress, king's mistress), perfect hostess (spectator-owner's wife), sex object (Venus, nymph surprised), etc.
> The sea, offering a new life.
> The treatment of distance by perspective – offering mystery."
> (Berger, 1977, p.138)

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[1] See this excerpt from the BBC series on which the book is based: http://www.youtube.com/watch?v=6q0JvXiZw7o

Arnheim, in his book "Visual Thinking" (1969), demonstrates that even those without formal art training are able to illustrate concepts visually. For example, student-subjects came up with multiple ways to communicate the concepts of *past, present, and future*; and *democracy* (pp.121-129). What would happen if we asked women to illustrate the concept of *science*?

Why installation art?

Installation art is a form of visual art constructed in and for a specific setting. It has been put into use for political statements about the status of women (e.g., Judy Chicago et al., *Womanhouse*, 1972, *as described by* Princethal, 2008), and challenges to the art establishment (Reiss, 2001, pp 110 *et seq*.). The actual form and materials of a given installation art is up to the artist, and a broad range of materials and styles have been employed (Princethal, 2008), but installation art by definition requires some interaction between the art and the viewer – a requirement that is not true of classroom teaching, theatre, demonstration, or even performance art, a close cousin of installation art.

In her ground-breaking history of the genre, Reiss (2001) explains

> The essence of Installation art is spectator participation… Participation can mean offering the viewer certain activities…demanding that the viewer walk through the space and simply confront what is there. Objects may fall directly in the viewer's path or become evident only through exploration of space. In each of these situations, the viewer is required to complete the piece; the meaning evolves from the interaction between the two. (p.xiii)

If accessible (both in situation and language – i.e., not laden with too much jargon, visual or otherwise), then installation art's mode of engagement lends itself well to the problem at hand, engaging women in new perceptions of and critical thinking about the culture of science.

Examples

This section provides a personal example of installation art for non-scientific audiences, and three disparate approaches by artists that can serve as sources for the design of a new model for engaging women in critical discussion of the culture of science.

Body Maps. This project, modeled after one in Africa for HIV-positive women (http://www.catie.ca/bodymaps/gallery.shtml), encourages women to reclaim knowledge of their own bodies. The author, faced with a diagnosis that only showed up through scientific imaging (i.e., not any illness physically felt), led a group of women in Arlington as they took away canes, wore purple dresses, and illustrated medical "miracles" on larger-than-life size canvasses.

Critical Art Ensemble (CAE; http://www.critical-art.net). This group of five artists "of various specializations" entered the national news when one of their number, Steve Kurtz, was arrested by the FBI under suspicion of terrorism – when he called 911 to report the death of his wife, agents found test tubes and microbial cultures in his home refrigerator related to a CAE experiment. The collective's work includes "tactical media" ("situational, ephemeral, and self-terminating communications"), street installations, and electronic and paper publications, all produced with the "hope to replace general fear with critical tools and replace public impotence with tools for direct action." I have not been able to assess the effectiveness of this approach to date – their single You Tube video has fewer than 400 views.

Capacitor (www.capacitor.org). This San Francisco-based dance company interprets science content through dance. This troupe has its own audience, whom I presume is more interested in dance than science – so it is unclear whether they meet their statement of purpose:

> By engendering dialogue around contemporary technological and scientific issues, the resulting performance piece is not meant to be true to science or demonstrative, but a creative response to the issues and ideas explored by the participants.

New directions

Several concepts of the culture of science lend themselves to installation, for example:

- The places and spaces of scientific practice (Henke and Gieryn, 2008).
- The political demands on applied science (e.g., federal and state regulatory agencies' requirements for data-gathering).
- Visualization of scientific information (Burri and Dumit, 2008).

We can take lessons from art criticism and studies of visual cognition as we design art installations for women on the culture of science. The components of an installation need not be abstracted or coded into oblivion, never to be understood by an audience unfamiliar with art history or art criticism.

Sources and Resources

Arnheim, Rudolf (1969). *Visual Thinking.* Berkely: University of California Press. 345pp

Berger, John (1977). *Ways of Seeing.* London: British Broadcasting Corporation. 166pp

Barr, Jean and Lynda Birke (1998). *Common Science? Women, Science, and Knowledge.* Bloomington IN: Indiana Press. 166pp

Burri, Regula Valerie and Joseph Dumit (2008). "Social studies of scientific imaging and visualization." pp 297-318 *in* Hackett et al., 2008

Hackett, Edward, Olga Amsterdamska, Michael Lynch, and Judy Wajcman (2008). *The Handbook of Science and Technology Studies* (3rd Ed.). Cambridge: MIT Press. 1065pp

Haynes, Rosslyyn D. (1994). From Faust to Strangelove: Representations of the Scientist in Western literature. Baltimore: Johns Hopkins University Press. *as cited in* Barr and Birke (1998)

Henke, Christopher R. and Thomas F. Gieryn (2008). "Sites of scientific practice: the enduring importance of place." pp 353-376 *in* Hackett et al., 2008

Lang, Molly M. and Barbara J. Risman (2007). "A 'Stalled' Revolution or a Still-Unfolding One? The Continuing Convergence of Men's and Women's Roles." accessed 2/7/2009 from http://www.contemporaryfamilies.org/subtemplate.php?t=briefingPapers&ext=stalledrevolution.

Princethal, Nancy (2008). "Installation Art," Microsoft® Encarta® Online Encyclopedia accessed 2/25/09 from http://encarta.msn.com/encyclopedia_761587538/installation_art.html

Pinker, Steven (1997). *How the mind works.* New York: WW Norton and Co. 660pp

Reiss, Julie H. (2001). *From Margin to Center: The Spaces of Installation Art.* Cambridge MA: MIT Press. 181pp

Women's Media Center (2008). [http://www.womensmediacenter.com/ex/110608_a.html]

Sally Paddock

Using metaphors to acquire, organize, and prioritize relevant scientific knowledge

Introduction

Listlessness. Anxiety. Lack of concentration. Lack of motivation. These are not characteristics generally encouraged in a science classroom. They are, however, all becoming characteristic of many students who experience information overload: any information, everywhere, at any time. Before the almost ubiquitous state of the internet, a lot of relevant information regarding the variable perspectives of science may not have been available to the average consumer or student. However, it is often the case now that there is too much information available. Many students are unable to judge between relevant and irrelevant information and knowledge claims. I would like to propose, then, that if students are presented with an opportunity to explore scientific knowledge claims within a local and culturally-specific context, and if they are offered object metaphors which – in prompting them to explore the cultural contexts of knowledge – help them organize their findings, then this process of learning could be helpful in counteracting information overload. It would be a constructive alternative to other explorations of scientific knowledge, those other alternatives being ones which primarily propose the deconstruction of knowledge; though necessary in order to expose cultural contexts of knowledge claims, I believe the deconstruction of knowledge without a corresponding re-construction may only exacerbate the contemporary problem of information overload. This, then, is a lesson plan to help teachers engage students/groups in constructions of local scientific knowledge. The idea is for students to take a dynamic structure that is familiar to them, a tangible metaphor, and then use what they know of the framework of that structure to investigate and organize scientific claims which are relevant for them.

Part A: The Initial Metaphor

The associations that students construct around each initial metaphor will be later used as a framework for exploring, organizing and prioritizing local and culturally specific scientific knowledge claims.

Step 1: Hand out object metaphors. Encourage students to also come up with their own dynamic metaphors.

<u>Examples:</u> *Orange, Birth control tablets, Rock-climbing gear, Tainted Peanut Butter, Parachute*

Step 2: Explore the dynamics of the each object with the class. Ask students which presuppositions they bring to the objects and which associations they might have with each object. The purpose is to understand that each object 1) had a creator(s) and/or variable contexts of creation; that 2) each has some sort of life as it exists in front of us, on its own; but that 3) generally *how* it was created and the conditions under which it was formed and brought to us will determine how effective or deleterious it is once appropriated. Examples of questions and associations pertinent to the orange and rock-climbing gear are offered below:

General Q's: What do we know about each object? What is its purpose? What do we not know about it? What would we want to know if we were going to ingest, use or interact with the object?

Orange: *What is it?* An Orange. *What do we do with it?* Eat it. *Why?* Its healthy, it tastes good. *What determines if its healthy or tastes good?* Age, where its been, what its been exposed to, what season it was harvested in, how healthy the tree was. *Other Considerations?* Labor practices, fair pay for growers, whose land was it grown on, sustainable growth practices, etc. *What would we want to know if we were going to buy it or eat it?* Probably age, what its flesh has been exposed to, if the workers were treated fairly. *Conclusion?* Just being an orange does not mean it is healthy or tastes good! The relevant knowledge about it is the background knowledge, however obvious or as yet unknown that knowledge is.

Rock Climbing Gear: *What is it?* A daisy-chain and a carabiner. *What was it intended to be used for?* Anchoring properly into a rock face, carrying a static load with a redundant safety system. *What do we want to know?* Whether or not the carabiner was dropped on cement, if the anchor on the rock is secure, if the daisy-chain is frayed. *Conclusion?* Just because an object was manufactured appropriately, does not mean that it will be used as it was intended to be used. Effective use depends on skill of user, history of equipment, and other variables.

Part B: Acquiring, Organizing and Prioritizing Scientific Knowledge

Step 1: Propose or brainstorm about relevant scientific issues which the group is exposed to.

Step 2: Ask students which object metaphors and which object's associations previously discussed could be relevant as a framework for organizing knowledge claims, questions and associations pertaining to the chosen scientific issue(s).

Step 3: Discuss the overt claims proposed by each local scientific issue, the effect and/or possible consequences of moving forward based on those claims, and the background information that actually determines how the claims become manifest. Keep a metaphor in mind in order to prompt and organize information, like an *orange* or the *climbing gear*.

Step 4: Discuss how to acquire the information – interviewing people, field-site visits, internet, newspapers, municipal offices, involved non-profits, local residents. Organize the information in relation to the overt claim and decide what the determining factors should be regarding its appropriation.

Example: The Small-Scale Dam proposal for a nearby river is an example of a clean, green, renewable energy source and will contribute to our province's energy independence.

What is it*?* A less than 50 MWh dam. ***How is it supposed to 'taste'?*** *"*Healthy", clean, unpolluted, cheap. ***For whom?*** Anyone who "eats" it, or buys the energy. ***What determines if it is clean, unpolluted, cheap, and accessible? What is its***

lifespan, when will it rot?

This is where it can get messy, confusing and where students and groups may begin to feel powerless with regards to how to organize information and determine what is most important. Using the metaphor as a tool can help. For example, similar to the word "healthy", what does the word "unpolluted" mean? In this case, maybe there are very few carbon emissions, but the river life itself will be impacted. What does a loss of river life do for the surrounding biotic and social communities? Also, like a grocery store, who is selling the idea of the dam and the claim that it is clean energy? What are their interests in selling it, what is their history with these projects? An orange also has seasons of harvest and seasons of growth; a river experiences seasonal changes as well. When were the tests conducted regarding the viability of the river and the impact on the river's inhabitants? To push the metaphor even further: Regardless of how "healthy" the orange is or how "clean" the energy from the river is, what or who else is affected by the project? For the orange it could have been the treatment of the workers in the grove; for the river it could be the people who live on land nearby or who use the river area as a means of livelihood.

General and Case-Specific Resources:

Jungwirth, Bernhard, and Bertram L Bruce. "Information Overload: Threat or Opportunity." *Journal of Adolescent and Adult literacy* 45, no. 5 (F 2002).

Weaver, Jace. *Defending Mother Earth: Native American Perspectives on Environmental Justice*. Maryknoll, NY: Orbis Books, 1996.

BC Citizens for Public Power. http://www.citizensforpublicpower.ca

Independent Power Producers Association of British Columbia. http://www.ippbc.com/

Resource Guide

Cultural Dimensions of Science: The Influence of Industry and Government on Research and Development

[1] Illustration by: Simphony Guiden (grade 7)
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Gender, Race, and the Complexities of Science and Technology
A Problem-Based Learning Experiment
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Revised: February 23, 2009

Cultural Dimensions of Science:
The Influence of Industry and Government on Research and Development

The objective of this resource guide is to explore the cultural dimensions of science through the influences of Industry and Government on research and development (R&D) in Western society. By examining the influences of capitalism, private funding and administrative agendas on R&D one begins to understand how culture shapes science, while at the same time, science shapes culture.

How Does One Define Culture?

To begin this process, a general understanding of culture becomes important. From an anthropology tradition, culture can be defined as codes of conduct as seen in social life. From a sociology-of-knowledge tradition, culture is the symbolic products of a group [8]. In examining science as culture these two definitions become interwoven, as science is one of the conducts emerging from Western society and Western science and technology are symbolic products of their culture.

Who Benefits from Science in a Capitalist Society?
A Simple Exercise

A simple exercise to begin to visualize the ways in which science and culture are entangled in a Western capitalist society is by analyzing the illustration [1] on the cover of this resource guide. A 7th grade girl submitted this picture as part of *Discover Magazine*'*s* Cover Design Contest. In her contest statement she stated, "The time will come when you will have to pay a lot of money to go into space" (Simphony Guiden, 2008). Here one can see a young women's early understanding of the ways in which science and technology benefit those with power and resources. One can also see the cyclical relationship between science and those with access to resources and power. For if science and technology benefit the elite, then the elite will be more interested in science and technology. This leads to a series of questions concerning the "objective" nature of science, technology, research, development and knowledge. It also provides an excellent starting point for the material covered in this resource guide.

Capitalism and Modern Science and Technology

Many historians believe, modern science (and positivism) evolved out of the transition of societies from a Feudal system into a Capitalist system [3]. Whether modern science is a product of capitalism [3] or not [6], [12] is debatable, however, there is no denying that forces of production, social relations, science and technology all intersect, thereby making science and technology a social process [6]. Again we see another cycle where capitalism both shapes modern science and is shaped by science.

From a Marxist perspective, the capitalist/science structure becomes problematic as scientists become another form of "labor" and therefore are subjected to costs, control and supervision [3], [9]. Scientists begin to understand their knowledge in terms of "commodities" that can be bought and sold both by themselves and their employers [2]. Therefore, scientists find themselves influenced by both internal and external forces. Two of the external forces examined here are government and industry. These are two of the strongest social institutions in any capitalist culture.

Government and Its Power to Create Policy and Knowledge

Political administrations have the power to manipulate the processes through which scientific knowledge is released and applied in any society [2], [10]. Methods of manipulation include dismantling advisor committees, censorship, not seeking independent scientific advice and nominating individuals with clear administrative agendas to specific science related posts [10]. A capitalist culture is more likely to use these tactics to future capitalism, increase profit and further expand. Take the cases of the FDA's attempt to silence physicians who wanted to report the dangers associated with FDA approved drugs [10]. These cases demonstrate how the government employs tactics not only to avoid a negative reaction from members of society but also to protect profits.

Government administrations also have the power to determine how much funding will be directed to specific fields of R&D. For example, an administration can determine how much public spending will go toward defense and the development of new weapons systems and how much will be appropriated to ecological R&D. In the United States, financial support of defense and weapons technology has been justified as a necessity to insure stable peace [2]. Here one can observe another dimension within the web of science, technology, politics and power.

Governments often use the R&D as a tool in foreign policy. Technology has been used to create alliances and punish disruptive nations. This can be seen in information exchange, transnational institutes and embargos [2]. By examining science from a socio-political frame one can see it as a medium for understanding what cultures have similar agenda (alliances) and what cultures are at ideological odds [2].

Industry and Private Funding: The Case of Pharmaceuticals

Private corporations and industries are the top funders of research and development. Through private funding R&D becomes a business investment, driven by profit and expectations of future returns [3], [5], [9]. Some of the methods corporations and industries use to influence R&D include funding in-house research, funding research institutions, funding NGOs, public-private partnerships, placing company representatives on academic research counsels, and pressuring scientists who obstruct commercial agenda [7].

One of the clearest examples of the influence of private corporations on science and technology can be seen in the R&D of pharmaceuticals. A study published in the *British Medical Journal* [4] found research sponsored by drug companies was less likely to be published or presented than research funded by other sources. However, if the research favored a sponsor's product it was more likely to be reported, published, and/or presented. These findings were applicable across a wide range of drugs, drug classes, diseases and time periods, regardless of the type of research being assessed.

It is also important to note that exploitation of global south nations is common in drug response trials for Western companies, as members of impoverished communities are often used as trial subjects [9]. Here one can question what this says about class, race and gender, as subjects are often poor, non-white and female.

Scientists that speak out against pharmaceutical research often find themselves under attach by their employers, colleagues as well as other private funding organizations. One example is the case of Steven Nissen, a physician and whistle-blower who spoke out against the pharmaceutical company GlaxoSmithKline. His case demonstrates the strong internal and external pressures scientists in private funded R&D face [11].

Strategies for Moving Forward and Strands of Inquiry for Future Inquiry

The United States is a capitalist society and the culture of this society is reflected in the ways in which science and technology are used and developed. Science, technology, research and development are profit driven enterprises [3], [5]. [9]. Science is used as a political tool [2], [10] and often can be used as a means of observing power relations between nations [2], [9]. However, this doesn't mean that strategies for producing a new form of social scientific development have not been attempted in the past or should not be explored in the future [7], [12].

Future inquiries could take several directions including suggestions for dealing with biased researched, a reemergence of a new scientific left and the incorporation of community participation in the construction and understanding of scientific knowledge. While suggestions for dealing with biased research [7] and the possibilities of a new scientific left [12] are touched upon in the readings covered in this guide, the importance and breadth of these topics makes them worthy project in their own rights and, as Donna Haraway would say, another pair of threads to pulled in the tangled ball of yarn that is the cultural analysis of science.

[2] Dickson, D. (1988). ***The New Politics of Science.*** **Chicago: University of Chicago Press.**

- During the 1980s financial support given to science was cut back by the administration in every field of public spending except for defense and the development of new weapons systems.
- Financial support to defense technology has been justified by administrations as a necessity to insure stable peace.
- Science and technology research have been used by administrations as tools in foreign policy.
- Science and technology has been used both in practice and principle as a means of creating and strengthening political alliances.
- In the 1970s and 1980s foreign scientists were banned for US conferences and research projects.
- Scientific knowledge has come to be viewed as a commodity, as in the example of ICL, a British computer manufacture that was required to obtain an export license to recruit US scientists.

[3] Levins, R. & Lewontin, R. (1985). ***The Dialectical Biologist.*** **Cambridge: Harvard University Press.**

- Modern science is described as a product of capitalism.
- Science (positivistic thought) was used as a means of fighting against the feudal system.
- Scientific research that advances cutting edge technology is necessary in a capital state for the development of commercial, military and global power.
- Research has become a business investment and is often the first to be cut when corporations suffer economic setbacks.
- Scientific researchers are a form of "labor" within the structure of a corporation and are subjected to production costs and managerial control and supervision.
- Scientists are "produced" and therefore are the creation of their experiences, education and other flexible social trends.
- In a capitalist society, science is specialized and compartmentalized.

[4] Lexchin, J., Bero, L. A., Djulbegovic, B., & Clark, O. (2003). Pharmaceutical Industry Sponsorship and Research Outcome and Quality: Systematic Review. ***British Medical Journal.*** **Retrieved on February 8, 2009 from**
http://www.mindfully.org/Industry/2003/Pharmaceutical-Industry-Sponsorship31may03.htm

- This study found research funded by drug companies is less likely to be published or presented than research funded by other sources.
- This study provided evidence that research favoring a sponsor's product is more likely to be reported, published, and/or presented.
- These findings were applicable across a wide range of drugs, drug classes, diseases, and time periods regardless of the type of research being assessed.
- This study provides evidence of the social dimensions interwoven in research and knowledge with regard to privately sponsored pharmaceutical research.

[5] Mirowski, P. & Sent, E.M. (2008). The commercialization of science and the response of STS. In E. Hackett, O. Amsterdamska, M. Lynch, and J. Wajcman (Eds.), ***The***

***Handbook of Science and Technology Studies (3rd ed.)* pp. 635-689. Cambridge: MIT Press.**

- Funding and organization have shaped the content and conduct of science throughout history.
- Modern commercialized science is vastly different from the science of previous eras.
- International agencies encourage commercialized-standardized research, development and institutions, which are driven by profit making motives.

[6] Noble, D. (1977). *America By Design: Science, Technology, and the Rise of Corporate Capitalism.* New York: Oxford University Press.

- The difference between modern science and science of the past is not the presence of technology but rather the means by which modern technology has come to define contemporary society.
- Forces of production and social relations fundamentally intersect, are interwoven and are interrelated.
- Technology is a social process.
- To illustrate this claim, Noble uses the example of the reciprocal relationship between corporate engineers and their allies within the academy. He explores the methods they employ to transform the objectives and structure of technical based institutions.

[7] Parkinson, S. (2004). *Corporate Influence on Science and Technology*: Speech. Retrieved on February 2, 2009 from http://www.sgr.org.uk/SciencePolicy/SpeechGreenParty004.htm

- Methods large corporations use to influence research and development include funding in-house research, funding research institutions, funding NGOs, public-private partnerships, placing company representatives on academic research councils, and pressuring scientists who obstruct commercial agendas.
- Industrial influences produce conscious and unconscious biases, therefore impacting the research conducted, the scientists conducting the research, and the results of the research.
- Suggestions for dealing with biased research include the development of existing technology, emphasis on non-technical solutions to social problems, and interdisciplinary research.

[8] Peterson, R. (1990). Symbols and Social Life: The Growth of Cultural Studies. *Contemporary Sociology, 19(4),* pp 498-500.

- "Oversimplifying the range of usages, one may say culture is used in two quite different ways, one deriving from anthropology and the other deriving from the humanities via the sociology of knowledge tradition. The first sees culture as codes of conduct embedded in or constitutive of social life. In this sense scholars may speak, for example, of the culture of a nation, a class, a corporation, a gang, or a scientific research laboratory. Here culture is to social structure roughly what the genetic code is to a species of living organisms. Such cultural codes may be discovered in ethnographic observation, attitude surveys, patterns of cultural choice, or the content of analysis of documents. The second general perspective sees culture in the symbolic products of group activity, be they those of artists, religionists, scientists, lawyers, taste makers, the folk, the mass media, and the like. In this perspective culture represents the symbols that people use to encode and convey various forms of information: knowledge, power, authority, affect, merit, beauty, and virtue. Such symbolic elements also serve individuals and groups to identify those of like kind and to mark distinctions from others. Scholars employing this usage of culture focus on how such symbolic codes are produced, what they teach, and how they are used in the competition between classes and collectivities ranging in size from nations to scientific research laboratories" (p. 498).

[9] Rajan, K. S. (2006). ***BioCapital: The Constitution of Postgenomic Life.*** **Durham: Duke University Press.**

- Science, in capitalist societies, can be understood as a business plan.
- Biotechnology can be analyzed as "speculative capitalism," with emphasis on hype, vision and expectations of future returns.
- There is a co-production of the social and scientific on a global scale.
- Exploitation of global south nations is common in drug response trials for Western companies.
- "Scientific truth" can be seen in a cyclic relationship with those who have the power to produce and continue that power.

[10] Shulman, S. (2006). ***Undermining Science: Suppression and Distortion in the Bush Administration.*** **Berkeley: University of California Press.**

- Political administrations have the power to manipulate the process through which scientific knowledge is released and applied in any society.
- Methods of manipulation include dismantling advisor committees, censorship, not seeking independent scientific advice and nominating individuals with clear administrative agendas to specific science related posts.
- Shulman explores the case of US Climate Change Science program where data exposing global warming was both suppressed and distorted by governmental spokespersons.
- Shulman also examines the cases of the FDA's attempt to silence physicians who attempt to report the dangers associated with FDA approved drugs.

[11] Washburn, J. (2007). Science's worst enemy: Corporate funding. ***Discover Magazine.*** **Retrieved on February 2, 2009 from http://discovermagazine.com/2007/oct/sciences-worst-enemy-private-funding/article_view?b_start:int=0&-C**

- Washburn cites the case of Steven Nissen, a physician whistle-blower who spoke out against the pharmaceutical company GlaxoSmithKline and was attacked by colleagues with financial ties to the drug industry.
- Washburn also calls attention to the case of the BP announcement of a 10-year, $500 million research alliance with UC Berkeley and University of Illinois at Urbana-Champaign.
- One of the most troubling dilemmas for scientists is weighing the benefits of private funding (research opportunities, conversion of knowledge into practice, jobs, economic growth) against the challenges (tainted research, limited studies, suppression of the truth.)

[12] Werskey, G. ***The Marxist Critique of Capitalist Science: A History in Three Movements?*** **Retrieved on February 15, 2009 from** http://human-nature.com/science-as-culture/werskey.html.

- Despite the weakness of Werskey's history with regard to women's involvement in the British Scientific Left and the Radical Science Movement, he provides a detailed account of these movements through a Marxist perspective.
- By viewing history through Marx's ontology one can make the points: "History is the motor of technology," "Technology is the embodiment of values in artifacts," Nature is a historical category," "Natural science is also a historical category, a human relation, as is objectivity."
- "Science Wars," and cultural scientific ideology grew out of political confrontations and alliances.
- Globalization, lead by US transnational corporations, restructured the division of labor, production and distribution; therefore, widening inequalities based on class, race, nation and gender.

“Reading” Science

strategies for critically interpreting science “texts”

Intro

Paper Tiger's “Donna Haraway Reads the National Geographic on Primates,” brings into question the contexts in which scientific knowledge is created. Throughout the video, Haraway reiterates the phrase “what gets to count as nature, for whom and when and who much it costs to produce nature at a particular moment in history for a particular group of history.” She indicates that these are the questions of a cultural critique. They are also the questions of critical media literacy.

Working from key concepts and questions used in critical media literacy, this guide is intended to provide a first few steps towards the exploration of science texts as cultural enterprises. It's primary focus is on the artifacts and products of scientific research. The idea is that through a critical examination of science “texts”, one can begin to understand a range of forces and influences operating in the science knowledge production environment.

Key Concepts

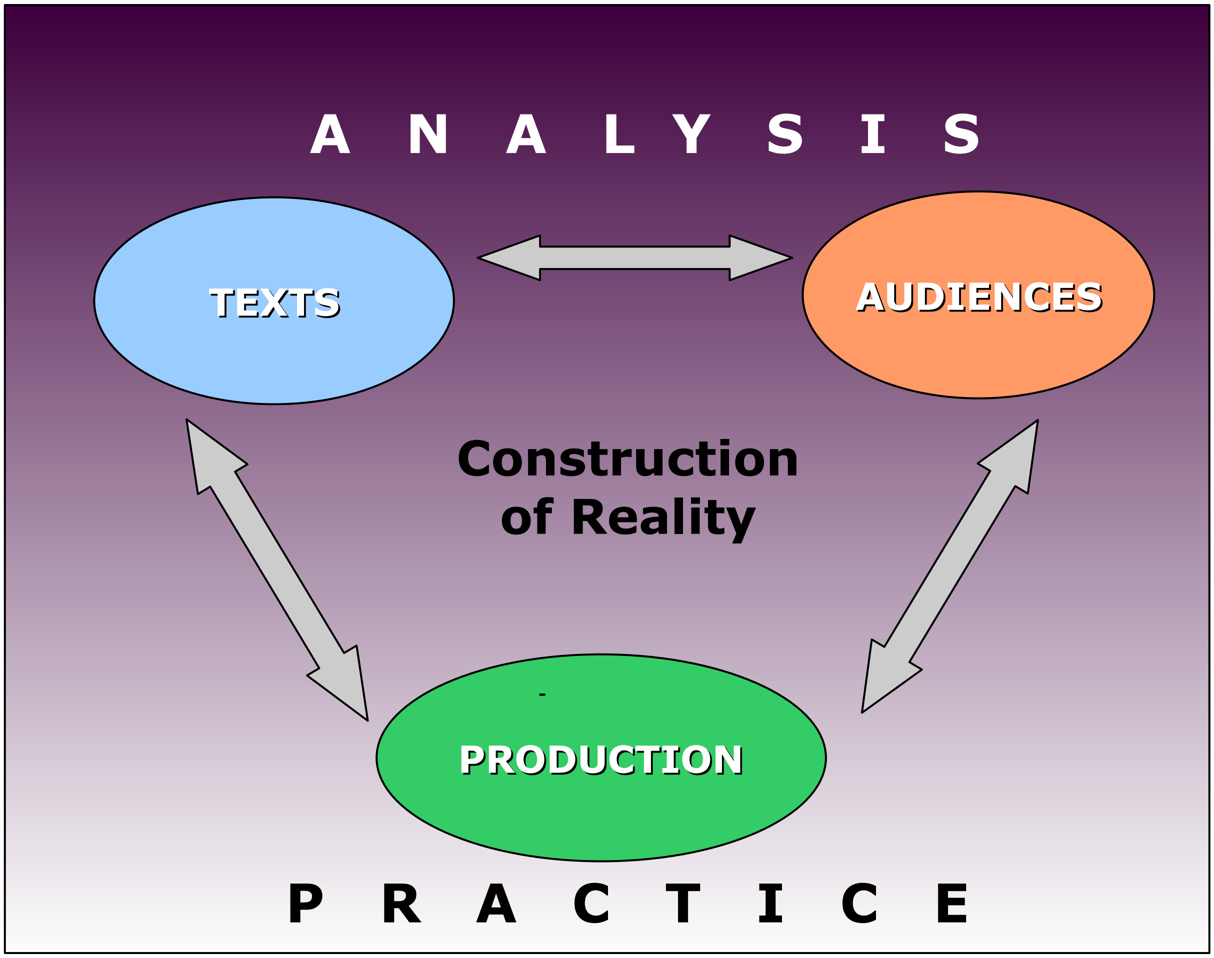
(adapted from material found at: http://www.media-awareness.ca/english/teachers/media_literacy/key_concept.cfm)

1. All scientific “texts” are constructions
2. Scientific “text” construct a reality
3. Audiences negotiate meaning in their reading of scientific “texts”
4. Scientific “texts” have commercial implications
5. Scientific “texts” contain ideology and values
6. Scientific “texts” have social and political implications
7. Form and content are closely related in the presentation of scientific “texts”
8. Each scientific discipline has a unique set of conventions and methods and present these in specific “textual” forms.

Key Questions

(adapted from material found at: http://www.media-awareness.ca/english/teachers/media_literacy/key_concept.cfm)

1. Who produced this scientific “text”?
2. What techniques are used to convince me of its validity?
3. How might different people understand this “text” differently from me?
4. What lifestyles, values, and points of view are represented in or omitted from this “text”?
5. Why was the underlying research conducted and presented in this form?



Texts

examination of conventions (textual, graphic and symbolic), methods, approach and disciplinary boundaries, and format of the specific scientific artifact

Production

evidence of technology and tools used to support research, financial and institutional support of the research as well as publishing / production organization, ownership and control of research process and products including editorial control, evidence of research practices, institutional configurations, mechanism for knowledge sharing (i.e. peer review, open access), standards of legitimacy (i.e. prestige, reputation, acknowledgment), and other social-structural elements

Audiences

influences on the reader / interpreter (i.e. culture, gender, race, age, expertise, education), context of use, ability to actively read or choose textual meaning, position vis-a-vis researcher / author, understanding of the relevance science knowledge to specific contexts

Adapted from a graphic found at:
http://www.media-awareness.ca/english/resources/educational/teaching_backgrounders/media_literacy/perfect_curriculum_1.cfm

Sample Exercises

Exercise 1: Communicating Science
(based on a exercise developed by Jinnie M. Garrett - Biology Department, Hamilton College - http://sicw.wikispaces.com/n05ScienceCommunication)

Objective
This exercise should sensitize participants to the varied ways in which scientific information can be disseminated. Ideally, participants should complete the exercise with a deeper understanding of the how different scientific products and artifacts (i.e. publications): 1) are shaped to meet the needs of specific audiences; 2) include or exclude information depending on these audiences; 3) have specific institutional supports (i.e. finances, peer support; and 3) communicate both intended and unintended messages depending on form and content of the artifact.

Step One
Separate the group into teams assigning each team a single "text." When choosing "texts," the group facilitator should keep in mind a variety of ways in which scientific knowledge is disseminated. The "texts" can come from popular magazines, personal essays, academic peer reviewed journals, television and radio programs, websites, documentaries as well as a range of other formats. Ideally, all "texts" should originate from a similar scientific research source (i.e. genetic testing, clean energy, etc). Here is a paired example:

> Building Nanobristle Structures on Science Friday (NPR)
> http://www.sciencefriday.com/program/archives/200901095
>
> "Self-Organization of a Mesoscale Bristle into Ordered, Hierarchical Helical Assemblies", B. Pokroy, S. H. Kang, L. Mahadevan, J. Aizenberg, Science 2009, 323, 237-240. Accessible at: http://www.sciencemag.org/cgi/content/full/323/5911/237?ijkey=SG8ei9hGh8Vcg&keytype=ref&siteid=sci

Step Two
Each group should consider the following questions in the examination of the text:

> Who is communicating?
> What is their goal in producing this text?
> Who is the intended audience?
> What do you know from this text?
> What evidence supports the conclusion?
> Is there information missing?
> Does the format of the text support or detract from the information presented?

Step Three
Each group presents their discussion of their text to the larger group. The facilitator's role is help students compare and contrast the different formats presented and understand the pros and cons of how each disseminates scientific knowledge.

Exercise 2: The Role of the Researcher

Objective
This exercise is designed to show how the researcher influences the nature, scope and focus of scientific knowledge creation. It is also designed to sensitize the reader to their own cultural assumptions and biases in assessing the value and validity of scientific knowledge. A secondary objective of the exercise is engage students in questions about the environments in which science knowledge is produced as well as resources available

Step One
Participants individually, in small groups, or as a whole should are asked to consider different types of researchers. They should take some time to create a mental map of the researcher by putting themselves in the researcher's place.

The individuals listed below are engaged in some aspect of scientific knowledge creation in the Masai Mara (http://en.wikipedia.org/wiki/Masai_Mara) in East Africa:

1. fourth grade science teacher
2. eco-tourism operator
3. zoologist for the San Diego Zoo
4. biologist for a top tier academic institution
5. geologist working for an oil company
6. pastoralist herder and family
7. science writer for National Geographic
8. environmental impact specialist working with a developer

Step Two
The instructor or group facilitator then guides the group through a series of questions such as these:

- What might be the goal of each of these individuals in the pursuit of scientific knowledge?
- Who is each sharing their knowledge with? Is there more than one audience?
- What resources do you envision each person having at their disposal to conduct their research?
- What are the methods each uses to produce their knowledge?
- Whose knowledge is most valued and by whom?
- What is the mental image you have of each of these subjects? Consider gender, race, country of origin, age, status and other identity markers. Where do these mental images come from?

The discussion should help participants understand how researchers are motivated by their specific contexts. The facilitator should also help participants understand how the participant's own biases and personal perceptions interact with their construction of these hypothetical researchers.

Some Resources

Reading Science Texts

The Authentic Filter: Lessons from Photoshop on Biological Engineering
http://www.scienceprogress.org/2009/02/the-authenticity-filter/
An example of how Photoshop can create modified visualizations that impact the ways in which we "see" scientific research. Can be useful in critically assessing images, graphics and other visualizations presented in scientific "text".

Metaphors in Science and Art: Enhancing Human Awareness and Perception
http://ejse.southwestern.edu/volumes/v11n1/articles/art01_ashkenazi.pdf
Explores that ways in which science as a creative process constructions metaphors that shape our understanding of how we understand science knowledge. Helpful in considering the types of metaphorical structures that may influence or shape our understanding.

The Role of Language in Science
http://www.fdavidpeat.com/bibliography/essays/lang.htm.
Looks at how language works to create our ideas of the world around us. In the world of science the same work can be used to mean different things as new bodies of knowledge come online. Article is useful in sensitizing need to understand key terms within the context of their research environments.

Writing, Literacy, and Technology: Toward a Cyborg Writing (from *Women Writing Culture*)
http://www.jacweb.org/Archived_volumes/Text_articles/V16_I1_Olson_Haraway.htm
An interview with Donna Haraway in which issues of being "technoscience" literate are addressed in which all science "texts" are placed in a cultural context.

Mathematics as Sign: Writing, Imagining, Counting
http://www.sup.org/book.cgi?id=415
This book explores the semiotics of mathematics as a human-centered method of communication that is based in the creative mental processes and social contexts.

Deconstructing Science
http://www.ibiblio.org/wunc_archives/sot/?p=150
An NPR interview with Priscilla Wald, professor of English at Duke University, who discusses how distorted depictions of research can create unfounded fear and anxiety.

Media Literacy Supports

Action Coalition for Media Education: Questioning Media Toolkit: -
http://www.acmecoalition.org/files/ACME_questioningmedia.pdf
These 10 basic principle of media can augment the critical concerns and questions addressed at the beginning of the guide. This two-page flyer gives simple concepts to shape critical media examinations.

Media Awareness Network
http://www.media-awareness.ca
This Canadian-based site provides educators, teachers, and parents with a range of media education tools, research and strategies. The site promotes itself as the "world's most comprehensive collections of media education and Internet literacy resources"

“Case-based learning as a productive approach to generating wider engagement in the production of science and technology”

Preamble: This case has a longer gestation period than the first, rapid-immersion case. It is designed to take you into the heart or belly of the field of science and technology studies, although, as always, the path you take will reflect your specific interests. A sequence of between-class and in-class activities will help you identify, revise, and pursue those interests, then report on what you find out.

In this case the instructors are the sponsors of the inquiry. We want you, the students, to note that the GCWS Course Proposal Guidelines are very pointed about including systematic attention to race, class, and culture with gender as categories of analysis as well as the requirement that courses reflect a social and cross cultural dimension. Note also that, in response to an initial sketch of the course, a GCWS board member suggested that the instructors “make those inclusions transparent (beyond the mention of subverting these barriers).” We were asked to explain how the process would work to cover important ideas and authors. Now, the fact that you’re reading this case in the context of the course means that we answered well enough to get the course approved. Nevertheless, we would like to be able to give faculty colleagues an experience that makes the teaching approach seem more concrete and worthy-of-support, where this teaching approach is one in which students and instructors respond to provocative cases and put into play diverse resources that we bring and that we subsequently develop.

The specific provocation is Gary Werskey’s historical account of account of (male, white, UK) Marxist scientists that gained influence in England in the 1930s and the (mostly male, white, UK) radical science movement in the 1970s and his claim that “epistemological disputes within [science and technology studies since the 1970s have distracted attention from] the social relations of science [which] were being transformed and more closely yoked than ever to sustaining the power and profitability of global and, more specifically, American capitalism.” The help we need—in light of the GCWS guidelines and advice—is for you to build on—or against—Werskey’s account and show how access to the production of scientific knowledge and technology has been and could be widened in ways that subvert the barriers of expertise, gender, race, class, and place.

A panel of interested faculty will visit class in week 6 to hear your reports, ask questions concerning both the process and products, and make suggestions about ways to enhance “systematic attention to race, class, and culture with gender as categories of analysis” and the course’s “social and cross cultural dimension.” Their comments and a podcast of the presentations will be made available to the GCWS board. The form of what you present to them remains for you to determine, but it might include alternative histories or case studies, dialogues with Werskey, grant proposals, units in a syllabus, annotated reading lists, compilations of activist efforts visible on the web, and further provocative cases for this or related courses. You might also include reflection on how your engagement with the problem-based learning process is evolving.

Werskey, G. (2007). "The Marxist Critique of Capitalist Science: A History in Three Movements?" http://human-nature.com/science-as-culture/werskey.html (viewed 7 Mar 07).

Work page and links to work in Spr '09 class for Case 2
incomplete audio for presentations
titles & links to reports for Case 2

GRST 09, Assignment 5--to be undertaken in week 2/12-2/19

At any point, email to instructors if you would like more guidance.

Read Case 2, “We look forward to being convinced that the guidelines will be met"

Read Werskey's article (referred to in the case)

Do warm up

Complete initial KAQs

Post on the wiki workpage two or three of your KAQFs that you are most interested in pursuing.

Begin your explorations/initial inquiries using the resources of the internet and library databases, the initial bibliography linked to the syllabus, the evolving annotated bibliography, the course texts, and emails to the instructors to see if they have leads.

- At this stage, it's OK to explore widely, but keep in mind that the inquiries are eventually meant to lead to a product as specified in the case. In the next class, we will "probe" each others KAQs to help focus you in on inquiries that are do-able by March 5, engage you, and fit the case.

The Sexual Equality of Physics Educational Opportunity and the Sexual Differentiation of Physics Educational Result In China and UK

From: http://www.theory.caltech.edu/people/patricia/scigen.html

Fangfang Wen

Boston College

MIT Graduate Consortium of Women Studies

Research background

- Students get equal opportunity to receive physics education nowadays.
- Physics is broadly listed as one of the required courses for elementary school to high school in many countries.
- Different performance of female and male in physics.
- According to Werskey's essay, female's contribution in scientific research always is thought as supportive and less important.

Research object, issue and goal

- Object: physics and gender.
- Issue: how do male and female get the equal physics educational opportunity and appear different physics educational result? What are the possible influential factors? What are the possible solutions?
- Goal: describe the situation of male and female's role in physics learning. Analyze the possible influential factors. Render some suggesting solution for specific issue.

Research method

- Available data analysis.
- Interviewing.
- Document analysis.

The equal physics educational opportunity in China and UK

- 1. The increase number of female students in different level educational institution.

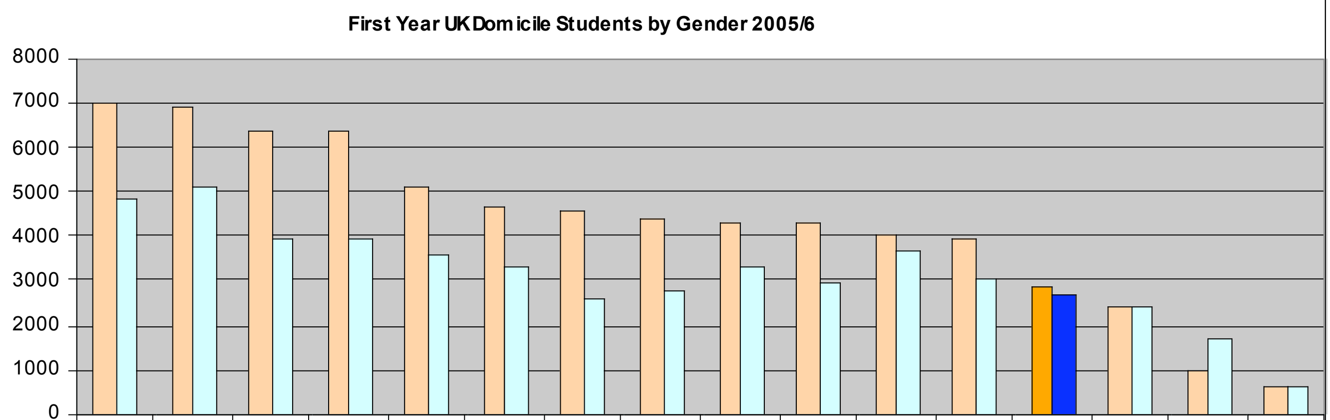
Table 1, percentage of female students by level and type of regular schools in China

Unit: %

Year	Elementary School	General Secondary Schools	College and University
1997	47.63	45.46	37.32
2000	47.6	46.17	40.98
2006	46.66	47.05	46.035

Data source: Ministry of Education of P.R.China

Graph 1



	Warw i ck	Manch ester	Leeds	Notting ham	Birming ham	Sheffie ld	King's	Southa mpton	Liverp ool	Cambri dge	Oxford	Bristol	New ca stle	UCL	Imperia l	LSE
Total Females	7060	6955	6385	6370	5165	4730	4650	4430	4340	4315	4050	3960	2865	2425	1020	655
Total Males	4920	5115	3985	3940	3625	3390	2625	2820	3355	2945	3710	3110	2750	2410	1730	630

Data Source: HESA Planning Plus 2007 - Undergraduate and Postgraduate

- Equal opportunity monitoring in UK
- In 2006/7 Newcastle had 50.8% female undergraduate, UK domicile entrants.
- In 2005/6 51.0% of Newcastle's first year, undergraduate and postgraduate, UK domicile students were female.
- At 63.9% King's College London has the highest percentage of female first year, UK domiciled students in 2005/6.

Data Source: HESA Planning Plus 2007 - Undergraduate and Postgraduate

2. Physics as a required course from elementary school to high school.

China: In China, physics is listed as required course from elementary school to high school.

UK: In UK, physics also is listed as required course from elementary school to high school.

3. The college's physics department admission principal just based on grades and students' interests.

China: grades. Except for some specific major only admit male students.

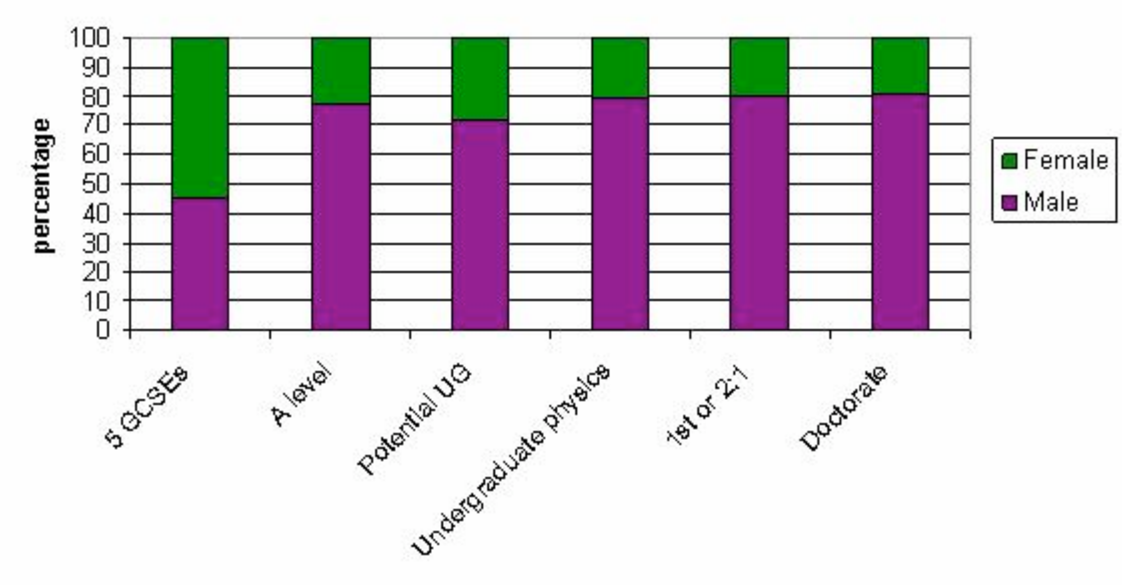
UK: applicants' interests. Comprehensive quality.

The differentiation in physics educational result

- The gender differentiation in school achievement.

China: In the Physics Olympics team, only 20% members are female.

Graph 2, the percentage of female students in physics department in UK

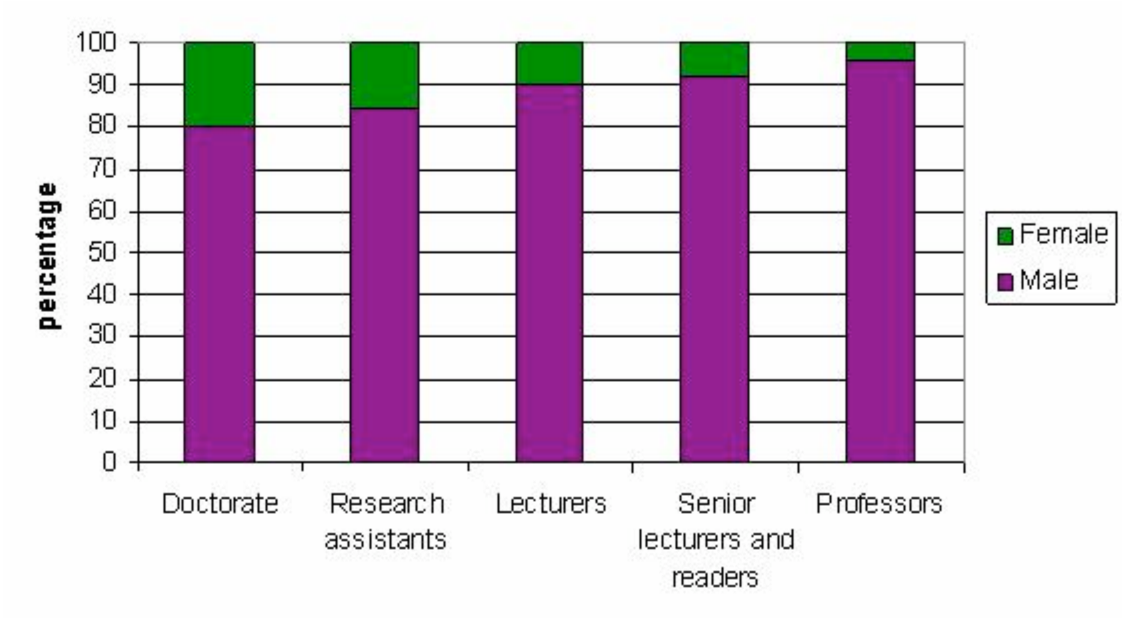


Data source, UK IOP Statistics

2. The gender differentiation in physics research.

China: All 7 present leaders in Chinese Physics Society are male. There are 699 members in Institute of Chinese Academy of Science, but there are only 10 female members in the math and physics department.

Graph 3, the percentage of female researcher in UK



Data source: UK IOP Statistics

In UK, women comprise:

50% of the population,

20% of these studying physics in university

4% of physics professors

Influence

- 1. For female, it is the suppression of female's self-worth and achievement in physics.
- 2. For the society, it is the underestimate of female's physics capacity and it may be probably results in the loss of female physics talent.

Possible influential factors

1.The differentiation in physics learning has different characteristics according to the different development period.

Johson's space test for kids from 6 years old to 18years old.

Female students' advantage on calculation and male students' advantage on issues' solution.

2. Male has better physics learning ability than female.

E.L. Thorndike

Eleanor Maccoby

Carol Jacklin

3. Different attribution model has different impact on physics learning.

Female: negative

Male: positive

4. The gender construction in physics culture.

5.Female’s multiple roles in family and society.

Suggesting solutions

- Inspire female students' interests in physics.
- Develop students' related ability according to their developmental characteristics.
- Share equal family and social responsibility.
- Develop students' ability according to their own interests.

What I got from this course

- PBL
- KAQF
- Presentation and discussion
- Be entitled enough space to develop own academic interests.
- Communication

Thank you for your attention

Have any question? Please contact me at:

wenfa@bc.edu

Creating New Spaces for Science

submitted by Felicia M. Sullivan (3/5/09)

In the "Marxist Critique of Capitalist Science," Gary Werskey details the history of both the left science of the 1930s and the radical science of the 1960s and 70s. His focus on the British scientific establishment explores how both movements sought to challenge the rational of science created in the interest of capital. However, neither movement succeeded in transforming the institutions of science knowledge creation or the capitalist society in which they resided. Werskey's hope for the future is that a new generation of activists and critical scientists will create the new institutions that will lead to a more just and equitable society.

The challenge put forth then is "how do we then create new spaces for the creation of scientific knowledge that recapture the concerns of the radical science movement?" How do we build scientific knowledge creation practices that:

- address issues of power
- understand that science is not neutral
- critique science contexts (social, political, and psychological)

By brining in critiques of these movements (Martin, 1993; Rose; 1994) as well as insights from feminist epistemologies of science (Harding, 1991; Rose, 1994), can we also create environments that:

- bridge between theory and practice
- connect academic researchers and communities (especially communities that are poor, marginalized and oppressed by the dominant culture)
- allows knowledge to be driven and informed by the experiences of these communities

Can these new spaces for science be created within the context of capitalism? Or, are any new endeavors destined to share the fates of the left and radical science movements? Can we learn from past examples? For instance, Margaret Rossiter (1994) indicates that female scientists in the Post World War II era were able to create opportunities for themselves when locked out, undervalued, or exploited in traditional research environments. By entering alternative settings, such as nonprofits or through independent work via self-employment, they were able to make gains in terms of autonomy, control (resources and personnel), prestige (titles and positions), and even at times financial reward. What are the alternative spaces that can be created for a new science?

One specific technological environment that may provide some insights into the possibilities for alternatives is how a small communication network, ARPANet, became the global information network known as the Internet. The Internet has reworked and challenged many traditional institutions and shifted power relations in dramatic ways. Can learning about this transformation provide us with a blueprint on how new spaces for science might be configured? The chart that follows details the contours of these two iterations of the technology.

	ARPAnet *Advanced Research Project Agency Network*	**The Internet**
Definition	The ARPANET was designed in the 1960s for the US Defense Department. It was developed as a new bombproof, distributed packet-switching network technology that would ensure communication systems would withstand a nuclear attack.	The Internet is a communications network with a global reach comprised of diverse computers platforms which connects users to one another allowing them to share information along multiple channels.
Reach	Boston, NYC, Pittsburgh, IL, Southern California in the continental US	Global reach on every continent.
Users	Initially served military contractors (i.e. RAND, Lincoln Labortories), defense department personnel and researchers at major academic institutions (i.e. MIT, UCLA, Standard)	Diverse populations across cultures, age groups, income levels, educational levels. Those with limited literacy, some physical barriers, remote geographic areas, and in extreme poverty still excluded to some degree.
Purpose	Strategic development to ensure that military complex would be able to communicate with key players in the event of a thermonuclear attach on the US	Multiple purposes from personal communication, commerce, education, community-building, creative expression, etc.

So how did a technology designed for one purpose, evolve into something quite different from its initial formation? One can look to key design elements present from the very beginning of ARPAnet:

- **open** – the technical architecture was designed to allow any type of computer program, running any type of operating system software to connect to the network. The system did not preference one type of content over another. A standard set of protocols eased this process.
- **decentralized** – the system was intentionally self-organizing with new method of sending information called packet-switching. This ensured that no one computer acted as the central traffic cop on the network, making the system expandable and flexible.
- **connected** – the system allowed any node to communicate with any other node without centralized control or moderation.

These initial design features were amplified as other academic institutions joined the network and subsequently began sharing access to the network with their communities. These additional elements of accessibility were soon to follow:

- **usability** – the creation of a graphical user interface (e.g. browser software) transformed the ease with which individuals could approach and access resources on computer connected on the Internet.
- **cost** – competitive market forces entered in driving the cost of connectivity down dramatically. Combined with increasingly low-cost personal computers, this allowed more and more

individuals to get connected.

- **knowledge** – the information network make the transfer of knowledge much easier and online communities were willing to support the learning curves of "newbies." Affordable commercial options (i.e. books, workshops, classes) and computer learning centers expanded the

These six features of ARPAnet allowed it to be culturally reconfigured to the Internet. David Hess (1995) explains that once a science or technology is distributed to mass publics these publics bring their own knowledge systems and cultural contexts to the table and shape new meanings. By its very openness and reach, the ARPAnet technology created the context which would allow it to be molded and reshaped.

So in thinking about new spaces for science, consciously incorporating the features that transformed ARPAnet into the Internet might be a good first step. By promoting openness, decentralization, connectedness, usability, affordability, and learning networks, new communities of learners and practitioners from a variety of backgrounds with differing experiences can be brought into scientific research. These new perspectives may bring the "strong objectivity" espoused by Harding (1991) to a new cultural reconstruction (Hess,1995) of science that may begin to reconfigure the institutional pressures that thwarted the left and radical science movements.

The markers of a new science space would include:

- making the vast knowledge capacities of scientific communities available to all through open journals and open courseware.
- providing access to the tools, materials, and techniques of science to more people and communities through open data projects, shared computing power, and linkages with working scientists.
- building up the capacities of local communities to engage in their own scientific research thorough improved science education, community-based learning opportunities, and participatory science research which allow these communities to discover new processes and knowledge in the process.
- creating networking opportunities between scientists and non-scientists through conferences, online forums, and workshops.

So given these conditions, what would a new science space look like? A scenario might look something like this:

> In the center of downtown Lowell, MA, one finds Science for Humanity (SFH). Housed in the newly redeveloped and green Hamilton Mill complex, the space is bright, open and inviting. It has the openness of contemporary design, but still hints at the city's industrial past. Images and languages representing all of Lowell's diverse communities (i.e. Cambodian, Dominican, Brazilian, Greek, Portuguese, etc) are incorporated into the building's design along with references to science and technology achievements representative of a world culture. In fact, as one enters the light-filled lobby, the images of a global scientific community are promoted on the walls with all ages, genders and nationalities represented.
>
> SFH was created through a combined effort of local community groups (i.e. Cambodian Mutual Assistance Association, United Teen Equality Center, Girls, Inc., Massachusetts Alliance of

Portuguese Speakers, etc.), city leaders and key academic partners from the University of Massachusetts Lowell and Middlesex Community College. Several high tech firms were also involved in the project. However, the key impetus for the creation and development of this space came from the community, especially from those involved in environmental projects (i.e. Brownfield cleanup, river reclamation, sustainable framing), community health, and worker safety endeavors.

Many of founders are young leaders who attended the local university, benefited from community service learning projects, and grew up in Lowell's immigrant communities primarily from Cambodia, Central America and Brazil. They understood how necessary a space like this was in moving Lowell towards a more sustainable future that provided jobs and skills to a re-tooling population. These young activists were also acutely aware of how previous technology pushes from the 1800s onward had served the interests of an elite owner class while exploiting generations of workers. They were intent on bringing the values of their traditions, the needs of their communities, and the hopes for a more green and sustainable future to the SFH project.

One of the innovative ideas for SFH was a concept of an open organization. SFH would provide the space, tools, and facilitate the knowledge and skill building of Lowell's communities in the sciences. The organization views itself as a knowledge facilitator and works with local groups and individuals around projects and research of interest to members of the community. They have no specific research agenda other than a mission to educate and support diverse scientific research that is driven and lead by the community for primarily non-commercial purposes. It also views itself as a space for the critical exploration of contemporary science research such as genetic modification, reproductive technologies, advancements in physics, and other emerging fields such as nanotechnology.

SFH's programs and resources are as diverse as its people and it works to make the production of science knowledge a transparent and accessible endeavor. SFH's supports a number of after school programs with community partners including an all-girl space lead by Girls, Inc. SFH also helps link Greater Boston's large scientific community to the local public and private school systems. The organization has an extensive resource room where scientific journals (many provided through the Directory of Open Access Journals), courseware and self-paced tutorials in scientific topics (with the help of the Open Courseware project), data sources (including from the Open Data Consortium) as well as a number of volunteer staffers supplied via a service learning program at the University of Massachusetts Lowell and are supervised by a full-time staffer. A series of regular workshops in basic scientific techniques and methods are also made available and community researchers make presentations and share new techniques and research they are engaged in.

In addition to the resource room, SFH has two fully equipped labs with the necessary equipment for basic biological and chemical testing and experimentation. Strong partnerships with the University of Massachusetts Lowell, Middlesex Community College, Lowell General Hospital, Saints Memorial Hospital, and other research laboratories make additional tools and testing equipment available on a regular basis to a variety of projects often for free or low cost. A high-end computer lab which allows for data processing, computer modeling and computation is also available. These three labs are supported by-year long research interns from local universities supervised by a full time staffer.

SFH also acts as a clearinghouse for community researchers to connect into larger scale research projects, other community research centers, as well as experts in the field. A number of research projects initiated by Lowell community researchers have found support through this network including an urban fish farming project started by the Cambodian Mutual Assistance Association, improvements to small scale food production supported by the United Teen Equality Center's Fresh Roots program, and an exploratory committee looking into rebuilding the city's canal-powered turbine system as means to generate renewable energy. This last endeavor is being explored by a local conservation group, city planners, and a citizen coalition of for green energy. The SFH has provide the space, resources and support to help all of these diverse endeavors take off and assists community researchers with mechanism for making their finding public and creating public data stores of vital research findings.

Given the large number of volunteer and service learning personnel engaged in supporting SFH programs, the organization has a relatively small staff of five full timers. As community members gain skills they are encouraged to share and contribute back into the community to build on local knowledge by running workshops, supporting other research projects and volunteering. The organization is very picky about its funding sources and works to maintain its independent focus as much as possible. While they accept grants from government, private foundations, and corporate entities, the organization is constantly battling attempts to either exploit local research for other purposes or direct specific research agendas. The organization turned down a half million dollar grant for this very reason last year. The organization also diversifies its funding base by ensuring that at least a third to half of its funding comes from local individuals and program use fees. Program user fees are charged on a sliding scale.

SFH has a governance structure that ensure that a majority of its board members are from the community and have been involved in at least one SFH supported project. The by-laws ensure that gender, age, race and ethnic diversity as well as income diversity are maintained in these leadership positions. The remaining board positions are often held by important partner organizations working with SFH.

The SFH space is a model of scientific research conducted by and for a community can happen. It demonstrates that power of partnerships while supporting ways for new perspectives and insights to enter into the research process. It respects community power and understands that building important linkages between marginalized communities and a world of scientific resources and expertise are important.

Resources to Explore

Community Research Network - http://www.loka.org/crnpublicationslist.html
The CRN held six conferences with worldwide attendance from 1998 – 2003, and Loka has published several landmark studies on CBR. CBR is a platform for challenging and transforming the entire mainstream research and development system, and can be used as a tool for policy development in arenas such as nanotechnology design and use. The project is inactive, but a number of useful publications are available.

Community Science Action Guides - http://fi.edu/guide/index.html
Community Science Action Guides offer resources for teachers at any level. The collected "Guides" offer a wide variety of resources and approaches. Some of the resources provide background information while others offer tips for conducting community action projects related to water, energy and life science.

Community Science Workshops - http://www.scienceworkshops.org
To Expand Knowledge, Thinking, and Imagination with Tools of Discovery and Things to Discover." The Community Science Workshops create a safe, informal, and fun space for kids to learn through hands-on activities. Outside of the pressures of the formal classroom, students are free to explore and discover the wonders of the natural world in their own community.

Directory of Open Access Journals - http://www.doaj.org/
The Directory of Open Access Journals covers free, full text, quality controlled scientific and scholarly journals.

Living Knowledge: The International Science Shop Network - http://www.scienceshops.org/
Science Shops are small entities that carry out scientific research in a wide range of disciplines – usually free of charge and – on behalf of citizens and local civil society. Science shops respond to civil society's needs for expertise and knowledge and are often, but not always, linked to universities, where students conduct the research as part of their curriculum.

Open Conferences / Workshops
Environments were the opportunity to learn and network is open to a scientists and non-scientists alike.
Open Workshop - http://psb09openscience.wordpress.com/about/
SciBarCamp - http://www.scibarcamp.org/
BioBarCamp - http://www.barcamp.org/BioBarCamp

Open Courseware Consortium - http://www.ocwconsortium.org/
An OpenCourseWare is a free and open digital publication of high quality educational materials, organized as courses. The OpenCourseWare Consortium is a collaboration of more than 200 higher education institutions and associated organizations from around the world creating a broad and deep body of open educational content using a shared model. The mission of the OpenCourseWare Consortium is to advance education and empower people worldwide through opencourseware.

Open Data Consortium - http://www.opendatacommons.org/
Legal tools for sharing and providing data in an open manner.

The Open Science Directory - http://www.opensciencedirectory.net/
Access to scientific literature is very important for the scientific work in developing countries . As a result of different projects a large collection of e-journals is now available for researchers in developing countries.

Open Science Grid - http://www.opensciencegrid.org/
A national distributed computing grid for data intensive research. Allows research communities to pool together resources. Also check out the world community grid - http://www.worldcommunitygrid.org.

Open Science Notebook - http://en.wikipedia.org/wiki/Open_Notebook_Science
Open Notebook Science is the practice of making the entire primary record of a research project publicly available online as it is recorded. This involves placing the personal, or laboratory, notebook of the researcher online along with all raw and processed data, and any associated material, as this material is generated. An example is here - http://onschallenge.wikispaces.com/list+of+experiments

Open Wetware - http://blog.openwetware.org
Created to support open research, education, publication, and discussion in biological sciences and engineering

Science Commons - http://sciencecommons.org
Works to pull research data in to a shareable commons.

Sciences Linkages in the Community - http://www.aaas.org/programs/education/slic/
The primary goal of SLIC is to enhance the effectiveness of community-based organizations and schools in providing science, mathematics and technology (SMT) activities.

The Open Science Project - http://www.openscience.org/blog/
A group of scientists, mathematicians and engineers who want to encourage a collaborative environment in which science can be pursued by anyone who is inspired to discover something new about the natural world.

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The Technology of Classical Instruments: Do Artifacts Embody Gender Biases Through Constrution and Design?

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Extended Abstract:

Understanding social values and politics through the design of cultural objects has been a hotly contested debate among social scientists and political theorists (Winner, L., 1986 & Werskey, G., 2007). According to the theory of technological politics, certain technologies not only become the methods of settling issues within communities, but also, embody political phenomena and social values in their own right (Winner, L., 1986). Therefore, through the examination of the engineering and design of artifacts, one could theoretically gain a greater understanding of gender, gender roles, gender expectations and gender inequalities within a society.

To test Winner's hypothesis, this project examined the design of two classical musical instruments, the piano and the cello. This study aimed to determine if the instruments were in themselves gendered and demonstrative of a Western patriarchal culture. Through content analysis, instrument size, proper playing position, necessary hand span and common instrument related injuries were compared to previously collected data on men and women's average height (CDC, 2004), anatomy, hand span (Steinbuhler, D., 2006) and clothing restrictions (Lowe, J. & Lowe, E., 1982).

The evidence produced in this study suggested a strong correlation between the most common challenges of female pianists and cellists and instrumental design. In addition, instrument modifications, designed to eliminate some of the arduous conditions faced by many female players, became more common beginning in the 1970s (Steinbuhler, D., 2006), the peek years of the second wave feminist revolution. Therefore, it can be concluded that, to an extent, certain classical instruments embody the gender biases of Western society. One could argue that by their design and construction, the piano and cello illustrate the historical preference for men within the public sphere, the asymmetry between men and women among the artistic elite and the slowly changing, but still present, gender inequalities in contemporary Western society.

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The Technology of Classical Instruments:
Do Artifacts Embody Gender Biases Through Construction and Design?

Heidi Rademacher

In his article "The Marxist Critique of Capitalist Science: A History in Three Movements," Gary Werskey states that if we explore the history of technology from a Marxist ontology then "history is the motor of technology [and] technology is the embodiment of values in artifacts." This point was especially striking from a sociological perspective.

Sociologists are generally trained to abstain from attributing human qualities to objects. Social scientists label the process of ascribing human characteristics to articles as reification. The danger of reifying objects is generally tied to fears of failing to see world as a social construction and disregarding the possibility of social change.

In contrast to sociological tradition, Langdon Winner, a political theorist and professor of Science and Technology Studies (STS), explores objects and technology from a "theory of technological politics." Winner argues that if one takes the reification standpoint literally, it would imply that technical things do not matter. Instead, he suggests that certain technologies have political phenomena within themselves and embody specific forms of authority and power. These technical politics not only draw attention to the intertwining of politics and technology, but also makes one aware of the impact technical arrangements have on social order. In other words, technology, engineering and design advance the interests of only certain members of a society.

A "theory of technological politics" provides an excellent starting point for questions related to STS. Who benefits from technology, engineering and design? Who is subordinated by technical arrangements? What can be understood about society through the study of technology? What politics, social values, norms, biases and inequalities can be explored through a study of technology? However, these are not only questions for the scientist and STS theorist to answer; they are rudimentary lines of inquiry essential for every member of society.

The purpose of this project will be to attempt to apply Winner's "theory of technological politics" to societal values. This project will explore the possibility that many artifacts are designed to continue a tradition of patriarchy and the subordination of women and therefore, these objects themselves produce and reproduce a patriarchal society. To examine these proposals, this project will focus on the technology and engineering of two classical instruments. While it is important to remember that classical instruments also embed racial and class-based values, this paper will focus specifically on sex differentiations and sex discrimination.

The modern piano was invented around 1700 in Florence, Italy. As the instrument became more popular, and available to a larger number of elite and upper-middle class people, the favored style of music transitioned from classical to romantic. The piano was a preferred instrument of the Romantic era (1850-1900). The piano music of this period was characterized by dramatic, lush, theatrical sounds that utilized the entire keyboard.

While both men and women have historically played the piano, gender expectations have constantly influenced when and where a person would perform. Men dominated the public sphere, while women generally played within the home, giving parlor concerts for family and friends. Gender norms and the fashion styles of the time greatly impacted the various avenues available to a pianist. However, even more constraining, even today, is the technical design of the piano.

One of the most challenging physical requirements for piano playing is having an appropriate hand span. According to research presented at the Music Teachers National Association conference in 2004, the average hand span for an adult woman is 7.7 inches. This can be problematic in many compositions, which require a player's hand span to cover a tenth. On a standard keyboard a tenth measures over eight inches.

A second instrument design that is challenging for women and players with a smaller physical build is the cello. The proper placement of the cello requires the top of the instrument to rest against the chest. For women, this can be uncomfortable, especially if a woman has sensitive breasts or is lactating. As the instrument is held between the legs, gendered fashion styles and expectation impacted who typically played the cello in the public sphere.

Again, hand span becomes an issue for women who wish to play the instrument. Specific notes are produced, in part, by the position of the first, second, third and pinkie finger. Individuals with longer fingers have an advantage at cello playing. If one returns to the research on hand span presented in 2004, it becomes clear that there is almost a dimorphic separation between the average hand span and finger length of men and women.

Despite these limitations, the developers of modern technology have created means of making musical instruments more suitable to women, children and men with smaller physical bodies. If one believes human ends are transformed as they adapt to technical means, these new developments could be interpreted as a signal of changing gender biases. Special sized piano keyboards can be ordered and inserted into a piano. Cellos can be ordered in a wide range of sizes, with many female cellists opting to play 7/8 sized models. Individual musician also find a variety of methods to overcome physical limitation. Many pianists play chords as an arpeggio, striking notes in quick succession, rather than together as a block sound. Cellists spend time focused on finger agility, flexibility and strength and also create innovative fingerings that sometimes include temporarily using the thumb. It is also important to note that modern fashion has enabled women more access to many instruments.

These modifications, however, can be difficult to achieve. Specialized keyboards can cost between $5,000 and $10,000. These keyboards are difficult to install, and therefore, cannot be used in every piano on which a performer might have to play. Cellos sized for smaller players produce slightly different acoustical resonance. Some musicians, critics and instrument makers have critiqued the slight difference in sound produced by a smaller cello. Arpeggios only work well in certain styles of music and finger exercises only alleviate the physical challenges presented by hand span.

In conclusion, one might ask what do the examples presented in this project say about the Western cultural values. If one interprets these examples from a reification standpoint it is easy to state that instruments only demonstrate the historical fact that the majority of professional musicians were men. However, if one opens the case to exploration through Langdon Winner's theory of "technological politics" (values), it becomes clear that instruments are gendered, and therefore, certain instruments, such as the piano and the cello, encourage male performers and challenge and discourage the many of female players.

A conclusion based Winner's standpoint emphasizes the need for the production of musical technology as a means of fighting Western gender biases. Through this project, it has become clear that the gender biases embodied in musical instruments can only be changed through a combination of technological and social reform. Changes in music education and pedagogy could incorporate non-traditional and creative approaches to support female players in practice and performance. Creating new venues for female performances, compositions and recording, as well as listening to a variety of interpretations of pieces, including those on modified instruments, can help individuals become open to new sounds. Another approach to changing the gender biases within classical music would be to utilizing the mass media to feature the achievements, struggles and challenges of female players, instrument makers and composers. These suggestions for social change combined with new developments in musical technology could lead to a new set of musical artifacts; a set of artifacts that embody the values of a more egalitarian society, where male and female musicians are truly equal.

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"Capitalist Science and the Medicalization of the Gendered Body"

Katie Plocheck

Course Description:

In the 1970s, anthropologist Sherry Ortner posed the question: is nature to nurture as woman is to man? Her argument, constructed to explain what she claimed was women's near universal subjugation, was rooted firmly in the notion that women were constrained to the "natural" and private domain: reproduction, child raising and rearing. Accordingly, men were free to become cultural producers, in charge of not only the construction and dissemination of values, beliefs and rituals, but also of knowledge.

Other theorists posit that nature and culture are inextricably tied, united by a mutual link to science. In claiming that science reflects cultural values, Werskey averred that capitalism, as manifested through science, was culpable for inequality in the scientific realm. A capitalist notion of science seems to have the potential to transform the natural into the cultural, debunking Ortner's earlier analysis of nature and nurture as distinct categories. Her argument remains salient, however, as males, under the capitalist system, continue to be the writers of cultural knowledge of which the body is one canvas.

This course examines how such capitalist science indeed transforms the natural into the cultural, often leaving inequality in its wake between the private and public spheres. Specifically, we will look in depth at the gendered body in regards to matters of reproduction. Using the medicalized body as a cultural template, the following questions can be explored: How, specifically have gender inequalities been exacerbated by science under capitalism? How has nature, constructed by science, essentially become culture? How would a theoretical Marxist approach help to elucidate women's subversion in the scientific and technological realm? Apart from these questions, broad theoretical relationships, such as a Marxist-feminist approach will also be explored to create a platform for further theoretical inquiry.

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- Women and the experience of capitalism:
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- Marxist-Feminist critique:
    - Firestone, Shulasmith Firestone. (1970). The Dialectic of Sex: The Case for Feminist Revolution
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    - Butler, Judith. (1993). Bodies That Matter: On the Discursive Limits of "Sex". New York: Routledge.

- Case Studies: Surrogacy and Intersex
    - Surrogacy:
        - Berkhout, Suze G. Buns in the oven: objectification, surrogacy, and women's autonomy, January 2008
        - Teman, Emily. The Medicalization of "Nature" in the "Artificial Body": Surrogate Motherhood in Israel. *Medical Anthropology Quarterly,* Volume 17, Issue 1
    - Intersexuals
        - Dreger, Alice. (1998). Hermaphrodites and the Medical Invention of Sex. Cambridge, Massachusetts: Harvard University Press
        - Fausto-Sterling, Anne. (2000). Sexing the Body: Gender Politics and the Construction of Sexuality: New York, New York
        - Preves, Sharon E. (2000). Intersex and Identity: The Contested Self. New Brunswick, New Jersey: Rutgers University Press

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Butler, Judith. (1993). Bodies That Matter: On the Discursive Limits of "Sex". New York: Routledge.

> Philosopher Judith Butler wrote Bodies That Matter to clarify her earlier misunderstood assertions of gender as a daily performance. Rather than being something that a person can put on or remove, she claims that gender, while constructed, is more is more potent and indispensable than that—a potency that often manifests onto the body through the projection of regulatory ideals. Much of this has been due to the heterosexual imperative, which mandates that bodies align with a hegemonic understanding of sex and gender. In doing so, she challenges the readers and broader culture to use the tools of a hegemonic society, but to re-adapt them.

Conrad, Peter. (1992). Medicalization and Social Control in *Annual Review of Sociology,* Vol. 18: 209-232

> Conrad examines the relationship between medicalization and social control, by employing studies published on the topic since 1980. Of particular focus are changes in the medical profession and how it effects medicalization, as well as the social dilemmas faced in the realm of medical research and practice.

Dreger, Alice. (1998). Hermaphrodites and the Medical Invention of Sex. Cambridge, Massachusetts: Harvard University Press

> Foregrounding the medical treatment of intersxuals and hermaphodrites in a historical perspective, Alice Dreger traces the advancements of medical technology and how it affects the individuals who often suffer from its pernicious consequences. In doing so, she creates a compelling discourse not only around sex, sexuality and gender, but how the conditions (namely intersex) that blur our understanding of them, should be treated both within the medical community and broader society, championing a social response rather than a medical one.

Martin, Emily. (1987) The Woman in the Body: A Cultural Analysis of Reproduction. Boston: Beacon Press.

> Martin discusses women's bodies by using the metaphor of the machine. The machine, she claims, produces culture's perception of normalcy with its systematic mechanisms. A machine runs regularly; women, she claims, do not. Thus, she claims that like other mechanisms of the body, such as the heartbeat, women's body and their impossibility to attain normalcy, should be alluded more

to a chaos model than to a machine. In doing so, unattainable standards for women will be eradicated.

Ortner, Sherry B. (1974). Is Female to Male as Nature is to Culture? In M. Z. Rosaldo and L. Lamphere (eds) *Woman, Culture and Society*. Stanford, CA: Stanford University Press, pp. 68-87

In one her most seminal works, Ortner poses the title question as a lead-in to the claim that females were oppressed because of their roles as child bearers and caretakers. As such, men were free to go out and create culture, thus controlling the production and dissemination of all knowledge. Essentially, Ortner claims that women's initial oppressions begins with the constraints of her physical body and that, like de Beavoir said, "....the woman is adapted to the needs of the egg rather than to her own requirements". This has not only explained why culture is often exalted above nature, but also why women have not had an integral role in its production.

Preves, Sharon E. (2000). Intersex and Identity: The Contested Self. New Brunswick, New Jersey: Rutgers University Press

While Preves work focuses on the contentious issue of intersexuality and how it should be treated, she was also one of the first to speak with intersexed individuals to get their perspective, including how they cope with their conditions and how they perceive their own identities, often times in contrast to medical diagnoses. This book offers a rare glimpse into the world of intersex by the individuals who live it. In sharing intersex voices, Preves challenges, like so many others, the restrictive binary gender categories we live by.

Rubin, Gayle. (1975). The Traffic in Women: Notes on the "Political Economy" of Sex in Feminist Theory: A Reader, 2005,

In this essay, Rubin attempts to pinpoint the locus of female oppression, especially those social mechanisms which are responsible for it. She suggested that there was a "sex/gender system" at work which she defines as "the set of arrangements by which a society transforms biological sexuality into products of human activity, and in which these transformed sexual needs are satisfied". In doing so, Rubin leverages the work of previous theorists, including Marx, Levi-Strauss (exchange of women) to show how women have been subverted within various frameworks, but also reinterprets their theories to more fully explain the female situation.

Teman, Emily. The Medicalization of "Nature" in the"Artificial Body": Surrogate Motherhood in Israel. *Medical Anthropology Quarterly,* Volume 17, Issue 1

Springboarding off the understanding of motherhood as connected to nature, Teman looks at the medicalization of the mother category in Israel, using surrogacy as her locus of investigation. She examines the personal agency of surrogate mothers, as well as redefines the surrogate body as artificial and locates nature in the commissioning mother's womb. By doing so, Teman showcases how surrogacy in Israel is exalted as a means for women to achieve normal and natural reproduction.

Class Pedagogy

While this course will be mainly reading and discussion-based, I would also like to have the students choose certain ideological positions in regards to specific course topics for each class where this is pertinent. This is meant to be more than a simple pro/con exercise, but to encourage the students to engage deeply with the theory, so that they may begin to consider and develop their own working theories on how such contentious issues, like surrogacy and intersex, may be approached and understood. Pulling from the literature for each week, I would like students to examine specific issues through these lenses, augmenting or subtracting from the existing body of knowledge where necessary. I anticipate this being an anthropology graduate course of around 10-20 students who are interested in gender, sexuality, the body, and how each of these categories intersect with medical science.

New Images of Scientist-Activists

Gary Werskey (2008), in his article, "The Marxist Critique of Capitalist Science: A History in Three Movements?" describes two eras during which scientists applied their status as knowledge-producers to conduct coordinated activism for social progress. Werskey, unfortunately, restricts his historical survey to the activities of men in England during the 1930s-1940s and the 1960s-1970s.

I was intrigued to learn about these movements, as much of my own work has been trying to bring science and scientists to the policy arena – both currently practicing scientists and scientists-in-training who otherwise perceive science as wholly objective and unbiased. In this light, Werskey's limited perception of the scientist-activist was frustrating.

My questions became, what is a scientist-activist, anyway? Are there other models of scientist-activist? And if there are other models, can we teach a new definition of the scientist-as-activist to scientists of all descriptions?

What is a scientist-activist?

Some might see the term scientist-activist as an oxymoron (McGill U. blog, 2008), the objective, fact-obsessed scientist serving as stark contrast to the half-crazed, illogical and knee-jerk activist.

Esa Valiverronen (2001) identified seven roles for scientists described by the media over the course of a debate around sustainable forestry practices in Finland. Table 1 lists the roles and their functions.

Table 1. Media Representations of Scientists' Roles (Valiverronen, 2001)

Roles	Functions
Popularizer	Presenting new research results
Interpreter	Interpreting new phenomena and problems
Advisor/Advocate	Making and commenting on policy claims
Promoter	Raising funds or promoting research
Manager	Rendering account for use of public funds
Critic	Commenting on research results

In a broad sense, scientists who serve in any of these roles could be called scientist-activists. Each role requires the scientist to step out of their narrow research-oriented frame and the comfort of the traditional culture of science to engage in greater society. I find these definitions too narrow, based on research into definitions and models of scientist-activists. Valiverronen's functional categories – developed on the basis of a single-issue case study – restrict the range of scientist-activism. Many scientists have stepped beyond specific scientific issues to influence broader policy and issue arenas, for example social and environmental justice, peace work, and politics. This paper provides examples of four types of scientist-activists: Advocates, Organizers, Promoters, and Activists. The following section defines these types and provides varied descriptions of their respective activities from other sources.

Advocates. These working scientists step outside of their institutional roles to act in the public sphere, on policy and politics.

> "[The liberal scientists of 1930s England] modeled the role of a successful scientist-activist. For they combined high scientific status and achievement with a willingness to risk their reputations as 'sound' men…to do good work and benefit society." (Werskey, 2008)

Organizers. This type includes "working scientists active in changing the institutions of science themselves" (Fausto-Sterling, 2009) from within the system.

> "The first step in political radicalization of intellectual labor is *not* to ask for more and better jobs, mainly in research, development, and teaching, in order to fully employ everyone to his or her capacity. No, the first step… is to question the nature, the significance and the relevance of *science itself as it is praticed now*, and to question thereby the role of scientific workers." (Gorz 1980)

> "In an attempt to get around these artificial barriers and inconsistencies [regarding women's roles in science], early women scientists developed…strategies…of two sorts. One was the idealistic, liberal-to-radical, and often confrontational strategy…writing angry letters and otherwise documenting the "unfairness" of the unequal opportunities open to men and women." (Rossiter, 1982)

Promoters. Working scientists who engage in public conversation to promote research science as an institution, the scientific pursuit itself (perhaps via links with elementary and secondary educational systems), and especially funding for continued research.

> "The Scientist Activist, reporting from the crossroads of science and politics… takes on the people and obstacles standing in the way of the progress and proper application of science…defending scientific and social progress." (Anthis, 2006)

> Scientists should "get involved in science-related public issues and to learn to lobby." (Garfield, 1988)

Activists. Some scientists have merged their political agendas with their scientific work, and apply their research to promote social change. Their activities may extend to "grassroots, confrontational activism." (Fausto-Sterling, 2009)

> Knowledge and knowledge-makers taking part in political and community activism (Frickel, 2005).

> "Conventional behavior in pursuit of contentious goals can sometimes produce significant sociopolitical change…redirecting research and science policy, not undermining or remaking it…carried out collectively." (Frickel, 2006)

> According to Basava (a Hindi Saint), "'doing good work is Heavenly' and 'there can be nothing more sacred than work.' Closely associated with the sacredness of work was the sacredness of sharing. The gifts received from society through ones labour should be shared." (Shiva, 2005)

> "…take action to create a healthy environment and a safer world." (UCS, 2009)
>
> "scientists, engineers and other innovators [have] an ethical obligation to bring their knowledge and experience to bear on critical national decisions…" (FAS, 2009)
>
> The scientist-activist's role is to "get independent science to the public and to promote science that's socially accountable and ecologically sustainable." (Ho, 2007)
>
> "It should not be imagined that scientists who make public statements or join rallies are being more political than those who remain in their offices and laboratories. The latter group cannot escape the structural influences of funding, bureaucratisation and selective usefulness of scientific results. Their research is inevitably value-laden due to the values embedded in the context of their research, both organisationally and theoretically.[3] Those who become 'socially active' are merely being more overt in attempting to link their values and their actions." (Martin, 2006)

Are there other models of the scientist-activist?

As Frickel (2006, p.206) points out, the Advocate and Activist types – because they are stepping outside of the institution of science -- are more likely to be "older, established researchers with tenure" who run less risk of repercussions. So, in contrast to the scientists of "high scientific achievement and… reputations" of which Werskey (2008) writes, Rossiter (1982, p. xvii) describes female scientist-activists as women who advocated for a place for themselves (and rarely, other women) in professional scientist positions (i.e., Organizers). Even as their numbers were increasing in undergraduate- and graduate-level science programs (Rossiter 1982, p. 52), paid positions were limited both hierarchically (i.e., lower-status and low-pay positions) and territorially (i.e., in "women's" fields such as home economics). Some women, rather than fight to enter the professional sphere, conducted research in their own backyards and children's nurseries (e.g., ornithologist Margaret Morse Nice) or otherwise kept themselves in the field with "private research" (Rossiter 1982, pp 276, 139-142).

Membership in professional societies was overwhelmingly closed to women (Rossiter 1982, p. 73), which also kept them isolated from the realms of professional science that would gain them broad recognition (Rossiter 1982, p. 268).

Recognition for women and people of color has continued in the same pattern to the present time. Table 2 contains statistics on several listings of "achievement" and awards earned by scientists, including:

- (Star) Top 1000 scientists listing, indicated by stars in "American Men of Science," a directory published between 1906 and 1943 by statistician James McKeen Cattell. (Rossiter 1982, p 291)
- (WoS) Included as a scientist biography on "Eric Weisstein's World of Science," a website promoted as a resource for students. (Weisstein, 2009)

- (AA) Listing by the Academy of Achievement, with the goal of "bring[ing] the inspiring life stories of the eminent achievers of our time to the fingertips of every student, teacher and parent…" (Academy of Achievement, 2009)
- (ASO) Listing on the PBS webpage "A Science Odyssey," which includes "the men and women responsible for the 20th century's greatest science achievements" (PBS, 1998)

Table 2. Recognition of "important" scientists by multiple measures

recognition	total listed	women (#, %)	men(m), women(w) of color (#,%)
Star	1369	27, 2.0	unk
WoS	1071	19, 1.8	20m, 1.9 1f <0.1
AA	38	5, 13	3w, 0.8
ASO	52	8, 15	2m, 0.4

Consider another example, a website containing online resources for students associated with the PBS television program, "A Science Odyssey: People and Discoveries." The site lists 68 "significant stories from a remarkable century of discovery" between 1900-1996 – and only 4 reference women and/or people of color (PBS, 1998), mentions that are buried in the links:

1. "1953 Watson and Crick describe structure of DNA" (provides due credit to R Franklin within item text at http://www.pbs.org/wgbh/aso/databank/entries/do53dn.html)
2. "1959 Leakey family discovers human ancestors" (Louis, Mary, Jonathan; http://www.pbs.org/wgbh/aso/databank/entries/do59le.html)
3. "1962 Silent Spring published" (not "Rachel Carson publishes *Silent Spring"* http://www.pbs.org/wgbh/aso/databank/entries/dt62si.html)
4. "1975 Role of endorphins discovered" (Choh Hao Li not mentioned by name in title; http://www.pbs.org/wgbh/aso/databank/entries/dh75en.html)

While it is difficult find information about (or even names of) successful women in science, it is even more rare to find examples of female scientists and scientists of color taking on the Activist and Advocate roles.[1] For example, Table 3 provides statistics on gender and race representation with two awards presented to scientists for work in the realm of social justice:

- (Nobel) The Nobel Peace Prize (assumed in this case to highlight scientist-activists, as opposed to the science prizes).
- (PWM) The Public Welfare Medal, presented by the U.S. National Academy of Sciences "in recognition of distinguished contributions in the application of science to the public welfare" (NAS, 2008).

[1] In fact, when women are identified in current times as activists by conservative commentators and corporations, it is with derision, and questioning of their underlying science credentials (see, e.g., Poynter, 2008 and Center for Consumer Freedom, n.d.). This harkens back to the reaction to Rachel Carson's call to action, "Silent Spring." (Lear, 1997)

Table 3. Recognition for scientist-activists; proportion of women and people of color. (NAS, 2009)

recognition	total awarded	total scientists (#,%)	women (#,% of scientists)	men, women of color (#, % of scientists)
Nobel	96	4, 4	2,50	1m, 25 1w 25
PWM	68	59, 87	4, 6	1m, 0.1; 1f, 0.1

Table 4 is a sampling of scientist-activists identified – essentially at random, but seeking representation from multiple settings and backgrounds – who can serve as new models for scientist-activists-to-be.

How can we inspire more scientist-activists?

Werskey (2008), at the end of his article, asks if a 3rd movement is possible. To which I answer, only if a broad swath of scientists take up the work that needs to be done on so many issues, from preparing for impacts of climate change to serving the needs of underserved populations across the globe.

To encourage collective and concerted action in the U.S., I recommend three initiatives:

1. Convene a meeting of organizations providing venues in which Advocates can take action – e.g., Union of Concerned Scientists, Federation of American Scientists, and others as identified – to:

- Share best practices for recruiting and motivating scientists to take part in public debate. Maybe some good role models will prompt more scientists to take up the challenge.
- Explore the utility of a joint clearinghouse, collaborative training, and/or conferences for Advocates.
- Plan a "year of action" in which projects and initiatives by Advocates are highlighted in the media, which will expose the public to the idea of scientist-activists.

2. Establish a Journal of Activist Research (perhaps more utilitarian and research-oriented than the new "Science for the People" [www.scienceforthepeople.com]) to facilitate sharing of findings and application of research to social problems. Grassroots and community-based activism, because of its low-budget nature and immediacy, is seldom shared beyond the immediate locus, but scientists working in those arenas should have a venue for sharing research tools, methods, and findings across issues and locations.

3. (In the best of all possible worlds:) Bring representatives of all science-activist types to the table to identify issues of common concern, trends that cut across all areas of activism, and identify joint efforts to address institutional and cultural roadblocks thwarting progress on all fronts.

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Table 4. Diverse scientist-activists: an non-statistical sample

name	m/f	race	award	country	era	science field	activism field	source
Wangari Maathai	F	black	Nobel Peace Prize	Kenya	1970s to present	environment	forest conservation	Nganza, 2004
Vandana Shiva	F	asian	Right Livelihood Award (the "alternative Nobel Peace Prize")	India	1970s to present	physics	environment; food & water distribution; genetic engineering	Eco Books, 2009
Melba Phillips	F	european		U.S.	1940s	physics	vs. nuclear weapons; co-founder of Federation of Atomic Scientists	University of Chicago, 2004
Mae Wan Ho	F	asian		England	1980s to present	genetics	genetically modified organisms; genetics ethics	Ho, 2007
Alice Hamilton	F	european		U.S.	1920s	medicine	industrial hygiene	Sicherman, 1984
David Ho	M	asian		U.S.	1970s to present	medicine	AIDS	AA, 2008
Lillian Dyck	F	aborigine	National Aboriginal Foundation Lifetime Achievement Award	Canada	1990s to present	neurochemist	Senate, women in science	Dyck, 2005
Ralph Bunche	M	black	Nobel Peace Prize	U.S.	1950s	social science/ anthropology	international peace negotiations	Haberman, 1972

Sally Paddock
03.05.09

ABORIGINALS AND SCIENCE - A CANADIAN CONTEXT

Course Objectives:

Glen Aikenhead, in his essay "Integrating Western and Aboriginal Sciences: Cross-Cultural Science Teaching" talks about the alienation process that takes place in science classrooms and how Aboriginal students in his Canadian context are particularly vulnerable to this alienation. Western science, however, is still "a major global influence in [Aboriginal] lives," says Aikenhead, and "alienation reduces their effectiveness at 'legitimate peripheral participation' in community matters related to science and technology". The purpose of this class, then, is to introduce students to these complexities of Aboriginal participation in the fields of science and technology, with a particular emphasis on education. At first students will be introduced to Aboriginal world-views as they pertain to science in society; they will then be introduced to initiatives which are seeking to incorporate Aboriginal world-views and cultural values into science education and research at an elementary and post-secondary level; and the final part of the course will focus on specific community cases and initiatives related to science and technology. The readings and websites are not exhaustive and students will be encouraged to find other literature related to each subject.

Course Requirements / Procedures:

The course will, ideally, follow a seminar-format. Classes will also, ideally, alternate between required readings/resources and student-initiated readings/resources. For each sub-section, students will be asked to report to the class on one of the required readings and, for the weeks following those readings, report to the class on a student initiated reading/resource. Format of presentations will be discussed with the students. Formats could include a strictly oral report, a written report to hand out to the class, a series of questions related to each subject posed to the class, a prepared dialogue with another student in the class and/or other suggestions. The teacher will also make an effort to communicate with a local elder(s) / Aboriginal leader(s) in the area to see if there is an interest in joining the class for one or more of the sessions. A larger final project would be expected, format to be discussed. If the opportunity arose for projects to be presented at a local elders meeting, having students present their projects in class and at the meeting would be ideal. Depending on the geographic location of the class, students will be asked to find at least one local topic/resource/reading to present on for one of their presentations. There will, with respect to this requirement, also be time reserved in a class session near the beginning of the course to discuss relevant Aboriginal history and contemporary Aboriginal social settings as they relate to the geographic setting of the course.

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"Lessons in Learning: The cultural divide in science education for Aboriginal learners." Canadian Council on Learning. http://www.ccl-cca.ca/CCL/Reports/LessonsInLearning/LinL20070116_Ab_sci_edu.htm (accessed March 4, 2009).

II. Aboriginals And Science Education

Elementary and Secondary, Statistics and Initiatives

Environmental Sciences and Fisheries Roadshow. http://www.roadshow.ubc.ca/staticpages/index.php?page=20070906110238204 (accessed March 4, 2009).

"Planning Guide and Framework for Development of Aboriginal Learning Resources." British Columbia Ministry of Education, Aboriginal Education. http://www.bced.gov.bc.ca/abed/planguide/welcome.htm (accessed March 4, 2009).

First Nations Education Steering Committee. http://www.fnesc.ca/

Elementary and Secondary, Research

Aikenhead, Glen. "Integrating Western and Aboriginal Sciences: Cross-Cultural Science Teaching." *Research In Science Education* 31, no. 3 (2001).

Glen Aikenhead's Webpage. http://www.usask.ca/education/people/aikenhead/ (accessed March 4, 2009).

Post-Secondary, Statistics and Initiatives

Aboriginal Canada Portal, Education. http://www.aboriginalcanada.gc.ca/acp/site.nsf/en/ao28010.html

First Nations University of Canada, Department of Science http://www.firstnationsuniversity.ca/default.aspx?page=30

"Statistics by Subject." Statistics Canada. http://cansim2.statcan.gc.ca/cgi-win/cnsmcgi.pgm?Lang=Eng&SP_Action=Main-Principal&SP_Mode=2 (accessed March 4, 2009).

"Aboriginal Education." Ministry of Advanced Education and Labour Market Development. http://www.aved.gov.bc.ca/aboriginal/ (accessed March 4, 2009).

Post-Secondary, Research

Dyck, Lillian E. "An Analysis of Western, Feminist and Aboriginal Science Using the Medicine Wheel of the Plains Indians." *Native Studies Review* 11, no. 2 (1996).

III. Aboriginals, Science and the Community

Traditional Knowledge and Public Participation

Weinstein, Martin S. "Sharing Information or Captured Heritage: Access to Community Geographic Knowledge and the State's Responsibility to Protect Aboriginal Rights in British Columbia." Digital Library of the Commons. http://dlc.dlib.indiana.edu/archive/00000184/ (accessed March 4, 2009).

Gilchrist, Grant, Mark Mallory and Flemming Mertel. "Can Local Ecological Knowledge Contribute to Wildlife Management: Case Studies of Migratory Birds." *Ecology and Society* 10, no. 1 (2005). http://www.ecologyandsociety.org/vol10/iss1/art20/ (accessed March 20, 2009)

Monastersky, Richard. The Social Pole? *Nature* 457 no. 26 (February 2009), 1077-1078.

Wertheim, Margaret. "The Way of Logic." *New Scientist* 148 (December 2, 1995) 38-41.

Sample Health Issues

Debruyn, Adrian M H. "Ecosystemic Effects of Salmon Farming Increase Mercury Contamination in Wild Fish." *Environmental Science and Technology* 40 (2006).

National Aboriginal Health Organization. http://www.naho.ca/english/index.php

Science/Economic Issues – Case

Helen Polychronakos, "Two Towns, One Choice," *theTyee*, May 22, 2007. http://thetyee.ca/News/2007/05/22/SalmonFarms/ and

Helen Polychronakos, "Economy vs. Ecology in Fish Farms Debate," *theTyee,* May 24, 2007.

http://thetyee.ca/News/2007/05/24/FishFarm2/

Randyn Seibold, "First Nations Power Up," RenewableEnergyWorld.com, December 18, 2007.
http://www.renewableenergyworld.com/rea/news/article/2007/12/first-nations-power-up-50888

Gillian Riddell, "Tla-o-qui-aht plan green power project," *Westerly News*, May 29, 2008.
http://www.bc-creeks.org/index.php/tla-o-qui-aht-plan-green-power-project/#more-159

***Marxism and Native Americans*. Edited by Ward Churchill Boston: South End Press, 1983(?).**

A work of collected contributions, *Marxism and Native Americans* brings together essays from both Marxists and Native Americans alike. The Marxist authors were asked to share thoughts on how they believed Marxism is and could be applied to various non-Western cultural situations. The responses range from a complete dismissal of Native American concerns claiming that an insufficient material achievement in Native American society has stunted the development of thought, to an admission that Karl Marx, himself, may rightly be rejected by Native Americans but that current Marxism is open to sharing the wisdom of other cultures and, indeed, needs the wisdom of other cultures in order to fully progress.

The Native American perspectives, on the other hand, voice concerns about the European priority of "progress"; what they feel is the priority of indoctrination of the education system; the rejection of Native American authored contributions to Marxist journals; how they feel that Capitalism and Marxism both neglect to protect what is most valuable to the Native Americans – their land, territory and right to self-determination; and, embedded in all these concerns, what they feel are two opposing Euro-Centric and Native American world-views: man at odds with nature and man with nature. The Native American perspectives assert that their world-view affirms relationship with all things – land, air, people, animals, plants – and that so long as this spiritual-physical dimension is ignored, Marxism is as harmful to the Native American people as capitalism and Christianity.

Deloria, Vine Jr. *Spirit and Reason*. Golden, CO: Fulcrum Publishing, 1999.
Selected Essays
This book of essays by Vine Deloria Jr. bring together his thoughts concerning Philosophy, Social Science, Education, the history and renewed "popularity of being" Indians, and Religion. In each essay he offers a distinctive Native American point of view, one which acknowledges the "whole" – including communities, elders, youth, women, animals and land – as more valuable than the part, whether that part be an individual person or a scientific theory. Of particular

interest is his essay and critique of Western science. His claim is that scientists impose "certain restricted patterns on the natural world, thereby limiting its potential for response....Scientists are not asking complete questions and they may not even be asking relevant questions" (12).

"Oren Lyons – The Faithkeeper," Interview with Bill Moyers. Public Access Television. July 3, 1991 http://www.ratical.org/many_worlds/6Nations/OL070391.html
In this interview with Bill Moyers, Oren Lyons, Faithkeeper of the Turtle Clan of the Onandoga Nation, explains his role within his community, how he considers community traditions as, seemingly, disparate as lacrosse and agriculture and oral history to be spiritually real and how his community maintains hope for the continuity of their traditions in the coming future. His people, he says, think in the "time of the oak tree" or "the time of the mountain" and, thus, try to make decisions that will benefit the seventh generation to come. From this perspective, then, he says that Native American communities offer a critique of science and industry, believing that "technology has overtaken the commonsense of human beings and the understanding of time". He also adds that, according to his people, life should not be taken too seriously, it should be enjoyed. The instruction for life, he says, is not to progress or acquire knowledge but to give thanks.

"Lessons in Learning: The cultural divide in science education for Aboriginal learners." Canadian Council on Learning. http://www.ccl-cca.ca/CCL/Reports/LessonsInLearning/LinL20070116_Ab_sci_edu.htm **(accessed March 4, 2009).**
Using a combination of census data, testing results and recent research, this article demonstrates how sharply under-represented Aboriginals are in the science and engineering fields in Canada. According to the research and statistics, the article concludes that the reason for the the under-representation is an educational one: compared to the non-Aboriginal population, Aboriginals are not only under-represented in science and engineering occupations but the percentage of Aboriginal students who study in science-related fields in post-secondary settings and those who take advanced high school science classes is also far less than the non-Aboriginal population, including other ethnic minorities. The study proposes that the reason for such disparity is cultural:

> "The Aboriginal world view sees people, landscape and living resources as a spiritual whole. In contrast, the Western science approach seeks greater understanding through breaking apart the whole and analyzing it into its smallest parts. These cultural differences can create difficulties for Aboriginal students in classrooms dominated by the Western science perspective."

The article proposes integration within science classrooms of Aboriginal content and a flexibility which allows local knowledge along with textbook knowledge to be incorporated into the classroom, without demanding that content and knowledge be inserted into previously-established Western science frameworks. Consultation with local Elders is recommended for such an project of integration. The article also describes current initiatives which are already integrating Aboriginal perspectives into their curricula and which are researching ways – along with industry partners – that would encourage Aboriginals to pursue further undergraduate and graduate education in scientific fields.

Environmental Sciences and Fisheries Roadshow. http://www.roadshow.ubc.ca/staticpages/index.php?page=20070906110238204 **(accessed March 4, 2009).**

An initiative of UBC Faculties of science, Aboriginal organizations, public schools, Department of Fisheries and Oceans and various levels of government, the Environmental Sciences and Fisheries Roadshow is an ongoing project which shares with Aboriginal students the educational and career opportunities available in the sciences (particularly the environmental sciences) through presentations given by graduate students. The program also seeks to establish connections between Aboriginal youth and graduate students so that the youth can begin to feel comfortable in a campus setting and community. Programs are especially targeted towards students in the Gr. 6-10 range, encouraging them and helping them understand the pre-requisites needed to gain admission to particular programs.

"Planning Guide and Framework for Development of Aboriginal Learning Resources." British Columbia Ministry of Education, Aboriginal Education. http://www.bced.gov.bc.ca/abed/planguide/welcome.htm **(accessed March 4, 2009).**

This site includes data on Aboriginal performance in schools at all grade levels compared to non-Aboriginals, current research pertaining to behavioral considerations and learning styles, and curriculum initiatives. Of particular interest is the context-flexible Shared Learnings Guide, a guide for integrating Aboriginal content into all subject areas from K-10, including lesson plans, how to include Elder participation in the classroom, specific content for incorporation, and links to other resources. The guide, created with a public-school audience in mind, is a good example of a resource and initiative which tries to be culturally sensitive to Aboriginal learning needs in the classroom while simultaneously encouraging non-Aboriginal students to better understand the Aboriginal culture.

First Nations Education Steering Committee. http://www.fnesc.ca/
As a counterpoint to the Ministry of Education's website, the FNESC website is autonomously controlled by First Nations people. After years of negotiation, the First Nations signed an agreement with the provincial government in 2006 which gives them complete jurisdiction over the K-12 education of First Nations students, including curriculum design, content, and teacher accreditation. The agreement has stages implemented which would allow further autonomous design of post-secondary programs and early-childhood programs. The site is a point of contact for information on teaching resources, individual schools, initiatives, funding opportunities and further contact information. Of particular interest for this course is the advertised funding available for the "Science and Technology Program". Communities are encouraged to develop summer programming for youth which encourages them to learn more about science and technology, promotes careers in science and technology including employable skills like problem solving and working together, and incorporates local First Nations traditional knowledge regarding science and technology.

Aikenhead, Glen. "Integrating Western and Aboriginal Sciences: Cross-Cultural Science Teaching." ***Research In Science Education*** **31, no. 3 (2001).**
This article describes the cultural assimilation that commonly takes place in science classrooms and the corresponding alienation experienced by students whose world-views do not resonate with that of the world-view of Western science commonly expressed in a classroom. Aboriginal students (in Aikenhead's Canadian context) are particularly subject to this alienation, according

to Aikenhead, and it can prove detrimental for them and their communities; for Western science is still "a major global influence in their lives. Alienation reduces their effectiveness at 'legitimate peripheral participation' in community matters related to science and technology" (2-3). Aikenhead proposes a cross-cultural approach to teaching science, one that does not seek to indoctrinate students into a particular culture or to resolve conflicts of culture, but to simply give culture, specifically Aboriginal culture, a voice. Aikenhead then illustrates what such a teaching approach could look like within specific teaching units. He pays particular attention to what words mean in each context, such as the "wolf" or "to observe", encourages teachers to ask students to say which cultural perspective they are speaking from when they describe what they have learned, and suggests field trip initiatives and even how the design of a classroom can help students learn to look at the world from each other's perspectives.

Glen Aikenhead's Webpage. http://www.usask.ca/education/people/aikenhead/ **(accessed March 4, 2009).**
Glen's webpage includes teacher resources for teaching cross-cultural science and technology units in a classroom as well as links to numerous published articles (his own and others) on cross-cultural (Aboriginal and other) approaches to science in the classroom.

Aboriginal Canada Portal, Education.
http://www.aboriginalcanada.gc.ca/acp/site.nsf/en/ao28010.html
A partnership between the government and Aboriginal communities, the portal contains information on natural resources and environment updates, community programs and resources, and links to education sites. There are resources, similar to those above, for elementary and secondary teachers and students. There are also links, however, to Aboriginal post-secondary institutions, training sites and employment programs by province. Of particular interest is the predominance of humanities, social sciences and human services programs over science programs. The natural resources and environment section, however, also provides links to resource management, environmental studies which emphasize a relationship to Aboriginal communities and how Traditional Knowledge regarding the environment and resources can be incorporated in studies in a manner respectful of the source of the Traditional Knowledge.

First Nations University of Canada, Department of Science

http://www.firstnationsuniversity.ca/default.aspx?page=30

The First Nations University of Canada, Department of Science incorporates Indigenous knowledge and holistic learning and support into their research and pre-professional science programs. Their purpose, as stated on their site, is to:

> "Promote scholarly research, teaching and learning activities that will directly and indirectly benefit Aboriginal communities in an age of technological advancements and globalization, and thereby, increase the representation of Aboriginal people in science and health related careers."

Their site, apart from the university program, also describes community projects and research that the department is affiliated with. Health and science camps are sponsored for youth and one of the departments largest community-based research endeavors is National First Nations Environmental Contaminants Program. Through the program, communities and researchers apply for funding to assess the exposure level and health effects of individual communities in relation to environmental contaminants as well as funding for research to develop methods for remediation, once assessed. The program is committed to community participation at all levels – initiation, assessment, policy-making and policy-implementation, and is an example of how environmental and health related issued particular to Aboriginals are able to receive research attention when Aboriginals are part of institutional and 'expert' design of research in addition to being part of communities.

"Statistics by Subject." Statistics Canada. http://cansim2.statcan.gc.ca/cgi-win/cnsmcgi.pgm?Lang=Eng&SP_Action=Main-Principal&SP_Mode=2 **(accessed March 4, 2009).**

Census data from the government of Canada, including information on levels of educational attainment of Aboriginals compared to non-Aboriginals as well as data on chosen fields of study of the two population groups.

"Aboriginal Education." Ministry of Advanced Education and Labour Market Development. http://www.aved.gov.bc.ca/aboriginal/ **(accessed March 4, 2009)**

A site of the B.C. Ministry of Advanced Education and Labour Market Development, the site contains the Charting Our Path Aboriginal Report, published in cooperation with the Ministry and Aboriginal leaders and institutions. The report includes statistics comparing Aboriginal and non-Aboriginal high-school graduation rates, transition periods and post-secondary enrollment according to institution type and subject area.

Dyck, Lillian E. "An Analysis of Western, Feminist and Aboriginal Science Using the Medicine Wheel of the Plains Indians." ***Native Studies Review*** **11, no. 2 (1996).**

This paper is a reflection and analysis by an urban-Aboriginal, feminist neuroscientist on how she, herself, does science. She uses the medicine wheel of the Plains Indians as a tool for her analysis, analyzing the Western scientist approach, the Feminist approach and the Aboriginal approach separately in relation to the four directions of the medicine wheel: North being mental/integrationist, East being spiritual/creative, South being emotional/authoritarian and West being physical/reductionist. The analysis is both a critique of the traditional "value-free" description of Western science as well as an approach which allows readers to see how Western, Feminist and Aboriginal perspectives of science can be simultaneously similar, complementary and different.

Weinstein, Martin S. "Sharing Information or Captured Heritage: Access to Community Geographic Knowledge and the State's Responsibility to Protect Aboriginal Rights in British Columbia." Digital Library of the Commons.
http://dlc.dlib.indiana.edu/archive/00000184/ **(accessed March 4, 2009).**

Through an examination of a case study involving a collaborative mapping initiative of the B.C. Government, the Ministry of Forestry and Aboriginal communities, this article explores real and potential conflict that develop when information is shared. Undertaken as a project which proposed to protect Aboriginal communities and resources by asking communities to map their own perspective of cultural and resource geography, the government then proposed that the data be held in a government database, publicly accessible. Once information becomes accessible to the wider public, however, it becomes available to unwanted parties like developers and, thus,

could undermine its initial goal of resource and property protection, according to the Aboriginal communities involved. The report demonstrates how knowledge shared for the purpose of community participation in projects and for protection of those communities can quickly develop into an information transfer which undermines that initial purpose. This example of incorporating Indigenous knowledge of territory into research is representative of the complexities of researchers must deal with when they try to involve communities in projects. Many communities may be reluctant to share relevant and important information in order for it to not be used in ways they never intended it to be used. Building a relationship of trust, offering the community something in return for the information they offer and deciding on how the information will be controlled are all important decisions that have to be made in preparation for the research.

Gilchrist, Grant, Mark Mallory and Flemming Mertel. "Can Local Ecological Knowledge Contribute to Wildlife Management: Case Studies of Migratory Birds." ***Ecology and Society*** **10, no. 1 (2005).**
http://www.ecologyandsociety.org/vol10/iss1/art20/ **(accessed March 20, 2009)**
In this article, wildlife conservation researchers explore the potential benefits and potential drawbacks of combining Local Environmental Knowledge (LEK) with Institutional-Scientific knowledge. The researchers claim that is not incorporated as often as it should be into research pertaining to wildlife management and sustainable conservation efforts. Both modes of knowledge – LEK and Institutional-Scientific are necessary for a fuller understanding of environments, say the researchers. There are also limits to how each can be used. Using case-study research of migratory birds, the researchers explore these limits and benefits of knowledge sharing and propose guidelines for future research.

Monastersky, Richard. The Social Pole? ***Nature*** **457 no. 26 (February 2009), 1077-1078.**
A brief summary of some initiatives of the International Polar Year which have sought to incorporate local indigenous knowledge into scientific research. The article offers examples of local northern communities and scientists who have benefited from such collaboration as well as community leaders and scientists who are skeptical of the benefits of shared knowledge. Those who advocate for the collaboration hope that the knowledge sharing will increase research

capacity within indigenous communities, will advance scientific understanding of polar environments and will help indigenous communities adapt to climate change.

Wertheim, Margaret. "The Way of Logic." *New Scientist* 148 (December 2, 1995) 38-41.
This article is a brief summary of the research thrust of Helen Verran, an Australian researcher of the Yolgnu people of northern Australia. Verran has also been inducted into the Yolgnu tribe and charged with sharing their system of knowledge with the non-Aboriginal world. According to this article, Verran's research demonstrates not just the epistemological framework of the Yolgnu but how that framework is also consistently logical, as logical as any Western scientific view. To demonstrate this, Verran compares the number system with the Yolgnu kinship system, explaining how the kinship system can be used to explain relationships of the natural world just like mathematics can. The purpose Verran's reseach is to see "the world through different eyes, she says, [so that she] can help [non-Yolgnu] see more clearly how [their] own science was constructed.

Debruyn, Adrian M H. "Ecosystemic Effects of Salmon Farming Increase Mercury Contamination in Wild Fish." *Environmental Science and Technology* 40 (2006).
An examination of the escalating mercury concentrations in demersal rockfish surrounding salmon farms in British Columbia's coastal waters. The article is of interest because the mercury contamination directly effects First Nations communities in particular who depend on a diet of wild seafood, including demersal rockfish.

National Aboriginal Health Organization. http://www.naho.ca/english/index.php
A website containing research, publications, employment links and community services for Aboriginal peoples, including the Journal of Aboriginal Health. Particular attention is to be directed to the midwifery section. The practice of Aboriginal midwifery is one where health – particularly women's health – traditional knowledge, scientific knowledge, employment opportunities and community participation all come together.

Helen Polychronakos, "Two Towns, One Choice," *theTyee*, May 22, 2007.
http://thetyee.ca/News/2007/05/22/SalmonFarms/ **and**

Helen Polychronakos, "Economy vs. Ecology in Fish Farms Debate," *theTyee,* May 24, 2007. http://thetyee.ca/News/2007/05/24/FishFarm2/

A case study involving two different First Nations communities, the fish-farming conflict, unemployment and community well-being.

Randyn Seibold, "First Nations Power Up," RenewableEnergyWorld.com, December 18, 2007.

http://www.renewableenergyworld.com/rea/news/article/2007/12/first-nations-power-up-50888

Gillian Riddell, "Tla-o-qui-aht plan green power project," *Westerly News*, May 29, 2008.

http://www.bc-creeks.org/index.php/tla-o-qui-aht-plan-green-power-project/#more-159

Two case studies involving First Nations communities and local hydro-power projects.

The curriculum car

Rosalie Barnes

Educational Pedagogy today expects teachers to design curriculum in which students can apply effective strategies and pre-knowledge to course content matter. (Bransford, 2001). Teachers are also expected to design their curriculum in such a way as to encourage the diverse learning styles of their students (CAST, 2002) and to dive deeply into subject matter, through the provision of multiple entry points and student agency (Gardner, 2005). Putting these principles into systematic practice at the graduate school level (never the mind the elementary) is both difficult and rare, because of academic expectations for rigor and because of pedagogical diversity. No two teachers teach the same way, this is a given, but the somewhat troubling result is that graduate students studying cognitive development are not necessarily experiencing the pedagogical approaches that are espoused by the field. (Bransford, 2001). In summary, Graduate students may read about the cognitive strategies for learning, but there is no guarantee they experience them.

This is of concern for two reasons. First, graduate students are just as diverse in learning style as children. Therefore, simply reading about an effective strategy is not necessarily enough for them to put it to practice. (Bransford, Gardner, Willingham). Second, it has been proven that the most effective way for teachers-in-training to improve their pedagogical practice is to study the "concrete tasks of teaching, assessment, observation, and reflection" (d-h 1995, p598). Abstract theory does not help the soon to be teacher. Teachers in training, aka graduate students, need context-specific practice (Marashel, Karmiloff-Smith) in the improvement of classroom and course design. How could you model this practice in a graduate school? Some teachers require students go out into the field, others have students teach. Another option could be to engage would-be-teachers in reflecting and strategizing about the curriculum design of the courses they are enrolled in. This last option, while seemingly bizarre, is of great interest to me.

CURRICULUM DESIGN & REVISION

Of the 16 courses I have taken at the Harvard Graduate School of Education (HGSE), four have been about curriculum design. I have a double concentration in Technology & Mind, Brain & Education. None of my courses in education at HGSE, nor any I have taken in my whole academic history, have ever asked me to reflect upon the curriculum I was expected to engage with while I was taking it. Yes, at the end of the year I sometimes had to fill out an evaluation sheet, and these evaluations were taken seriously. But we all know that multiple choice questions cannot capture the creativity of the student body, many of whom want to learn and many of whom have ideas about what could be done to improve their learning experience. In summary, classroom student bodies, are not encouraged to analyze and/or make suggestions to a teacher's syllabus. It just isn't done. But what if we could justify it biologically?

2. FRAMING THE CHALLENGE

B. THE ANALOGY: THE CURRICULUM CAR

Let's imagine that every year, a teacher drives a 'curriculum car' that is filled with students. Ultimately, if the bus breaks down (or gets a bad comment in the end of year review), the teacher is responsible. The teacher has to look under the hood of their curriculum at the end of the trip to try to make a fix. Then, they test it the following year. What would happen if the teacher looked under the hood in the middle of the year, before anything was broken? What if they encouraged students to look too? Would the students break the car? Or Would they all run away screaming?

Most of the time, especially at the graduate school level, the curriculum car doesn't break down. However even if their course gets mostly high marks at the end of the year, professors remembers their worst comments. (JPalfrey, Gardner, personalcommunication, 2009). The negative comments nag at them. How could they have helped that student? What were they missing?

Let's return to the curriculum car analogy. The year (or semester) long road trip was good for most of the people in the car, but a few were just miserable. Maybe they wanted to take more pit-stops. Maybe the car passed too quickly by some exciting landmarks. Maybe the car just generally moved too slow. If you ask your passengers at the end of the trip what could have been done to make the ride better, you've lost the opportunity to make it better for them while they were still in the car with you.

You've also lost the opportunity to harness the creative solutions that come from student brainstorms. Your other passengers might have some very cool ideas for modifications of the curriculum car experience. Overtime, a curriculum car might go bio-diesel; take regular pit-stops for national parks; and even add on a solar-power converter to the roof.

But a classroom? A classroom stays the same because students are not invited to contribute to the intellectual road trip. The traditional view of the classroom is that the curriculum belongs to the teacher and the knowledge is passed down to the students. This outdated, unidirectional attitude about learning that prevails in graduate level classrooms is in direct contrast to what we know currently know about learning, development, the brain and biology. (maraschel, etc). (Erlich, Immordino-Yang,). If learning and teaching is to evolve and embody the principles, graduate school curriculum pathways must become more heterarchical or bidirectional.

THE CURRICULUM CAR AND THE INTELLECTUAL ROADTRIP

Traditional interpretationLet's imagine that every year, a teacher drives a 'curriculum car' that is filled with students. Ultimately, if the bus breaks down (or gets a bad comment in the end of year review), the teacher is responsible. The teacher has to look under the hood of their curriculum at the end of the trip to try to make a fix. Then, they test it the following year. What would happen if the teacher looked under the hood in the middle of the year, before anything was broken? What if they encouraged students to look too? Would the students break the car? Or Would they all run away screaming?

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Is the new genomics reconfiguring race and science?

There is a great deal in contemporary science journals and in the popular press about gene, the genome, genomics, race and gender. NB. You may want to work in groups to develop this case.
Read the whole case, but focus on step 1 in preparation for class on 3/12. Use the googlegroups listserv to and/or a wikipage to share questions and lines of inquiry, and to seek a collaborator if you choose to do that. From the 3/12 class: (audio of workinprogress discussion, PT's notes, AFS's powerpoints, audio of intro to bibliography then mini-lectures)
The following class on 4/2 will be three weeks later and it is then that you will make your presentations on this case. The assumption for this case is that you have tools and experience now for opening up lines of inquiry, focusing in after initial explorations, and formulating a product and presentation that match your interests and intended audience. The instructors are available "24/7" (not quite!) to provide feedback and suggestions, so email or arrange a phone conference whenever you need it during the 4 weeks of work on this case. Indeed, one such check-in is required by 3/24, when you should be ready to talk about what you have learned under step 2 and get our input on what you are proposing for step 3.

1. To untangle what is out there start by studying the following websites:
http://www.personalgenomes.org/ and
http://www.decode.com/
http://www.africandna.com/About.aspx
• What kinds of knowledge claims are made on these websites?
• What kinds of events and institutions are linked on these websites?
• Who and what are the actors that emerge from these pages and what kinds of actions do they take
• Use Clarke, Chapter 3 as a guide and construct a situational map of the human genome territory opened up by these websites. Be prepared to present and explain the map or maps in class.

2. What do people out in the world—academics, medical scientists and consumers say and think about these websites and the maps that they invite?
Below is a starting bibliography. Choose some portion of it to study and understand.
• What knowledge claims are made in the literature you have chosen?
• What actions are suggested?
• How do these reflect back on the claims and actions made on the original websites from part 1?
• Do these articles introduce new actors including people, things, institutions and technologies?
• Use Clarke, Chapter 5 to map the narrative discourses encountered in your chosen readings

3. What conclusions can you come to about the push to make personal genomes accessible? If they are inevitable, then what actions would you deem necessary to make their acquisition and use scientifically and socially acceptable?
a. Devise a guide that would help an individual decide whether or not to have their own or a loved one's genome mapped; should they agree to make it public or should it be only for private use? OR
b. Devise a guide for scholars and ethicists that explains the strengths and dangers of developing a mass market for individual genome mapping.

Your starting bibliography:
Arbuckle, Tye (2006) "Are there sex and gender differences in acute exposure to chemicals in the same setting?" Environmental Research 101,1950294
Gender-based medicine, what causes apparent differences?

Bandelt, Hans-Jurgen, Yao, Yong-Gang, Richards, Martin, and Antonio Salas (2008) "The brave new era of human genetic testing" BioEssays 30, 1246-1251
Commercialization compromising science – e.g., genetic ancestry testing, questionable tests for disease – threatens to erode traditional science approaches

Bolnick, Deborah et al (2007) "The Science and Business of Genetic Ancestry Testing" Science 318 pp399-400 and

follow-up letters in Science 319 pp1039-1040.
Position paper from social scientists, anthropologists, etc. of color v. ancestry testing – responses follow

Braun, Lundy and Evelynn Hammonds (2008) "Race, populations and Genomics: Africa as laboratory" Social Science and Medicine doi:10.1016/j.socscimed.2008.07.018
Historical overview

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Sally Paddock

Strengths and Dangers of Developing a Market for Genome Diversity Mapping: Considering the Literature from Indigenous Perspectives and Communities

Context / Background of Previous Attempts to Identify Indigenous Populations for the Purpose of Genome Testing

Just in December, elders froze in South Dakota because of substandard housing. And then you look at the millions and millions of dollars that are being spent to research indigenous peoples' DNA with absolutely no regard for our lives, and maybe even no intent to ensure our survival as peoples. I honestly don't think that there is much of an interest really to make sure that we survive as who we are.[1]

- Native American representative at a 1998 HGDP Stanford meeting

We are suffering and dying from type II diabetes because our pancreases can't manage the amounts of…junk food, the carbs what we consume…We are not dying from our physical inheritance. We are dying from the environments that we live in, and the conditions that we have to survive in.[2]

- Debra Harry, Indigenous Peoples Council on Biocolonialism

One can easily see how scientific speculation on who came from where would eventually be used to politically disenfranchise Indigenous peoples.[3]

- Winona LaDuke, Native American Activist

For Indigenous peoples, who are often the most marginalized and impoverished peoples of the world, the promises of benefit sharing agreements may be alluring….Before entering into a benefit sharing agreement, Indigenous peoples must understand that by entering such an agreement, they are submitting to a legal jurisdiction entirely foreign to their own systems of management and protection of natural resources and knowledge.[4]

- United Nations Permanent Forum on Indigenous Issues

Indigenous peoples who provide key material for a project have a right to share in the long term profit which accrues from that project's outcome, even if it is many years in coming. Protocols that outline these principles may be useful in helping all those involved to ensure that issues are fully discussed and understood.[5]

- Michael Dodson and Robert Williamson, University of New South Wales

If Indigenous people were interested in genetic research for a genetic question specific to their group, they do not need the HGD project to do this work. The technology and expertise is widely available to groups interested in genetic research.[6]

- Debra Harry

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[1] Jenny Reardon, "Creating Participatory Subjects," in *The New Political Sociology of Science*, ed. Scott Frickel and Kelly Moore (Madison: University of Wisconsin Press: 2006), 360.
[2] Winona LaDuke, "Vampires in the New World," in *Recovering the Sacred* (Cambridge: South End Press, 2005), 129.
[3] Ibid., 123-124.
[4] United Nations Permanent Forum on Indigenous Issues. Sixth Session, May 14-25, 2007, New York, NY. *Indigenous Peoples Council on Biocolonialism*, http://www.ipcb.org/
[5] Michael Dodson and Robert Williamson, "Indigenous Peoples and the morality of the Human Genome Diversity Project," *Journal of Medical Ethics* 25 (1999): 204-8.
[6] Debra Harry, "The Human Genome Diversity Project and its Implications for Indigenous Peoples," *GeneWatch* 20:2-3 (1996), 8-9.

In 1991, the Human Genome Diversity Project was first proposed for the purpose of sampling and archiving human genetic diversity in order to understand "who we are as a species and how we came to be."[7] The immediate target subjects for the study became indigenous populations. According to organizers, the genetic identities of these isolated groups were becoming threatened with increasing migration and mixing of populations. Sampling of these populations was, then of "greatest importance for understanding human evolution…[and the] valuable gene pools would need to be sampled before they 'vanished'."[8] What researchers did not expect was the fierce opposition to their project by the very subjects of their study: the many different indigenous groups around the world. While the researchers claimed that the collection of samples would benefit all of humankind and curtail racism by furthering a collective knowledge of humanity's shared past and origins, publicly claimed to be against the patenting of any of their collected samples, and welcomed collaboration from indigenous groups, the researchers' best intentions could not convince many of their target groups that the project would be beneficial in any way, or even be, at best, harmless. Although many spokespeople for the indigenous groups agreed that HGDP organizers believed they were embarking on a just and beneficial project, their opposition was rooted in the recognition that "researchers and potential research subjects do not share the same cultural values and structural positions in society."[9] Of the many concerns indigenous representatives voiced, three became prominent in the ensuing discussions with HGDP organizers: 1) Indigenous groups had little to no interest in investigating ancestral origins based on genetic analysis because they already had a knowledge system in place which created their ancestral identity; 2) Many indigenous groups had no intentions of "vanishing". They questioned why millions of dollars would be spent on researching Indigenous

[7] Jenny Reardon, *Race to the Finish* (Princeton: Princeton University Press, 2005), 1.
[8] Ibid., 1.
[9] Jenny Reardon, "Creating Participatory Subjects," in *The New Political Sociology of Science*, ed. Scott Frickel and Kelly Moore (Madison: University of Wisconsin Press: 2006), 353.

DNA while many of those Indigenous populations did not even have the most basic necessities for survival; and 3) they believed that any genetic constructions of identity could undermine indigenous struggles for land, resources, rights and efforts towards self-determination that many self-identified indigenous groups have been struggling for against colonial powers. These concerns, along with many more, including individual and group consent boundaries, the sanctity of life disrupted by the extraction of DNA, potential patent piracy and commercialization DNA materials, the indeterminancy of many genetic conclusions, and the attention not paid to cultural or environmental conditions have limited the progress the Human Genetic Diversity Project hoped to have made to date and have raised questions concerning other efforts which involve the genomic testing of indigenous peoples. The HGDP is still pursuing its efforts, however, along with similar groups like the International HapMap project and others directly involved in investigating the links between individual and population genomes and health. Based, primarily, on the concerns identified from this relationship between the HGDP oraganizers and Indigenous groups, then, some ethical guidelines have been proposed for future genomic research that may want target Indigenous populations. These ethical guidelines are not exhaustive and welcome additional insights, especially from representatives of Indigenous peoples and from other contributors working on guidelines for individual genomic testing.

Ethical Guidelines for Future Genomic Research involving Indigenous Peoples

1. Any research project that is seeking the participation of Indigenous subjects should include subjects in the full planning, implementation and analysis of the project, from the actual planning stages to the publication of results.

2. Definitions of group consent, essential for many indigenous peoples who regard culture and property (including biological property) as belonging to a group or tribe rather than an individual, should be understood and negotiated in partnership with the subject group. Scientists need to respect the cultural values of the group and to "accept answers that they may not like. If the result of such negotiations is that research does not proceed, so be it."[10]

3. Any research which is agreed upon which seeks to establish the evolutionary history or geographic of subject groups should:

A) Recognize the limitations of genetic analysis in establishing ancestral conclusions;[11]

B) Recognize other forms of knowledge establishing Indigenous identity, such as cultural affiliation or oral history, as equally determinative. Thus, any legal action involving Indigenous peoples and their rights to self-determination (including land and resource issues) should give Indigenous groups involved the option of determining their ancestral identity culturally or biologically (a comparison of adoptive vs. natural parental rights might suitable for establishing status of identity). Both forms of knowledge need to be recognized as distinct forms of knowledge, neither being more valid than the other.

4. Any Indigenous peoples who provide genetic or other material for the purposes of research should receives agreed upon shares in any profit that may accrue as the result of such material, including profits accrued by other researchers who borrow or share the material. While this guideline "represents a breach in principle that all participation in research is strictly voluntary and not dependent on remuneration, in this context the group that has been previously disadvantaged receives the benefit as a people."[12]

5. With respect to the above guideline, any genetic or biological material provided to researchers should remain the sole property of the donating Indigenous peoples, giving them the right to choose with whom the material is shared with. This is in conjunction with the United Nations Permanent Forum on Indigenous Issues, Sixth Session, 2007, which concluded that Indigenous peoples' rights with "are not limited to Indigenous knowledge…[including] genetic resources that originate in [their] territories, lands and waters whether or not associated directly with Indigenous knowledge."[13]

6. If there is not a mutually shared interest in the result of the genetic research, and if no profit is expected from the research, researchers should provide agreed upon resources, aid,

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[10] Dodson, 205.

[11] Deborah A. Bolnick, "The Science and Business of Genetic Ancestry Testing," *Science* 318 (19 October 2007): 399-400.

[12] Dodson, 208.

[13] United Nations Permanent Forum on Indigenous Issues

training or additional research opportunities to the Indigenous peoples involved in order to contribute in a comparable manner to the interests of the Indigenous group in way that the Indigenous group is participating in the interest of the researchers.

7. With respect to the above guideline, researchers should make an concerted and sincere effort to build a relationship with the Indigenous community before research begins and maintain a relationship with the community after the research concludes.

8. When genetic sampling of Indigenous peoples is conducted for the purposes of health-related research, researchers should co-ordinate their efforts in such a way that genetic research is always conducted in partnership with other researchers who are investigating environmental or social conditions of similar health-related conditions.

Projects Which Could Be In The Interest Of Both Indigenous Peoples and Genetic Researchers (Health-Related Issues)

Genetic research can beneficially impact Indigenous communities. Collaboration with researchers, activists and policy-makers who are working with Individual Genome-Mapping efforts should be pursued, to both contribute insight from Indigenous perspectives and to receive insight from other participants working in the field of individual genomics. Health-related research is one area from which Indigenous groups could benefit, but the same caution should be exercised with regards to data interpretation and ownership as was with the HGDP so that Indigenous interests are not compromised. And equal, if not more, resources should be available for Indigenous communities than genetic resources in order to access basic health-care resources such as clean water, adequate nutrition, and medicines available for tuberculosis, malaria or other common illnesses.

Diabetes, however, prevalent in Indigenous communities worldwide, is one health-related condition that could benefit from further genetic research. Some researchers have concluded that there "is at present no consistent evidence to suggest that minority populations are especially genetically susceptible….Genetic research into complex disease demands careful attention to key environmental, social, and genetic risk factors operating within and between groups."[14] Others have included that there is a strong genetic basis for the disease and, because Indigenous peoples have a much higher rate of Type 2 diabetes than non-Indigenous peoples, genetic research into this complex disease should focus on Indigenous communities.

One example of such research is being conducted by Joanne Shaw out of the University of Queensland. The organization of her project may be helpful as a model for other health-related research involving Indigenous communities. In a 2002 news release, it did not specify the

[14] Yin C. Paradies, Michael J. Montoya and Stephanie M. Fullerton, "Racialized Genetics and the Study of Complex Diseases," *Perspectives in Biology and Medicine* 50, no. 2 (Spring 2007): 203-27.

arrangement made with the involved communities regarding data and genetic-material ownership, or participants' involvement in research design. It does describe Shaw, however, as modeling some of the other guidelines presented above. Besides her research on the genetic components of Type II diabetes, she also has a second project, the development of a Diabetes education program which emphasizes the roles that physical activity, family and community support play in disease progression. She has also been working with the involved communities at their local Indigenous Health Center for six years previous to her current Diabetes research. Her efforts, then, model the importance of building and maintaining relationships with research participants and investing in other projects which directly benefit the community.[15]

[15] "Indigenous Communities to Help in Diabetes Battle," Faculty of Health Sciences, University of Queensland, Australia (November 7, 2002) http://www.uq.edu.au/news/?article=3851

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www.ipcb.org

Bioethics and Genomics:
Exploring the Representation of Race and Gender in Popular Culture

Heidi Rademacher
Gender, Race, and the Complexities of Science and Technology
Revised April 13, 2009

Voices of the Academy:

In 2003 a multidisciplinary group of faculty from Stanford University organized a two-day workshop designed to engage dialog focused on the debates about the connection between genetic traits and racial difference. The workshop developed into an ongoing research seminar with a goal of creating a set of principles to guide the research of race and ethnicity categories in genetic variation.

In July 2008, the collective published an open letter in *Genome Biology* outlining ten statements endorsed by all participants. While the ten statements published by members of this aggregate are specifically designed to explore race and ethnicity dynamics in genetic research, sex and gender can easily be substituted in the majority of the ten statements.

http://genomebiology.com/2008/9/7/404

EXERCISE 1.

Read the 10 statements published by Sandra Soo-Jin Lee et. al. (2008). What is the importance of creating a set of ethical guidelines for the future research of human genetics and racial/ethnic variations? Can sex/gender be substituted for race/ethnicity in these tenets? Does this substitution not work in any of the statements? Why? Is there a need to alter the framework of statements where sex/gender cannot be substituted for race/ethnicity? How can this be done?

Voices of Science Fiction:

Science fiction is often a creative outlet for individuals to express their hopes, fears and concerns about current developments in science and technology. Literature, art, television and film are all venues that used science fiction to both represent the achievements and challenges of current scientific development and technology and comment on the social conditions of a society.

EXERCISE 2.

Watch the following two-minute clip from the 1997 movie *Gattaca*. Keep in mind the ten statements published by the Stanford collective concerning the ethical guidelines for human genetic research and the alternative list you created in Exercise 1. After you have viewed the clip answer the following questions.

Gattaca Clip
http://www.youtube.com/watch?v=9xY1ke6KNcY

- Does this clip represent an ethical approach to practical use of genetic technology? Cite specific example from the film and use the ethical tools from exercise 1 to create a concrete argument. There is no right or wrong answer to this question but you must support your findings to avoid simply proposing your "gut reaction."
- Go through each of the statements and alternative gender specific guidelines from exercise 1. Are any of these issues seen in the clip? Remember both race and gender are discussed in the segment. While it might not be the focal point of the film, the inclusion of these topics suggest they are social issues wrapped up in genetic dialog.
- Film often uses elements such as lighting, music, line delivery, the physical look of an actor to give the audience a deeper understanding of the filmmaker's intent and even opinion of certain social and

political issues. How are bioethics and human genetics represented in the scene from *Gattaca*? What hopes and fears of genetic development are explored in this segment? Would this scene be different if the screenwriter created a world where genetic scientists all followed the guidelines presented in the Stanford project? Explain how.

- Using the statements published by Sandra Soo-Jin Lee et. al. (2008) and the scene from the film *Gattaca* discuss the difference between genetic engineering and genetic enhancement. Is there a difference? What variation would be more ethical based on the statements of Lee et. al. and the alternative gender statements produced in exercise 1. Be prepared to defend your answer by citing specific points in the Lee text.

Fueling the Abortion Debate:

Prenatal genetic testing has become a common procedure within the United States and the consequences of these tests have become a hot bed of debate on moral, ethical, health and social development grounds. Disagreements about the impact of genetic testing and abortion politics are seen in pop culture, the mass media, academia and the medical sphere with no one voice able to outline a standard ethical framework.

EXERCISE 3.

Below are three articles exploring the complex dimensions of prenatal genetic testing, genetic disabilities and abortion. Read the three articles and take a position on this issue. Use the journal articles to build upon the human interest story published in the New York Times. Try to explore as many dimensions of the debate as possible. [For example a woman's right to choose, the quality of life for a genetically disabled person, social-economic status, accuracy of information, legal implications, health care provider biases, etc.] Remember by exploring more paradigms of the debate you will be able to create a stronger argument. .

Genetic Testing + Abortion= ???

http://www.nytimes.com/2007/05/13/weekinreview/13harm.html

Prenatal Diagnosis and Selective Abortion: A Challenge to Practice and Policy

http://www.ajph.org/cgi/content/abstract/89/11/1649

Human Embryos and Genetic Testing: A Private Policy Model

http://www.jstor.org.resources.library.brandeis.edu/stable/4235833?&Search=yes&term=Model&term=Policy&term=Human&term=Embryos&term=Testing&term=Private&term=Genetic&list=hide&searchUri=%2Faction%2FdoBasicSearch%3FQuery%3DHuman%2BEmbryos%2Band%2BGenetic%2BTesting%253A%2BA%2BPrivate%2BPolicy%2BModel%26x%3D10%26y%3D10%26wc%3Don&item=1&ttl=444&returnArticleService=showArticle

[Note: You will have to login to JSTOR to view this article.]

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Genetic Technology: Opportunities and Challenges for Female Miao Minority's Race and Gender Reconstruction

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Abstract

This essay means to discuss what are the opportunities and challenges genetic technology could bring to the female Miao minority. Genetic technology provides people chances to reconsider race and gender. It also offers the possibility to search for the origin of race. Under such condition, female Miao minority allows to enhance their race status, to reconstruct their gender status, and to reconstruct their racial identity. However, genetic technology also brings new challenges to female Miao minority. It is hard for female Miao minorities to consume genetic services and gain attention from genetic scientists. Besides, tracing the origin of race also may bring new discrimination for female Miao minority. To balance the opportunities and challenges of genetic technology requires female Miao minorities, government and non-governmental organization's cooperation.

Key world: Female Miao Minority, Genetic Technology

Introduction

Miao minority is a Chinese ethic group that has a special culture and long history. As a female member of the Miao minority in China, I have a deep understanding of how this group of people is discriminated against by mainstream society. I grew up in the Miao's region, maybe one of the most rural places in China. I am very lucky to have the chance to pursue my graduate study in the U.S. and to take the course of Gender, Race and the Complexity of Science and Technology in MIT Graduate Consortium of Women's studies. What I am interested in is how to use technology to help female minority to enhance their social status, especially how to use genetic technology to help female Miao minority to reconstruct both of their race and gender status. I would like to use what I learned from here to help these women in my ethic group who are still oppressed due to their gender and racial identity.

Genetic technology could be considered as part of the scientific revolution. It has great meaning not only in the health and medicine fields, but it also has an influential impact on the gender and race. Since the publication of the gene map, race has been proven not to have a scientific basis. There also are more and more biologists who argue that the differentiation between men and women is constructed by biological differentiation and environmental differentiation. Genetic technology has proved that both race and gender are social construction. That is to say, genetic technology provides people a new perspective about gender and race. Besides, the possibility to search for the origin of race with genetic technology offers people a chance to reconstruct their own racial identity. In such a gene era, female Miao minorities could use genetic technology to change their mistreatment.

At the very beginning of this essay, I try to give a brief introduction about the female Miao minority. Through the introduction of female Miao minority, I want to let people know why the female Miao minority deserve people's attention. Then, I give an introduction of how genetic technology impacts gender and race. This is to help people understand how to relate genetic technology to gender and race. Due to the opportunities to reconstruct gender and race as well as the possibility to search for the origin of race that provided by genetic technology, I have chosen genetic technology as the method to help the female Miao minority to reconstruct their gender and race identity. Next, I argue about the opportunities and challenges that genetic technology brings to the female Miao minority. In the final part, I give some suggestions about how to balance opportunities and challenges of genetic technology.

Even though many critics argue about the negative influences of genetic technology, it still has a very positive impact on people's lives. This positive influence impacts both physical and social lives. I try to view genetic technology in a positive way and also to emphasize possible challenges at the same time. Through this essay, I hope to give people a general introduction of the female Miao minority, as well as why and how to use genetic technology to reconstruct the female Miao minority's gender and race identity.

History and Culture of Miao Minority

Miao minority is also known as Miao Zu in China, which is an ethic group that has long history and special culture. According to Chinese population general survey in 2000, the population of Miao minority is 894, 0116. Long long ago, before the occurrence of any character record, there already were ancient people living in the Yellow river valley and Yangzi river valley. Through years after years' breed and hard work, these people formed tribe association almost 5,000 years ago. The name of this tribe association was "Nine Li". And the leader of "Nine Li" was Chiyou (The brief history of miao,1985). Miao was the offspring of Chiyou (Ssu-ma Ch'ien, High official in ancient China, the chapter of lvxing). Chiyou was subordinated to the Yan Emperor. But Chiyou was killed in the war with the Yellow Emperor and the Yan Emperor in 26th century BC (The song of miao's move, recorded in 1987). After Chiyou was killed, Miao minority gradually moved into Hunan province, Guizhou province, Guangxi province and Yunnan province, where they mostly live in nowadays (Shi, 2006). The living characteristic of Miao minority is that they "live separately as a big community and live together as a small group". Miao minorities mostly live in remote mountain areas. Such distribution model is a result of years of race oppression and race discrimination. Since most Miao minorities live in mountain areas, it is very hard for them to communicate with outside world. And so that Miao minorities are isolated. However, isolated situation helps Miao minorities to keep their culture and tradition very well. They esteem nature, ancestor and ghost. There are many wizards (Gui Shi, also known as Shanman) in the rural Miao minority's inhabitation region. These wizards play a role as the spiritual leader in local area (Schein, 2000). Some Miao minorities are the believer of Christian and Catholicism

(Shi, 1997; He, 2000). Even though Miao minorities are isolated from outside world, they have own scientific knowledge. They try to learn the celestial body and the astronomical phenomenon (The epic of miao minority, the song of jin ying). They also have own calendar, which is thought of as one of the oldest calendar in the world. Miao minority's calendar was earlier than ancient Egypt's (6200 years ago) for 3800 years (Wu, 2000). Miao minority use the calendar to calculate the time, to anticipate the good or bad time and to decide the day of festival (Wu, 1999).

Dual Oppression of Race and Gender for Female Miao Minority

Female minority were under the dual oppression of race and gender. As members of Miao minority, female Miao minorities were driven and oppressed by majority ethic group as male Miao minorities. Despite the oppression of their racial identity, female Miao minorities also were oppressed by their gender identity. Such oppression could be expressed through female Miao minorities' status inside ethic group, traditional thoughts about female Miao minorities as well as female Miao minorities' marriage and education.

Female Miao Minority's Status Inside Ethic Group

In Miao's community, men had much higher status than women. The reason of such phenomenon is the impact of traditional beliefs and male's important status in economic production since Miao minority live on farming and men are main labor force for farming work. Men are thought of as a family's hope. People think that the family could only survive if this family had male child. If the female Miao minority can't breed a male child, her husband's family would treat her very badly. Many families breed lot of children just for wanting one son. Too many children often leads to greater poverty.

Traditional Thoughts about Female Miao Minority

The discrimination for female Miao minority could be found in many traditional beliefs and legends. The most popular legend about the female Miao minority is "Gu". "Gu" is similar to poison. It is a form of sorcery, which is thought to be only passed to women. And it is thought of the symbol of evil. If the female Miao minority was suspected to have "Gu", she would be isolated by the community, and that woman would get very severe punishment. In Han dynasty, Song dynasty, Ming dynasty and Qing dynasty, there were specific law for the punishment of "Gu". In Miao community, male wizard is thought of the spiritual leader. But the female wizard is always thought of evil and unforgivable. There are many Chinese works of literature and movies that depict female Miao minority as the evil conductor of "Gu". Actually, there is no adequate evidence to prove the existence of "Gu" and female Miao minority conduct "Gu". Another legend about the female Miao minority is "tiger ghost" (lao hu gui). That legend is popular in the Qian Dong Nan area. If any female Miao minority had the protruding canine like teeth, she would be thought of the tiger ghost. Being thought of tiger ghost, no one dare to marry that girl. If that girl had a lover, her lover's family also would not allow their marriage. Because of such thoughts, many female Miao minority could only live in adversity.

Female Miao Minority's Marriage

Female Miao minority's marriage always is thought of in terms of patriarchy, even though female Miao minority got more freedom after the establishment of new China in 1949. The traditional thoughts still have profound impact on female Miao minority's marriage. Female Minorities have the right to find their lover in Miao's traditional festival. Such behavior is called "You Fang" or "Yao Ma Lang". But for marriage, the female Miao minority has to get the agreement of her father and her mother's brother. There is a custom in Miao's area called "Qiang Qin". If the female Miao minority's marriage didn't get her family's agreement, that girl may go to her lover's family in secret. After they hold their wedding, the female Miao minority would inform her family. At that time, it's difficult for her family to do anything. It is also very hard for the female Miao minority to initiate divorce. If it was the female Miao minority who refer initiates divorce, she would face pressure from her family and the clansman. Before the establishment of new China, female Miao minority's marriage was usually decided by her parents. Female Miao minorities were often betrothed at a very early age and they had no right to change this decision. This phenomenon is called "Wa Wa Qin". Besides, there is a custom in short skirt Miao (Duan Qun Miao) that called "trying marriage" (Shi Hun). It means that the female Miao minority has to have sex with many male Miao minorities. The female Miao minority could marry to other male Miao minority until she could prove she has the breeding ability. Female Miao minority always get married at a very early age. And in the rural area, many Miao minority's marriage don't get the legal protection since such marriage usually didn't go through the law procedure.

Female Miao Minority's Education

Since the male Miao minority is thought as hope of family, it is hard for the female Miao minority to get opportunity for education. This thought also leads to delay of the conduction of nine years compulsory education for female Miao minority (Weng, 2004). Of course, government set lot of funds and policies to improve the education status of Miao minority, especially for women. However, lacking of effective monitoring mechanism, the result is not so good. Even though some female Miao minority could complete the nine years compulsory education, it is also hard for them to continue their education. And the educational resource in Miao's area is very limited. Female Miao minority can't get high quality education. And they also face the family's economic pressure. Many female Miao minority drop out from school and go to the east coast provinces to find a job. In 1990[s], many female Miao minorities went to Guangdong province to work in factories. Some of them became the mistresses of local wealthy men. With the increase of their age, they were abandoned by these men and lived miserable lives. Some female Miao minorities became sex workers during their migrant labor process. I did an interview about female sex worker in Kaili bath center in 2007. I found many sex workers are Miao minority. Some female Miao minorities were cheated and sold to other areas to be wives while they are looking for a job.

Brief Look at Biology, Women and Race

Biology, women and race always have relation with each other. At very beginning, women played important role in medicine and health care. But their status was replaced by men finally. Even though biology is a subject that controlled by men and majority ethic groups in developed countries, it still has great meaning for minority ethic groups in developing countries and women. Genetic technology, which is one of important technology in biology, offers people a new chance to reconsider race and gender.

Biology, Women and Men

Although men have dominated science, from the earliest times women have been involved in the healing professions (Rosser, 2008).The first report about women in medicine, Aagmede(12th century BC), appears in Homer's Iliad (Homer Iliad Ⅱ.740; Rosser, 2008). After women were allowed to practice medicine on their own sex in the last third of fourth century BC, there were more women who became involved in medicine and health care area. In the medieval era, more women got the opportunity to conduct medicine and health care jobs due to the construction of universities and the support of religious communities. In the Renaissance age, women also played substantial role in health and healing. They have been undercounted in studies that rely upon occupational labels, but when we look at caregiving and bodywork, we can see women providing a broad range of services (Fissell, 2008). This tendency of women controlled much of traditional health and medicine until the late nineteenth century in most western countries and until the late twentieth century elsewhere. (Rosser, 2000)

Biology is a profession that is dominated by men in which women have to work harder to compete, have less status, get passed over for promotion, and find it difficult to get a partnership (Dobson, 1997). The most obvious evidence that men have dominated biology and medicine may be the list of Nobel Prize winners. Only 8 female scientists have been awarded the Noble Prize in physiology or medicine. Men get more recognition in biology and medicine. In contrast, much work done by women in science has been brushed aside, misunderstood, or attributed to male colleagues (Rosser, 1992). Women's role in science is thought be more of a "support role", and therefore less important (Werskey, 2007). That could be considered as the anonymous status of women in science.

Since men dominated biology and medicine, thus it seems that men just use their norm to be the general norm for medicine and health. Women have been discriminated against by a male-dominated health-care system. One possible reason for women status in medicine and biology is the social bias about women. From Aristotle, women were thought of as not distinct from slaves (Aristotle, Politics, 1252b). And Aristotle also argues that the inequality between male and female is permanent (Rosser, 2008). Society has labeled women as lacking ability. Under such expectations, it becomes difficult for women to become successful in science and other causes. According to Rosser's survey for women in science, lacking of trust is one of the important factors that influence women's participation in science (Rosser, 2004). Without enough support, women could only stand outside the domain of biology and medicine.

Genetic Technology and Race

Genetic technology provides a new perspective about race that race is a socially constructed definition. With the publication of gene map, race is confirmed not to be a scientific concept (Philipkoski, 2001). For sequences from a single location with >99% identical nucleotides, only one was used for phylogenetic analysis (Short and Suttle, 2005). It was thought that as little as only .1% of genetic code was pertinent to racial traits. The conclusion was that people are fundamentally similar. This research result just breaks through people's stereotype about the biological difference among race. Race is a social construction. We should take human interaction rather than natural differentiation as the basis for racial categorization (Rivkin and Ryan, 2007). In race relations one is considered not just with individual prejudice, nor merely with labeling, but with assumptions, and ways of seeing, interrelating and interacting that are shared within the "in-group"(Figueroa, 1991).

With the development of genetic technology, people also get the chance to trace the family tree. New technology makes searching for racial origins possible. Definitely, the possibility of searching one's family tree means the possibility of improving one's health or resolving some healthy issues for a certain group of people. It also could be used as a way to reconstruct a race's identity and history.

Genetic Technology and Gender

The meaning of gene technology to women is not only limited in the improvement of women's health, but also includes the opportunity provided by gene technology to reconsider what is gender and how to know gender. Many scholars have rendered their viewpoint about what genetics means to gender and race. Hubbard, Henifin and Fried (1979) suggest that the division by sex of power and privilege in society is politically motivated and not based on biology. Janet Sayers (1982) suggests that it is the social construction of menstruation that reinforces sexual inequality. Ann Fausto-Sterling (1985) argues in her "the Myth of Gender" that there is not a significant difference between men and women. And we also should consider environmental factors when we try to explain the behavior of men and women. Bonnie B. Spanier (1995) argues that we should reinforce a sexist ideology of difference and empowering it with an added dimension of cellular and molecular organization of living beings-even more, by widening the perceived distance between science and society-current molecular biology unwittingly promotes the exclusion of politically aware women, people of color, and some white men from the field of molecular biology and from the new biology. Sue V. Rosser (2000) suggests that the globalization of biology provides an opportunity to expand topics, to examine the complexity of diversity, to expand the definition of work, to redefine politics and to rethink major historical events, social movements, and gender relationships. The metaphor of woman as a separate species may provide some guidelines for setting policies and models of interaction that are less harmful to women (Rosser, 1992). Our bodies are too complex to provide clear-cut answers about sexual difference. It is hard to find a simple physical basis for "sex" (Fausto-Sterling, 2000). Gene technology just gives people a new perspective about the gender. Gender is not only a biological concept, but also a social concept. Thus, maybe we can say there is no biological prevalence for male or female, just difference. Because of the gene technology, we get the chance to explore this issue in a deeper level.

Race as Social Construct: Equal Race Status for Female Miao Minority

Genetic technology has proved that race is a social construct. It means that people contain the same gene sequence, no matter what race or class that people obtain. Since race contains no scientific basis, it means new opportunities to reconstruct race status and to obtain equal treatment.

Reconstruction of Race Status

Genetic technology offers opportunities for female Miao minority to reconstruct their racial status. Genetic technology proved the differentiation of gene sequence among human being is extremely tiny, thus it gave race a reconstruction: race is a symbol of culture other than any biological classification. Female Miao minorities as members of Miao minority, their racial identity are their representation of Miao's culture other than any basis for discrimination.

Miao minorities could be thought as the third type of culture, which is neither farming nor nomadic. Miao minority mainly live on farming. The most important crops for them are paddy and corn. But they also have long moving history. They had 4 times bid scale of moving in the history and their population distributed in worldwide: Asia, Europe and the U.S. (Wu, 1990; Li, 1996; Shi, 2006). Even though Miao minority has long moving history, their culture is still preserved completely. UNESCO included Qian Dongnan, which is the main inhabitation region for Miao minority, as the first choice of tourist destination for "Return to Innocence, Back to Nature". In Asia, only Tibet and Qian Dongnan got this title.

Female Miao minorities' traditional costume is a symbol of Miao's culture and it is also a good way to preserve Miao's culture (Long, 2005). Female Miao minorities' costume is the symbol of Miao minority's racial characteristics, customs, aesthetic consciousness as well as the harmonious relation between human and nature. Thus, it is a vector of Miao's culture (Tan, 2008). Female Miao minorities' costume is an important part of Miao's culture, thus female Miao minorities play an important role in representation and preservation of Miao's culture. Culture is a record of history and a way to preserve diversity, so people's attitudes toward culture should be appreciated other than discriminated.

Obtainment of Equal Treatment

Since race has no biological differentiation, it also means every ethic group has the same gene sequence and deserves the equal treatment. Female Miao minority as members of Miao ethic group, they also deserve equal treatment other than discrimination. Equal treatment for female Miao minority should include effective implementation of related policies as well as equal treatment of female minority and female majority.

It is hard to evaluate whether female Miao minority recently get equal treatment from Chinese government. In China, the government does much work to improve the female Miao minority's status. Such endeavor includes both policies and financial assistance. However, the issue is whether the government did effective implementation. Giving equal treatment to female Miao minorities not only means legislation of related policies, but also means implementation of these policies. Legislation is representation about government's attitude about female Miao minority. However, only through implementation of these related policies could female Miao minorities get benefit. Lacking of effective implementation of related beneficial policies for female Miao minority is the result of lacking of monitoring mechanism as well as effective communication between central government and local government. Establishing monitoring mechanism about related policies as well as achieving effective communication between central and local government could improve female Miao minorities' treatment from government.

Besides, it is also hard to evaluate whether female Miao minorities get equal treatment as female Majorities. For example, in Miao's area, most elementary school teachers only have a high school education or a professional school diploma. In contrast, the majority ethic group's elementary school teachers usually have bachelor or master degrees. Worse education quality for female Miao minorities may lead to less competition ability and less consciousness to improve their own status. Therefore, government should try to decrease beneficial gaps between minorities and majorities through improving beneficial policies' quantity and quality for female minorities.

Gender's Redefinition: Reconstruct Female Miao Minority's Gender Status

Genetic technology not only has great meaning on human's health, but is also provides a chance for scholars to rethink gender. Gender, typically described in terms of masculinity and femininity, is a social construction that varies across different cultures and over time (Wood, 1997). Gender differences really exist. However, such differences are not completely based on Darwin's principles of sexual selection, it also based on a series of social factors (Fausto-Sterling, 1985; Geary, 1998). Some feminists argued that people should also include feminism perspective in rethinking some disciplines (Hewitt, 1997; Rosser, 2000). For female Miao minorities, it is an opportunity to redefine their work and reconstruct their gender status inside Miao minority.

Redefinition of Female Miao Minority's Work

Genetic technology offers people chances to rethink women's work. It inspires people to expand the definition of work since women also play an important role in genetic research as well as other disciplines (Boserup, 1970; Hubbard, 1995). It also inspires people to re-evaluate women's contribution (Rosser, 2000). For female Miao minorities, it means a chance to redefine work and re-evaluate work inside Miao minority. Miao minority lives on farming. Thus, people in Miao minority always think farming work is the definition of work. As a result, people discriminated other work against the definition of work. Farming work becomes the most important part of “work”. Male Miao minorities undertake most farming works, thus both their jobs and they get the highest evaluation. In contrast, female Miao minorities always undertake reproduction, caring children and parents as well as housework. Their works always are thought as supportive, thus female Miao minorities hold a much less important status in the ethic group. Actually, farming work provides Miao minority food to survive. Reproduction helps Miao minority to survive as an ethic group. Other works such as caring children and house work also are very important for Miao minorities’ normal lives. Therefore, farming work is not only work for Miao minorities. Other works should be included in the definition of “work” for Miao minorities. Only through the redefinition of “work” could female Miao minorities’ work get appropriate evaluation.

Reconstruction of Gender Status

Genetic technology offers female Miao minorities opportunities to reconstruct their gender status. Such opportunities include reconstruction of female Miao minorities’ status in reproduction as well as reconstruction of equal treatment for men and women inside ethic group.

Genetic technology proved that embryo’s gender is not only determined by women.

Humans are born with 46 chromosomes in 23 pairs. The X and Y chromosomes determine a person's sex. Most women are 46XX and most men are 46XY. Research suggests, however, that in a few births per thousand some individuals will be born with a single sex chromosome (45X or 45Y) (sex monosomies) and some with three or more sex chromosomes (47XXX, 47XYY or 47XXY, etc.) (sex polysomies). In addition, some males are born 46XX due to the translocation of a tiny section of the sex determining region of the Y chromosome. Similarly some females are also born 46XY due to mutations in the Y chromosome. Clearly, there are not only females who are XX and males who are XY, but rather, there is a range of chromosome complements, hormone balances, and phenotypic variations that determine sex (World Health Organization, 2009). In Miao's community, people always think that embryo's gender is totally decided by women. Breeding a son could bring enhancement of status in family for female Miao minority. In contrast, if female Miao minority can't breed a son, they have to keep breeding for wanting a son or they would get bad treatment from family. Since genetic technology has proved that determining sex is a complicated process, female Miao minorities do not need to be responsible for embryo's gender. Propaganda about basic knowledge of reproduction could be a good way to correct people's thoughts and help people to get a correct understanding about who decide embryo's gender.

Genetic technology proved that the existence of gender difference, it also provides people the chance to reconsider gender as a social construct. Gender difference is differentiation between men and women other then the basis for gender discrimination.

For female Miao minorities, equal gender treatment should mean equal decision right and removal of any stigma about them. In Miao's community, men always control all of decision and put many stigmas on female Miao minorities. To achieve these two goals, education can be a good way. On the one hand, male Miao minorities should get education to get a general understanding of equal gender treatment. On the other hand, female Miao minorities should get education to improve their own education level and to establish the awareness.

Tracing Family Tree: A Possible Way to Reconstruct History and Racial Identity

Genetic technology makes tracing family tree become possible. Tracing family tree has great meaning on medical care. It provides possibilities to find treatment for some diseases (Leroi, 2005). It is also used to trace genetic diversity in populations around the world and human migration that originated from the first humans in sub-Saharan Africa (Adams, 2008). For female Miao minorities, the possibility to trace family tree means possibilities for them to reconstruct history and racial identity.

Tracing family tree offers female Miao minorities the possibility to reconstruct their history. Miao minority have own language. It includes 3 dialects: east, middle and the west (Li, 2002). However, according to "The Epic of Miao Minority", Miao minorities lost their character during their moving process. Lacking of character, Miao's history is preserved as songs (Graham, 1954). Thus, songs become one of important evidences for scholars to research female Miao minorities' history and culture. The other important evidence is female Miao minority's costume (Yang, 1998). Advanced genetic technology could trace the origin of a specific race, thus it provides the possibility to trace Miao's origin. For female Miao minorities, it could be used to reconstruct female Miao minorities' own history. It could help female Miao minorities as well as people to get a better understanding about female Miao minorities' history and culture.

Tracing family tree also could help female Miao minority to tie together. Years' driven by the majority, Miao minority kept moving. Nowadays, Miao minorities distribute in different places around the world. Genetic technology may become an effective tool to help Miao minorities to tie together as a whole ethic group since genetic technology can determine whether people have the same racial origin. For female Miao minorities, genetic technology can help them to tie together as a big community. Being a big community can enhance possibilities for female Miao minorities to gain more attention and to strive for equal treatment since they can get more support from each other from this big community.

Challenges of Genetic Technology to Female Miao Minority

Genetic technology offers opportunities to female Miao minorities to reconstruct their racial status, gender status and history, but it also brings challenges. Such challenges include high cost of genetic technology, men and majority ethic groups' domination on genetic technology and the possibility of new race discrimination.

High Cost of Genetic Technology

Genetic service somehow looks like a luxurious consumption. A survey about the cost of genetic testing versus clinical screening conducted by 3 Canada scientists shows that the average cost in the genetic screening arm is $2259.23 in Canadian dollars (Chikhaoui, Gélinas, Joseph & Lance, 2002). The per capita income for Canadians in 2002 was $22390. At the same time, the per capita income for China was $960. (Data source: World Bank, 2004) Thus, the cost of genetic screening is 10% of the annual per capita income for Canadians. And for Chinese, it is equal to the more than 2 years and 3 months' income. It means that only the most wealthy people have the right to consume genetic services. For the lower class, especially for the lower class in developing countries, the most important and urgent need is to fulfill basic needs. These people have neither the money nor the necessary knowledge to consume genetic services. Female Miao minorities mostly live in rural places in southwest China, which people hold a much lower income than the per capita income for China. It is almost impossible for female Miao minorities to consume genetic services by themselves.

Men and Majority Ethic Groups' Domination on Genetic Technology

Genetic technology is men and majority ethic groups dominated science. Thus, it may probably become a service exclusively for the male and the majority ethic groups. It is hard for minorities to participate in scientific research, and it is especially hard for female minorities to participate in scientific research. Like other science disciplines, genetic technology also is a "white" science subject. That means it is the white people who mainly conduct the genetic technology and participate in the genetic service. In contrast, there are fewer people of color involved in genetic technology. Of course, we can't deny that there are more and more people getting the chance to participate in genetic technology, both in research and in benefitting from the research achievements. But the majority of genetic analysis research and consumption is still conducted by white people, maintaining the status of genetic science as a "white" subject. Female Miao minorities as members of minority ethic group in China, it is very hard for them to gain attention from scholars in developed countries.

Possibility of New Race Discrimination

Genetic technology offers the possibility to reconstruct race identity also may bring new race discrimination during the reconstruction process since reconstruction also means emphasis of racial differentiation. Besides, tracing family tree also means finding racial differentiation. Thus, using genetic technology to trace family tree also may lead to racial differentiation (Leroi, 2005). Genetic technology offers opportunities for female Miao minorities to reconstruct their racial status, but it also may bring new racial discrimination when they try to use genetic technology to reconstruct their racial identity due to reconstruction of racial identity also means declaration of female Miao minorities' difference from other ethic groups.

Suggestions to Balance Opportunities and Challenges of Genetic Technology

Balancing opportunities and challenges is a work that needs female Miao minorities, government and non-governmental organization's common participation. Female Miao minority are the direct beneficial group, thus they should have both awareness and ability to be benefit from genetic technology. For government, it is their responsibility to help female Miao minorities to get equal race and gender status. Besides, non-government's comparative advantage entitles them the ability to fulfill human services (Matthias and Green, 1994).

Female Miao Minorities' Participation

Genetic technology is a technology that controlled by men, majority ethic groups and high class, thus only female Miao minorities have ability and awareness to strive for their own right could they benefit from genetic technology. Firstly, female Miao minorities should have basic knowledge about what is genetic technology and why genetic technology could provide opportunities for them to enhance race as well as gender status. They can have awareness to be benefit from genetic technology until they have related knowledge. It could achieve by providing propagandist brochure and holding community peer workshop. Both propagandist brochure and peer workshop are a cheap way and do not need hiring expert. Secondly, female Miao minorities should have enough ability to strive for own ability. That means their education quality should be enhanced. To enhance female Miao minorities' education quality need to ensure the implementation of nine years compulsory education policy for female Miao minorities. It needs specific legislation and strict monitoring mechanism. So, education becomes a good way to help female Miao minorities to have basic quality to establish awareness and enhance ability to strive for their own right through genetic technology.

Government's Participation

Government plays important role in the participation of social affairs (Gilbert and Terrell, 2009). Government's responsibilities for female Miao minorities' enhancement of race and gender status could be fulfilled through setting related policies and affording financial assistance. On the one hand, setting related policies could give research institution direction and control in order to prevent the occurrence of new race discrimination. On the other hand, setting financial funding could give opportunities for lower class people, such as female Miao minorities, enough support to be benefit from genetic technology. As the most powerful organization, government's work will have great impact on genetic technology.

Non-Governmental Organization's Participation

Non-governmental organization's comparative advantage entitles non-governmental organization become the best organization to conduct human service. Non-governmental organization has a comparative advantage over other sector agencies in areas where their distinctive ambiguous and hybrid structures enable them to overcome problems of principal–agent gap, median voter reluctance, weak messages from politicians to staff and lack of market interest (Billis and Glenerster, 1998). Thus, non-government organization can have positive impacts on balancing opportunities and challenges of genetic technology for female Miao minorities. Such impacts could be described as setting assistant funding to give lower class people necessary financial support, conducting education activity to help people to get general understanding about genetic technology and conducting propaganda activity to help minorities to gain scientists' attention.

Conclusion

Genetic technology and female Miao minorities are not two separate concepts. Female Miao minority is a group that under oppression due to their race and gender status. It is also a group that with myth and great history. Genetic technology offers opportunities as well as challenges to female Miao minority. On the one hand, genetic technology not only means progress of both science and technology, but it also provides new perspective about gender and race. Genetic technology is a new chance for female Miao minorities to enhance both their race and gender status. On the other hand, genetic technology also means new challenges for female Miao minorities. Genetic services are very expensive and controlled by men and majority ethic groups, thus it is not easy for female Miao minorities to be benefit from genetic technology. Besides, genetic technology also brings possibility of race discrimination to minority ethic groups since it provides chances to explore racial differentiation in a deeper level. To balance opportunities and challenges of genetic technology, female Miao minorities, government and non-governmental organization have to work a certain function. Female Miao minorities have to establish awareness and enhance ability to be benefit from genetic technology through education. Government has to give certain control and direction to research institution as well as support to minority ethic groups though setting related policies and financial funding. Non-governmental organization could afford gene education, propaganda and assistant funding to give minority ethic groups for improving their chances to be benefit from genetic technology. Through cooperation of female Miao minorities, government and non-governmental organization, genetic technology could be opportunities other than challenges for female Miao minorities.

Acknowledgements

I would like to gratefully acknowledge Professor Peter Taylor, who opens my eyes to science and technology studies. I am particularly grateful to Professor Peter Taylor for his precious suggestions about this research. I appreciate the encouragement and support from members at the Gender, Race and the Complexity of Science and Technology class. Their work and comment always inspire me.

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Katie Plocheck
April 9, 2009
Guide: Genome Sequencing and Dimensions of Race and Identity

Genome sequencing has both strong advantages and disadvantages. On one hand, it can be very beneficial for an individual to know his or her medical and ancestral history. On the other, genetic histories—tied to the exalting science as truth mentality—have the potential to account for broader strokes of a person's identity than it necessarily should.

In the year 2000, the human genome project broke the news that human genetic sequences are 99.9% similar, and that of the small .1% that vary, only 3-10% of that variation is due to geographic ancestry. This shattered many people's beliefs about distinctive racial and ethnic boundaries, especially around such issues as behavior and intelligence. Interestingly, while distinctions among individuals may certainly exist, this seemed to reify a notion that such differences arise more from cultural or environmental factors than they do from genes.

Even still, however, scientists (many of whom have trouble even defining race)continue to use genes to account for these differences, a reality that individuals considering having their genomes mapped should be aware of (Fulwiley, Biological Construction of Race). Scientists who use these methods claim that genetic differences among populations indeed correspond to traditional understandings of racial divisions. Additionally, such methodology (i.e. incorporating race) was valorized in order to help treat health issues commonly associated with different races.

If considering to have your genome mapped, it is important to consider that while such information is important—both from a medical and personal perspective—that biogenetic information makes up but a small part of one's identity. Perhaps even more important is the spurious conflation of one's ancestral origin with race. Such blurring of concepts has the ability to transform the positive attributes into negative consequences for people in various groups who seek out certain rights either attributed to or not attributed to specific backgrounds.

Because genome sequencing is still considered to be in a nascent stage, researchers are still developing new ways to organize and understand the data. As such, race is often used as an organizing tool for certain genetic markers, which are commonly associated with specific races. While often relevant, it is careful not to make these markers reference sites for future research, especially as such research is disseminated more and more to the public, and race becomes "packaged" as a commodity. This could have pernicious effects on the reification and institutionalizion of race in society, eradicating genome sequencing's benefits. To reiterate, in order to maintain the advantages of genetic sequencing, it is important to understand that biological understanding creates one piece of a multi-faceted and kaleidoscopic puzzle of human identity. Science is important, but even more, it is is important to understand that all science is interpreted through a social lens. Results that truly matter tend to take both social and biological claims to task, and even more, keep these interpretations within the professional realm so as to not reify meanings to the broader public. When important information is publicly disseminated, it risks being oversimplified or misinterpreted. While genome sequencing may become public, regardless, it is important that the disseminators of that information are professionals—either geneticists or anthropologists—who can maintain its proper meaning.

It is also important to note how one understands not only race, but how race is used and whether or not it is socially or biologically constructed. According to many anthropologists, race as a term usually refers to the categorization of humans into populations or groups on the basis of various sets of characteristics. The most widely used human racial categories are based on salient traits (especially skin color, cranial or facial features and hair texture), and self-identification; hence it is socially constructed in many ways. Anthropologists, however, tend to be concerned with race, not as a measurable quantity based on science, but with the meaning of race. For example, a person's cultural affiliation, rather than their skin color, are considered to be just as, if not more important. This sums up the often times problematic usage of race: while self-identification is important, and genetic testing can often times yield results which may help with specific diseases or disorders, a person's race is much more nuanced than a mere quantitative genetic assessment. In this way, it is crucial to consider other factors, such as social, cultural and environmental dispositions.

Questions for a person considering genomic sequencing:

1. What are your reasons for wanting to have your genomes mapped? (Recreational or medical purposes, or both?)
2. To what extent does your ethnicity/ancestral history matter to you in terms of your identity?
3. Do you feel like this is a private or public attribute?
4. Who should have access to your personal genome information?
5. How do you understand the notion of a gene?
6. Who do you feel comfortable with having access?
7. Do you feel comfortable purchasing such a history?

My project is investigating ways to visually represent the culture of science. I've focused in on the history of women in science and their experience of the cultural aspects of science, using Margaret Rossiter's books as primary sources for characterizing that experience.

On April 23rd, I will facilitate some brainstorming around the culture of science as experienced by women in the U.S. in two time periods (1840s to 1940 and 1940 to 1972), share some sketches/ideas of my own for how one might illustrate this in an art installation, and finally ask you to work in groups to build your own table-top installations with materials I will supply.

To prepare, I have three assignments for you.
1) Please take a look at the Introductions to Margaret Rossiter's two valuable histories:
Volume 1 , Women Scientists in America, Struggles and Strategies to 1940; Introduction, pp xv to xviii
Volume 2 , Women Scientists in America, Before Affirmative Action 1940 - 1972; Introduction, pp xv to xviii

2) To stretch the right side of your brain a little, please use any size paper and medium (pencil, crayon, paint) to illustrate one of the following words (your choice):
Discovery
Theory
Research

Experimentation

3) Poke around on the Project Kaleidoscope webpage. Project Kaleidoscope (PKAL) is a sort of think-tank dedicated to increasing diversity in undergraduate science, technology, engineering, and math (STEM) programs, founded with National Science Foundation monies and currently funded by NSF and the W.M. Keck Foundation ("one of the nation's largest private foundations" with one focus on undergraduate education). (The Executive Director is an amazing woman who serves on an advisory committee for one of my projects at the Aquarium.)

Start with the page, "Leadership in Ensuring the Success of All Students ," paying attention especially to the "What Works" pages for "Serving all Students " and "Ensuring the Success of Under-represented Groups in STEM Learning Environments. " In the past few years they have turned to looking at how to design undergraduate facilities that support science in the context of learning communities.

Let me know if you have any questions (or ideas)!

Sex in the Symphony:
The Continuation of Gender Biases and Asymmetry Among Male and Female Instrumentalists

This exercise is part of a Women's and Gender Studies course I have created titled, "Women in Art, Literature and Music at the Intersections of Science and Technology." It is an undergraduate course designed not only to explore the ways science and technology have impacted the arts, but specifically, the ways they have intersected with art, literature, music and gender. This course will examine the roles science and technology have played in the lives of women who create art and women who are represented through art. Students may, or may not, have a background in Feminist Theory, Art, Literature and/or Music.

This activity is designed to help students visualize the connections between gender, science, society and classical music. The entire exercise should last about one hour.

It is highly probable that both men and women have been making music since the onset of human existence. However, within the Western Classical tradition, performing music as a profession has been historically coded as men's work (Allmendinger & Hackman, 1999, p.424). Despite the advances of women since the second wave feminist revolution, disparities in numerical balances between men and women in professional symphonic orchestras still exist today (Rademacher, 2009.) Social scientists, music educators, musicologists and music historians have examined this issue in an attempt to understand the slow integration of women into professional symphonic orchestras. Three key themes central in this research include the technology, engineering and design within classical music; biological and physical limitations of many female instrumentalists; and socio-cultural expectations of men and women that limit women's access to certain musical instruments.

Our goal is to work as a collaborative to flush out these three issues and then weave them together in an attempt to understand the continuing gender biases within classical music. Once we have examined the issues we can begin to explore mechanisms for creating a more egalitarian environment within the classical music sphere.

To begin, I will give a brief (10-15 minutes) introduction presentation on Historical and Contemporary Asymmetry In Classical Music. Do not be afraid of suffering from the typical ennui associated with music history. Music history is full of drama and excitement including the association of female instrumentalists with prostitution and the use of castrati as a means of preventing women from performing in operas.

After an untraditional adventure into the history of classical music, we will break up into three groups. Groups will have 15-20 minutes to discuss one of the three dimensions of asymmetry in symphonic instrumental music (technological, biological, or socio-cultural limitations.) Groups will then take a position on their issue, using the attached documents to support their argument. Each group should try to explore as many dimensions of the debate as possible in an attempt to create a solid and structured argument. Any additional knowledge or materials can be incorporated into your position as well, as long as you bring citations. Of course, these three central issues will intersect, merge and at times appear to be inseparable from each other, so it is acceptable, and even expected, that your discussion includes elements of the other themes.

Once groups have had time to prepare an argument will we reconvene as a class and each group will present their findings. As a collective we will weave these elements together to create a situational map as outlined by Adele Clarke (2005). Through our map, we will attempt to explore a variety of traditional and creative ways for opening the world of professional classical music to more women in Western society. [HER]

Sign up for Discussion Groups
Group 1 (Biological/Physical Limitations for Female Instrumentalists)
1. Katie P.
2. Pam
3.

Group 2 (Technology and the Impact on Female Instrumentalists)
1. Felicia
2. Fangfang
3.

Group 3 (The Socio-Cultural Dimensions of Gender and Classical Instruments)
1. Vanessa
2.
3. Peter

Suggested Readings/Sources for Group Discussions**
Skim these articles or do a search for related articles to support your presentations.

Biological
Centers for Disease Control and Prevention (2004). *Americans slightly taller, much heavier than 40 years ago*. Retrieved on February 25, 2009 from http://www.cdc.gov/od/oc/media/pressrel/r041027.htm

Chicago Artists Resource (2009). *Musicians can be victims of peculiar skin problems*. Retrieved April 3, 2009 from http://www.chicagoartistsresource.org/node/9263

Levine, R. (2009). Age, gender and orchestras. Retrieved March 20, 2009 from http://www.polyphonic.org/article.php?id=181&page=2

Steinbuhler, D. (2006). Our story. Retrieved on February 26, 2009 from http://www.dskeyboards.com/html/history.html

Technical
Armstrong, V. (2001). Theorizing gender and musical composition in the computerized classroom. Women: A Cultural Review 12(1),
35-43(9). [You will need to use JSTOR to access this document.]

Dilworth, J. (1999). The cello: Origins and evolution. The Cambridge Companion to the Cello (R. Stowell, Ed.). Cambridge: Cambridge University Press. Google books preview retrieved April 22, 2009 from http://books.google.com/books?id=2lHPUtMFkPoC&printsec=frontcover&dq=The+Cambridge+Companion+to+the+Cello#PPA1,M1
[you will have to navigate to the table of contents and then select Dilworth's chapter. It is chapter 1.]

Goldin, C. & Rouse, C. (2000). Orchestrating impartiality: The impact of “blind” audition on female musicians. The American Economic Review, 90(4), 715-741. Retrieved April 14, 2009 from http://74.125.93.132/search?q=cache:TlRnA7zv_U4J:www.faculty.diversity.ucla.edu/search/searchtoolkit/docs/articles/Orchestrating_Impartiality.pdf+Orchestrating+impartiality:+The+impact+of+%E2%80%9Cblind%E2%80%9D+audition+on+female+musicians.&cd=2&hl=en&ct=clnk&gl=us

Steib, A. (2009). YouTube orchestra debuts, wows carnegie hall. CNN (New York, NY). Retrieved April 20, 2009 from http://www.cnn.com/2009/TECH/04/16/youtube.orchestra/?iref=mpstoryview

Steinbuhler, D. (2006). Our story. Retrieved on February 26, 2009 from http://www.dskeyboards.com/html/history.html

Socio-Cultural

Abeles, H. F. & Porter, S. Y. (1978). The sex-stereotyping of musical instruments. Journal of Research in Music Education, 26(2), 65-75.
[You will need to use JSTOR to access this document.]

Allmendinger, J. & Hackman, J. R. (1995). The more the better? A four-nation study of the inclusion of women in symphony orchestras. Social Forces, 74(2), 423-460.
[You will need to use JSTOR to access this document.]

Griswold, P. A. & Chroback, D. A. (1981). Sex-role associations of musical instruments and occupations by gender and major. Journal of Research in Music Education, 29(1), 57-62.
[You will need to use JSTOR to access this document.]

Martin, K. A. (1998). Becoming a gendered body: Practices of preschools. American Sociological Review, 63(4), 494-511.
[You will need to use JSTOR to access this document.]

Sinsel, T., Dixon, W. E., & Blades-Zeller, E. (1997). Psychological sex type and preferences for musical instruments in fourth and fifth graders. Journal of Research in Music Education, 45(3), 390-401.
[You will need to use JSTOR to access this document.]

Sex&theSymphonymap.pdf

Framework for Exchanges and Inquiry

Use of this framework is intended to highlight the interplay between knowledge, inquiry, and ideas about possible social actions.
In the simplest case (see other variants), one person begins an exchange by making a

Knowledge claim

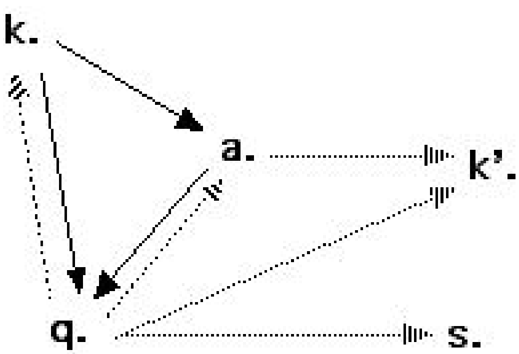
then other participants formulate responses to this knowledge claim using one or both of the following pair of prompts:

Actions that follow from the Knowledge: What change could people pursue if they accept the Knowledge claim?

Questions for further Inquiry: What more do you want to know in order to—

- clarify what people could do (thus feeding back -> Actions).
- clarify which people are interested in that action (thus feeding back -> Actions).
- understand more (and revise/refine the knowledge claim, thus feeding back -> Knowledge claim).

Questions invite inquiry, which may elicit further Knowledge claims or develop through notes and drafts into a more detailed **Summary or Substantive Statement** on a topic or set of resources (including bibliographies).



All contributors should provide **References** to cited publications and links to other **Resources.**

Instructions

Alternative Starting Points for Exchanges

- People introduce not only a knowledge claim, but also their ideas about Actions and Questions for further inquiry.
- People introduce a proposed Action, then they or other participants "backfill" by identifying what knowledge claim(s) this Action is based on.
- People introduce a Question for inquiry, then they or other participants backfill by identifying the Action or Knowledge claim that this question clarifies.
- An instructor or facilitator of exchanges contributes a Scenario, then other participants extract Knowledge claims from this and use it as a basis for proposing Actions and identifying Questions for further inquiry.
- Ditto after people present a Summary of Substantive statement on a topic (or their notes and drafts).

Phases of the Exchange

(These phases may overlap.)

- **(Re)orientation** of group to KAQ process by whole group discussion of straightforward Knowledge claims in the scenario, Questions for inquiry, and Actions that follow from Knowledge claims. Individual work on a KAQ worksheet for a specific Knowledge claim, followed by discussion in pairs, consulting with instructor or facilitator when needed, and group discussion of unsettled or significant issues. During thsi meeting or in a follow up meeting, participants may practice Probing each others' K-A-Q connections, thus reducing the weight on one person to be the KAQ coach for everyone. An assistant to the instructor or facilitator can record on a single "brainstorming" worksheet the Ks, As, and Qs raised during the course of this Orientation meeting.
- Further **Brainstorming and exploratory research** before participants identify specific issues and directions they are interested to pursue.
- **KAQ** worksheets for participants to think carefully through the K-A-Q connections (and identify ways or methods to investigate each Q).
    - These worksheets may be completed off-line (or in interaction only with the instructor/ facilitator) before being exposed to the other participants.
    - The simplest contribution to an exchange is to add an Action or Question to a Knowledge Claim made by another participant.
- **Probing** each others' thinking (as well as one's own) by asking about
    - Knowledge claims: "How do you Know that? -- What's the evidence (e.g., from a Scenario used to initiate an exchange), assumptions, and reasoning?"
    - Actions: "What knowledge claim(s) does this Action follow from?" "What problem raised in the Scenario does that Action relate to?" "Which people or group would be taking this action?" "Which people or group would this Action seek to change?"
    - Questions: "How will you investigate this questions?" "Will your method of research best enable you to find this out?"
        - If your thinking needs to be clarified or spelled out, go back and revise accordingly.
        - If there is a knowledge claim stated or implied in your response or in anyone else's that warrants an exchange of its own, state the claim explicitly and succinctly. You may compose the initial version of the new page or indicate in parentheses that a new page is needed. In the latter case, you or someone else can compose the initial version of the new page later. Similarly, indicate if you think a topic warrants a Summary or Substantive statement.
- **Periodic summary of new developments** by the instructor/facilitator (without which it may be difficult for participants to keep track of each others' contributions).
- **Inquiry** or investigation so as to find answers for some of the questions.
- Individual or collaborative **development of Summaries and Substantive Statements**.
    - Don't be intimidated by the label "Substantive Statement" -- this may start as notes or a draft, which only later gets revised into a well-organized and referenced information on the topic.
    - If these are shared at an early stage as notes, then more than one participant can contribute to their development into a polished form (following the model of wikipedia| wikipedia entries).
- **Presentations** of the outcomes of inquiry.

Instructions for exchanges on a listserv, threaded discussion, or face2face setting

- To help others refer back, identify the page and the specific Knowledge claim, proposed Action, or Question to which you are responding.
- Indicate what kind of response you are making. (Using the prefixes k., a., q., s. helps make this clear.)

Instructions for exchanges on a wiki

- Use the sandbox to experiment and refer to further instructions on using wikispaces.
- Identify your contributions by placing in parentheses your wikispaces username or your real name or guest.
- When you make your first contribution, add yourself to the contributors page (optional).
- If your contribution is probing someone else's thinking (see above), indent this directly below the point you are probing.
- If you have an answer to a question, you may include it EITHER indented after the question (if it is short) OR as a new Knowledge claim (which allows others to respond to your claim) OR as a Summary/Substantive Statement (if you have notes on a topic or have developed them into a well-referenced guide to this topic). The 2nd & 3rd kind of answer require a new page.
- When you create a new page, give it an abbreviated name of **25 characters or fewer** starting with a caapital letter that conveys your Knowledge claim. If you develop your thinking first on a personal, unlinked wikipage, then rename this page when you "go public." Add the page to the Index of Pages related to the set of exchanges or unit in a course. Identify yourself at the bottom of the page as the originator of the page.
- When you have more detailed findings on a topic, make a link to a new page on which you present a Summary or Substantive statement OR to a file that you upload to the wiki.
- When you refer to an existing or new Knowledge claim or to a topic of a Summary or Substantive Statement, make a link to it.

(original page by -  **pjt**)

"Race resurgent, Race reconstructed: Responses to developments around genomics and biomedicine"

With the explosion of genomics data "race" is hotly discussed as a potentially useful category for biomedical research and therapy (Epstein 2004, Braun et al. 2007; Fullwiley 2007a, b). What contribution can you, as students in a course that analyses or interprets the complexities of the production of science and technology, make to these debates? You cannot be expected to become experts in the research and therapeutics and resolve how useful the category really is. There is, however, a role you can play in educating others who analyze science and technology from historical, sociological, philosophical, cultural, and other perspectives. Let us explain.

It is routine in historical and sociological interpretation of science to portray scientists shaping society while they establish knowledge or make technologies work (a.k.a., the "co-construction of science and society") (Sismondo 2008). To be consistent, interpreters of science should be explicit about what they aim to do—what aspects of society they are shaping—with their own knowledge claims. This issue becomes especially apt when interpretations point to shortcomings in the science or concerns about the directions it is taking. Is it envisaged that critical interpretations will influence working scientists or that it will it be more effective to insert historical and sociological perspectives into the education of future scientists? When should interpreters "go native" among the scientists in their "labs"? When should they become active citizens or consultants in policy debates? Of course, there are no universal answers; they must depend on the particular situation of each interpreter of science and the colleagues they influence.

The starting point for this case is that interpreters of science are often not clear or systematic in thinking about such questions. So we want you to provide "briefings" to help graduate students and emerging scholars in various disciplines develop their own thinking. The best model we have for these briefings is the "Trends and Prospects" contributions to ITEMS project—"Identifying Trends in European Medical Space: Contribution of European Social and Human Sciences" (Centro de Estudos Sociais 2005; see selection at http://www.faculty.umb.edu/pjt/GRST/Items.pdf). However, we want you to depart from this model in three ways:

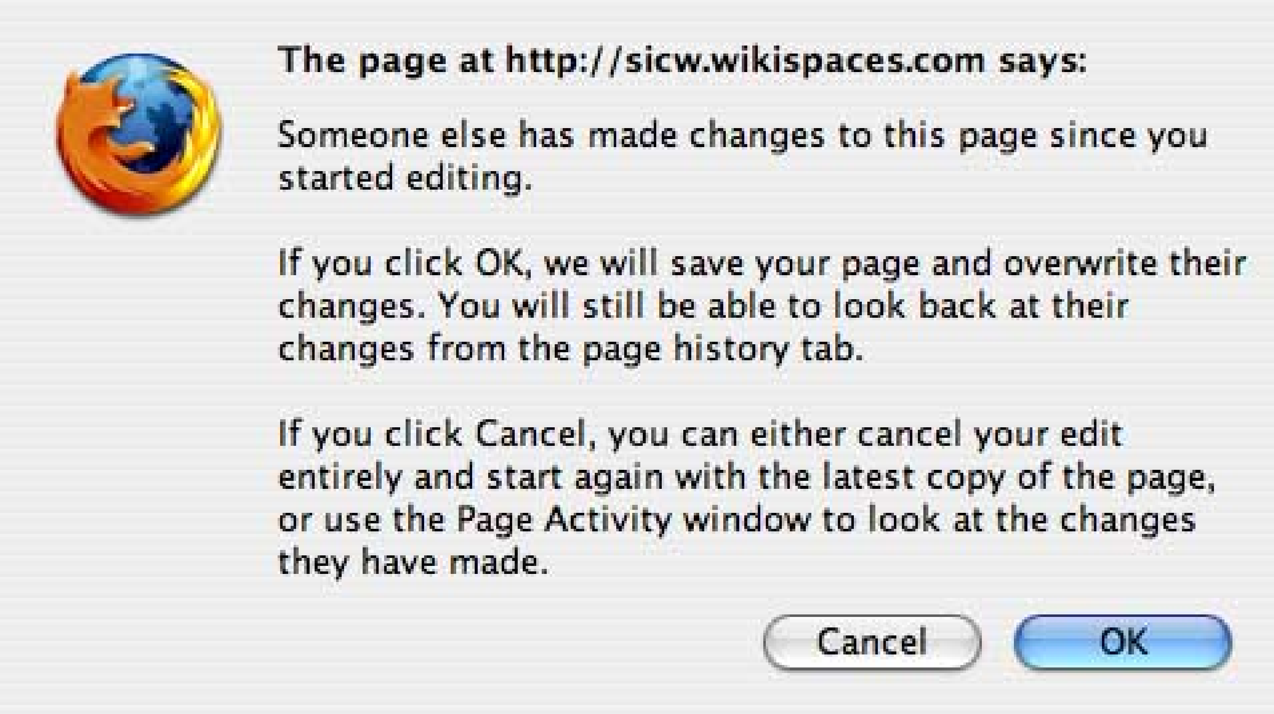
- The area is not the vast "Medical Space," but places where "race" is being discussed or used;
- The briefings may range widely according to your interests and training. We could imagine, for example, someone with a literary background reviewing the ways that metaphors about human variation borrow from thinking about race or someone from a statistical background showing which kinds of claims about average racial differences can and cannot be supported by data analyses; and
- The intended audience is graduate students and emerging scholars in various disciplines of interpretation of science and technology who want to clarify their thinking about how they envisage their work influencing society (where "society" may be as modest as an audience whose attention they want to focus on some themes or as grand as the government agency whose policies for allocation of research funds they want to redirect).

In three weeks you will present the briefings to a panel of Boston-area graduate students and emerging scholars in various disciplines of interpretation of science and technology. The briefings will then be assembled into a website made more widely accessible.

Notes to users

- Video overview of wikis
- **You want to view this sicw wiki**: That's simple -- you are already doing that. To view other pages on the wiki, follow the links in the menu on the left and on any page you view.
- **You want to print a page without the sidebars, etc.**: add after the URL the following: ?f=print
- If anything gets difficult don't get turned off the wiki -- it's probably a problem with your browser or internet connection. Wait until you can get help from someone who has used the wiki before or who has a newer browser.
- **You want to make changes to the sicw wiki** (e.g., edit the text, add a wikipage, insert a picture): For this you have to be a member of the sicw wiki.
- **You want to join the sicw wiki?** First you need to create a user name and password that applies for the whole realm of wikispaces (not only the sicw wiki). Go to http://www.wikispaces.com to do that. Make a record of your username and password so you don't forget them. There is no need to create a space (i.e., a wiki) of your own using the optional part 4 of the box on http://www.wikispaces.com. After all that, use the back button on your browser to come back to this page.
- **You want to join the sicw wiki now you have a username and password**: go to http://sicw.wikispaces.com/space/join and click on the link at the bottom "already a member?" (which means already a member of the whole wikispaces realm, not already a member of this specific sicw wiki).
- **You want guest access to contribute**, contact wikimeister.
- **You want to create a new wikipage**, simply type a name for the page in place of "wikinstructions" in the URL of this page, press return, then click the edit button. Keep the name of any page **under 26 characters** (counting the spaces—better still, eliminate spaces in the name). Make the name helpful to anyone who comes later and wants to see what part of SICW it relates to and how old the information is, e.g., NewSSCReadings07. If the page is for a course, start the name with the course number and make a link to it on the page where the instructor tells you to.
- **You want to learn how to edit, create pages, insert pictures, etc.**: Experiment in the sandbox and visit the help button up on the top right.
- **You want to create your own wiki separate from the sicw wiki**: go ahead and fill in the optional part 4 of the box on http://www.wikispaces.com.

If you are editing at the same time as someone else, you will get this message like this when you try to save that gives you two choices about what to do. Perhaps you will want to email the other user and coordinate turns at editing.



For some browsers (e.g., Internet Explorer less than version 5.5) the visual editor does not work. You can only edit using the text editor and you will not see indented items on the menus on the left. See wikitext if you want to know the markup commands to edit using the text editor. Use the sandbox to experiment in editing a wikipage. Some browsers have big problems with wikipsaces (e.g., Safari 1.3.1 bring up a blank page instead of the text to edit and cannot at this stage be used.) The wikispaces people say: "Firefox works great [for wikispaces] on all platforms, IE works fine on Windows, and Safari and IE don't work well on the Mac."

To let wiki viewers know more about you edit your profile. Feel free mention your interests in the SICW wikispace, and give links to your website or blog. To edit your profile, click on your user name in the bar above, then click again when you get to your profile page.

A Creative Commons License governs this space. Contributors should note that:

- You are letting others copy, distribute, display, and perform your copyrighted work but only if they give you credit.
- You are allowing others to distribute derivative works only under a license identical to the license that governs your work.
- You are letting others copy, distribute, display, and perform your work, but for noncommercial purposes only.

The terms under which wikispaces operate includes an idemnity clause that makes the contributor liable if someone sues them for content you contribute to a wikispace. If this worries you, please feel free not to contribute.

McNeal, A. (n.d.) How to Read a Scientific Research Paper--a four-step guide for students and for faculty. Retrieved on August 23, 2007 from http://helios.hampshire.edu/~apmNS/design/RESOURCES/HOW_READ.html

Good advice for how to systematically approach reading a technical or scientific article with little or no background in the topic. The section for faculty is also helpful for students as it shows how to “chunk” different parts of the paper in order to reduce anxiety and concentrate on the type of information provided in each part (i.e., introduction, methods, results, discussion). (Jan Coe)

Armand Marie Leroi, an evolutionary developmental biologist at Imperial College in London, is the author of "Mutants: On Genetic Variety and the Human Body."

Aikenhead, Glen. “Integrating Western and Aboriginal Sciences: Cross-Cultural Science Teaching.” *Research In Science Education* 31, no. 3 (2001).

This article describes the cultural assimilation that commonly takes place in science classrooms and the corresponding alienation experienced by students whose world-views do not resonate with that of the world-view of Western science commonly expressed in a classroom. Aboriginal students (in Aikenhead's Canadian context) are particularly subject to this alienation, according to Aikenhead, and it can prove detrimental for them and their communities; for Western science is still “a major global influence in their lives. Alienation reduces their effectiveness at 'legitimate peripheral participation' in community matters related to science and technology” (2-3). Aikenhead proposes a cross-cultural approach to teaching science, one that does not seek to indoctrinate students into a particular culture or to resolve conflicts of culture, but to simply give culture, specifically Aboriginal culture, a voice. Aikenhead then illustrates what such a teaching approach could look like within specific teaching units. He pays particular attention to what words mean in each context, such as the “wolf” or “to observe”, encourages teachers to ask students to say which cultural perspective they are speaking from when they describe what they have learned, and suggests field trip initiatives and even how the design of a classroom can help students learn to look at the world from each other's perspectives.

Glen Aikenhead's Webpage. **http://www.usask.ca/education/people/aikenhead/** **(accessed March 4, 2009).**

Glen's webpage includes teacher resources for teaching cross-cultural science and technology units in a classroom as well as links to numerous published articles (his own and others) on cross-cultural (Aboriginal and other) approaches to science in the classroom.

Anglin, Mary K. 1997. "Working from the Inside Out: Implications of Breast Cancer Activism for Biomedical Policies and Practices." Social Science & Medicine 44:1403-1415.

In this article, Anglin studies the treatment activism of women with breast cancer through an ethnographic study of NORCAL, an advocacy organization, and its members. While others have focused on women’s health behaviors, treatment decision-making, and risk factors, Anglin examines patient experience through breast cancer activists. What she terms “treatment activists” are women who work to improve access to and knowledge of available breast cancer treatment options. They reframe access to care to “access to the *right kind of* care” (1407). NORCAL has advocated for less toxic treatment options, more alternatives, and access to clinical trials through “compassionate use”. The women that speak on behalf of NORCAL build from the feminist saying “the personal is political” and extend this philosophy to medicine. They do not separate emotional experience of having breast cancer from the scientific information relevant to treatment. One avenue they have taken is to pressure government agencies and pharmaceutical companies to make drugs more quickly accessible to very ill patients. Another is to improve public policies about breast cancer treatment coverage. A limitation of this group is that they encompass mostly white middle class women and as a result do not address issues that affect women of other social classes or racial groups. As the author notes, obtaining access to “the *right kind of* care” presumes that women already have access to some form of health care.

Rita Arditti, in her 1980 article, "Feminism and Science," describes her own gradual realization that women were not well-served by the culture of science in the U.S. through the 1950s and 1960s. Her attempts to call male colleagues' attention to inequities were dismissed and considered trivial compared with the ongoing Vietnam War, or met with comments that she was being "difficult" and "oversensitive" (p. 362). She argues ultimately that science suffers as a result of such narrow vision, and envisions science influenced by a feminist perspective:

A feminist perspective in science would involve the creation of an environment that maximizes the development of minds and bodies... conversion of an exploitative "value free" technology to a commitment to humane technology...assessed by the impact it has in bringing meaningful change in social relations....

Since science does not progress only by inductive analytical knowledge, the importance of imagination and emotion in the creative process should be obvious.... A feminist perspective would re-introduce and re-legitimize the intuitive approach. The benefits of this in terms of new knowledge might well be incalculable. (pp 365-366)

She asserts that science requires a transformation to a "more humane" approach that takes into account the consequences and ramifications of its outcomes (p. 364); she credits her own "learning about the past and present position of women in science" with a realization that women can and should contribute to this transformation (p. 363).

Armstrong, V. (2001). Theorizing gender and musical composition in the computerized classroom. Women: A Cultural Review 12(1),
35-43(9).

This study proposes that certain forms of music technology are gendered and exclusionary for many women. Armstrong argues that computerized musical composition is constructed within a masculine domain. She believes that modern the computerized composition technology incorporated into music classrooms is plan-oriented and canonical. According to the girls Armstrong interviewed, this style of learning is undesirable and limits creativity. Male students preferred this style of working and were therefore more successful in computerized compositional classrooms.

Aronson, Debra (2009). "The Authenticy Filter: Lessons from Photoshop on Biological Engineering," Science Progress. February 5th, 2009. Accessed on February 11, 2009 at: http://www.scienceprogress.org/2009/02/the-authenticity-filter/

Article looks at the influence technologies have in influencing our perceptions of what is real and authentic. Expresses tensions over acceptance of technologies as natural to our daily experience of truth. Also contemplates the point at which this tension erodes and the use of technology is conceived of as real.

[annotated by FMS]

Bandelt, Hans-Jurgen, Yao, Yong-Gang, Richards, Martin, and Antonio Salas (2008) “The brave new era of human genetic testing” BioEssays 30, 1246-1251

The authors look at the how genetic research is influenced by the pressures of the commercial market specifically the medical industrial complex comprised of pharmaceutical industries, mass media and private funding. While the research is taking time to yield usable results, the market is pushing for the transformation of this knowledge into usuable products. This is especially evident in the use of genetic testing to trace ancestral roots. These pressures in turn are impacting the direction and scope of research. Erosion of traditional research methods and protocols are in danger.

[annotated by FMS]

Barr, Jean and Birke, L. (1998). Common Science? Women, Science, and Knowledge

The England-based authors report on research conducted to evaluate different modes of adult education for women. On the way, they share women's reported perception of science and scientists, their understanding of the scientific process, and suggestions for sharing and co-creating knowledge. They assert that women already have knowledge that is science, yet it is not recognized as such by society. Once women realize that they hold knowledge, they are empowered for a give-and-take with the existing power structure around science.

Best, S. & Kellner, D. (2001). The Post Modern Adventure. New York: Guilford Press.
[cultural_science, global_impacts_of_technology]

Best and Kellner explore the ways in which advances in science and technology are shaping society and culture in the new global era. Developments in science and technology have started a transition from the modern to the post-modern societies. The authors propose that the very nature of this global era will evolve based on the ways in which people use developing science and technology in creating a society of liberation or a society of domination. To explore these issues, Best and Kellner look at the technical developments in warfare, comparing biographical narratives from the Viet Nam war and the Gulf war. The Post Modern Adventure examines not only how science and technology has affected culture in Western society but on all across the globe. [HER]

Bolnick, Deborah et al (2007) “The Science and Business of Genetic Ancestry Testing” Science 318 pp399-400 and follow-up letters in Science 319 pp1039-1040.

A brief piece that examines the rising popularity of personal genomics for ancestral research. The joint authors caution that such “recreational” use of such tests are not without risks. Unintended consequences, limitations of the tests and increasing commercialization all create unstable ground for the consumer. Impacts on identities, community formation and social constructs such a race may surface out of seemingly simple tests. The tests themselves may only contain fragments of information that fail to allow for complex interpretations. The for-profit sphere may gloss over or promise results that are impossible to deliver and raise expectations.

[annotated by FMS]

Bucchi, Massimiano and Federico Neresini (2008). "Science and Public Participation," *The Handbook of Science and Technology Studies*. Cambridge, MA: MIT Press. pp. 449-472.

This article opens with a criticism (and explanation of the crisis) of the deficit model of public understanding of science. The deficit model has been used by scientific experts to promote an increase in scientific education directed towards the general public, reasoning that an increase in the quantity and quality of public scientific knowledge would guarantee "favorable attitudes toward science and technological innovation" (450). The problem with that model, according to Bucchi, Neresini and others, is that it "problematize[s] the relationship between science and the public only as regards the... public" (450) and prioritizes public knowledge as qualitatively inferior to expert knowledge.

Bucchi and Neresini offer an alternative framework to the deficit model and construct a typology of public participation in the production of scientific knowledge that differs even from other typologies of such public participation. To the authors, the interaction between the public and experts is not just one of knowledge transfer but of social conditions which enable spontaneous, non-sponsored public participation as well. The range of public participation, and the changing definitions and forms of democracy which enable it, however, are not evaluated by the authors. Bucchi and Neresini do not offer prescriptive advice for the generation of future hybrids of public-expert scientific knowledge but offer, rather, a description of various forms of that hybrid and the various conditions which might enable each form.

Butler, Judith. (1993). Bodies That Matter: On the Discursive Limits of "Sex". New York: Routledge.
Philosopher Judith Butler wrote Bodies That Matter to clarify her earlier misunderstood assertions of gender as a daily performance. Rather than being something that a person can put on or remove, she claims that gender, while constructed, is more is more potent and indispensable than that—a potency that often manifests onto the body through the projection of regulatory ideals. Much of this has been due to the heterosexual imperative, which mandates that bodies align with a hegemonic understanding of sex and gender. In doing so, she challenges the readers and broader culture to use the tools of a hegemonic society, but to re-adapt them.

Collins, P. H. (2005). Prisons for our bodies, closets for our minds: Racism, heterosexism, and black sexuality. *Black Sexual Politics.* New York: Routledge, 87-116.
[black_bodies_in_medical_experimentation, historical_examination_of_the_intersection_of_race_and_sexuality]

In this chapter of *Black Sexual Politics*, Collins explores the historical and contemporary state-sanctioned institutional mechanisms used to maintain sexual and racial hierarchies. Specifically relevant to this course is the laboratory experiments and field research used by natural and social scientists in the 19th and early 20th centuries on Black bodies. Collins explores how Black women's sexuality was historically exploited as Black women were used as breeders to increase the property of white property owners. Enslaved Black women were also used for medical and gynecological experimentation. These experiments often took place in unsanitary places such as barns and backyards. More contemporary examples of the medical exploitation of Black bodies often center around limiting Black women's access to pregnancy, as Black babies are no longer profitable. Collins cites Norplant, Depo-Provera and unwanted sterilization as modern means of controlling Black sexuality and choice. [HER]

Council for Responsible Genetics (2009) GeneWatch - http://www.gene-watch.org/pages/genewatch.html
[personal_genomics, scientist_activist]

This is a resource supported by the Council for Responsible Genetics that “fosters public debate about the social, ethical and environmental implications of genetic technologies.” GeneWatch makes available online and in print a bimonthly magazine that explores the rapidly evolving issues in the biotech industry especially from a critical stance.

[annotated by FMS]

Critical Art Ensemble (2002) The Molecular Invasion. Brooklyn, NY: Autonomedia. 140pp. Anti-copyrighted; available for download at http://www.critical-art.net/books/molecular/index.html

A manifesto from a performance- and installation-art collaborative, laying out a plan for generating and supporting public debate re: genetically modified foods. (From the Introduction: "The perception that science is too difficult for anyone other than a specialist to understand is socially ingrained in those separated from the discipline on an everyday life basis. The walls of the division of technical labor seem unbreachable. The common English expression 'it's not rocket science,' usually made as a sarcastic remark when someone has an inordinate trouble with any task, is but one example of a manifestation of public reverence for the intellectual intensity of science and its separation from common daily activities.")

This is part of my (Pam's) investigation into artistic critique/response to the scientific process as a means to make the latter accessible to stakeholders. A question raised in response to Donna Haraway case.

Croissant, JL and Smith-Doerr, L (2008). “Organizational Contexts of Science: Boundaries and Relationship between University and Industry,” in The Handbook of Science and Technology Studies (3rd Edition), EJ Hackett, O Amsterdamska, M Lynch, and J Wajcman (Eds). Cambridge, MA: MIT Press: 691-718.
[cultural_of_science, industrial_influences]

Examines the exchange of knowledge and values between the academy and industry which has grown since the 1980s as a result of shifted government legislation and increased funding from industry. The authors detail the historical context of these university-industry research relationships (UIRRs). The professionalization of science and technology coincided with the growing structures of corporate capital. The growth of a federal research system (i.e. NSF, DARPA) also created bureaucratic funding mechanisms that matched the private sector developments. These were solidfied by admendments to trade and patent law which asigned increasing propety rights to corporations. These institutional configuration were supported by new measurements and the growing scinece of economics as well as new geographical formations such as research parks, incubators, and networked communcation tools. The authors then question the effects these connections have for knowledge creation.

[annotated by FMS]

Conrad, Peter. (1992). Medicalization and Social Control in *Annual Review of Sociology,* Vol. 18: 209-232
Conrad examines the relationship between medicalization and social control, by employing studies published on the topic since 1980. Of particular focus are changes in the medical profession and how it effects medicalization, as well as the social dilemmas faced in the realm of medical research and practice.

This article is about the internet and online sex industries. It based on the perspective of science and technology.

Deloria, Vine Jr. (1999). "Perceptions and Maturity: Reflections on Feyerabend's Point of View." *Spirit and Reason*. Golden, CO: Fulcrum Publishing. pp.3-16.

This essay is the first of four essays under Part I: Philosophy of Vine Deloria Jr.'s *Spirit and Reason.* It is a provoking, lively and even uncomfortable at times introduction to an influential Native American perspective on the norms of western-dominated science. Deloria offers a brief comparison on the philosophies of Thomas Kuhn and Paul Feyerabend, all the while keeping the priorities of Native American values at the forefront: perspective over truth, maturity over accomplishment and wisdom over knowledge. The main thrust of Deloria's argument is that mainstream science fails to recognize any knowledge claims that do not fit into pre-established categories; any information that does not fit into a very strict and limited world-view, explains Deloria, is often ignored or condemned into a category of non-existence. On the other hand, for the Native American, he says, gathering knowledge assumes that everything one encounters in experience is significant and that pre-mature conclusions about experience or encountered knowledge should be avoided. Maturity, says Deloria, is learning how "to decide how special forms of knowledge are to be applied, how far they may be trusted, what their relationship is to the totality of human experience and therefore to other forms of knowledge" (13).

Not only is the essay a good introduction to a Native American perspective on science, but the rest of the essays in the book provide poignant reflection on Native Americans and their relationship to other sciences, the education system and religion. Deloria does not suggest that his fellow Native Americans should avoid the scientific establishment but rather that they should engage themselves with it, critique it and provide their own perspective to it. The book is also, then, a good resource to have when working alongside Native Americans in educational and community settings: it allows the non-Native American to hopefully have a better understanding of the rich Native American culture and Deloria is also a leading voice that Native Americans themselves - young and adult learners alike - can learn from with the confidence that their own perspective is being acknowledged. (SLP)

Dilworth, J. (1999). The cello: Origins and evolution. *The Cambridge Companion to the Cello* (R. Stowell, Ed.). Cambridge: Cambridge University Press.
[technology_and_classical_music]

In this chapter of Stowell's *The Cambridge Companion to the Cello*, John Dilworth examines the origin of the cello. Dilworth compares the engineering, construction and design of the cello from the introduction of the instrument in the 16th century to the modern instrument used among the majority of professional musicians today. He looks at both modifications and alterations that have developed as instrument making expanded into the industrial sphere. The reading suggests the important dimensions science and technology play within the realms of art and music. [HER]

Dreger, Alice. (1998). Hermaphrodites and the Medical Invention of Sex. Cambridge, Massachusetts: Harvard University Press
Foregrounding the medical treatment of intersxuals and hermaphodrites in a historical perspective, Alice Dreger traces the advancements of medical technology and how it affects the individuals who often suffer from its pernicious consequences. In doing so, she creates a compelling discourse not only around sex, sexuality and gender, but how the conditions (namely intersex) that blur our understanding of them, should be treated both within the medical community and broader society, championing a social response rather than a medical one.

Epstein, Steven. 2008. "The Rise of `Recruitmentology': Clinical Research, Racial Knowledge, and the Politics of Inclusion and Difference." Social Studies of Science 38:801-832.

This article addresses the consequences of mandates to include women and minorities in clinical trials. “Recruitmentology”, Epstein argues, is a new science of techniques to recruit underrepresented groups to participate and remain in clinical trials. The recruiters are torn, he states, between their sensitivity to the cultural and social histories of underrepresented racial/ethnic groups and the treatment of these groups as administrative categories. The later is at least partially required by the federal mandates for inclusion of underrepresented groups. This article is helpful in thinking about this week’s case, the genetic websites for www.personalgenomes.org, www.africandna.com, and www.decode.com, because it provides an analysis of the dangers of using racial categories as ways to recruit participants. Also it addresses some of the ethical issues that arise from this method, including reinforcing notions of racial difference. This article, through an examination of the sensitivity of recruiters to cultural and historical differences between groups, also suggests that the gathering of information about genealogy may be more complex that it initially appears. In the africiandna.com website for example, we see an infusion of language about race and also shared history, culture, and ancestry.

In this chapter, Steve Epstein provides a comprehensive overview of studies of patient groups and health movements (which I will abbreviate as “patient groups”). Studies of patient groups have increased in the past 15 years in part due to an increase in their numbers, the move “beyond the lab” in science studies, and changes in biomedicine outlined in a widely cited review of “biomedicalization” by Clarke and others]. In the remainder of the article Epstein conducts a literature review of patient group studies; he begins by with analysis of the definitions of “patient groups”, explains some of the methods used, criterion used to compare and classify groups, outlining the key research questions, and enumerating some of the consequences of the existence of these patient groups and health movements. Patient groups, he argues vary considerably in terms of membership (who can be patients, proxies for patients, and/or medical professionals), the aims of the group (political, civic, medical), and whether groups are engaged in boundary-crossing (specifically in the areas of lay-expert, state-civil society; state-market; science-politics). One way that patient groups are classified, which Epstein argues only tells part of the story, is through their relationship to medicine. Specifically, researchers sometimes classify groups as being involved in medicalization, or trying to gain legitimacy by claiming that their condition is “of a medical nature” (510)]. As Epstein notes, the relationship between patient groups and medicine is complicated and often cannot be captured through this concept. Some of the key research questions seek to understand how social and technoscientific developments and aspects of disease impact the formation of patient groups. Another set of questions seeks to understand the type of knowledge they use and expertise they develop. Specifically, researchers are interested in the use of informal knowledge and the ways that knowledge is produced in biomedicine.

I found this article useful because it takes a look at how scientific knowledge about drug efficacy is produced – not from scientists, but through recruiters. The process of recruitment itself is laden with subject and sympathetic tendencies as well as the scientifically-driven understandings of racial groups.

]Clarke, Adele, Shim, Janet K., Mamo, Laura, Fosket, Jennifer Ruth, and Fishman, Jennifer R. 2003. "Biomedcicalization: Technoscientific Transformations of Health, Illness and U.S. Biomedicine." *American Sociological Review* 68:161-194.

] See (Conrad 1992; 2007) for a slightly different definition of medicalization. Medicalization is obtaining legitimacy for a condition by adapting medical terminology to explain it. Conrad, Peter. 1992. "Medicalization and Social Control." *Annual Review of Sociology* 18:209-232, Conrad, Peter. 2007. *The Medicalization of Society: On the transformation of human conditions to treatable disorders*. Baltimore: Johns Hopkins University Press.

First Nations University of Canada, Department of Science
http://www.firstnationsuniversity.ca/default.aspx?page=30

The First Nations University of Canada, Department of Science incorporates Indigenous knowledge and holistic learning and support into their research and pre-professional science programs. Their purpose, as stated on their site, is to:

“Promote scholarly research, teaching and learning activities that will directly and indirectly benefit Aboriginal communities in an age of technological advancements and globalization, and thereby, increase the representation of Aboriginal people in science and health related careers.”

Their site, apart from the university program, also describes community projects and research that the department is affiliated with. Health and science camps are sponsored for youth and one of the departments largest community-based research endeavors is National First Nations Environmental Contaminants Program. Through the program, communities and researchers apply for funding to assess the exposure level and health effects of individual communities in relation to environmental contaminants as well as funding for research to develop methods for remediation, once assessed. The program is committed to community participation at all levels – initiation, assessment, policy-making and policy-implementation, and is an example of how environmental and health related issued particular to Aboriginals are able to receive research attention when Aboriginals are part of institutional and 'expert' design of research in addition to being part of communities.

In this article, Fausto-Sterling examines scientific studies of bone density that make claims about race and racial differences. While many studies do not find race differences, they set out initially looking for these differences. Studies often attribute differences to race without a more comprehensive examination of the social factors (geography, diet, life history, exercise, etc) that influence bone density. Fausto-Sterling argues that genetics are not causes of conditions, but rather a set of possibilities that can be triggered by social conditions. This particular study is helpful in understanding how the importance of incorporating social conditions to scientific understandings of the body. The use of genetic knowledge is limited without information about the social conditions of people's lives. This is an accessible article about the "science" of bone studies and the need to bring social conditions into these studies.

Ford, A & Peat, FD (1988). The Role of Language in Science. Foundations of Physics. Vol 18, 1233, Retrieved on February 1, 2009 from http://www.fdavidpeat.com/bibliography/essays/lang.htm.

Ford and Peat propose a range of explorations into the role of language in science. In this exploration, all concepts are bound up in the language in which they are conceived. The authors understand that language can block or impede the exploration of new ideas. While there are those that argue meaning is simply transmitted from speaker to listener, the authors see language as part of a much more active and dynamic system of constructed meaning. Yet, meaning can become a contested space causing confusion and argument within the conveyance of knowledge. They posit that the language of every day, natural language, is capable of expressing a wide range of meanings required by science but that it is necessary to thoroughly examine the concepts being explored and to understand where confusion can arise. The creation of artificial languages to address gaps in new concepts may only lead to continued confusion. Other language systems such as mathematics, primitive and technical are all equally useful in the communication of science.

[annotated by FMS]

Fox, M.F., Johnson, D. G., Rosser, S. V. (2006). Women, Gender, and Technology. Urbana-Champaign: University of Illinois Press. Preview Retrieved on February 25, 2009 from http://books.google.com/books?id=nf1E3EFqoXAC&printsec=frontcover&source=gbs_summary_r&cad=0#PPP1,M1

This book was designed to fill in the gaps in current American STS literature with regard to the relationship between gender and technology. The authors argue that most literature on this topic focuses on the barriers women entering technological fields face but does not address feminist perspectives on technology and the impact of gendered technology on gender relations within US society. The authors use an interdisciplinary method to bring forth these issues and suggest multiple approaches exploring women in technology and the impact of gendered technology on society, institutions, organizations and individuals. (HER)

Garver, K. L. & Garver, B. (1994). The human genome project and eugenic concerns. The American Journal of Human Genetics 54(1),
148-158.

This article examines the darker possibilities that could evolve from the U.S Human Genome Project. While thee authors are hopeful about the benefits of the project, they are concerned with possible breaches of bioethics. This article specifically examines the ways in which genome development could be incorporated into a eugenics ideology. Garver and Garver take a historical approach as they cites examples of eugenics and biological determinism in the United States and Germany. The article is an excellent source for considering how race and gender are intertwined in technology, especially genetic research.

Gorz, Andre. 1980. The Scientist as Worker. In: Science and Liberation Boston: South End Press. 398pp

In this article reprinted from Liberation magazine (May/June 1974), Gorz exposes the scientist as another tool for the ruling elites of capitalism, as much as the factory worker. He cites evidence in three areas: the realm of science itself (e.g., compare the use of the terms “scientific” and “technical” to the terms “craftsmanship” and “skill”), the “language and object of science” (which keeps science in the realm of the experts and useful information out of the hands of those who need it), and the ideological content of science (i.e., the existing power structure decides what will be studied, and bars from the discussion knowledge that would empower society to take things into its own hands).

Scientists have not broken out of their bondage because of competition for the perceived shortage of challenging positions and the extreme specialization of scientific work that prevents any one scientist from taking matters into their own hands – only by working together will they see the whole picture, in a form useful to societal change.

Gorz calls on scientists to cease being victims of this system as a matter of principle. Though he doesn't employ the term activist, he calls on scientists to take action:

“the goal is not for a few specialists to achieve the highest possible professional standards; the goal is the general progress and diffusion of knowledge within the community and the working class as a whole… the best possible ways of sharing new knowledge must be the permanent concern of all research scientists… It will call for research to be carried out in constant cooperation and interchange between experts and non-experts.” (p. 278)

Haraway, Donna. 2004. "Teddy Bear Patriarchy: Taxidermy in the Garden of Eden, New York City, 1908-1936." Pp. 151-197 in *The Haraway Reader*, edited by D. Haraway. New York: Routledge.

In this paper, Donna Haraway analyzes the creation and organization of the African Hall exhibit in the American Museum of Natural History and the biography of the exhibit's primary taxidermist, Carl Akeley. Haraway uses the experience of walking through the African Hall exhibit and details from Carl Akeley's biography, in published works and museum archives, to study messages that visitors receive about animals, nature, and "primitive" people. Haraway argues that the preservation of the animals in taxidermy actually creates new animals that have "transcended mortal life" (157). Haraway goes further to say: "[t]his is a spiritual vision made possible only by their death and literal re-presentation. Taxidermy fulfills the fatal desire to represent, to be whole; it is a politics of reproduction" (157). Haraway argues that the experience of the exhibit is historically and geographically situated and that the camera and gun are used to create meanings. And finally, the ways that biography is "woven into and from a social and political tissue" (162).

Throughout the rest of the chapter, Haraway uses examples from Akeley's biography to explain the ways that racialized and gendered elements of art of taxidermy and the creation of African Hall museum from 1908 to 1936. Using the biographies that Akeley's wives (through first and second marriage) wrote about him, Haraway analyzes the role of these women in the hunt and final creation of the exhibit. Haraway's explanation of their relationship to the "African boys," Akeley, and the gorilla illuminates the complex relationships between humans-animals, blacks-whites, man-woman, etc.

Annotation: Haraway, Donna. 2004. "A Manifesto for Cyborgs: Science, Technology, and Socialist Feminism in the 1980s." Pp. 7-45 in *The Haraway Reader*, edited by D. Haraway. New York: Routledge.

In this paper, Haraway outlines and critiques elements of feminism and proposes a new approach to feminism using irony as a tool. There is irony in the construction of a “women’s experience” by the international women’s movement because the construction is both necessary and contrary to the very purpose of the women’s movement. Haraway starts by saying that she would like to see irony, “the tension of holding incompatible things together because both or all are necessary and true . . . more honored within socialist feminism” (7). Haraway speaks about the possibility for cyborgs, “creatures simultaneously organism and machine, who populate worlds ambiguously natural and crafted” as a site for challenging boundaries and being more conscious in construction of boundaries. She argues “for *pleasure* in the confusion of boundaries and for *responsibility* in their construction” (8, original emphasis). Haraway identifies three boundary breakdowns that make this vision possible: the animal-human boundary, the organism-machine boundary, and the physical-nonphysical boundary.

Haraway discusses the work of Chela Sandoval and Katie King, both attempts “to craft a poetic/political unity without relying on a logic of appropriation, incorporation, and taxonomic identification” (15). A major argument in this paper is that feminist theory should take into account partial explanations rather than the totalizing explanations usually employed. Another part of her argument is that a critical analysis of science does not involve a total rejection of science, or the cyborg, but instead understanding of the ways science is used for domination and human satisfaction.

Harding, S (1991). Whose Science? Whose Knowledge?: Thinking from Women's Lives. Ithaca, NY: Cornell University Press.
[science_feminism, feminist_perspectives, reflexivity_strong, objectivity_strong]

Harding explores the possibilities of a feminist science in meeting the needs of all women. She argues that inclusion of women (as well as “others”) challenge the fabric of knowledge by bringing new and strong objectivity to inquiry. In addition to arguing for more access and control over such knowledge creation by women, she details the way in which feminist standpoint theory can inform ways of gaining new knowledge by others through situating the inquiry in the perspective of the “the other” . She also stresses the need for knowledge to be informed by experience as well as political activity thus linking theory to practice. Harding concedes that a feminist science is contradictory, multiple and complex which can only serve to strengthen scientific research.

[annotated by FMS]

Harmon, A. (2007). Genetic testing + abortion =??? New York Times (New York, NY). Retrieved March 18, 2009 from http://www.nytimes.com/2007/05/13/weekinreview/13harm.html
[genetic_testing, abortion]

This newspaper article explores the new dynamics of abortion in an era of genetic testing. Harmon believes that many women who identify as being pro-choice find the abortion choice less clear if abortion is used as a means to terminate an undesirable child. In other words, many pro-choice women find they support abortion if a woman does not want to have a baby but question abortion used by a woman who does not want a particular baby. Harmon exposes a new (yet ironically very old) element in the abortion debate; how much "choice" should a woman be given? Where does the line between a woman's body and a "child's" body become blurred. The article is an interesting representation of bioethics, politics, gender dialouges, science and technology in popular American culture. [HER]

Hess, DJ (1995). Science and Technology in a Multicultural World: The Cultural Politics of Facts and Artifacts. New York, NY: Columbia University Press.
[culture_of_science, science-as-power, cultural_reconstruction, technototemism, multicultural_interpretations]

Hess looks at the social construction of science and technology knowledge in terms of what it means for underrepresented and marginalized groups. He explores concepts such as temporal cultures (e.g., time shapes the meaning), technototemism (e.g. cultural artifacts shape the meaning), intercultural communications (e.g. how meaning is shaped by cultural context and history). He also considers the variety of knowledge systems that exist and the ways in which science can be culturally reconstructed to bring about new meaning.

[annotated by FMS]

Ho, Mae Wan. 2007. “The Importance of Being a Science Activist.” Lecture presented at the launch of *Confessions to a Serial Womaniser* by Zerbanoo Gifford (www.ashacentre.org), Nehru Centre, London, 1 October 2007. Accessed at http://www.i-sis.org.uk/ScienceActivist.php 2/22/2009.

Mae-Wan Ho tells her own story of becoming a scientist-activist and the founder of the Institute of Science in Society with her husband, Peter Saunders. Ho is a PhD geneticist; she was awakened to the need to bring "independent" scientific information to the public realm when she attended a conference titled "Redefining the life sciences" co-organized by Vandana Shiva, another scientist-activist based in India. Ho describes her own work to promote global sustainability (e.g., responding to climate change, ensuring clean water and food in all corners of the globe).

Ho is an example of a scientist who has found a way to put her knowledge and expertise to use in the policy arena, advocating for social justice without compromising the underlying science.

Jungwirth, Bernhard and Bertram L. Bruce (F 2002). "Information Overload: Threat or Opportunity." Journal of Adolescent and Adult Literacy. 45 no. 5 pp. 400-406.

This article explores the pace and the implications of the ever-expanding global accumulation of knowledge. Both individuals and whole cultures, say the authors, are feeling the effects of the information "bomb" which is growing at a rate faster than ever before. Though the burden of too much information (and, consequently, how to manage it) has been persistent for hundreds of years, the last thirty years has witnessed more information produced than the grand total of produced information in the previous 5000 years. In less than one generation people are being asked to manage and filter more information than have previous civilizations in their entire history. One opinion is that technology and scientific advancement do not necessarily enable acquisition of information but are created as a managerial adjunct to information and changing world views which already acknowledge and have opened themselves up to new categories of information. In this case, information overload is an opportunity, it is a manifestation of a new wave of culture and being.

On the other hand, as the majority of the authors quoted in the article believe, too much information is becoming a looming threat. One researcher proposes that most people with common exposure to the internet, newspapers, television and public education have cultural AIDS: Anti-Information Deficiency Syndrome. The symptoms of this disease, says the researcher, is that people are no longer able to filter information. They can neither control what they receive nor are they able to pass judgments on it. "Everything is everywhere at every time." The result is an increasing dependency on experts which only increases the vulnerability of groups of people being taken advantage of by those experts or of dismissing contextually crucial information which may not be considered crucial in the experts' contexts.

Though the article offers very little in terms of prescription, it is a good resource for a) the multitude of researchers who have published on the topic of information overload and anxiety and b) becoming aware of the problem and possible consequences of too much information. Teachers especially would do well to consider the problem of information overload. One consideration could be that passing on information to students and instilling a love of learning, regardless of students' age, is very important; but teaching students how to filter and pass judgments on received information may be just as crucial. (SLP)

Kahn, Johnathan. 2008. "Exploring Race in Drug Development." Social Studies of Science 38.

In this article Kahn takes the case of BiDil, an FDA approved drug for the treatment of African Americans with heart failure. The formal clinical trial for BiDil was conducted with only self-identified African American patients. This allowed investigators to obtain FDA approval while using smaller clinic trial with less stringent guidelines. Kahn describes investigators model as one “exploits race to gain regulatory and commercial advantage, while ignoring its power to promote a regeneticization of racial categories in society at large” (737). Kahn also challenges the popular idea that BiDil is a form of pharmacogenetics, or personalized medicine. This article highlights the economic and regulatory factors that are part of decisions that reify racial categories. Unlike studies that Fausto-Sterling reviewed, the investigators in the BiDil clinical trial do not make claims that there are racial differences, however, the approval of BiDil to treat ‘black’ patients suggests that there is scientific evidence of significant biological differences among racial groups that merit the use of different medical treatments.

Launius, R. D. (2007). The public history of science American memory, culture wars, and the challenge of presenting science and technology in a national museum. *The Public Historian, 29(1),* 13–30. [critical_analysis_of_the_history_of_technology_and_science]

In this article, Roger Launius explores the challenges of presenting science and technology within the context of historical preservation. Launius questions the ways in which the Smithsonian often interchanges technology and national identity, without examining complexities and diversity of perspectives that make the representation of modern science less of an absolute truth than an interpretation.

Launius proposes a series of questions that ask the reader to reflect upon knowledge claims, values, perspective and expertise. He asks the reader to engage in a task similar to the one suggested at the beginning of this course. [HER]

**This article was a perfect find for my last bibliography entry.

“**Lessons in Learning: The cultural divide in science education for Aboriginal learners.” Canadian Council on Learning.** **http://www.ccl-cca.ca/CCL/Reports/LessonsInLearning/LinL20070116_Ab_sci_edu.htm** **(accessed March 4, 2009).**

Using a combination of census data, testing results and recent research, this article demonstrates how sharply under-represented Aboriginals are in the science and engineering fields in Canada. According to the research and statistics, the article concludes that the reason for the the under-representation is an educational one: compared to the non-Aboriginal population, Aboriginals are not only under-represented in science and engineering occupations but the percentage of Aboriginal students who study in science-related fields in post-secondary settings and those who take advanced high school science classes is also far less than the non-Aboriginal population, including other ethnic minorities. The study proposes that the reason for such disparity is cultural:
“The Aboriginal world view sees people, landscape and living resources as a spiritual whole. In contrast, the Western science approach seeks greater understanding through breaking apart the whole and analyzing it into its smallest parts. These cultural differences can create difficulties for Aboriginal students in classrooms dominated by the Western science perspective.”
The article proposes integration within science classrooms of Aboriginal content and a flexibility which allows local knowledge along with textbook knowledge to be incorporated into the classroom, without demanding that content and knowledge be inserted into previously-established Western science frameworks. Consultation with local Elders is recommended for such an project of integration. The article also describes current initiatives which are already integrating Aboriginal perspectives into their curricula and which are researching ways – along with industry partners – that would encourage Aboriginals to pursue further undergraduate and graduate education in scientific fields.

Martin, B (1993). "The Critique of Science Becomes Academic." Published in Science, Technology, & Human Values, Vol. 18, No. 2, Spring 1993, pp. 247-259. - Accessed on February 22, 2009 at : http://www.uow.edu.au/arts/sts/bmartin/pubs/93sthv.html
[STS_History, action_research]

Martin traces the major trends in the research of the social critique of science from the 1960s to the writing of the article. Primarily he questions the increasing disconnect between the field and the subjects it studies especially the depoliticization and dematerialization of its concerns. The piece touches key debates and seminal works. He also provides concrete recommendations towards reconnecting the academy with the field.

[annotated by fms]

Martin, Emily. (1987) The Woman in the Body: A Cultural Analysis of Reproduction. Boston: Beacon Press. Martin discusses women's bodies by using the metaphor of the machine. The machine, she claims, produces culture's perception of normalcy with its systematic mechanisms. A machine runs regularly; women, she claims, do not. Thus, she claims that like other mechanisms of the body, such as the heartbeat, women's body and their impossibility to attain normalcy, should be alluded more to a chaos model than to a machine. In doing so, unattainable standards for women will be eradicated.

Mody & Kaiser, Scientific Training and the Creation of Scientific Knowledge

The first question Mody & Kaiser ask: why scientific training, and how should it proceed? The authors describe various aspects of the culture of science -- modes of working, means of communication, and the "moral economies" (values or norms of the field) -- that are and are not included in scientific training, as well as the power structure imbedded in and transferred by that training.
[pad]

This comprehensive handbook attempts to summarize the state of gender studies not only by examining the crucial research of the past decade, but by encouraging thinking about how the questions central to studying gender have themselves changed. Building on the work started by the contributors to this volume's predecessor, (Analyzing Gender, Sage 1987), editors Myra Marx Ferree, Judith Lorber, and Beth B. Hess reflect on the advances of gender scholarship during the past decade with its emphasis on all levels of social structure from the most macro to the most individual. Revisioning Gender is a step, albeit a tentative one, toward constructing a new analytical approach for the social sciences, one that calls into question disciplinary boundaries and the specific agendas that may be entailed within them. The editors, and the contributors to this important volume, illustrate how the use of gender by scholars in various and overlapping fields of study has helped alter concepts and research designs. The goal of this volume is to present, and encourage, the debates that advance the study of social science.

Morning, Ann. 2008. "Reconstructing Race in Science and Society: Biology Textbooks, 1952-2002." American Journal of Sociology 114:S106-S137.

This article bridges the gap between basic scientific research and popular understandings of science. While Fausto-Sterling examines unfounded assumptions in basic science research, Morning takes a look at how science is presented to the public through her study of high school biology textbooks. In this study she conducts a content analysis of the mention of race in biology textbooks during the years 1952 to 2002**.** She finds that while there was a decline in the mention of race from the 1950s to 1990s, there has been a recent increase since the 1990s. Unlike earlier discussions of race, however, recent text books discuss race almost entirely in terms of genetics. This article is a useful piece for thinking about the ways that genetics serves as a vehicle for justifying discussions of biological race. This article provides a unique lens into analyzing scientific knowledge that is disseminated to the public. The use of genetic explanations for racial difference permeates popular explanations of science as well as formal scientific knowledge. How significant are the messages about race that students learn through their biology textbooks?

Oldenziel: Man the Maker, Woman the Consumer: The Consumption Junction Revisited [pad]

The author provides some historical context for the perception of women as consumers of science, engineering, and technology rather than agents of invention and production themselves. Rather than debunking the female-consumer perception, Oldenziel makes the case for redefining the boundaries between production and consumption, pointing out that women as informed and activist consumers who have influenced the production of useful and robust technologies. She suggests that Ruth Schwartz Cowan's 1987 thesis* -- that consumers should be considered imbedded in any analysis of the development of new technologies -- should be applied to analysis of women's roles in the production of science and technology.

- see "The Consumption Junction: A Proposal for Research Strategies in the Sociology of Technology," in: *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*. Cambridge: MIT Press. accessed February 20 from http://books.google.com/books?id=SUCtOwns7TEC>

Okie, Susan. “Crack Babies: The Epidemic That Wasn’t.” New York Times. January 28, 2009.
http://www.nytimes.com/2009/01/27/health/27coca.html?_r=1&scp=1&sq=crack%20babies&st=cse

-This article talks about new research that largely disproves the myth of the “crack baby” that emerged in the 1980s and 1990s. New research suggests that doing prenatal cocaine exposure does about as much damage as prenatal exposure to tobacco, and less damage than exposure to alcohol, to the fetus. It’s particularly interesting because Okie pretty explicitly critiques the morally loaded debates the encircled the idea of the “crack baby” in the 1980s and 1990s.
-A little background: This mythology predicted that “crack babies”—children born addicted to cocaine because their (black, poor, urban, “welfare queen”) mothers were abusing the drug during pregnancy—would be so developmentally altered by the drug that they would grow up to be the anti-social drug dealers, gangsters, murderers and rapists of the future. These babies were particularly terrifying because, so biologically altered, the mythology goes, they would have no hope for recovery and would become the absent (because imprisoned) black men (it’s important that these babies were largely gendered male) of the 2000s. This is an obvious case of the intersection of science and politics and normative morality.
-Particularly interesting to my inquiries because this article purports to un-do some pretty major stereotypes about black women/families through new scientific data. Some of the science really seems to do this! But the writing also does quite a lot of reinscribing of these tropes (for example, the article emphasizes the “programs,” not the self-determination of formerly addicted mothers, as saviors of children born addicted to cocaine).
-Also deals in the nature/nurture debates (is it exposure in the womb, or environment in which one grows up that determines a child’s development?)
(EAO)

Ortner, Sherry B. (1974). Is Female to Male as Nature is to Culture? In M. Z. Rosaldo and L. Lamphere (eds) *Woman, Culture and Society*. Stanford, CA: Stanford University Press, pp. 68-87

In one her most seminal works, Ortner poses the title question as a lead-in to the claim that females were oppressed because of their roles as child bearers and caretakers. As such, men were free to go out and create culture, thus controlling the production and dissemination of all knowledge. Essentially, Ortner claims that women's initial oppressions begins with the constraints of her physical body and that, like de Beavoir said, ".... the woman is adapted to the needs of the egg rather than to her own requirements". This has not only explained why culture is often exalted above nature, but also why women have not had an integral role in its production.

Parkinson, S. (2004). Corporate Influence on Science and Technology: Speech. Retrieved on February 2, 2009 from http://www.sgr.org.uk/SciencePolicy/SpeechGreenParty004.htm
[scientific_ethics] [industrial_influences]

This link provides the reader with a transcription of Dr. Stuart Parkinson's speech given at the Green Party Spring Conference on March 13, 2004. Parkinson focused on industrial influences within science and technology. These corporate agendas often promote economic achievement over environment, public health and social responsibility. Dr. Parkinson describes ten methods large corporations use to influence science and technology, which include funding university research and privately funded in house research. He continues to address how industrial influences affect science and technology, looking specifically at both conscious and unconscious biases woven within the fabric of corporate funded research. This relates directly to the case presented by Haraway, specifically when she questions, "What gets to count as nature [or in this case science and technology] for whom and when? And how much it costs to produce nature at a particular point in history, for a particular group of people." Additionally, the transcription of this speech helps us link science and culture by examining the influence of capitalism (outside social context) within the realm of science, which many assume is completely objective. (HER)

Preves, Sharon E. (2000). Intersex and Identity: The Contested Self. New Brunswick, New Jersey: Rutgers University Press

While Preves work focuses on the contentious issue of intersexuality and how it should be treated, she was also one of the first to speak with intersexed individuals to get their perspective, including how they cope with their conditions and how they perceive their own identities, often times in contrast to medical diagnoses. This book offers a rare glimpse into the world of intersex by the individuals who live it. In sharing intersex voices, Preves challenges, like so many others, the restrictive binary gender categories we live by.

Reardon, Jennifer (2004) “Decoding Race and Human Difference in a Genomic Age” Differences 15:3 pp38-65.

Reardon looks at how scienctific reasearch is used within a context of social constructions and challenges the ascertain that science is a simple “reflection of nature.” Specifically she looks at the use of genomic research and concepts of race. She then traces the interaction between “truth” and “ideology” regarding race and science. Even the statements within population science that assert that race is meaningless is part of the social constructs of sicence and society. She argues that the resurgance of a biological basis to race can be traced in part back to various UNESCO statements on race. The first of these statments urged to construct race was a result of geographical isolation. That is should be based ons shared physical, not mental characteristics and interpretted at the population level. Additoinally race should not be hierarchically order and understood as a dynmaic aspect. The second statement added that differences may occur between human groups, but that these differences may be less than differences between individuals within a particular group. The Human Genome Project raised new quesitons regarding race. Long believed relationships between phenotype and genotype were beginning to show greater gene similarity than the surface differences implied. At the same time, a push to reconstruct racial definitions based on gene differences rather than physical characteristics was growing. Yet this type of reworking of racial understand creates confusion as it butts against long-standing social constructions of race.

[annotated by FMS]

Reardon, Jenny (2005). *Race to the Finish*. Princeton, NJ: Princeton University Press. 237 pp.

In this balanced, historical study of the Human Genome Diversity Project, Jenny Reardon discusses not only the history and important players involved with the controversial genome project but also explains why this purportedly benign and charitable project raised such global alarms, especially within Indigenous communities. Research methods, ethical and religious values, knowledge systems, histories of peoples, and whole world-views clash in this book and readers are left wondering how the scientists involved in the project could have overlooked such obvious and meaningful differences across cultures. The book then, would be worthwhile for any scientist involved or looking to be involved with Indigenous communities or for any activist and advocate of Indigenous peoples. Six stars out of Five!

Roberts, D. (1997). *Killing the black body: Race, reproduction and the meaning of liberty.* New York: Vintage

Dorothy Roberts examines the various ways black women's bodies and reproductive rights have been controlled and oppressed by social and governmental institutions; including science and technology. Her thorough book explores the regulation of black women's bodies from the era of slavery to modern reproductive technology. Roberts uses cases of coerced sterilization to illustrate the very different roles science and reproductive technology played in the lives of black and white women. While middle class white women were gaining more reproductive liberties, women of color and poor women were being sterilized in an attempt to limit "undesirable populations." Roberts also address the ways in which the 1990s birth control Norplant was targeted to low income women. She found that Norplant engaged in a 2.8 million dollar campaign to distribute the product to low income women. In addition, many states offered low income women financial bonuses for having the implant. The majority of these women were never told of the side effects, which included cysts, swelling of the ovaries, hair loss and depression. While this is only brief look at two of the issues covered in Robert's text, they are important in understanding how science and technology can simultaneously benefit one population and oppress another. (HER)

Roche, RA and Annas, GJ (2007). “New Genetic Privacy Concerns,” Genewatch, 20(1). Accessed on March 28, 2009 at http://www.gene-watch.org/genewatch/articles/20-1RocheAnnas.html

Examines the issues of establishing a US biobank that would contain a wealth of genetic information. The potential establishment of such a bank raises questions of both ownership and privacy. Individuals may not be fully aware of the full potential worth or use of DNA samples they may provide to such a bank. The use of such material reaches beyond the individual to members of their extended family as well. It is unclear and court cases suggest that ownershp may be transferred to researchers. The expansion of commerical testing facilities have complicated these issues of privacy and ownership.

[annotated by FMS]

Rose, H (1994). Love, Power and Knowledge: Towards a Femnist Transformation of the Science. Bloomington, IN: Indiana University Press.
[women_knowledge, women_in_science, feminist_perspectives]

Rose begins with the history of the science and technology studies field with a strong nod to the radical science movement. Based in theories of feminist realism that argue that “good science” is possible, she also acknowledges the contributions of her postmodern feminist colleagues who argue for subjective and always contestable. Rose explores the need to reconnect rationality to responsibility, love and caring and to place knowledge within a social context that is multiple and complex. Rose explores the very real constraints faced by female scientists and argues that this exclusion has led to a disembodied science, disconnected from experience and practice. The book examines real women confronting the real challenges of creating and knowing science informed by their lives.

[annotated by FMS]

Rose, Nikolas (2001). "The Politics of Life Itself." Theory, Culture & Society 18(6):1-30. http://tcs.sagepub.com/cgi/content/abstract/18/6/1

Rose examines the place of science in society, and the evolution of personal biology to become another aspect of human politics. He is especially interested in the "contemporary resurgence of biological and genetic accounts of human capacities and incapacities," i.e., genomics and disease diagnosis. This article (precursor to his book of the same name published in 2006) describes three aspects of this new biopolitics: risk politics, molecular politics, and ethopolitics. This summary is focused on the article as it is relevant to GRST09Case 3 , examining the context of genome analysis.

- Biopolitics as risk politics. When a person has their genome analyzed, they are entering into the world of risk politics, where their results are used to assess their risk as part of a group as well as riskiness as an individual. This information is applied for the purposes of managing the risk via a range of interventions. This "risk profiling" is used by insurance companies, medical researchers, and the expanded "pastoral power" of associations, committees, and government agencies to make decisions for the individual, their community, and their larger group, belying their "espous[al] of the ethical principles of informed consent, autonomy, voluntary action, and choice, and non-directiveness." Overshadowing and intrusive monitoring and surveillance is one outcome of testing, a sign of risk politics in action.
- Biopolitics as molecular politics. Our contemporary vision of our body is different from the 19th-century perspective: In the 1800s, life was the body as a whole, operating in the context of culture. In the 1900s, life became molecular, operating in the context of the human genome. This shift has led to the commodification of life, with genes, genomes, and genetically modified organisms in the control of the funders and corporations who hold the keys to problem-solving and advances in this arena.
- Biopolitics as ethopolitics. Finally, the author describes the confluence of health and beauty with success and happiness, where the self is directly equal to the body, and "fitness" describes both emotional and physical aspects of a person.

Rose closes with a call for attention to the modern aspects of the politics of life, where individuals are assigned "biological citizenship," and "the biological lives of individual human beings are recurrently subject to judgments of worth," event by the individuals themselves.

Margaret Rossiter's landmark volume draws back the curtain on the role(s) of women in science leading up to WWII. The thorough study examines women's entry into universities and treatment at the hands of male scientists, careers in government and academia, and the impact of the feminist movement on the opportunities open to women.

Some take-home messages from this volume include:

- there were far more women scientists in this period than most people realize.
- women did well just to gain employment as scientists at all, let alone garner recognition for their accomplishments.
- women scientists during this period generally chose one of two tacks for making progress in their chosen field: going along to get along, or making noise and facing marginalization.

See Rossiter 1995 for an overview of Volume 2.

Margaret Rossiter's second volume on the history of women in science in America (see Rossiter 1982 for an overview of Volume 1) is subtitled "Before Affirmative Action," describing the period through 1972. Like Volume 1, her scholarship is impressive, and the vast amount of research behind this book is evident.

Rossiter describes the conditions that led to a decline in the number of women employed as scientists after WWII, an otherwise golden period for science and technology:

- Displacement by returning veterans.
- New antinepotism laws and tenure practices in universities.
- Attempts to convert home economics to "more professional" (i.e., male-dominated) status.
- "Upgrading" teachers' colleges and other "normal schools" to university status.

Royte, Elizabeth (2008). The Caged Bird Speaks. Retrieved on February 4, 2009 from http://www.nytimes.com/2008/11/09/books/review/Royte-t.html?_r=1&scp=1&sq=%22The%20Caged%20Bird%20Speaks%22&st=cse

Royte reviews Irene Pepperberg's memoir about Alex, the African Grey Parrot, and their work together on nonhuman communication. Royte comments on Pepperberg's need to prove herself to the scientific community, implying that Pepperberg's gender as well as her choice of scientific study generated skepticism about her findings and suggests that there was something "tragic" about Alex's life as a study subject. The article draws attention to the distinction between objective scientific research-- and writing -- and the emotional attachment between woman and bird which Pepperberg is finally able to express in the form of this memoir. The article also subtly challenges the ethics of science's insistence on objectifying its object of study. (AV)

Rubin, Gayle. (1975). The Traffic in Women: Notes on the “Political Economy” of Sex in Feminist Theory: A Reader, 2005,
In this essay, Rubin attempts to pinpoint the locus of female oppression, especially those social mechanisms which are responsible for it. She suggested that there was a "sex/gender system" at work which she defines as "the set of arrangements by which a society transforms biological sexuality into products of human activity, and in which these transformed sexual needs are satisfied". In doing so, Rubin leverages the work of previous theorists, including Marx, Levi-Strauss (exchange of women) to show how women have been subverted within various frameworks, but also reinterprets their theories to more fully explain the female situation.

A Study on the Status of Women Faculty In Science at MIT (1999). Retrieved on February 9, 2009 from http://web.mit.edu/fnl/women/women.html#The%20Study
[women_in_academia]

This 1999 study examines how the Committee on Women Faculty came to be established in the School of Science at MIT. The initial unofficial study, which was reported only ten years ago, found that women in junior faculty position were optimistic about their futures and careers at MIT. Although, many worried about how they would combine their personal and professional lives, most junior faculty members were content in their positions. In contrast, tenured women felt excluded and marginalized. This loss of a positive outlook increased as women progressed in their careers. Tenured women felt marginalized by differences in salary, resources and awards compared to their male colleagues. Additionally, in 1994, the number of women in faculty positions in the School of Science at MIT (8%) had remained static for a period of at least ten years. The informal study led to the creation of the Committee on Women Faculty in the School of Science. This committee began taking immediate action to create a collaboration between faculty and members of the administration to address the needs of women in the School of Science at MIT and serve as a model for other marginalized populations within the university. (HER)

Shostak, Sara, Conrad, Peter, and Horowitz, Allan. 2008. "Sequencing and Its Consequences: Path Dependence and the Relationships between Genetics and Medicalization." American Journal of Sociology 114: S287-S316.

Although this article does not directly address racial difference or assumptions about race, it is directed toward concerns about how genetic information will be used. This article questions an assumption made by social science studies of genetics. The assumption is that findings for genetic markers are accompanied by increased control over those conditions by the medical profession (medicalization). Sociologists who study medicalization tend to criticize the way that biomedicine increasing controls the treatment and explanation of conditions, such as alcoholism and normal sadness, that may also have social causes. (This is a strikingly less expansive understanding of social conditions than Fausto-Sterling uses). Authors argue that the impact of genetic findings on medicalization depend on the medical condition under consideration. They use case studies of three conditions for which genetic markers have been identified: depression, homosexuality, and sensitivity to chemical exposure. They argue that for each condition, the use of genetic findings have had a different impact depending on the role of medical professionals, patient groups, and where the condition was in the process of medicalization. This article is useful because it provides one model for considering the impact of genetic findings on the trajectory of conditions, how conditions are understood, and the ways that people with those conditions are treated. I include this article because it speaks to the debate on genetics within sociology. This article is helpful in contextualizing the use of genetic information within the broader context of medicine and social advocacy. New genetic knowledge does not simply create new understandings of a condition. Rather genetic knowledge is worked into pre-existing knowledge about medical or social conditions.

Teman, Emily. The Medicalization of "Nature" in the"Artificial Body": Surrogate Motherhood in Israel. *Medical Anthropology Quarterly*, Volume 17, Issue 1
Springboarding off the understanding of motherhood as connected to nature, Teman looks at the medicalization of the mother category in Israel, using surrogacy as her locus of investigation. She examines the personal agency of surrogate mothers, as well as redefines the surrogate body as artificial and locates nature in the commissioning mother's womb. By doing so, Teman showcases how surrogacy in Israel is exalted as a means for women to achieve normal and natural reproduction.

Valiverronen, Esa (2001). “Popularisers, Interpreters, Advocates, Managers, and Critics: Framing Science and Scientists in the Media.” pp 39-47 In: Nordicom Review 2/2001 (Ulla Carlsson, Ed.). 102pp Accessed 3/17/2009 at http://www.nordicom.gu.se/?portal=publ&main=info_publ2.php&ex=34&

Valiverronen (2001) examined media coverage around a debate regarding sustainable forestry practices in Finland. He identified seven roles for scientists:

Roles Functions

Popularizer Presenting new research results

Interpreter Interpreting new phenomena and problems

Advisor/Advocate Making and commenting on policy claims

Promoter Raising funds or promoting research

Manager Rendering account for use of public funds

Critic Commenting on research results

In a broad sense, scientists who serve in any of these roles could be called scientist-activists. Each role requires the scientist to step out of their narrow research-oriented frame and the comfort of the traditional culture of science to engage in greater society. However, Valiverronen’s functional categories – developed on the basis of a single-issue case study – restrict the range of scientist-activism. Many scientists have stepped beyond specific scientific issues to influence broader policy and issue arenas, for example social and environmental justice, peace work, and politics.

The authors generate knowledge claims based on a review of the literature on genomic and phenomic differences between humans and non-human hominids (NHH, esp. chimpanzees), and essentially ask the question, can the phenotypic differences be explained by genetic differences?

After a survey of the (generally inconclusive) scientific evidence of scarce genetic differences between humans and NHH, the authors make a case for influence of culture and behavior on the human phenome. They argue that Baldwinian evolution (where learned behaviors become hard-wired in the genes over time) and Wallace's conundrum (regarding the problem of adaptations that only become advantageous under future conditions) should be considered as we try to link genome-phenome information.

One more note -- twice in the article, the authors lament a "recent" National Institutes of Health ruling that will end captive breeding of NHH. They contest the decision on the basis that "studies that can be ethically done in humans can also be done in other hominids, of course with appropriate mechanisms for protection of individual rights and dignity." This more-than-an-aside points to another potential area of research(!)

Wailoo, Keith. 1997a. "'Chlorosis' remembered: Disease and the Moral Management of American Women." in *Drawing blood: technology and disease identity in twentieth-century America*. Baltimore: Johns Hopkins University Press.

In this chapter, Wailoo examines the relationship between technology and disease and the ways that technology can change understandings of disease. By examining chlorosis, w women's disease characterized by "poor appetite, gastric disturbance, and faint green pallor" (17) between 1880 and 1910. Explanations of chlorosis changed during this period. Initially it was thought to result for late marriage and later from overwork or being over educated. At this time, Wailoo argues, "institutionalized moral management" was the realm of the doctor, who might tell a patient when and what to eat. New technologies in hematology (hemoglobinometers and hemacytometers) made it possible to replace chlorisis with "more precise categories of blood diseases". There continued to be debates among doctors about whether what was seen in the blood with these instruments were symptoms of the disease or the disease itself. This tension also involved questions about the role of the doctor, as "moral guide" or "clinical manager". Similarly debates about the cause of the disappearance of chlorosis, some attributing it to the end of the Victorian society (which involved hardship and constraints for women) while others attributed it to new technology.

In the 1940s, drug companies became more influential in influencing medicine and iron pills, which were widely prescribed, replaced the diagnostic tools used previously. Wailoo states, "iron deficiency became characterized as an elemental fact of womanhood" (41). Medical writings continue to portray women as naturally limited, particularly after puberty. Wailoo argues that "the identify of chlorosis had also become closely bound to the attitudes of the modern hematologist and his use of iron to paint a deterministic, but culturally compelling, portrait of physiological womanhood" (43). He describes this as an interaction between "technologies, gender ideals, and a changing culture of medicine" (44). The use of one technology over another, he argues, is a result of this interaction between "broader assumptions about professional identity, patients' identity, and the nature and location of disease" (45).

Wailoo, Keith. 1997b. "Detecting 'Negro Blood': Black and White Identities and the Reconstruction of Sickle Cell Anemia." Pp. 134-161 in *Drawing Blood: Technology and Disease Identify in Twentieth-Century America*. Baltimore: Johns Hopkins University Press.

This chapter examines the particular configuration of new technologies and social forces that shaped the identity of the “disease of ‘Negro blood’ (today called sickle cell anemia). The concept of blood, Wailoo argues served a similar function that genes serve today in that it captured ideas about heredity and kinship. There are two identities for sickle cell anemia that arose in the twentieth century: the Mendelian thesis (pre-WWII) and the molecular thesis (post-WWII). These two theories are closely linked to the technologies used to diagnose the disease as well as the historical time period of the diagnosis. The diagnosis using Emmel’s technique captured carriers of the trait as well as those with the disease without distinguishing between the two. Diagnosis of the disease occurred independently of the clinical profile, whether patient showed symptoms of the disease. This understanding of the inheritability of sickle cell anemia was used to encourage fears about miscegenation and concerns about the productivity of workers.

Wailoo, Keith. 2001. Dying in the City of the Blues: sickle cell anemia and the politics of race and health. Chapel Hill: University of North Carolina Press.

In this book, Wailoo traces the history of sickle cell anemia through the scientists that studied the condition, political and social groups that spoke publicly about the disease, and the flow of medical research funding to study the illness. This historical analysis seeks to explain how sickle cell anemia went from being an invisible to highly politicized disease. As Wailoo notes in the introduction, this study is unique in that it focuses not on the medicine or “features” of a disease, but rather on the patient experience of disease. Wailoo places medical and “scientific” changes in understandings of sickle cell anemia within the economic, political, and racial climate of the 19th and 20th centuries. Wailoo’s site of historical analysis is Memphis, Tennessee, the location of the first sickle cell clinic, using primarily accounts from scientists, politicians, activists, and others that lived or frequented through Memphis. An important concept in this book is the “comodification” of disease. Wailoo uses the term commodity to demonstrate how disease is part of an exchange relationship “where disease concept and illness experience acquired value and could leverage resources, money, or social concessions” (9) . Part of this concept involves the value of the sick body for the economy as in the case of African Americans under slavery and for the instruction of medicine in the 19th and increasingly 20th century. He argues that at different points in history and for different actors, sickle cell anemia had varying exchange value. This concept of comodification allows us to think about the ways that health care institutions and clinical research are implicated in broader economic and political systems. This book is an excellent site to begin examining the contingency of disease.

Washington, H. (2006). *Medical Apartheid.* New York: Harlem Moon.
[scientific_racism]

Harriet Washington's book *Medical Apartheid* explores the intersection between race, social justice and medical/scientific studies. Washington begins by exploring the Tuskegee Syphilis Study, a 40 year long public health project that studied but did not treat Black men with syphilis. Washington argues that while this study might be the most infamous it was hardly the first or even most inhumane abuse of Black men and women by the medical community. She cites other examples such as the testing of small pox vaccines on Blacks, the use of Black prisoners as test subjects, and the current global exploitation of Black bodies in Africa as test subject for pharmaceutical companies. Washington also examines the use of Black men and women in the development of genetic science. She states that federal and state forensic DNA databases contain a disproportionate number of samples from African Americans. Since genetic samples carry information about a subject's health making blacks particularly vulnerable to the exposure of sensitive medical information. Washington concludes that while the experimentation on Black bodies is less invasive, the exploitation of Black men and women still continues today in the name of science and medical development. [HER]

WHO is the directing and coordinating authority for health within the United Nations system. It is responsible for providing leadership on global health matters, shaping the health research agenda, setting norms and standards, articulating evidence-based policy options, providing technical support to countries and monitoring and assessing health trends.
In the 21st century, health is a shared responsibility, involving equitable access to essential care and collective defence against transnational threats.

Welborn,V & Kanar, B (2000) Building Science Literacy. Accessed on February 4, 2008 at http://www.library.ucsb.edu/istl/00-winter/article2.html

This piece provides and overview of literature related to science literacy as a guide in building solid scientific resource for a science-based website. Working from concepts of information literacy discussed by Shapiro and Hughes (1996), the article proposes that science literacy should include these dimensions with respect to science information - tool literacy, resource literacy, social-structural literacy, research literacy, publishing literacy, emerging technology literacy, and critical literacy. The author then focuses specifically on the first three dimensions (tool, resource and social-structural literacy) to show how a specific web resources for a specific science topic might be assessed.

[annotated by FMS]

Wertheim, Margaret. "The Way of Logic." *New Scientist* 148 (December 2, 1995) 38-41.

This article is a brief summary of the research thrust of Helen Verran, an Australian researcher of the Yolgnu people of northern Australia. Verran has also been inducted into the Yolgnu tribe and charged with sharing their system of knowledge with the non-Aboriginal world. According to this article, Verran's research demonstrates not just the epistemological framework of the Yolgnu but how that framework is also consistently logical, as logical as any Western scientific view. To demonstrate this, Verran compares the number system with the Yolgnu kinship system, explaining how the kinship system can be used to explain relationships of the natural world just like mathematics can. The purpose Verran's reseach is to see "the world through different eyes, she says, [so that she] can help [non-Yolgnu] see more clearly how [their] own science was constructed.

Winner, L. (1986). Do artifacts have politics? *The whale and the reactor: A search for limits in an age of high technology.* Chicago: University of Chicago Press, 19-39. Retrieved February 20, 2009 from http://74.125.45.132/search?q=cache:pLV9pfQyzuAJ:zaphod.mindlab.umd.edu/docSeminar/pdfs/Winner.pdf+do+artifacts+have+politics&cd=1&hl=en&ct=clnk&gl=us
[technical_politics]

This chapter from Winner's 1986 book, *The Whale and the Reactor: A Search for Limits in an Age of High Technology*, questions if technical objects embody political properties. Winner suggests that, without mystifying human artifacts, it is necessary to recognize the ways in which technology both shape social and economic agendas and at the same time are shaped by these same forces.

To examine this issue, Winner begins by looking at the design of bridges in Long Island, New York. Winner found the design of these bridges produced a very political social effect; the height of the overpasses made public transit on these roads nearly impossible. Therefore, racial minorities and low-income populations, who typically used public transportation, were kept off the roads.

Winner cites the atom bomb as the most obvious example of a human artifact with an embodied political agenda. He describes the bomb as authoritarian and independent. He concludes that the social structures that maintain this political technology must find ways to manage it since the bomb has a character independent of its rulers.

It is no surprise that Winner concludes that some technical systems are intertwined in conditions of politics. Furthermore, he argues, based on the examples presented in the chapter, that a number of technical artifacts embody political properties that shape the social and economic systems of an era. [HER]

Zimmermann, B. (2005). Technology is culture: two paradigms. *Leonardo Music Journal, 15,* 53-57. [musical_technology, technology_and_culture]

Zimmermann's study of musical technology in China between 2001 and 2004 is an excellent example of the infusion of science, culture and the arts. Through this article, the reader can see the ways in which science, technology, nation and even gender are always intersecting with the creation of popular and art music. While the author focuses his study on accumulation of decisions and struggles against difference, Zimmermann's article also proposes key themes in understanding the strong connection between the arts and sciences. (HER)

Assignment Checklist

(for Gender, Race, and the Complexities of Science and Technology)

Assignment	Date submitted	Date OK received
1. Use KAQ to identify questions for further inquiry		
2. work-in-progress presentation for case 2 (replacing original assignment)		
3. Presentation of Resource Guides for Teaching/Engaging Others to Interpret the Cultural Dimensions of Science		
4. Resource Guides for Teaching/Engaging Others to Interpret the Cultural Dimensions of Science		
5. Initial KAQs on case 2, posted on the wiki		
6. Presentations to the GCWS Panel		
7. Product from case 2		
8. Presentation from case 3		
9. Product (guide) from case 3		
10. Presentation of drafts of grant proposals, teaching cases, syllabi, curriculum units		
11. Draft report on product		
12. course projects revised in response to comments on drafts		
Participation Items		
a. Participation in class meetings based on Preparation between classes (=13 items)	number =	
b. Annotated reference or resource (=person, organization...) added to the evolving wiki bibliography (each week exc. 1 & 13)	number =	
c. Email contribution to discussion on the course email listserv or email exchange with the instructors (at least 5 weeks)	number =	
d. In-person or phone conference before session 5	date =	
d. In-person or phone conference before session 11	date =	
e. Work with another student commenting on each other's final project report	other student =	
f. Assignment checklist kept up to date and submitted in week 11 or 12.	date reviewed =	

Sally's Final Project: The Case(s) of the Independent Power Projects

<u>IPP Evolving Resources</u> Please Note: **I may not have mentioned it, but, as these sites suggest, I am primarily interested and concerned with the Run-of-River IPP projects, the hydro ones. Not the wind energy or geo-thermal ones (haven't looked into them and haven't heard much of an outcry).**

1.
http://www.ippbc.com/ The Independent Power Producers Association of BC

This is the website of IPP industry members. Personally, I would check out "Quick Facts" and "Members in the News" (contains articles of minor and major players, including local businesses and corporations like GE) in the Industry News tab. I would also look into seeing what it takes to join the association in order to get privileges to all of the site. Other points of interest, for me at least, are all the articles and attention on the site devoted to trying to subdue fears of the public. For me, that means that the public is doing a pretty good job of being heard.

2.
http://www.bc-creeks.org/index.php/ category/third-party-articles/ Scroll to video "Jack Woodward on Tsilhqot'in Nation" (June 12, 2008); other resources are also on this page.

I have found this video to be the best and most condensed introduction to many First Nations issues in British Columbia, including history, politics, law and civil rights. The speaker (a lawyer) is primarily reflecting on one recent case and how it will play a large role in the future of IPP's in the province. I found the video strangely riveting and informative. As a warning, though: it is a video of one guy speaking to a camera for about 45 minutes.

3.
http://www.ippwatch.info/w/
Contains a VERY brief history of the hydro industry in British Columbi, but it has good maps, statistics of active and licensed IPP's and other resources.

What I found most informative was, under Resources, the "Integrated Land Management Bureau" (Resource List); "Political Contributors Search List" (Political Resources); "Private Power Producers".

4.
http://www.citizensforpublicpower.ca/issues/water Another citizens group site containing valuable resources. The article on this page is a good summary of the issue. Specific attention should be made of the Ashlu Project in the Squamish-Lilloet Regional District. A quick online search of the controversial Bill 30 for British Columbia will elaborate on this issue.

The documentary at the end of this article "49 Megawatts" is an impassioned plea by a local guy at a citizens' meeting for the public to take a stand. The resources site on this website is also useful, especially the "Fact Sheet".

5.
http:// www.bc-creeks.org/index.php/tla-o-qui-aht-plan-green-power-project/#more-159
An example of a First Nations community initiating a small IPP in their territory.

Many other articles on this site as well.

6.
http://www.youtube.com/watch?v=WPtddgUqr4o&feature=related

http://www.youtube.com/watch?v=brHBeFb3qw0
If you want more aesthetic, personal, and shorter videos to watch, here's tow of the many youtube videos made my local kayakers, regarding the ashlu dam / Bill 30 issue. Approximately 5 minutes each. I recommend the first one.

http://www.youtube.com/watch?v=PTAdhi3wcsM&feature=related
you can compare these with this youtube video of plutonic power which has entered into a 50-50 profit sharing agreement with GE for the IPP Run-of-Rivers (so I just read)

Introduction to the Case:

The purpose of this case is threefold: 1) To try out developing my own case for a class! 2) To engage others with an issue I am working on and would like to become more involved with. By introducing it to the class I can hopefully receive feedback, alternative viewpoints, fresh ideas, etc. And 3) To experiment with a tool for research that was introduced to me in another class of mine.

During my half-class session I will give a brief, maybe 15-20 minute introduction to the topic of IPP's in British Columbia from my own perspective. I would like to, however, if classmates and instructors have time, ask each individual to look at a few of the websites listed above in the week leading up to my presentation in order to become familiar with some of the issues, background of hydro in BC, community groups involved, environmental concerns, etc. If there was time for exploring only one site, I would recommend the video by Jack Woodward. Having a bit of familiarity with any aspect of the IPP's, though, will enable better participation, I think, during the presentation-session.

This is the research tool I would like to explore with the class, in abbreviated form. It was developed by Seward Hiltner, a practical/pastoral theologian, as a way to explore and construct theology with experience as the foundation rather than a pre-determined message as the foundation. As my professor introduced it, there are five main steps involved:
1) Determine an issue to be researched/explored
2) Acknowledge and/or write down your own personal pre-judgments regarding the issue or familiarity with the issue that you may already have.
3) Interview someone else who is involved with the issue under different circumstances than yourself or who as familiarity with a different aspect of the issue.
4) Explore, read, and become informed with the written material or other resources pertaining to the issue.
5) Respond to the material which you have researched, but direct your response (written or in person) to the person you initially interviewed.

Admittedly, this method was constructed with issues other than "Independent Power Projects" in mind. For example, the issue that was raised as an example in class was "Feminism in Theology and the Church". We lay out our pre-judgments. Interviews, then, could be anyone from a male parent to a grandmother to a pastor (male or female) to someone not involved with theology at all, etc. The next step would be to maybe research the history or the philosophy of feminist theology and then formulate a response to the interviewee based on the research. The point of the research tool is to try to think from another person's perspective and to recognize one's own context, which I think is appropriate for any issue.

For the purposes of this case, I would like to try out this research tool but in abbreviated form (I don't expect everyone to find people to interview or to research the matter in depth on their own!). What I would like is for us all to familiarize ourselves with the topic a little bit. Then, in class, we can "interview" eachother. This will not only allow us all to learn about other things we may not have been attuned to, but it will help us communicate what we each learned or were confused about. I believe we did something very similar to this in our first class. This step will also help me identify the aspects of IPP's that are either most confusing or easiest to identify with, which will be helpful for me as I keep thinking about the project. The next step is a little tougher to do in the context of one class. But if we thought of the first steps as a rough, but structured, version of K's and Q's, this next step would be something like the actions; and I think that it is these responses that may be most helpful for me personally, as I think about this issue even after our course is done. My proposal for this step would be one of two things: 1) each of us go back to a section of a website that we previously read and then tell the class about it, but explain it from the perspective of the person you interviewed. 2) Recommend a future action that you think could be taken based on what you read or based on what you think was not addressed. I will, of course, participate in all these steps as well, and people are welcome to pass on any recommendations or questions to me!

CASE 2

Marxism and Science
K: Werskey is interested in social equality (Marxism) and science.
A: These may be meaningfully combined, as in his paper.
Q: Are these goals independent or is there some way that they contribute to each other?
F: Investigate the purported relationship between Marxism and science.

Capitalism and Science
K: Werskey stipulates that capitalism has detrimental effects, presumably for science.
A: If this is true, these effects should be countered wherever and however possible, so long as we are dedicated to science.
Q: What reasons do we have to think capitalism is either bad for science or independently bad?
F: Investigate criticisms of capitalism and their claims concerning the necessary relation between open economy and science.

History and Science
K: Werskey is concerned with the effect of political history on science and thinks it is necessary for scientists to keep an eye to history.
A: If this were correct, we should investigate the specific relationship and be mindful of it to the degree it has affect.
Q: Is the political history merely practically important or should it inform how science itself ought to be practiced?
F: Investigate the relationship between history and science by looking at the relationship between society and science, in general, and then looking at this aspect of the relationship, in particular.

Resources to read:
Marxism as Pseudo-Science
www.reasonpapers.com/pdf/12/rp_12_3.pdf

Scientific Progress
http://plato.stanford.edu/entries/scientific-progress/

Science versus Capitalism
http://www.greenleft.org.au/1997/301/15267

The Commercialization of Science and the Response of STS (in book)
Philip Mirowski and Esther-Mirjam Sent

Science, Technology, and Social Movements (in book)
David Hess, Steve Breyman, Nancy Campbell, and Brian Martin

CASE 1

K1. DH uses controversial statements to generate connections between the subjects and the general theme of her talk. (For example, Sugito's love for Birute Galdikas was oedipal, she says, though accounts of their connection only suggest a maternal love and a child-like jealousy in the part of Sugito. See http://books.google.com/ books?id=DOsIGAljuGsC& printsec=frontcover#PPA34,M1)

Q1. Why does DH use these controversial statements rather than offering the reported facts of the case?

K2. Many of DH's controversial claims revolve around sex. (JG is "virginal," orbits are "phallic," etc.)
Q2. Why is DH particularly interested in presenting science in a sexual way when it is not clearly sexed?----

K3. DH uses video to reinforce her claims. (For example, there is the video of the gorilla changing into the man at the beginning, the video of the gorilla crying like an infant, and the image of the person in a gorilla costume rotating the image around the cameraman to show that the image with Koko need not have been controlled by her, the video of Michael? being captured in the jungle)
Q3. Why does DH use video and other imagery to make her points, instead of simply stating them?----

K4. DH repeats herself on some seemingly important phrases. ("What gets to count as nature, for whom, and when, and how much does it cost..." is repeated twice and then the end is repeated several times. Also, Koko as universal man is repeated 4 times.)
Q4. Why use repetition for certain phrases rather than drawing attention to them in other ways?----

K5. DH uses what seem to be distractors. (Person in underwear, eating of cake, looped wires, etc.)
Q5. Why does DH think that these distractors will help her project?----

K6. DH uses terminology that is not defined. (Universal man, etc.)
Q6. Why does DH use words that could be misinterpreted by her audience?----

K7. DH seems to explicitly call on our intelligence, not emotions, to look at these cases. ("Do you know where your brain is at 8:30 in the morning?")
Q7. Why does DH make use of emotional salience, rather than reason, to make her points?----

K8. DH is adding her voice as a critic of certain practices by science. (Image of Michael? being captured, talk about Nestle, talk about Jane Goodall, emphasis on cost of science, etc.)
Q8. What does tacitly voicing ones opinion on science have to do with engaging in scientific criticism?

PT's response 2/2/09

What you call "controversial" is what DH would call an interpretation. Q1 could be read: Why does DH offer interpretations of science rather than the reported results (aka facts)? This question could be investigated by reading her written work, especially the introduction to the text that covers the primate material in the video, Primate Visions.
Q1 could also be read as implying a K of your own: K9. People who speak about science have more influence if they stick with the reported results. -> Q9. For which audiences in which situations and for what kind of influence is this so? Or Q9b. What audiences find cultural interpretations more influential than reported facts?
Ditto for Qs 2, 3, 3, 5.
Q9b could be investigated in a short period -- see Chapter 2 of McNeil; Q9 is a bigger project than you could do in 10 days.

A possible answer to Q6 is that DH wants you to ask what "universal man" talk is all about if you don't know -> Q6a. What audiences at that time were thinking about "universal man" and what did it mean for them? and Q6b. What preparation is needed to shift an audience from "I want terms defined" to "If a speaker emphasizes a term, it must be important to her and so if I don't know what it means I'll ask?" Q6 could be investigated in 10 days; Q6b is worth keeping in ind, but seems a longer-term project.

If I had to choose between investigating Q9b or Q6, I might do Q9b because the case asks for Resource Guides for teaching/engaging others to interpret the cultural dimensions of science, not for Resource Guides for teaching/engaging others to understand Haraways' interpretation of the cultural dimensions of National Geographic on primates. However, your "First Thoughts" below indicate that you have gone beyond these KQs and are learning about Haraway's method in contrast to the methods of others. A succinct Resource Guide on that would be valuable, I think.

First Thoughts:

I note that many of these points concern D.H.'s style as including many mediums and progressing "non-linearly." I am especially interested in the absence of "straight talk." I found the following written about D.H.'s method:

http://www.stumptuous.com/comps/olsonhirsch.html
In Haraway's model, new forms of narrative do not simply subsume the old, but "widen the number and kinds of stories that get told and the actors who tell them."(p.47) However, Haraway is careful to note that while she also is interested in producing situated knowledges, her project is much more postmodern than that of Hartsock and Harding. She is concerned that the standpoint remain dynamic, always remain in process of constant negotiation, rather than "mistaking these irreducible narrative and generic immersions for the thing itself; the thing I'm against is a kind of idolatry that mistakes the sign for the thing."

These quotes suggest that Haraway is using this seemingly haphazard method in a purposeful way, perhaps because of a belief that a linear method would be "mistaking the sign for the thing." That is, she seems to want to point to meaning as it cannot be explicitly stated without error.

A second source that I will be looking into is:

http://plato.stanford.edu/entries/feminism-epistemology/
This resource seems to show that Haraway is part of a general movement in epistemology that is informing her method.

Finally, I plan to read the Cyborg Manifesto:
http://www.stanford.edu/dept/HPS/Haraway/CyborgManifesto.html
and notes on it:
http://www.stumptuous.com/comps/cyborg.html

Case 1 Inquiries: What can we learn from the Haraway/Paper Tiger video about ways to teach/engage others to interpret the cultural dimensions of science?

K/Q re: Donna Haraway/Paper Tiger production
K: Haraway attributes specific social commentary (e.g., depicting "Universal Man") to National Geographic magazine covers. (pad)
Q1: What are NatGeo's editors' objectives in featuring Koko and Jane Goodall on the cover? Are they unwitting cultural messengers, merely reporters on contemporary advances in natural science, or deliberate commentators on colonialism and the blurred lines between human and animal? (pad)

K: Haraway compares lines of inquiry to a tangled ball of yarn. (pad)
Q2: How did/does she decide which string to pull on first, or last? (pad)

K: Haraway states her own assertions as fact, rather than suggested interpretations. (pad)
Q3: Does repeating an assertion make it fact? How much can/should we allow audiences/readers to draw their own conclusions? How can we assist in that process? (pad)
K: Haraway employs performance-art sensibility to illustrate and underscore her points.
Q4: Who is Haraway's audience? How does one choose an audience for a specific inquiry? What do we gain by talking solely to fellow academics? (pad)
Q5: Might performance or other types of art be a effective medium for communicating science criticism? Could it open the discussion to more people/different audiences? Are there artists addressing gender & race issues related to the practice of science and the real-world scientific process (i.e., the scientific process as it really is, not the stepwise theory-test-results process taught in textbooks)? (pad)

K: Haraway states that zoos can only keep endangered animals if they arrange for them to reproduce... this means that reproductive politics, conservation politics, and human politics enter the stage for Koko and Penny Patterson. (pad)
Q6: What is the history on this policy? How does this policy apply to aquariums (guess why I care...)?
Q7: Can we ever separate politics from science? What is the best way to identify/highlight the interplay of politics in science?

Inquiries in process
Q5 Art performance/installation as a means for engaging women in science criticism. Bundle this with **Q3**, Facilitating critical thinking processes -- as opposed to bestowing fact. See inquiry/guidebook in process.

Resources include:
Critical Art Ensemble : 2002publication; youtube video "chickenflu opera," in which people are confronted with a video of a chicken processing plant and an (edited) chicken chorus as they walk down an Avignon, France street.
Office of Experiments: experimenting with ourselves
Installation art has been used to illustrate scientific principles, invite participation (e.g., Marta Lyall's work): see Lyall's wrlds: a for-profit that construct real-world objects based on online social exchanges which in turn are based on complex fields of study -- currently financial markets. This model could be adapted for an investigation of the scientific process, and perhaps the "unruly complexities" that P. Taylor writes about.
Science cafés as a means for bringing science to the audience
Similarly, dance has been employed to convey science content (e.g., Capacitor, based in San Francisco).

Q2 choosing the first, next, last string to pull.

K. Haraway states, "The words we just heard ('I'm animal-gorilla') were spoken by the gorilla Koko to the human being Penny Patterson." (HER)
[THIS LED ME TO CONSIDER]
K. "Spoken" implies phonetic formation of vowels and consonants in combinations that have representative meaning for a group of people. (HER)
[THEN I ASKED THE QUESTION]
Q. Why does Haraway use the word "spoken" when Koko communicates through sign language? (HER)
[WHICH LED TO ANOTHER QUESTION]
Q. Is she implying that "spoken" has a wider meaning than the conventional use of the word? (HER)
[TO WHICH I DETERMINED]
K. Sign language does communicate meaning. (HER)

K. Haraway uses the simile of tangled balls of yarn to examine the world. (HER)
[LEADING TO]
Q. What is the benefit of using similes and metaphors to explore the relationships between culture and science (nature)? (HER)
[AND THEN]
Q. Are there any drawbacks to this "expressive" understanding of science, nature and technology? (HER)
[AND]
Q. If science is interpretative through the lens suggested by Haraway, do findings become less "scientific?" (HER)
[AS WELL AS]
Q. How does this relate to feminist theories that suggest science and technology are gendered? (HER)

K. Haraway states, "What gets to count as nature for whom and when? And how much it costs to produce nature at a particular point in history, for a particular group of people." Then the phrase "for a particular group of people" is repeated over and over again. (HER)
[THIS MADE ME QUESTION]
Q. Who are the implied "particular group of people?" (HER)
[AND]
Q. Are these people the public, the learners, the scientists, the funders? (HER)
[AT THIS POINT I CONSIDERED THIS NOTE I TOOK WHILE WATCHING THE VIDEO IN CLASS]
K. Haraway mentions funding later when describing sponsorship by Gulf Oil of Jane Godall's research. (HER)
[LEADING ME TO QUESTION]
Q. How do corporate influences influence science? (HER)
[AND CONNECT THIS QUESTION TO]
K. Haraway mentions the boycott of Pepperidge Farm layer cakes and the Nestle scandal as she makes another simile to examine layers of meaning. (HER)
[QUESTIONING]
Q. What is the significance of comments that comes off as almost being mentioned in passing? (HER)
[I ALSO CONSIDERED]
Q. Is she making a reference to the impact of corporations in all areas of life, health and science? (HER)

K. Haraway speaks about cutting into history and unpacking the layers of meaning. (HER)
[THIS WAS SOMEWHAT RELATED TO THE LAST SECTION AND MADE ME CONSIDER]
Q. Could these layers of meaning include the influence of corporations, capitalism, colonization, and/or decolonization? (HER)
[AGAIN I NOTICED THAT I HAD MADE A NOTE OF THE FOLLOWING POINT]
K. This point is brought up later as Haraway speaks of the historical events that took place at the time

of Jane Goodall's research with National Geographic. (HER)
[THEREFORE I QUESTIONED]
Q. Do these layers impact who develops science and technology and for whom this science is developed? (HER)
[AND]
Q. Does this help us reflect what the real aims of science and technology are in our society? (HER)

FUTURE INQUIRY
My K&Q created four sections of thought that I want to examine more closely. The first and second sections are related to the use of semantics in scientific research, inquiry, and presentations. Haraway uses unconventional language (as well as images, sound effects, etc.) in her piece. Felicia's link, The Role of Language in Science- Alan Ford & F.David Peat http://www.fdavidpeat.com/bibliography/essays/lang.htm, will be very helpful in exploring this issue.

The third section is an outgrowth of the final question in section two. Haraway continues to remind the viewer of "a particular group of people." This statement appears to be central to our course. Our course description states, "What can we learn about science and technology—and what can we do with that knowledge? Who are 'we' in these questions?—whose knowledge and expertise gets made into public policy, new medicines, topics of cultural and political discourse, science education, and so on?" Corporate involvement often makes me question WHOSE interests are being represented? Those living at the very top of the social hierarchy? White, upper class, heterosexual men? And yet at the same time, corporate funding is essential to many major scientific projects.

The final section is related to section three in that I wish to continue to explore the idea of "who." Here I expand on section three using Haraway's discussion of the impact of historical events and the influence of capitalism, colonization and decolonization. These events can all impact a society's culture and therefore the science and technology produced by a culture.

RESOURCES (I plan to add more as I explore these issues prior to our class Thursday)
There is a good chapter in our course text that relates to gender in sciene. H. Etzkowitz et. al. "The Coming of Gender Revolution in Science." In Hackett, E., O. Amsterdamska, et al., Eds. (2008). The Handbook of Science and Technology Studies, pp. 403-428. Cambridge, MA, MIT Press.

With regard to the intersections of science, technology, capitalism and corporations I found the following transcription of Stuart Parkinson's speech on corporate influences on science and technology. Parkinson, S. (2004). Corporate Influence on Science and Technology: Speech. Retrieved on February 2, 2009 from http://www.sgr.org.uk/SciencePolicy/SpeechGreenParty004.htm

Peter suggested following link, http://www.rpi.edu/~akeraa/Akera_projects.html, which helped me explore science and technology both in terms of "layers" and as "tangled balls of yarn."

2/5/09
Here is a more evolved syntheses of my inquires.

Donna Haraway's video on the cultural analysis of National Geographic's coverage of primates stimulate a number of questions related to who develops science and technology, in the interest of whom are these developments designed and how these hidden agendas impact science and technology within any society. Haraway's unconventional production uses language, visual images, sound effects, similes, and metaphors to explore themes and problematic issues that are not yet part of popular discourse and typically not addressed in popular scientific periodicals.

Initially, I translated my reactions to the Haraway/Paper Tiger video into a series of inquires that created four basic themes. The first was related to the use of semantics in scientific research, inquiry, and presentations. I questioned why Haraway moved away from the traditional discourse and jargon used in academia and science based communities. The second section of my inquires focused on Haraway's use of similes and metaphors. I questioned how effective they would be in a cultural of science and technology. I questioned if Haraway's method made her arguments compelling and understanding to a broad audience. The third theme that sparked my interest questioned the "for whom" that exists within scientific research. I believe this is a foundational issue within the cultural analysis of science. I wanted to explore who benefited from science "as is" and how a cultural analysis of science would shatter the illusions presented by these elite and empower the masses. In following this theme, my final section specifically focused on the impact of capitalism, corporate sponsorship, colonization and historical events on the development of science and technology.

My inquires appeared to be very broad questions, and therefore I questioned how I would be able to incorporate them into a Resource Guide. However, after contemplating this problem I realized that I could fuse the four themes together if I changed the order in which I presented them.

First I should present the illusion of science in contemporary Western societies; a seemingly objective field that in reality is often shaped by the interest of capitalism. Of course, this is one of the goals of Donna Haraway. Looking at the history of the institution can also give us an understanding of the importance of this relationship between science and capitalism. Iwan Rhys Morus explores this historical connection in the article Manufacturing Nature: Science, Technology and Victorian Consumer Culture, Morus, I. R. (1996). Manufacturing nature: Science, technology and Victorian consumer culture. The British Journal for the History of Science, 29(4), 403-434. In addition, I found a transcription of Stuart Parkinson's 2004 speech to the Green Party Spring Convention, http://www.sgr.org.uk/SciencePolicy/SpeechGreenParty004.htm. Parkinson's speech supported the statements of Haraway, specifically with regard to the influence of capitalism and industry on scientific research. In this respect, we can see science and technology literally caught within a web of social advancement and a Marxist notion of class oppression.

Once this is established, I could move on to examining how the elite of society have shaped the field of science. This is the section where it is important to bring in Haraway's illustration of layers and tangled balls of yarn. Peter suggested an excellent pair of flash point presentations by Atsushi Akera, http://www.rpi.edu/~akeraa/Akera_projects.html, that present many intersecting and building elements in this complex matrix.

After the foundation related to the illusion of science as an objective field is set, I would then move on to exploring new and innovative ways members of society could look at science, research and technology. This could include openly acknowledging the hidden agendas within research, the moving away from traditional elitist jargon, incorporating more performance style presentations such as Haraway's and elevating cultural analysis of science to the same level of importance as are seen in other disciplines such as art and literature. Here we can open discussions up to incorporate notions of changing systems.

Moving beyond traditional scientific research, development and presentation is not a new notion. John McHale explored the need for including qualitative research within global research in his article Science, Technology and Change. McHale, J. (1967). Science, technology and change. Annals of the American Academy of Political and Social Science, 373, 120-140. Guy Beckwith suggested the need of an interdisciplinary approach to redefine and augment traditional studies in his article Science, Technology and Society: Considerations of Method. Beckwith, G. (1989). Science, technology and society: Considerations of method. Science, Technology and Human Values, 14(4), 323-339.

The question that remains unanswered is if this new exploration of science and technology will be compelling, understandable and accepted. This is a question I have not been able to answer. I believe it will depend on how we are able to articulate the hidden complexities that exist within the scientific field today. In addition, we will need to open ourselves, as a society, to new ideas and means of expression.

As a teaching tool, I would like to present a visual diagram illustrating not only the complexities within science (the layers and tangled balls of yarn) but also how these complexities impact the objective aim of science and how science is viewed differently by different individuals within a society.

not sure yet how i'll use this page--more to come!

Case 3
KAQ from related essays

K: Sex-based differences in gene expression.
A: Conduct gene research to find whether different gender has different gene structure and such different gene leads to certain type of disease.
Reflect on the website: Different gene test for male and female.
Q: Does the difference between genders is just the gene difference?
Q: Will such research could improve human development or enlarge gender difference?
Q: Does gene could also explain homosexuality?

K: Race difference could be proved through gene research.
A: Conduct gene research to find the difference between races.
Reflect on the website: African gene research.
Q: Does such researches is really good for human development?
Q: Under the background of globalization, whether we should emphasize the identity or difference?
Q: Whether such research may become a supporter of racism?

K: There is the existence of "common disease".
A: Conduct gene research to find whether certain gene leads to certain disease.
Reflect on the website: Their research goal.
Q: Whether such argument could be thought as a supporting evidence of racism?

Other actants: politician, racism, homoseulity people, minority and majority.

Personal genome project
http://www.personalgenomes.org/
K:
Make personal genome useful.
Personal genomes may be used to improve the understanding and management of human health and disease.
Personal genome sequences will give their owners new information about themselves to assimilate into their lives.
Participants' data used for large community research other than individually.

Event :
Help individual to gain an understanding of relevant information
Collect individual trait from online questionnaire
Get application for enrollment
Visit medical center to be interviewed by staff and submit the tissue sample
DNA sequence and other biological analysis
Add data of analysis to participant profile

Institution:
Sponsors Education and research institution
Industry

A&A:
Volunteer: share their genome sequence and many types of personal information with the research community and the general public
Researcher: doing research about understand genetics and environment's contribution. Including main founder and principal investigator, staff and affiliates, data safety monitoring boad.

decode genetics
http://www.decode.com/

K: This company affords service to improve the treatment, diagnosis and prevention of common diseases through genetic analysis.

It is commercial and the customer has to buy it. Participant's data analysis is for individual.
Event Provide genetic analysis service to customer.
Develop drug based on analysis result.

Institution
Company
Supporting organizations

Actor:
Customer
Management staff
Researchers

African DNA
http://www.africandna.com/About.aspx

K:
The goal is to determine the genome's history origin.
The genetic analysis also has cultural meaning.
The degree of records' backing availability is diverse.
There are different test for male and female.

Event
Order service
Take sample
Get data
Data analysis
Find match

Institution
Educational and research institution
Race community

Actor
Customer
Research

Situational map analysis
Nonhuman actants
Technology, funding and policy support

Socialcultural aspects
Disease, human

Idea/concept
Genetic analysis and DNA analysis

Social group
Educational institution Research institution
Commercial institution
Government
Individual

human actants
Scientists,

customers,
volunteers,
management staffs,
supporters

Collective human elements
University,
research institution,
company,
government

Implicated actants Patients,
people who care about health,
governmental officials,
scientists,
business man

Discursive constriction of nonhuman actants
Development of gene study,
technology and economy

Politic/economic elements
Country profit and economic profit

Spatial elements
The continuous need and profit Major issues Ethic, gender,
.JPG

Case 2

Social event and scientific research
K: The author lists a series social events' impact (the first world war, the second world war, etc.) on the scientific research.
A: There are many social factors work together on the scientific research. They could influence how much fund scientific research get, what issue to research, the research goal and so on.
Q: What are the present social events' influences on scientific research nowadays?
F: Investigate what scientists concerns most nowadays and relate them to the present social situation. Do a comparative study about the social event works differently on China and the western countries. (Especially the cultural revolution and the reform and open policy's impact on Chinese scientific research. And the situation of western countries' scientific research during the same period)

Class and scientific research
K: The author holds there are correlation between the capitalism and scientific research.
A: Capitalism leads to class stratification. There is also class stratification in the scientific research.
Q: How does the capitalism impact the scientific research?

Q:Whether scientific research severs to a certain class?
Q:Whether there is a certain class who could participate in the scientific research?
Q:Whether scientific research be funded only when it could make money?
F: Investigate the relationship between the class and scientific research. And try to determine the class' influence on scientific research from a series of history events. Do a comparative about the class in scientific research in China and western countries.

Gender and scientific research
K: The author points that female and male just hold a different status in the scientific research. People seem are easy to ignore female's contribution to the scientific research.
A: Male scientists occupy the dominant status in scientific research.
Q: How does this prejudice about female scientists occur?
F: Relates this issue to a sociological perspective. (I am prefer to use label theory and behavior expectation) Do a comparative study about female scientists' status. Especially the analysis of Chinese female doctor is rendered as the third gender. (Some people put forward that there are three genders nowadays: male, female and female doctor)

Politics and scientific research
K: The author emphasizes the relationship between politics and scientific research.
A: Scientific research is hard to be independent. Scientific research is conducted according to the direction of the politics.
Q: What are the impacts?
F: Investigate both the negative and positive impacts.

Equality and scientific research
K: The author emphasizes the equality of gender, class and so on.
A: People may pay more attention on this issue.
Q: How to achieve equality?
F: Try to find a balance between the gender, class and race in the scientific research. Try to figure out what is the equality of scientific research? Is it means the goal equality, participation equality or other equality?

The history of science
K: The author relates the history to scientific research.
A: It is easy for people find the issue through this way. And it is easy for people to understand.
Q: How about the science and history in China?
F: Investigate the development of Chinese modern science.

Marxism and scientific research
K: The author states his points under the influence of Marxism.
A: People concern more about the equality.
Q: How does Marxism works on Chinese scientific research?
F: China is a socialism country that is influenced a lot by Marxism. Try to find the Marxism's

influence on Chinese scientific research, except the politics, economy and society.

Case 1

My K&Q

K:

1. The cost of production of modern culture could be huge.
2. It is the science that tie gorilla to human.
3. The gorilla's social behavior could be referred as the origin and nature of human. And we also could think that it is also the origin of human language and society.
4. The sex and gender as well as the nature and culture are the boundaries of animal and human. We also could say that they are the important elements of primatology.
5. During the reproductive process, males always appear aggressive and females always appear receptive.

Q:

1. How does the science work to construct the nature of human being world?
2. How does the gender and race contribute to the construction of our society?
3. Does the gender and race have impact on the scientific research except their impact on the building of society?
4. Whether we could really refer Koko as universal man? Since it's human like behavior just as the result of repetitive training. And it may just be the reflection of the stimuli, which comes through a series of positive reinforce and negative reinforce. Just like the Skinner's experiment. Therefore, whether the methodology of the conclusion could be totally right?
5. How does the culture work on the building of nature? And what is the relationship between culture and science?

My inquiry process:

The first time I saw Haraway's video, all I could think about this video is the gorilla. I just put too much of my concentration on the gorilla's behavior. I was just so interested in the imitation's behavior and the reaction of stimuli. And I was so curious about whether the Skinner's theory could be applied on the gorilla's behavior. But I knew clearly that this video is not about the behavior research, thus I listened to the record of this video again and again and tried to get a deeper understanding.

Haraway's video could be thought as a story about the difference and common points of human nature, gender and the origin. Haraway emphasizes one question "what gets to count as nature, for whom and when, and how much it costs to produce nature at a particular moment in history for a particular group of people" in this video. I do think this is an interesting one. The human nature just goes through time and keeps stable. But there are some differences during the reproduction and transformation process. (we could see a new self sense of koko is created in the video) Now we could see the new possibilities. Then the question here could be how does this change occur and what is it's possible influence.

Another point Haraway made in her video is the capitalism's relationship with science. How does the capitalism impact the scientific research? I think it could reflect on the class differentiation in the scientific research. The connection between science and class is interacted. On the one hand, capitalism does could improve the development of science. And science also could advance the accumulation of capitalism. But what I concern is that whether capitalism also hinders science's development. In other words, whether capitalism could become a barrier to science?

Haraway just reconsiders the difference of nature-culture and gender. Human being's nature could be reconstructed as difference. And gender is not only about biological sex. It could be social and cultural. How does gender influence the scientific research? In my opinion, I would like to say it is the social exclusion and the "label" effect. The social exclusion means that it is a social energy that exclude female outside the gate of scientific research. And for the "label" effect, it means that female are always be labeled a label as less aggressive and should undertake more homework responsibilities. This phenomenon is more obvious in some Asian countries. Thus, female may just act according to their label. And the result is that they begin to stay far away from the scientific research and just keep their labeled role.

For the scientific change, the outside energy just plays an important role. The outside energy could be the social background or what we could call social influence. It is included by gender, class and race. Haraway did very good job on this point in her book primate vision. She just tells the stories about human nature in three periods. We could see these outside factors clearly both in her video and her book. But are there any other factors that also have influence on such change?

What is the cultural dimension of science? I found an interesting answer that: science as a social construct. In this meaning, it also could be thought as the outside energy of science. But whether the science has other inside energy, such as it's self.

Obviously, Haraway did a very good job about teaching others to interpret the cultural dimension of science. The metaphor method is very interesting, and also could make sense. Haraway just uses the unconventional language to give people an enough space to imagine. But for me, a non-native speaker and with totally different cultural background, I do have to spend lot time on understanding the metaphor. So, if I have to teach people who have the same background as me I would like to consider their cultural background and their language limitation. Besides, I would like to explain what is the cultural dimension and how does it works on science. I would like to give some specific examples and give concrete explanation.

Resource for inquiry:

Cartmill M. (1991). "Book review: Primate Visions" International Journal of Primatology 12(1), 75. (This article is a very good resource for you to get a general understanding about Haraway's primate vision in a short time. Even thought I think primate vision is a good book and it does worthy our time.)

Chagnon, Napoleon A. (1995). The View From The President's Window: The Academic Left and Threats to Scientific Anthropology. *Human Behavior and Evolution Society Newsletter*, 4(1). Retrieved 2002 August 31 from http://www.anth.ucsb.edu/faculty/chagnon/chagnon1995.html (This article just provides you a view about the scientific anthropology. And I do think it could help you to understand the cultural dimension of science.)

Donna Haraway. (1989). "Primate Vision". New York. (Donna Haraway just tells the stories about human nature and their changes in 3 periods. This book is very interesting. If you want to learn more about Donna Haraway's viewpoints, it would be a good choice. I do not finished it yet.)

Gender, Race, Social Class and Information Technology http://public.clunet.edu/~mklassen/GITEFinal.pdf (This article discusses how gender, race and class affect women to get access to science and technology and lead to a diversity among women.)

Hargittai, E., (2007). The social, political, economic, and cultural dimensions of search engines: An introduction. Journal of Computer-Mediated Communication, 12(3), article 1. http://jcmc.indiana.edu/vol12/issue3/hargittai.html (This article is an interesting one. And it is a specific analysis about the cultural dimension of science. The topic about the search engines seems interesting to me.)

Metter Bryld & Nina Lykke. (1999). "Cosmodolphins: feminist cultural studies of technology, animals and the sacred". New York. (I also do not finish this book yet. But I think it is a good book for your to learn the feminist cultural perspective and how does this perspective be applied in analysis.)

Pedersen, Daphne E & Minnotte, Krista Lynn (2008). "Women's work and "women's work": LDS dual-earner couples and the work-family nexus". Social Science Journal. 45(4) 594. (It is an article about women's work and gender's role.)

Rodman P.S. (1990). "Flawed vision: Deconstruction of primatology and primatologists." Current Anthropology 31(4) 484-486. (This article could help you to know more about the primatology.)

Robert Hanbury Brown (1986). "The Wisdom of Science: Its Relevance to Culture and Religion". Cambridge University. (This book emphasizes the significance of science and technology. The third chapter of this book is the cultural dimension of science. It would be very helpful for you to understand the cultural dimension of science if you read this chapter.)

Science and Technology: USA.gov: http://www.usa.gov/Citizen/Topics/Science.shtml. (It is a good web for you to get government information about the science and technology. And information here are well categorized.)

Science versus capitalism. http://www.greenleft.org.au/1997/301/15267 (This article provides you a view about the relationship between science and capitalism.)

The wiki of Science: Geert Hofstede Cultural Dimensions: http://wikiofscience.wikidot.com/science:geert-hofstede-cultural-dimensions. (It is a good place to go to learn more about the cultural influence.)

http://www.cte.usf.edu/bibs/gre/science/bib_science.html. (This website lists lot of bibliography about gender, race and ethnicity in natural and physical science.)

Graduate Consortium in Women's Studies at MIT **Course Evaluation Form**

Gender, Race, and the Complexities of Science and Technology

All evaluations are anonymous. They will be given to the instructors after they have turned in final grades. A copy will also be kept in the Consortium office files for use only by the Coordinator, Board of Directors, and MIT staff. Student evaluations are very important to the Consortium and instructors; we appreciate your thoughtful responses to the questions.

PLEASE COMPLETE THIS FORM DURING CLASS TIME AND PUT IT IN THE ENVELOPE (or email to arsutton@MIT.EDU), THEN SIGN YOUR NAME ON THE LIST. GRADES WILL NOT BE RELEASED UNTIL THE FORM IS SUBMITTED.

Part IA (designed by the course instructors)

1. Start with a self-evaluation: Did you achieve your personal goals? How would you have proceeded differently if you were doing this course again? What have been your major personal obstacles to learning more from this course?

- Yes, I did achieve my personal goals; I would put more endeavor into it next time; My pressure from my home institution was an obstacle
- Yes, I think I have learned (and begun to delve into) the STS literature. I have also learned techniques for narrowing my work and organizing readings.
- I did achieve my goals, but I wish I had more time (i.e. 40 hours/week) to go beyond them! I'm still feeling like there's lots more to read and learn in relation to my topics/inquiries
- I was unclear about my goals when I started this course, but it really was beyond any expectations. I would have had more confidence at the beginning and really had faith that I would come to an understanding of the main STS readings, theories, objectives, etc.
- 1. Yes, achieved goals; learned new pedagogy; discovered STS literature I did not know existed; and did projects that interested me. 2. Give a better introduction at the beginning of course regarding student expectations; 3. Balancing the scattered, evolving readings/projects with my 3 traditional and regimented courses.
- I definitely achieved my personal goal to explore S&T topics as they relate to policy work. Time is the only obstacle I found.
- Yes! I would also not do anything differently. I'm glad I audited the course.
- To be honest, I began the course not knowing if I had any personal goals. With that said, I achieved more than my personal goals and am now equipped with a MA thesis topic as well as the knowledge everyone else brought to the table. The biggest obstacle was myself and learning how to adapt to this mode of learning and producing but I loved it.

What have you learned about making a workshop format, PBL course stimulating and productive? What would your advice be to prospective students about how to get the most from a course like this?

- How to design and organize; at the very beginning, it is better to go with some concrete introduction about PBL
- I think the workshop is most stimulating when we engaged in exercises such as free writing. Getting the most from the course --- just delve in and try to ask questions you care about and begin to answer them. Letting go of what is extraneous is part of the process.
- I've learned that providing prompting cases/literature is a good way to spark PBL. I would say "go with it!"
- PBL courses, at least what I gather from my experience in GRST, are self-steering. I would tell prospective students that they will get what they put into the course.
- My advice would be: relax, but don't procrastinate. You'll put in more time, but the good part is, you only really have to do what you're interested in; and you'll be come interested in surprisingly new ways. PBL Course: everybody can learn something.
- Quite a lot. I want to use these formats both in academic and community-based work. My advise to prospective students would be to engage in the here and now process and don't let the course expectations get too far into the forefront.
- It's a great structure – but it's a skeleton. More work must be done design-wise to provide students with some skills.
- I would say to be open and creative as possible. I think I felt so worried about expectations that at times it stymied my output.

2. General evaluation: How did the course meet or not meet your expectations? How did your attitude to doing the course change through the semester? How do you think the course could be improved? What was special about this course (+positive & -negative)? How does it compare with other courses? What would be your overall recommendation to prospective students?

- This course provides me opportunity to do what I want to do. My attitude changed from stressful to enjoyable. Giving little lecture about the course (could help improve it.) I enjoyed the inclusive classroom, the different perspectives/backgrounds of teachers and students' participation. The course was lacking an introductory lecture. I love this course more than my other graduate courses. My other courses are all filled with lecture, lecture. This course provides chances to learn about learning and practice your own wondering.

- This course was great – very collaborative in terms of sharing work and giving feedback. My attitude changed throughout the semester in that I learned how to balance readings and developed a sense of the expectations of the course. I began to take seriously my own inquiries and interests. I think that at times presentation times were too long – it would have been better to have more shorter slivers of time to discuss our inquiry, especially the final presentations were very long. The course was very self-directed. I would say proactive students would learn a lot from taking this course – it teaches you some of the fundamentals of being in graduate school.
- The course exceeded my expectations! The first couple of cases I definitely worked beyond what I was able to sustain subsequently. Improvements? More time (as we did in the second half) for responses to fellow students' presentations and inquiries. A special + to self-directed inquiry by a collection of diverse students. A special – is that the expertise of the professors needs to be channeled more constructively. This course was comparable – on the inspiration scale – to other Critical and Creative Thinking classes I've taken, which is a good thing! I would recommend the course to others and recommend that they keep an open mind.
- This course was unbelievable! I am walking out of here with an understanding of STS, new technology skills, a <u>fantastic</u> idea for my master's thesis and a greater understanding of women and minorities who have generally been excluded from science history. As the course progressed I gained more confidence, skills, and interest in both STS and PBL. I would have liked a little more structure in the beginning. More "assigned" readings and lectures – just to get a background. The environment = +, self-steering = +, cases = +, limited group discussion = -; limited structure early on = -. Work/expectations were similar to other courses. I'd tell students to let their own experiences/interests guide them.
- Met my interests and therefore I was more interested in the work but I felt I did not have enough time to research (because of my other classes). I enjoyed the process of research and presentations more as the class went on. I was more relaxed, healthier, and learned more because I enjoyed it. I talked about this class outside of the class. The course could be improved if we had maybe one common article/book to read at the beginning of class. Or in the middle. Just a little break from cases to help shift gears smoothly. I got introduced to tons of new literature and made contact with other professors/researchers whose contact info I was given by Anne and Peter.
- The course definitely met and exceeded my expectations. I enjoyed learning more about my classmates and instructors as we progressed. (+) - the student centered approach was great and the construction of knowledge and inquiry was great; (-) – A little more interaction time between students to share feedback or in class to share reflection.
- The course was very interesting; frustrating and wonderful; lots of student culture was good; very little teacher lecture was both good and bad; student grading systems cause stress
- It exceeded my expectations. I really believe this is not just how graduate courses should be taught (which I strongly believe) but that PBL learning should begin as early as possible. I think the only downside is that I did struggle with expectations, but in a way, I think this was the point – that the professors never wanted to box us in. I loved being the producers of knowledge – not just on the typical things that grad students are doing (thesis, research projects) but in class.

3. Re-read the course description (from the syllabus). Comment on how well the goals expressed there were met and make general and specific suggestions about how these could be better met.

> What can we learn about science and technology—and what can we do with that knowledge? Who are "we" in these questions?—whose knowledge and expertise gets made into public policy, new medicines, topics of cultural and political discourse, science education, and so on? How can expertise and lay knowledge about science and technology be reconciled in a democratic society? How can we make sense of the interactions of living and non-living, humans and non-humans, individual and collectivities in the production of scientific knowledge and technologies?
> The course takes these questions as entry points into an ever-growing body of work to which feminist, anti-racist, and other critical analysts and activists have made significant contributions. The course also takes these questions as an invitation to practice challenging the barriers of expertise, gender, race, class, and place that restrict wider access to and understanding of the production of scientific knowledge and technologies. In that spirit, students participate in an innovative, problem-based learning (PBL) approach that allows them to shape their own directions of inquiry and develop their skills as investigators and prospective teachers. At the same time the PBL cases engage students' critical faculties as they learn about existing analyses of gender, race, and the complexities of science and technology, guided by individualized bibliographies co-constructed with the instructors and by the projects of the other students. Students from all fields and levels of preparation are encouraged to join the course.

- We used our inquiry to explore science and technology. We also tried to relate this scientific knowledge to our own interests and readings.
- We definitely developed our own lines of inquiry and practiced what it means to be investigators. The course was open to people of varying levels and interests without being chaotic.
- On a 1 to 5 scale: "ever growing body of work" = 4; "Practice challenging the barriers of technology = 3; Student collective participation = 2; Student individual participation = 4; "students develop their skills as investigators" (Adele Clarke's tools especially) = 4; "students develop skills as prospective teachers" = 5 (I saw the future professors get inspired!); "guided by individualized bibliographies" = 2 (More coordinated/predictable feedback and suggestions would have been helpful. Some were too late to be helpful unfortunately (for that particular case).
- I have highlighted the themes that were covered in depth during this course, however, since the course really encouraged individual inquiry, these were the themes I picked up on. Other experiences might be different.
- Answered the "we" question by talking about all the players = expert vs. lay knowledge, community members, researchers, cultures, policy makers, etc.; How can it be reconciled? We did quite a number of student-generated workshops that mentioned a reconciliation process, made maps, etc.; I read Haraway, Reardon, Werskey and more of my others and plan on reading more from the evolving bibliography when I am finished with class.
- I definitely got a good sense of STS and within a context that had relevance to my own research interests. I feel the combined interests of the class touched on many areas.
- [Regarding the question "How can we make sense of the interactions of living and non-living, humans and non-humans, individual and collectives in the production of scientific knowledge and technology?"] This is the only piece I didn't feel was truly addressed. Apart from that, I feel the course goals were addressed beautifully, especially the 'challenging the barriers' part.

Part IB (Items identified by GCWS)

4. Comment on any of the following items you have not already covered above.

Size of the class?

- I think it's good
- Small size (in the end) was nice
- Just right!
- Small, and perfect for this project.
- 8 people (we started with around 12)
- 8 persons was a good size; more than 12 or so would be too much.
- Good
- I thought it was great for our exercises.

Classroom dynamics, discussions, and interactions

- Students got involved. That's good.
- Great group, very respectful
- Energetic, diverse, and exciting dynamics. Great use of other students and professors as resources for interaction.
- All interactive with presentations approximately every three weeks. One lecture from each presenter. We had snacks too.
- Great interactions. Everyone was engaging and thoughtful.
- Pretty good
- There existed a lot of respect and encouragement among students.

Assignments, including presentations: Helpful for your learning? Number? Difficulty?

- Yes. They are very helpful for my learning. I think the number is ok. Sometimes it's our own time management issue, not the number.
- Helpful, very stressful, but a wonderful learning process. I mean learning in terms of information and critical thinking, but

also learning how to pursue questions, organize, and present information
- Yes – helpful. Number & difficulty – just right.
- Assignments and presentations were what we made of them.
- Very helpful, enjoyable. Experimented in new formats outside of traditional "papers". Did a course curriculum, an ethics guideline, a teaching methodology and a community workshop.
- Most definitely. Engaged in a deep knowledge building way
- Ok
- Very challenging, but in the absolute best way – in a way that I want to keep being challenged. It made me PASSIONATE about my work.

Instructors:
(one student responded to all: open, accessible, good and thoughtful feedback, inquiry mode extremely useful)

clarity and organization
- Very good
- Not bad.
- +
- 8.5 out of 10 (I didn't understand at the beginning of our course what was expected. After the 3rd week I did)
- Could use improvement
- This could stand to improve although I should caveat that with the fact that Peter and Anne were wonderful, I have never had professors take so much time to give me feedback and really care.

openness to a variety of approaches to the material
- Yes
- Both professors brought different approaches and different information.
- Yes indeed.
- +!!!
- 10/10
- Very good

instructors working together as a team
- Sure.
- Pretty good.
- +
- 10/10
- pretty good

interaction with students outside of class time
- I never went to any office hours so often like this course.
- Great.
- +
- 10/10
- none

feedback on assignments and presentations
- That's very helpful. Within feedback, we could know how to improve our work ourselves.
- Great.
- +
- 10/10 (Email, in class, and phone conversations. They were always available and challenged us to do better work by resubmitting projects)
- none

What (if anything) did you gain anything in this course that you would not have been able to get at your home institution?
- I intend to do my own research and involve it in the classroom. I don't feel I am an international student here. People are more nice and open.

- Openness to talking about race and gender in more complex ways. Attention to assumptions and knowledge production.

- Diversity of students, richness of resources represented by them and the instructors. Suggest the instructors connection with the home institution…

- New professors and new students
- Interaction with people from other disciplines
- Diverse students, expertise of instructors, STS topic
- Different structure and perspectives
- A thesis topic that I truly care about and the ability to seek out my own Q&As, also Peter and Anne

Would you take another consortium seminar? Why or why not?

- Sure. I'd like to take one. I'm so interested in the issue of gender and technology. It's hard for me to do this in my home institution.
- Yes, absolutely. Enjoyed meeting and working with interdisciplinary group of scholars. Professors were clearly committed to the course and topic.
- Yes! I had a great experience. Thanks for hosting, MIT!
- Yes – but you only offer one in the fall and I graduate in December.
- Yes. Let me try out communicating my interests in settings that I am not necessarily comfortable in. I also am introduced to students, professors, and material that I would not have the chance to be introduced to.
- Yes.
- Yes. Always open to my thinking. Broadened by perspective. Love it.
- Absolutely – I liked getting "outside" and specifically, I would be interested in taking a PBL.

Gender, Race, and the Complexities of Science and Technology Course evaluation
Part II (designed by course instructors)

Write out neatly a synthetic statement (1 or 2 paragraphs) evaluating this course. (You might build on/build in your comments from the other pages.) Please make comments both to help the instructors develop the course in the future and to enable some third party (e.g., GCWS or potential students) appreciate the course's strengths and weaknesses. (Imagine a reader who may not have time to wade through the items on the other pages.)

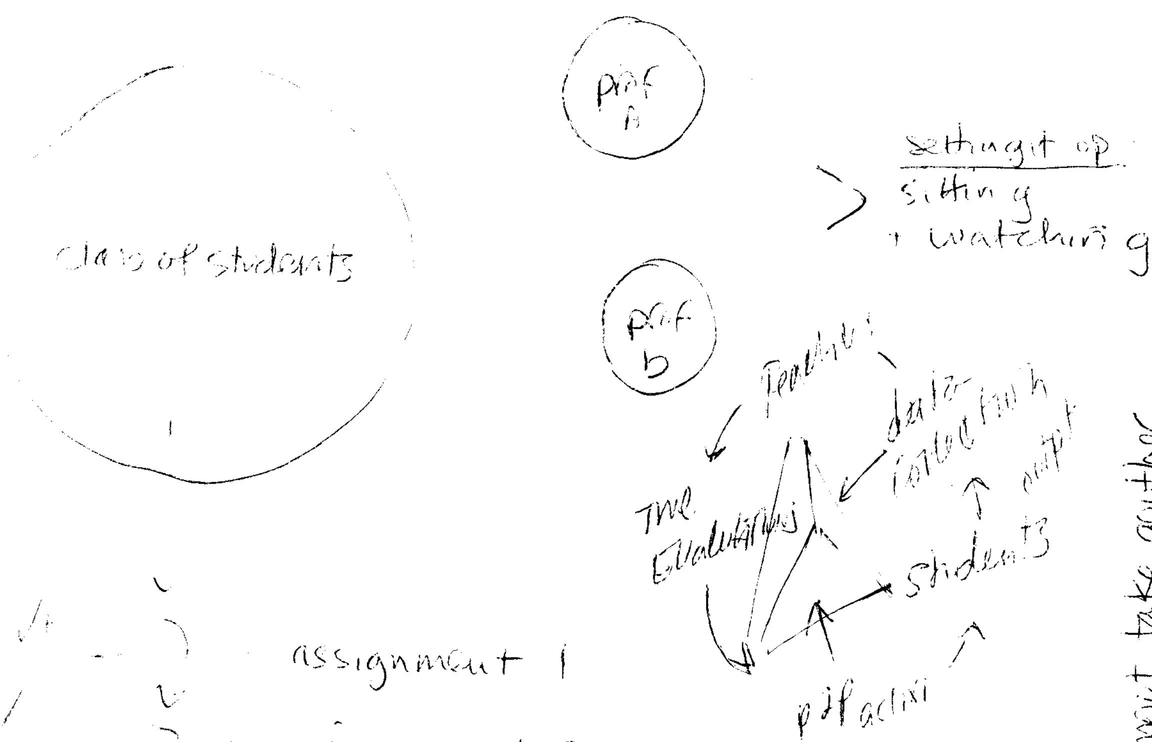
- About PBL: I do think that for STS, creativity is very important. PBL entitles students the right to create their own research without too much limitation. Students may become narrow minded, however how to balance lectures with PBL may be a good question to explore. About the class: I love this class. Presentations and discussion let everyone get the equal opportunity to participate in this class. We have diverse students in our classroom, and this is important to build an inclusive classroom. About the teaching: This course teaches students how to learn the learning and how to change what they know into what they are wondering.
- The course provided a space to think about issues both in an academic way and in an applied way. Critical questions about our social worlds were brought up. Opportunities to do work rather than just absorb information. The strengths of the course are that instructors really created a space for us to develop our own line of inquiry. This is a huge challenge – allowing yourself to follow important questions. I'm sorry I cannot write more – please see the rest of my evaluation (above)
- This course was challenging, inspiring, and fulfilling in many ways. The pedagogy, diversity of students and their strengths and interests and their professors' expertise and day-to-day support was invaluable.
- I would highly recommend GRST to any student, regardless of STS background. The self-steering nature of the course is an ideal setting for the knowledge seeking graduate student. The diversity of topics, professors, and a refreshing course made a great experience!
- I was given the space to pursue my own interests without being nervous about quality. (This allowed us to take risks!) I was introduced to research, scholars, books, materials, and ideas that I was not aware of. And this allowed me to find connections with my own innate interests. I was challenged to do better work all the time, as we were asked to do revise and resubmits. Having individualized, evolving bibliographies was the best part, and the professors worked with each of us on these throughout the week.
- Breaking apart the typical format and rhythm of most graduate learning environments is hard. Knowledge in core disciplines must be gained and "standards" of an academic profession imparted. But where is the joy and love of learning that made us all want to be students for as long as we can be? This class brings the exploration and inquiry back. It feels messy at times and frustrating and stressful, but what gets produced is amazing and deep and diverse and makes you want to know – "What's next?" Who committed to higher learning wouldn't want to participate in a course like this?
- [*This evaluation, by an auditor was a diagram (appended).]*
- During this course I have been challenged in ways that I thought were impossible, but that I had been craving in my home graduate program. People often talk about grad school being a place where you really begin to produce your own knowledge, but I had yet to do that apart from initial work I had begun (outside of classes and under no supervision) on my thesis. This class opened the door for me to be a producer and a thinker of my own knowledge that I had sought out. It has really changed me as a "student", and I'm so grateful I was given the opportunity to work with Peter and Anne to do it.

Gender, Race, and the Complexities of Science and Technology **Course evaluation**

Part II **(designed by course instructors)**

Write out neatly a synthetic statement (1 or 2 paragraphs) evaluating this course. (You might build on/build in your comments from the other pages.) Please make comments both to help the instructors develop the course in the future and to enable some third party (e.g., GCWS or potential students) appreciate the course's strengths and weaknesses. (Imagine a reader who may not have time to wade through the items on the other pages.)

without b-s-t inflations or oshmathms. I want [illegible]



assignment 1

assignment 2

assignment 3

assignment 4

TOTAL

STUDENT = GRADE AVERAGE ??

WHERE AM I ? HOW DID I GET HERE?

[illegible] this system become like this? Teachers Grading Students but Students Not Grading Teachers...

Its not prof A or prof B's fault — its a whole system that conflates learning w/ hierarchies of power. I cannot take another course ever again. I will not be graded until I can grade back. Meaningfully.

3. Re-read the course description (from the syllabus). Comment on how well the goals expressed there were met and make general and specific suggestions about how these could be better met. (1 to 5 scale)

What can we learn about science and technology—and what can we do with that knowledge? Who are "we" in these questions?—whose knowledge and expertise gets made into public policy, new medicines, topics of cultural and political discourse, science education, and so on? How can expertise and lay knowledge about science and technology be reconciled in a democratic society? How can we make sense of the interactions of living and non-living, humans and non-humans, individual and collectivities in the production of scientific knowledge and technologies?

The course takes these questions as entry points into an ever-growing body of work ++++ to which feminist, anti-racist, and other critical analysts and activists +++ have made significant contributions. The course also takes these questions as an invitation to practice challenging the barriers of expertise, gender, race, class, and place that restrict wider access to and understanding of the production of scientific knowledge and technologies. In that spirit, students participate in an innovative, problem-based learning (PBL) approach that allows them to shape their own directions of inquiry and develop their skills as investigators and prospective teachers. At the same time the PBL cases engage students' critical faculties as they learn about existing analyses of gender, race, and the complexities of science and technology, guided by individualized bibliographies co-constructed with the instructors and by the projects of the other students. Students from all fields and levels of preparation are encouraged to join the course.

collective ++

ind. ++++

+++++

++++ Adele Clarke's tools, esp.

+++++ I saw the future profs get inspired!

++ more coordinated/predictable feedback & suggestions would have been helpful. Some were too late to be helpful (for that part. case) unfortunately.

Part IB (Items identified by GCWS)

4. Comment on any of the following items you have not already covered above.

Size of the class?

just right!

Classroom dynamics, discussions, and interactions

Assignments, including presentations: Helpful for your learning? Number? Difficulty?

yes. just right

Instructors:

- clarity and organization not bad
- openness to a variety of approaches to the material yes indeed
- instructors working together as a team pretty good
- interaction with students outside of class time great
- feedback on assignments and presentations great

What (if anything) did you gain anything in this course that you would not have been able to get at your home institution?

diversity of students, richness of resources represented by them & the instructors. Suggest ↑ connection w/ the home instn...

Would you take another consortium seminar? Why or why not?

Yes! I had a great experience.

Thanks for hosting, MIT!

3. Re-read the course description (from the syllabus). Comment on how well the goals expressed there were met and make general and specific suggestions about how these could be better met.

What can we learn about science and technology—and what can we do with that knowledge? Who are "we" in these questions?—whose knowledge and expertise gets made into public policy, new medicines, topics of cultural and political discourse, science education, and so on? How can expertise and lay knowledge about science and technology be reconciled in a democratic society? How can we make sense of the interactions of living and non-living, humans and non-humans, individual and collectivities in the production of scientific knowledge and technologies?

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I have highlighted the themes that were covered in depth during this course, however, since the course really encourged individual inquiry these were the themes I picked up on. Other experiences might be different.

Part IB (Items identified by GCWS)

4. Comment on any of the following items you have not already covered above.

Size of the class?

Small -- perfect for this project.

Classroom dynamics, discussions, and interactions

Energetic, diverse & exciting dynamics. Great use of other students & profs as resources for interaction.

Assignments, including presentations: Helpful for your learning? Number? Difficulty?

Assignments & presentations were what we made of them.

Instructors:

- clarity and organization +
- openness to a variety of approaches to the material + !!
- instructors working together as a team +
- interaction with students outside of class time +
- feedback on assignments and presentations +

What (if anything) did you gain anything in this course that you would not have been able to get at your home institution?

new profs, new students

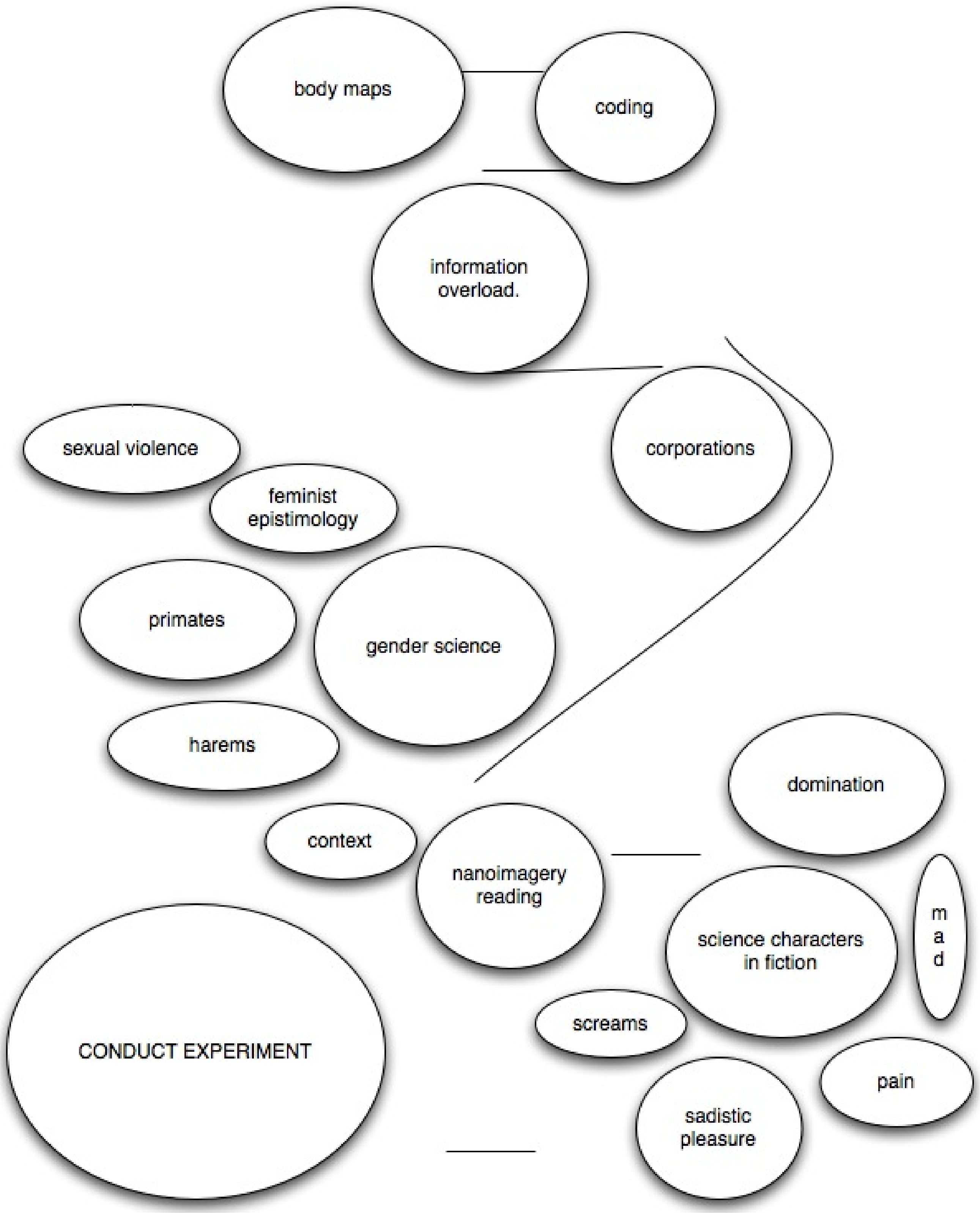
Would you take another consortium seminar? Why or why not?

Yes - but you only offer 1 in the fall & I grad. in December.

Guides for teaching/engaging others to interpret the cultural dimensions of science

Reading Science: strategies for critically interpreting science "texts" - Felicia Sullivan

Rosalie B RESPONSE FROM CASE 1:



Presentation 1: Body Maps
Presentation 2: Coding
Presentation 3: Information Overload
Presentation 4: Corporations
Presentation 5: Sexual Violence in Primates
Presentation 6: Gender Science
Presentation 7: Decoding NanoImagery
Presentation 8: Science Characters in Fiction
Presentation 9: Conducting Experiment

What can we learn from the Haraway/Paper Tiger video about ways to teach/engage others to interpret the cultural dimensions of science?

Knowledge claims and Question for inquiry

Main wikipage for the course on Gender, Race, and the Complexities of Science and Technology

Begin each line with a K or a Q and add your initials at the end:
K for Knowledge claims or interpretations made by Haraway that strike you, e.g.,
K: "Koko represents universal man" (PT)
AND any others Knowledge claims or interpretations YOU might make in response to Haraway or in reponses to what you read about interpretng the cultural dimensions of science.
K: Koko is self-reflective (FMS)
K: Nature is coded female and space is coded male (FMS)
K: The boundaries between humans and primates are blurred (FMS)
K: Jane Goodall is a virgin, white female (FMS)
K: Our corporate, capitalist system is bound up in our scientific expressions (FMS)
See CSD's paired KQs below

Q for Questions opened up that you would be interested in pursuing if you had a chance, i.e., What more do you want to know about any Knowledge claim or interpretation? e.g.,
Q: In what sense is the late 20th century a "mythic time"? (PT)
Broad Questions (FMS):

- Q: How do the interests of a corporate capitalist system direct and influence priorities for scientific inquiry and exploration? (FMS)
- Q: How are views about the natural world influenced by our social context – i.e. nature as exploitable resource, nature as managed resource, nature as protected resource, nature as indistinquishable from human activity, etc.? How and why are some views valued more than others? (FMS)
- Q: In the study of primates, and other animals, are we restricted by our own human context, language and reference points? (FMS)
- Q: What cultural and social biases do we bring into scientific study and to what extent are these obscured by the often positivist epistemology of scientific research? (FMS)
- Q: How do images in our popular media influence or prime our understanding and expectations in the scientific realm? (FMS)
- Q: Does as shift in the administrative or organizational culture of scientific inquiry necessarily result in different outcomes – for example, does the culture of open source software development differ from commercial, proprietary developments systems? If so, how? (FMS)
- Q: How do new ideas or radical shifts enter into orthodox systems? (FMS)
- Q: Does the scientific method limit or confine new knowledge? Does it create a preferred map that does not accommodate other ways of knowing – i.e. intuition, experiential, etc.? Or, are these other ways of knowing more appropriate for other disciplines? (FMS)

K1. DH uses controversial statements to generate connections between the subjects and the general theme of her talk. (For example, Sugito's love for Birute Galdikas was oedipal, she says, though accounts of their connection only suggest a maternal love and a child-like jealousy in the part of Sugito. See http://books.google.com/books?id=DOsIGAljuGsC&printsec=frontcover#PPA34,M1) (CSD)
Q1. Why does DH use these controversial statements rather than offering the reported facts of the case? (CSD)

K2. Many of DH's controversial claims revolve around sex. (JG is "virginal," orbits are "phallic," etc.) (CSD)

Q2. Why is DH particularly interested in presenting science in a sexual way when it is not clearly sexed? (CSD)

K3. DH uses video to reinforce her claims. (For example, there is the video of the gorilla changing into the man at the beginning, the video of the gorilla crying like an infant, and the image of the person in a gorilla costume rotating the image around the cameraman to show that the image with Koko need not have been controlled by her, the video of Michael? being captured in the jungle) (CSD)
Q3. Why does DH use video and other imagery to make her points, instead of simply stating them? (CSD)

K4. DH repeats herself on some seemingly important phrases. ("What gets to count as nature, for whom, and when, and how much does it cost..." is repeated twice and then the end is repeated several times. Also, Koko as universal man is repeated 4 times.) (CSD)
Q4. Why use repetition for certain phrases rather than drawing attention to them in other ways? (CSD)

K5. DH uses what seem to be distractors. (Person in underwear, eating of cake, looped wires, etc.) (CSD)
Q5. Why does DH think that these distractors will help her project? (CSD)

K6. DH uses terminology that is not defined. (Universal man, etc.) (CSD)
Q6. Why does DH use words that could be misinterpreted by her audience? (CSD)

K7. DH seems to explicitly call on our intelligence, not emotions, to look at these cases. ("Do you know where your brain is at 8:30 in the morning?") (CSD)
Q7. Why does DH make use of emotional salience, rather than reason, to make her points? (CSD)

15. DH is adding her voice as a critic of certain practices by science. (Image of Michael? being captured, talk about Nestle, talk about Jane Goodall, emphasis on cost of science, etc.) (CSD)
16. What does tacitly voicing ones opinion on science have to do with engaging in scientific criticism? (CSD)

K: Naming an animal means being human (represents universal man). (VLM)
Q: What is it about naming or classifying that makes one human? (VLM)

K: Koko is removed from the Zoo, where he is spectacle, to become Penny's companion. (VLM)
Q: What is the difference between spectacle, animal that is visited for the enjoyment of humans in the zoo, and animal as a companion? (VLM)

K: Koko is universal man when he engages in universal discourse. (VLM)
Q: How can we measure what counts as "moral discourse"? (VLM) and why does interpreting a story written by humans count as moral? (VLM)

K: There is a boundary between nature and culture. (VLM)
Q: What is the function (benefit) of being on this boundary or in coding through science rather than through culture? (VLM)

K: The first world approaches the boundary of nature and culture through American sign language, which is mediated by the disabled. Similary the "markings of universal man" are mediated through an animal. (VLM)
Q: How are these mediators of the boundary between nature and culture choosen? (VLM) Is it because they are perceived to already exist on this boundary? (VLM)

K: Science is coded as male or female. In some cases, white man is replaced by white woman. (VLM)
Q: What is the function of coding science as male or female? And what happens when white women (in the realm of science) are placed (or take on this role)? (VLM)

K. Haraway states, "The words we just heard ('I'm animal-gorilla') were spoken by the gorilla Koko to the human being Penny Patterson." (HER)

K. "Spoken" implies phonetic formation of vowels and consonants in combinations that have representative meaning for a group of people. (HER)

Q. Why does Haraway use the word "spoken" when Koko communicates through sign language? (HER)

Q. Is she implying that "spoken" has a wider meaning than the conventional use of the word? (HER)

K. Sign language does communicate meaning. (HER)

K. Haraway uses the simile of tangled balls of yarn to examine the world. (HER)

Q. What is the benefit of using similes and metaphors to explore the relationships between culture and science (nature)? (HER)

Q. Are there any drawbacks to this "expressive" understanding of science, nature and technology? (HER)

Q. If science is interpretative through the lens suggested by Haraway, do findings become less "scientific?" (HER)

Q. How does this relate to feminist theories that suggest science and technology are gendered? (HER)

K. Haraway states, "What gets to count as nature for whom and when? And how much it costs to produce nature at a particular point in history, for a particular group of people." Then the phrase "for a particular group of people" is repeated over and over again. (HER)

Q. Who are the implied "particular group of people?" (HER)

Q. Are these people the public, the learners, the scientists, the funders? (HER)

K. Haraway mentions funding later when describing sponsorship by Gulf Oil of Jane Godall's research. (HER)

Q. How do corporate influences influence science? (HER)

K. Haraway mentions the boycott of Pepperidge Farm layer cakes and the Nestle scandal as she makes another simile to examine layers of meaning. (HER)

Q. What is the significance of comments that comes off as almost being mentioned in passing? (HER)

Q. Is she making a reference to the impact of corporations in all areas of life, health and science? (HER)

K. Haraway speaks about cutting into history and unpacking the layers of meaning. (HER)

Q. Could these layers of meaning include the influence of corporations, capitalism, colonization, and/or decolonization? (HER)

K. This point is brought up later as Haraway speaks of the historical events that took place at the time of Jane Goodall's research with National Geographic. (HER)

Q. Do these layers impact who develops science and technology and for whom this science is developed? (HER)

Q. Does this help us reflect what the real aims of science and technology are in our society? (HER)

K1: Haraway asks her assistant/Koko: “Are you an animal or a person?” and a few moments later she repeats the question immediately after hearing the famous Tarzan howl (which we also hear again a few moments later). (AVV)

Q1: What is the relevance of the novel *Tarzan of the Apes* (1914), by Edgar Rice Burroughs, to Haraway’s cultural critique and particularly to the question, “Are you an animal or a person?” (AVV)

K2: Cultural critique is like untangling a ball of yarn or a unpacking the layers of meaning in a layer cake – Pepperidge farm layer cake formerly boycotted for the Nestle bottle-feeding scandal – to find out “what gets to count as nature for whom and when, and how much it costs to produce nature at a particular point in history for a particular group of people.” (AVV)

Q2: What can we find if we follow Haraway’s methodology and unpack the layers of her seemingly off-hand and marginal comment about the Pepperidge Farm layer cake – what politics of race, gender, and economics (the costs to produce nature at a particular point in history for a particular group of people) are embedded in the Nestle scandal? (AVV)

K3 : “Disabled people who speak American Sign language, who communicate with this language, have pointed out the power relationships in which that language is situated at the boundary between nature and culture so that the traffic across nature and culture for late 20th century, first-world people in the united states is mediated through a language of the disabled” (AVV)

Q3: What is/are Haraway’s source(s) for this claim that sign language is situated “at the boundary between nature and culture”? What does that claim suggest about language, culture, and nature? And disability? Is the idea that visual signs are closer to “nature” than audible signs? Where and how does this statement draw a boundary between culture and nature? (AVV)

K4: Koko should not be spectacle now that she can speak (and thus represent universal man rather than animal) but legally, she falls under conservation politics and reproduction politics as an “endangered animal” and while she is “liberated” from the zoo, she is legally bound to her gendered, animal body through the legal imperative that she reproduce. Her so-called liberation requires the “kidnap[ing]” and “buy[ing]” of another speaking gorilla to be “Penny’s consort.” (AVV)

Q4a: What is Haraway doing with animal sexuality in this piece? How do the sources she cites, from Penny/ Koko/Michael to the “out-of-control, libidinal love” of Sujito to Barute Galdicoff (sp?) to the desiring woman stealing the gorilla out of his bed in the King Kong postcard, illustrate this “traffic” between nature and culture? Does science work to contain the threat of inter-species sexuality – and female human sexuality – and why was/is the confrontation with these “boundary objects” of “species, racial recoding” of such interest in “modern American culture”? What do decolonization and multinational systems of production have to do with sex? (AVV)

Q4b: Haraway says that Michael is purchased to be a consort to Penny (rather than Koko). Was that statement an error that slipped by in the editing process, or was it intentional? If intentional, what does it do to our reading of this relational dynamic between Penny, Koko, and Michael? Does it perform a reversal like that in the King Kong postcard? (AVV)

K5: Haraway names a shift in Koko’s status from spectacle at the zoo to “companion” at Penny’s home in Silicon Valley. In her Q, Vanessa asked what the difference is between spectacle and companion. (AVV)

Q5: Vanessa’s question helped me to locate a clear point of intersection between Paper Tiger and an article I recently read about Alex the talking parrot and his “companion” Irene Pepperberg and a question that applies to both: what cultural and sexual problematics are embedded in the companionship between female scientist and animal-companion-and-study-subject? (AVV)

K's

-"Oppositional politics of reversal" are not effective (because networks—of norms?—are all tangled up, like a ball of yarn). (EAO)
-Networks—of norms?—are all tangled up, like a ball of yarn. (EAO)
-Naming is meaningful (VERY meaningful). (EAO)
-The figure of the female can represent "man" (human beings, culture). (EAO)
-The representations in *National Geographic* (all representations?) are meaningful in that they are highly symbolic of big discourses, and that they are historically located. To the extent that these images and narratives are symbolic, they are not disinterested/neutral; rather, they are deeply political. (EAO)
-The political meanings that these images and narratives encode are related to gender, sex and sexuality, and ideas about the nuclear family. In other words, *National Geographic* tells (national? normative? mythological?) stories about gender, race, and the family through these narratives of the study of primates. These narratives tell stories of gender, race, and family through the story of "nature/ nurture" inquiries. (EAO)
-The study of primates on which the film focuses is deeply gendered and sexual (tropes of the maternal, the white virgin, oedipal relationships, phallic imagery abound). (EAO)

Q's

-King Kong represents a feminized black man, and thus a black queen (black queer man)? What does Haraway mean with this aside? (How and why does she make the leap from science to pop culture?) How does the image of the black queen fit into the panoply of tropes (white virgin in white female scientists, black man/rapist in King Kong, universal man in Koko) making meaning out of/within these primate narratives? Why does she make that leap? (EAO)
-How are material reality and "mythic reality" (i.e., Haraway calls outer space a "mythic reality") related? Is it possible for science to uncover something "real," given how tied up scientific processes are in (myth-making) culture? (EAO)
-What is the connection between the "purity" of the white woman figure (embodied in the white female zoologists) and the "purity" of the "untouched" natural landscape and/or animal species, the idea of "nature" into which science/culture/human beings descend? (EAO)
-Why does Haraway look to primate science to make claims about science and culture? Why does she choose to look at and relate the cases of Koko, Jane Goodall, and HAM in space? (EAO)
-What might practicing science look like, given feminist critical theories of science? How does one practice science at once tied to scientific method (and the historical contexts through which it has developed) and responsive to feminist critiques? Is there space to engage feminist critiques of science without just saying "I don't believe in biology" (as I often end up saying)? (EAO)

See wikipages on Student Lines of Inquiry

Work Page and Links

"Case-based learning as a productive approach to generating wider engagement in the production of science and technology"

Case description

KAQs

(identify each one with your initials; feel free to link to per sonal wikipages if you have additional KAQs or thoughts that may be of interest to others)

American women's roles in the 1st & 2nd movements (pad)
K: Werskey limits his survey to men in academia. He explains:
"While I will often dwell upon the circumstances of academic scientists and their social analysts, the animus of my inquiry is to encourage greater understanding of – and more effective challenges to – the totality of science's social relations and the forms of social life they support."
A: We can encourage wider engagement with stories of others who have come before.
Q: What would a survey of a different slice of the radical science movement look like? Where do Hamilton, Sanger, Addams fit into the 1st movement? Gibbs, Carson, and the Boston Women's Health Collective in the 2nd?
F: research using biographies, alternative histories

Funding: between Freedom and Socialism (pad)
K: Werskey describes two opposing approaches to science, represented (in the 1st movement) by the purist Society for Freedom in Science and the leftist Visible College.
A: The two approaches mark the ends (though probably not the terminal ends) of a continuum of thought regarding the role of science in society. Our government's place on this continuum is something that should be identified, leading to calls for change as needed to widen access to funds for production of science and technology.
Q: Where does current government funding for science fit on the scale between "pure" science and "socialist" science?
F: Fill out the continuum between the two poles using a rubrick, then survey the Federal Register over a period of time to plot NSF & NIH requests for proposals on the scale. (note that it's worth checking to see if anyone has already done this!)

Contemporary forums for fomenting revolution (pad)
K: Werskey lists the journals that arose around the second movement, including *Radical Science Journal* (RSJ).
A: Having a forum for exchange of ideas – especially online -- is a key mechanism for widening the discussion and increasing access while subverting barriers of expertise etc..
Q: What are the current venues for this intellectual discussion? Are there blogs that engage in this conversation?
F: Conduct an online search, starting with www.scienceblogs.com, stswiki, and www.4Sonline.org to identify and characterize its activity (i.e., is a 3rd movement in the works?).

additional KAQFs in the works from Pam here.

(CSD-the next three)
Marxism and Science
K: Werskey is interested in social equality (Marxism) and science.
A: These may be meaningfully combined, as in his paper.
Q: Are these goals independent or is there some way that they contribute to each other?
F: Investigate the purported relationship between Marxism and science.

Capitalism and Science
K: Werskey stipulates that capitalism has detrimental effects, presumably for science.
A: If this is true, these effects should be countered wherever and however possible, so long as we are dedicated to science.
Q: What reasons do we have to think capitalism is either bad for science or independently bad?
F: Investigate criticisms of capitalism and their claims concerning the necessary relation between open economy and science.

History and Science
K: Werskey is concerned with the effect of political history on science and thinks it is necessary for scientists to keep an eye to history.
A: If this were correct, we should investigate the specific relationship and be mindful of it to the degree it has affect.
Q: Is the political history merely practically important or should it inform how science itself ought to be practiced?
F: Investigate the relationship between history and science by looking at the relationship between society and science, in general, and then looking at this aspect of the relationship, in particular.

Women's Roles
K: Women were present in these environments of the science left and radical left movements, but their roles are discussed as supportive and anonymous. (FMS)
A: Create scientific research environments that recognize, reward, and meet the needs of women. (FMS)
Q: What types of environments are these? (FMS)
Q: What types of recognition and reward are most prized by women in science? (FMS)
Q: What are the specific needs of women? (FMS)
F: Talk to women in involved in scientific research environments (at all levels, ages and backgrounds) to assess what their needs are; what rewards and recognition would be most meaningful; what would be ideal female-oriented and centered research environments. (FMS)

The Role of Activism
K: Activism or agitation are promoted as necessary or critical elements in a critical Marxist approach to science and these forces are focused primarily on material aspects of production and labor relations in the production process. (FMS)
A: Design an active peer learning environment which engages scientists in dialogues that examine Marxists concepts of labor relations, modes of production, and additional concepts related to social relations. (FMS)
Q: What does an active peer learning environment look like? (FMS)
Q: What does it mean to "engage scientistss in dialogues"? (FMS)
Q: Are there other concepts linked to activism or agitation that are beyond Marxism and social crituqes that should be included? (FMS)
F: See if such learning environments exist already within or without the scientific community. If they exist, how might they be more successful in engaging scientists? (FMS)

Institutional Pressures
K: The institutional arrangements in which science knowledge is produced appears to hampers a radical scientific approach (FMS)
A: Create alternative institutions that are conducive to building and sustaining radical science. (FMS)
Q: What is radical science? (FMS)
Q: What constiuttes an institution? (FMS)
Q: How does one measure builidng and sustaining? (FMS)
F: Find out how other subaltern and radical groups create structures that support their work. Identity if any current institutions or approaches exist that would be defined as radical science environments. How did the radical scientists of the 1960s configure their work? What do they see as the reason their work was not sustained?. (FMS)

Marxist Approaches to the History of Science (HER)
K: Werskey states in a Marxist approach to the history of science, history drives technology and technology is an indicator of social values.
A: Provide more examples of how these principles can be seen within social institutions beyond the academy, such as sterilization abuse directed towards African-American women and the testing of the Pill on women living in housing projects in Puerto Rico.
Q: What does the history of technology tell us about our social values of the past with regard to race, class and gender? How is capitalism enmeshed with race and gender privileges? If we use these principles as a model, what can we foresee with regard to human rights, technology, race, class and gender in the future.
F: Explore more deeply the matrix of human rights, technology, race, class and gender in the two examples cited above. Look for examples in a contemporary context.

Occupational Hazards and Employer-Biased Science (HER)
K: The radical science movement produced considerable work highlighting occupational health hazards and safety violations and the ways in which science supported these risky practices.
A: Give examples of specifics cases both in the past and today. Explore who was affected by this employer-biased science and what means employers used to brush these incidents under the rug.
Q: When were the first cases of occupational health hazards and safety violations reported? When did they begin? Are these hazards gendered? (For example, in the trades.) Is there a race component? How does our global market reproduce the same hazards? Does this topic get more attention and/or media coverage if children are involved? If the workers are white? If they are women? If this occurs in rural areas? Urban areas? Global north nations?
F: Look for data, statistics, information about cases of occupational hazards that occurred in the past. Look to international human rights organizations for information about modern day occurrences on a global scale. Examine how people living in these situations let their voices be heard (art, music, literature, protests, unions, strikes, etc.)

The "Birth" of Modern Science & Eurocentrism (HER)
K: Even Joseph Needem initially sided with traditional historians of science that modern science was a product of the natural philosophers in 17th cen. Europe.
A: Study modern science from a stand point of cultural relativism.
Q: Do these Eurocentric claims really tell us the birthplace of modern science, or do they tell us who had the power to script the history of modern science? What were the exact criteria for determining the beginning of modern science? How do the works of European natural philosophers compare to those of Native Americans or the information produced by the Chinese biochemists Needem met in 1937?
F: Explore the history of science and technology in Non-western cultures. Compare the tools, knowledge and practices to those of 17th cen. European natural philosophers. Compare Western science and technology to those in the non-Western nations.

Social event and scientific research (WFF)
K: The author lists a series social events' impact (the first world war, the second world war, etc.) on the scientific research.
A: There are many social factors work together on the scientific research. They could influence how much fund scientific research get, what issue to research, the research goal and so on.
Q: What are the present social events' influences on scientific research nowadays?
F: Investigate what scientists concerns most nowadays and relate them to the present social situation. Do a comparative study about the social event works differently on China and the western countries. (Especially the cultural revolution and the reform and open policy's impact on Chinese scientific research. And the situation of western countries' scientific research during the same period)

Class and scientific research(WFF)
K: The author holds there are correlation between the capitalism and scientific research.

A: Capitalism leads to class stratification. There is also class stratification in the scientific research.
Q: How does the capitalism impact the scientific research? Whether scientific research severs to a certain class? Whether there is a certain class who could participate in the scientific research?
F: Investigate the relationship between the class and scientific research. And try to determine the class' influence on scientific research from a series of history events. Do a comparative study about the class in scientific research in China and western countries.

Gender and scientific research（WFF)
K: The author points that female and male just hold a different status in the scientific research. People seem are easy to ignore female's contribution to the scientific research.
A: Male scientists occupy the dominant status in scientific research.
Q: How does this prejudice about female scientists occur?
F: Relates this issue to a sociological perspective. (I am prefer to use label theory and behavior expectation) Do a comparative study about female scientists' status. Especially the analysis of Chinese female doctor is rendered as the third gender. (Some people put forward that there are three genders nowadays: male, female and female doctor)

Marxism and Social Interpretations of Science (SLP)
K: "Marxism is a principle root of all STS disciplines"
A: Construct local conditions of a non-Marxist non-capitalist nature, primarily in an specific indigenous context, to enable all community members to engage in a critical approach to science and technology.
Q: How does Werskey define Marxism as he believes it should inform the STS discipline?
Q: Does Marxist theory have to be the root of an STS discipline?
Q: Are their critiques of Marxism or alternative approaches to STS that have been generated apart from a Euro-Western approach?
Q: Might new social conditions or contexts inspire new ways of approaching STS?
F: Attend to the specific ways that Werskey defines Marxism in relation to STS (and email Werskey to confirm); research commentaries/critiques on Marxism from other gender or cultural perspectives - primarily from indigenous perspectives; see if alternatives to Marxism have already been proposed as applying to STS and, if not, determine if they could be; research possible existing cases of indigenous groups providing a pro-active critique of science and technology as an example of what an applied non-Marxist critique might look in a community context.

The Ecological Left and Social Change (SLP)
K: The opposition to capitalist science within the ecological left is good but will not lead to social change (Werskey).
A: People might not pay attention to theories/communities of the ecological left and, thus, may not reap the benefits of the ecological left's dialogue and movement. Similarly, people may pursue other ways to achieve social change and overlook the ways that the ecological left is already doing that. Or social change may come about quicker if people shift their energies from the ecological left to simply a social left.
Q: Could it not also be the case that oppression of the environment goes hand-in-hand with oppression of peoples (racially, oppression against women, cultures, etc.)? Could working within one movement not help ameliorate both? Or could they even be the same movement? Also, what qualifies as a successful movement? Awareness, action, laws, publicity? I find it interesting that Werskey said environmentalists were successful.
F: Werskey said that the ecological left was becoming moderately successful. It might be good to study how they have organized their movement, how it has been (if it has) simultaneously associated with social change, social concerns and social critiques of science. I would also be interested here in the public participation vs. expert polarity. How has the environmental movement dealt with this? Who is leading various environmental movements: a specific gender, race or culture?

Patent Laws, Oppression, Information Access and Social Interpretations of Science (SLP)
K: Patent laws play a negative role within capitalist dominated science research
A: One would have to understand/investigate the function of patents, their history, etc. to pursue anything I suppose
Q: What function do patent laws play within scientific research and scientific expertise which is then used to nullify democratic opposition (According to Young)? How have patents been used actively to oppress races, cultures, genders? How have they passively affected those categories by withholding information? How permanent are patents? Who has control in acquiring them? How much public understanding of them is there?
F: I am a bit at a loss here, but I think it could be interesting to pursue, especially with regards to my earlier questions. It could offer something like a "case-study" example or at least help narrow my interests above.

VLM
K: Social relations of science are based in economic forces (relations of production).
A: Someone interested in change would look to economic issues as site for change.
Q: Are relations of production isolated from other power relations?
Q: How might other power relations, such as race and gender, shape how "economic' agendas are set?
Q: Could we argue that economic relations, like science itself, is shaped by social relations?
F: I would like to find sources that dicuss how economic relations are shaped by other social relations. I am thinking of sources that tackle this question of class analysis of science and incorporating race & gender into the analysis.
I would like to combine some readings about how race & gender shape economic calculations (or epidemiological calculations of cost) with a real like example of how this happens (access to health care). We see instances where they are various options, each with different economic costs associated with them. One can argue that the option that is pursued is the most cost-effective according to some economic calculations OR that this option is supported by particular stake-holders, yet there are often-times competing economic calculations. Deciding which economic explanation will guide scientific inquiry is itself a social process, influenced by race and class.

VLM

K: STS (along with feminists and postmodernists) have undermined the authority of science by not taking any part of science as truth, thereby alienating the very group that should engage in their scholarship. (26, 31) (VLM)
A: Scholars engaged in cultural interpretations of science could reach out to scientists. They could also attempt to take seriously some forms of scientific knowledge or develop criteria for evaluating "validity" of some scientific knowledge. This could include measures of ways that existing forms of domination (race, class, gender) inform and drive the scientific conclusions or how the science is used.
Q: How is important is it that the audience of cultural interpretations of science be scientists?
F: I could read about the epistemological debates in STS, including internalist/externalist. I could read STS scholars who try to keep themselves outside of this debate (such as Steven Shapin). I think it would be interesting to see what happens if we evaluate science not only based on the "validity" of scientific finding, but also on the analysis of race & gender implications of ways analysis is presented and interpreted. Some people that have done this are Emily Martin (study of reproduction); I think Anne Fausto-Sterling also questions ways that science has been presented while acknowledging scientific findings. I could read some of this work and then try to come up with an example to illustrate this, studies of sex/gender might be helpful here. It would be helpful to incorporate race into the analysis, but I have to think more about whose work does this.

VLM

K: Use of scientific knowledge to support racist and sexist beliefs, may not be an"abuse" of science, but a manifestation of the "values infused into the very core of science's social relations, knowledge, and privileged position in postwar society" (19) (VLM)
A: When assigning blame or accountability for the results of scientific work, we could look to "social relations of science" rather than to scientists.
Q: How do we get at those values infused in social relations?
Q: What are the social relations of science? What happens when we limit them to economic-based factors, does that limit our scope of analysis?
F: I could read about values in science. I might be more interested in reading about use/abuse of science debate.

AVV
K:Werskey writes that Hogben and Bernal published books about the history of science that became best-selling ""'self-educators' that would equip their readers with sufficient knowledge to become effective citizens in a scientific age" (11)
A: Scientists should make their work accessible to the general public and not be afraid to address social concerns and even politics.
Q: Using a new historical approach to reading literature (putting it into context with other materials from the period without claiming one Truth about the time or direct influence between the materials), what would students find illuminating in books like Upton Sinclair's *The Jungle* and H.G. Wells' *Tono-Bungay* in light of such scientific-socialist texts? How could this fictional and scientific literature be read together in a class?
F: Locate and read Hogben's *Science for the Citizen* (1938) and Bernal's *The Social Function of Science* (1939) to see how these popular texts address science, capitalism, and socialism, and think about how to use them in a literature class.

K: Werskey says that in the 1920s, optimistic young scientists' "broader outlook on science as a progressive historical force [was] reinforced during their formative years by the writers of scientific textbooks and romances, notably H.G. Wells" (7).
A: Critics of the idea that science is separable from culture could raise awareness (and find evidence for) the impact of romances on scientists.
Q: Frankly, I'm puzzled by Werskey's statement about Wells here. I see his work as highly critical of "science as a progressive historical force." Does it matter if Wersky is misrepresenting Wells? What was Wells' influence (on scientists) in the 1920s?
F: Take another look at Wells' books.

K: Werskey calls for a "reinvigorated modernism would need to combine a rigorous critique of capitalism – the inability of the global marketplace to realize the hopes of most of the earth's inhabitants – and a clear vision of a post-capitalist society" (49-50).
A:Those who critique capitalism and wish to change the direction of "progress" should use imagination and creativity to envision alternatives AND find ways to inspire others to help make those ideas a reality.
Q: How would today's "reinvigorated modernism" differ from the modernism of the first half of the 1900s? *The Jungle*, it seems to me, provided exactly what Werskey is asking for here, but did it in 1906. What can we learn about the history of science, capitalism, and socialism from the impact of *The Jungle* and books like it? Can we use those lessons (and the books that help us locate the lessons) to shape a new vision for the future?
F:Look at literary critiques of capitalism from the Modernist period of literature and their reception/impact. What alternative sstuctures did they offer? Why might they not have succeeded?

KCP

K: Capitalism exacerbates social inequality, including inequalities in the practices of science.
K: Werskey claims that a Marxist approach to science would create greater equality, both scientifically and socially.
A: People who want a more egalitarian society, including the scientific part of society, would push for Marxist/Socialist/communist political and economic system.
Q: How specifically have gender inequalities been exacerbated by science under capitalism?
Q: How in theory would a Marxist approach help to elucidate women's subjugation in the scientific and technological realm?

Warm up for Case 2

As you read Werskey and after you finish reading note issues that fit in these categories (adapted from Madison Metropolitan School District (2001). "Classroom Action Research starting points." http://www.madison.k12.wi.us/sod/car/carstartingpoints.html, viewed 25 Jan. 03)

1. What interests or intrigues me about the situation presented in the reading is...

2. Information--things I would like to know more about the situation are...

3. What's confusing, ambiguous or unclear to me is...

4. What seems most important to me about the situation is...

5. What seems to need improving/changing/responding to is...

6. Some people are unhappy about...

7. I am perplexed by...

8. I'm really curious about...

9. An idea I would like to explore in my courses/ life/ work/ classroom / community is...

10. Something I think would really make a difference is...

11. Something I would like to do towards change is...

KAQ(F)

What do we Know?

- (Q: How do you Know that? -- What's the evidence, assumptions, and reasoning?)

Action: What could people pursue if they accept the Knowledge claim?

- (Q: Which people or group?)

Questions for inquiry: What more do we Need to know

- —in order to clarify what people could do or clarify which people are interested in that action or understand more and thus revise/refine the Knowledge

How to Find this out?

- (Q: Will your method of research best enable you to Find this out?)

Start with either a Knowledge claim, a proposed Action, or a Question for inquiry you wish to consider. Then try to fill in the rest of the KAQF around it. E.g., if you entered a proposed Action, then write down what Knowledge claim(s) this Action is based on. Then move forward to identify Questions for inquiry that follow and how you would Find out the answer to the Question.

Use the additional questions in parentheses and another person as your sounding board to check your thinking. In particular, **ask how the research you are formulating is related to the Case**. If the connection isn't clear, review the Case and revise (or put aside) that KAQF.

Keep adding KAQFs as additional Knowledge claims, Action proposals, or Questions for inquiry occur to you and emerge from checking your thinking on the previous rows.

After you have many KAQFs, prioritize the research you need to do (that is, your F) and start it—or plan how you would do it.

Workpage for Case 3, Spr '09

Pam's KAQs & situational_map_(1_of_1).jpg

Vanessa's KAQs

Some Bibliographic supplements from PT

Bibliographic supplements from PT

On giving meaning to accessible genomes (Hayen), see
Khoury, M. J., Little, J., Gwinn, M., & Ioannidis, J. P. (2007). On the synthesis and interpretation of consistent but weak gene-disease associations in the era of genome-wide association studies. International Journal of Epidemiology, 36, 439-445.

On STS analysis of this issue, see
Taylor, P. J. (2009) "Infrastructure and Scaffolding: Interpretation and Change of Research Involving Human Genetic Information," Science as Culture, forthcoming - available from PT on request.

On imbalance between collection of genetic and environmental information, see
Frank, J. (2005). A Tale of (More Than ?) Two Cohorts - from Canada. 3rd International Conference on Developmental Origins of Health and Disease (discussed in "Infrastructure and scaffolding")

On the challenges of using genetic information in the best and probably simplest case of diagnosable genetic disease, namely, PKU, see
Paul, D. (1998). The history of newborn phenylketonuria screening in the U.S. Final Report of the Task on Genetic Testing. Baltimore: Johns Hopkins University Press) (discussed in "Infrastructure and scaffolding")

On the whole topic:
The Use of Race Variables in Genetic Studies of Complex Traits and the Goal of Reducing Health Disparities: A Transdisciplinary Perspective, http://www.msgetz.com/useofracevariableshealthdisparities.pdf

On disease and patient groups (Vanessa), see
Epstein in the STS Handbook and
Rayna Rapp's work with Faye Ginsburg on parent advocacy groups for children with rare genetic conditions. (I heard her talk about it in a session that AFS also spoke in. Not sure what she has published on this.)
http://as.nyu.edu/object/raynarapp.html

On activist groups (Felicia), see
GeneWatch, http://www.gene-watch.org/pages/genewatch.html

On bioethics (Heidi), see
commentaries on ELSI, including one done by Jan Coe (available from her at jhrcoe@yahoo.com)

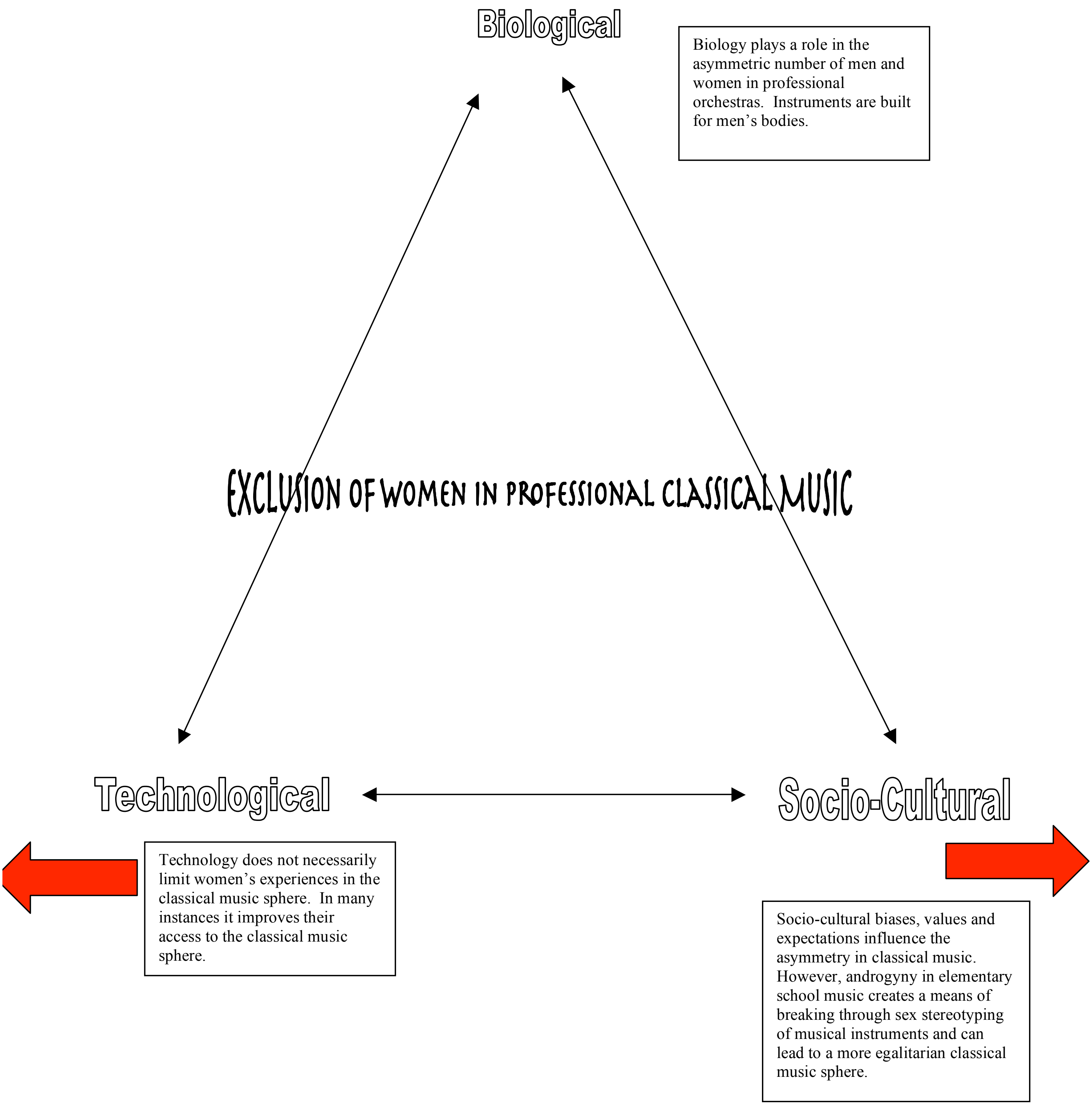
On bringing the environment in (Pam), see
Frank above (http://www.cihr-irsc.gc.ca/e/13967.html)

On digital pedagogy (Rosalie), see
audio & slides of Gonzalo Bacigalupe, talking about "The impact of the new social media on public health research", http://sicw.wikispaces.com/ISHS09

Exploring Themes of Gender Asymmetry in Classical Music

GRST CLASS MAP

4/30/09



Learning Technology and Diverse Students: A Classroom Resource Guide for School Teachers

Fangfang Wen

Introduction

Learning technology could be a useful tool to help teachers meet diverse students' needs. With the establishment of a series of education acts for students with special needs, more and more students with special needs have opportunities to be involved in a regular classroom. In addition, there is an increasing tendency for English Language Learning students to account for a larger percentage of the student population in the classroom. These students, both male and female, have diverse physical abilities, diverse cognitive abilities, diverse intellectual abilities and diverse cultural backgrounds. Under such conditions, it is very difficult for one teacher to meet all of the students' diverse needs in classroom. Learning technology is an effective way to enhance excellence in education, to support curriculum requirements, to meet various needs, to help students learn to learning, and to ensure quality of education. It is also a good way to help teachers meet diverse needs in a classroom. The aim of this resource guideline is to help teachers receive a general understanding about how to use learning technology in order to meet diverse needs of students.

At the very beginning of this resource guideline, I will introduce some distinct needs which diverse students bring to a classroom. Then I will explain why learning technology is a good way to meet these diverse needs in classroom. Next, I will introduce the main learning technologies that can be used in classroom. Lastly, I will introduce how to use learning technologies in order for education to be effective. In the appendix, there is a learning experiment about how to use multi media to teach the cultural dimensions of science to English Language Learning students.

With this resource guideline, I hope I can help school teachers to receive a general understanding in a short time. I will try to introduce learning technology in an easy to understand(ing), and succinct way.

Diverse Students in the Classroom

In the classroom, students are diverse. They have different cultural backgrounds, different genders and different abilities.

<u>Diverse Cultural Background</u>

As one of the most open and multicultural countries in world, the population of the United States is formed of individuals from diverse backgrounds. There are two aspects that could be thought of as the expression of students' diverse cultural backgrounds: students' English language proficiency and students' socioeconomic status. On the one hand, students' English language proficiency may become a barrier for their learning, communication and usage of technology. Without a fluency in the English language, it is difficult for these students to read textbooks, to keep up with a teacher's lecture, to communicate with classmates and to understand English websites as well as technology. On the other hand, socioeconomic status has an influential impact on students' learning experience. The socioeconomic status of one's family has an impact on students' accessibility to technology.

<u>Gender Status</u>

Even though there are more and more female students useing blog, facebook or other technology products, the issue is that female students still hold a less positive attitude on learning technology than male students. It is not hard for us to see that there are much more male students in college's computer science department.

Diverse Abilities

Learners with physical disability or impairments: Physical impairments affect mobility and limit student's interaction with the learning environment based on information processing.

Learners with cognitive impairments: Cognitive impairments can impede a student's ability to process information.

Learners with intellectual disability: Intellectual disability can lead to delay development, symbolic understanding, early cognitive milestone and fewer opportunities to interact.

A special learning group: Students who have special needs and speak a foreign language have more barriers to achieve communication in the classroom. Besides, female students with special needs also have different learning style.

Ensuring Students' Engagement in General Classroom

The Access to Equal and Appropriate Education for Every Student

Since the Education for All Handicapped Children Act in 1975, the U.S.'s education system begins to consider the equal education for every student in the classroom. The 3 milestone acts are The United States Congress enacted Education for All Handicapped Children Act, The Individuals with Disabilities Education Act and The

No Child Left Behind Act.

The United States Congress enacted Education for All Handicapped Children Act (EAHCA, or EHA, or Public Law (PL) 94-142) in 1975. This act improves the physical and mental disabled students' equal accessibility to free and appropriate public education.

The Individuals with Disabilities Education Act (IDEA) is a United States federal law that governs how states and public agencies provide early intervention, special education, and related services to children with disabilities.

The No Child Left Behind Act (NCLB, or Public Law 107-110) is proposed by President George W. Bush in 2001. It requires including all children in process monitoring and to insure that all children get access to a rigorous curriculum as well as to learn to full potential.

The Term of Universal Design Learning

Universal Design for Learning (UDL) is a framework for designing educational environments that enable all learners to gain knowledge, skills, and enthusiasm for learning. This is accomplished by reducing barriers to the curriculum and providing rich supports for learning.

Universal Design for Learning is mean to meet the widely diverse students' diverse needs for learning by diverse goals, materials, methods and assessments. Through Universal Design for Learning, teachers develop appropriate goals designed to address the needs of a wide range of students and implement instructional methods responsive to individual difference (Rose and Meyer, 2002).

The Term of Inclusion

The term "inclusion" means educating students with disabilities in regular classrooms. It is part of the least restrictive environment principal of IDEA. Inclusion in educational settings has several defining characteristics:

- The inclusion of students with a variety of abilities

- Students felling that they are an integral part of the classroom
- Students sharing a common education experience
- Persons with and without disabilities equally sharing the setting
- Addressing the needs of the entire students

Why Choose Learning Technology

Making Education Visible. Learning technology could help teachers to improve their curriculum. Such improvement includes making curriculum more vivid and attractive. Multi-media is one of good examples.

Engage Students in Learning Process. Learning technology could let students get more participation in class. Students could receive more communication between students with students and students with teachers.

From What I Know to What I Am Wondering. Learning technology can inspire students' learning. It can afford students a chance to explore and receive more information, thus students can conduct learning with continuous wondering instead of remembering knowledge.

Teach Students Learn to Learning. Learning technology affords students assistance as well as opportunities to learn by themselves.

Meet Students' Diverse Needs. Learning technology can help teachers to meet students' diverse needs. For example, translation software can help teachers to communicate with ELL students and augmentative and alternative communication technology could help teachers to communicate with students with special needs.

Introduction to Learning Technology

Computer input devices. Input devices can be constructed to accommodate a wide range of abilities. Keyboard and mice are two of the most common computer input devices. These can be modified to accommodate diverse individuals. For example, bigkeys keyboard, which has extra large keys to facilitate locating and pressing the keys correctly.

Computer output devices. Just as input devices can help make computers more accessible to people with disabilities, assistive/adaptive output devices can help make computer output more understand and useful. For example, low vision accommodations, these devices assist people with visual impairment. They include: glare protection screens and large monitors with high resolution.

Internet based communication. Internet based communication is an inexpensive and generally reliable method of local, regional, and long distance communication.

Telephone systems. The newest telephony technologies have the potential to convert text to speech and speech to text to allow communication between text based and auditory mediums.

Hearing aids. The two most common types fit either behind the ear or father down the hearing canal. Another hearing aid used commonly in the classroom is the FM listening system. The system is structured so that the teacher wears a microphone into which he or she can speak normally; the sound is then broadcast to the student's hearing aid.

Augmentative and alternative communication devices. AAC devices enhance a person's ability to interact. A simple version of an AAC is a pencil and paper for a person who cannot speak. Electronic AAC devices can produce text and synthesized speech through a variety of input options.

Translation software. Translation software is anything that converts the input or output from one communication mode to another.

Enhancement software. Enhancement software does not change the mode of communication; it supports that mode by offering a greater range of output options.

Learning Technology and Teaching Method

Technology for quality learning and teaching

Technology as the aid for learning and teaching.

Technology as assistance for self learning.

Technology and the inclusive classroom

Students with special needs: been isolated to least restrictive environment

Students receive all of their services in the regular education classroom.

Technology and the individual education plan

An IEP is the blueprint for how the education of students with exceptionalities needs to be carried out. It is the key of special education.

Teachers should plan what services students will receive and how to receive these services.

Teachers should plan what technology will use in the IEP.

Teachers should know does the specific technology been used.

Using technology with ELL students

ELL students lacing language skill.

ELL students have the difficulty in reading.

Using technology to help teachers to conduct communication.

Technology used in a large community and the active as well as engaging environment.

Teachers and parents' instruction and control

It is important for parents and teachers to afford necessary instruction and control for learning technology since it also may bring negative imparts on students' learning. Such negative impacts include unhealthy information and overtime usage.

Assessment

Assessment is also very important for the implementation of learning technology. On the one hand, it can help teachers to decide which technology should be used. On the other hand, it could help to evaluate effects of learning technology. I list some online resources about assessment of learning technology.

Learning Technology Evaluation Center

http://www.mgtofamerica.com/pk_12_market/services/learning_technology_evaluation_center_ltec_service

Free Learning Technology Evaluation Tools

http://www.kmsi.us/free_eval.htm

Teacher Resources-Evaluation of Learning Technology http://www.teach-nology.com/teachers/educational_technology/evaluation/

Books for Further Reading

John Siraj-Blatchford and David Whitebread. (2003). Supporting Information and Communications Technology in the Early Years

This book introduces how to use technology to help young kids to improve their learning.

Paula S. Cochran. (2005). Clinical Computing Competency for Speech Language Pathologists

This book introduces how to use computer to help speech therapist to conduct their communication therapy or speech therapy in an easy way.

Peter Gardenfors and Petter Johansson. (2005) Cognition, Education, and Communication Technology

This book introduces the basic theories about cognition, how to relate these theories to education and how to use communication technology to improve education.

David H. Rose, Anne Meyer, and Chuck Hitchcock. (2005). The Universal Designed Classroom-Accessible Curriculum and Digital Technologies

This book includes several essays about Universal Design of Learning. These essays include what is UDL, how to conduct UDL, how to use UDL to improve education.

Lawrence Tomel. (2007). Integrating Information and Communications Technologies Into The Classroom

This book introduces why technology is important to education and how to use technology in education.

Marty Bray, Abbie Brown and Timothy D. Green. (2004). Technology and the Diverse Learner

This book is a brief introduction about how to use technology to meet diverse learner's needs in education.

Cream Wright. (2000). Issues In Education and Technology

This book includes several essays about issues in education and technology. Every chapter also includes an case.

Useful Online Resources

http://en.wikipedia.org/wiki/Assistive_technology

Wiki page about assistive technology. It includes introduction of assistive technology and products.

http://www.iallt.org/

The international association for language and learning technology.

http://www.brandon-hall.com/publications/learntechproducts/learntechproducts.shtml

Free report about learning technology.

http://www.tltgroup.org/

A non-government organization about learning technology.

Creating Science & Technology Policy from the Grassroots Up

Class Times: MW 1:00pm to 2:15pm
Location: TBD
URL: http://techpolicy.pbwiki.com

Instructor: Felicia M. Sullivan
Email: felicia.sullivan@umb.edu
Office Hours: Monday 10:00am-12:00pm
Wednesday 2:30pm – 4:30pm
or by appointment

Description:

Science and technology policy is often created through expert knowledge networks that often lack an informed perspective from average citizens. Marginalized communities such as those living in poverty, youth, and immigrants lack the networks of knowledge and power that can influence policy making processes. Expertise networks in science and technology also suffer from gender and racial imbalances, meaning that significant input from these groups are not adequately incorporated into key decisions.

The problem is compounded by research which informs expert knowledge. Such research suffers from weak, unequal or non-existant ties to communities being "researched." Participatory research enviornments that allow greater grassroots input into shaping and defining research agendas do exist. However, these efforts are still few and far between. Tensions between the academy and community-based interests remain a significant barrier to creating meaningful research that can adequately inform policy in the realm of science and technology. The field work of the class will be supported by a teaching assistant who has extensive expereince working with community-based organizations and will work with students in their work with the community.

This course will ask students[1] to critically examine and analyze how science and technology knowledge is produced. Drawing from the field of science and technology studies, students will explore the social and institutional conditions of knowledge creation. Students will also be asked to re-envision how communities, espeically the historically marginlized, might create or inform the creation of a different set of knowledge systems. The learning environment will be enriched by teaming practioners and junior researchers. These teams will indentify key science and / or technology issues in the community that would benefit from additional research. Each team will construct a case for fellow classmates to explore through a problem-based learning approach. Teams will then take the insights from the class, combine them with additional research and craft a policy statement designed to gain support from legislators and community members.

Objectives:

- To understand the core arguments and critiques of STS with an eye towards marginalized voices
- To probe key science and technology issues from a community perspective
- To create cases based on real-life communtiy issues
- To use problem-based learning techniques to expand knowledge and create action
- To explore mechanisms for creating strong policy arguments
- To reflect on the tensions and benefits in crossing academic and activist boundaries

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1 It should be noted that this course will integrate 10 students from the undergraduate student body as well as 10 members of the community fellows program. Community fellows are engaged practitioners who have been accepted to a year long program of formal course work as well as critical reflection geared towards deepening and informing their work in the community.

Assignments:

Evaluation in this class will be on a pass / fail basis. Each student will submit the following items as part of a course "portfolio":

Individual	Team
Mid-term Essays on STS KAQ on one Community STS Case Weekly Personal Reflections Active Participation Evaluation by other Team Members	Team WIKI Community STS Case Community STS Case Presentation Policy Statememt

Mid-term Essays on STS
Students will choose 2 of 4 questions that seek to explore the key concepts covered in the STS section. Each essay should be approximately 750 works and look to critically analyze and synthesize core concepts.

KAQ on one Community STS Case
You will provide a KAQ on the Community STS case from a team other than your own. The process of conducting a KAQ will be demonstrated during class.

Weekly Personal Reflections
Students will keep a journal (either print or electronic) which reflects upon theories explored, practical applications used, team interactions, work with community partners, possible relevance to student interests and any other insights gained from the course. Students will share these with the instructor and teaching assistant twice during the semester.

Active Participation
Students are expected to engage in class discussion, participate fully in team projects and work with community partners in a thoughful and professional manner.

Evaluation by other Team Members
You will evaluate the dynamics of the team you are working with as well as the roles and responsibilities of yourself and others on the team. Your teammates will do the same, including an evaluation of your performance.

Team Wiki
Each team will maintain a team set of of wiki pages that will include notes from team meetings, "team to dos," team work documents, and other materials relevant to group collaboration. Members will be expected to share their team wikis with other teams, the instructor and teaching assistant. Team wikis should be updated on a weekly basis.

Community STS Case & Presentation
Based on conversations and input from community partners, each team will create a team case designed to explore possible directions for action with your community partner. This case will be shared with the rest of the class. Another team will then use the KAQ method to unearth additional questions, confirm knowledge claims, and envision actions to add to your team's thinking aobut your case. Your team will be expected to present your case to the class as part of this process.

Policy Statement

Based on the feedback to your community case, each team will create a policy statement indended to share with decision makers.

Outline:

GETTING ORIENTED

Week 1: Overview and Positioning Oursleves

Theory	Practice
Where are we coming from?	Team meetings[2]
Syllabus / Assignments / Evaluation	Set up team wikis
Assign community partners	Pick community partner

Required Reading:

Dick, B (2002). *"*Action Research: Action and Research" A paper prepared for the seminar "Doing good action research" held at Southern Cross University, Monday February 18, 2002. Accessed on April 15, 2009 at http://www.scu.edu.au/schools/gcm/ar/arp/aandr.html (Additional resources here - http://www.scu.edu.au/schools/gcm/ar/arhome.html)

McNeal, A. (n.d.) How to Read a Scientific Research Paper--a four-step guide for students and for faculty. Retrieved on August 23, 2007 from http://helios.hampshire.edu/~apmNS/design/RESOURCES/HOW_READ.html

DUE Week 2: make initial contact with community partner and assess time for team to meet with partner within the next two weeks.

QUESTIONING SCIENCE AND TECHNOLOGY KNOWLEDGE

Week 2: Intoducing Critical Approahces to Science and Technology

Theory	Practice
Class discussion[3] grounded in readings	Team meetings
Case #1	Preparing for initial community partner meetings
Introducing KAQ method	Relate partner work to this week's case

Required Reading:

Case #1: Donna Haraway Read National Geographic

Hess, DJ (1995). "Introduction" and "The Cultural Construction of Science and Technology," in *Science and Technology in a Multicultural World: The Cultural Politics of Facts and Artifacts* New York, NY: Columbia University Press: 1-53.

Martin, B (1993). "The Critique of Science Becomes Academic." Published in *Science, Technology, &*

2 Team work will be guided the small group work model detailed here - http://cct.wikispaces.com/SmallGroupWork
3 Class discussions will attempt to use the JigSaw Discussion model detailed here - http://cct.wikispaces.com/JigSawDiscussion

Human Values, 18(2):247-259. - Accessed on February 22, 2009 at : http://www.uow.edu.au/arts/sts/bmartin/pubs/93sthv.html

Rose, H (1994). "Is a Feminist Science Possible?," in *Love, Power and Knowledge: Towards a Feminist Transformation of the Science.* Bloomington, IN: Indiana University Press: 1-27.

Week 3: The Impact of Institutions on Science and Technology

Theory	**Practice**
Class discussion grounded in readings and using Case #2	Team meeting
	Final prep for initial community partner meetings
Strengthening use of KAQ	Relate partner work to this week's case

Required Reading:

Case #2: Personal Genomics

Croissant, JL and Smith-Doerr, L (2008). "Organizational Contexts of Science: Boundaries and Relationship between University and Industry," in *The Handbook of Science and Technology Studies(3rd Edition)*, EJ Hackett, O Amsterdamska, M Lynch, and J Wajcman (Eds). Cambridge, MA: MIT Press: 691-718.

Hess, DJ (1995). "Social Relations and Structures of Scientific and Technical Communities," in *Science and Technology in a Multicultural World: The Cultural Politics of Facts and Artifacts* New York, NY: Columbia University Press: 117-160.

DUE Week 4: 1st meeting with community partner completed

Week 4: Marginalized Voices in Science and Technology: Focus on Race and Gender

Theory	**Practice**
Class discussion grounded in readings and using Case #3	Team meetings
	Focussing in on community partner issue
Mastering KAQ	Relate partner work to this week's case
	Schedule workshop with community partner

Required Reading:

Case #3: Something the Lord Made (Film about the life of Vivien Thomas)

Canadian Council on Learning (2007). "Lessons in Learning: The cultural divide in science education for Aboriginal learners." Accessed on April 23, 2009 at: http://www.ccl-cca.ca/CCL/Reports/LessonsInLearning/LinL20070116_Ab_sci_edu.htm.

Keller, EF (2001). "Making a Difference: Feminist Movement and Feminist Critiques of Science," in

Feminism in the Twentieth-Century: Science, Technology and Medicine, Creager, ANH, Lunbeck, E & Schiebinger, L (eds.). Chicago, IL: University of Chicago Press: 98-127.

Rossiter, M (1995). "Introductions" in *Women Scientists in America: Before Affirmative Action 1940-1972*. Baltimore, MD: Johns Hopkins University Press: xv – xviii.

Washington, H (2006). *Medical Apartheid*. New York: Harlem Moon.

Week 5: Working Towards Alternative Knolwedge Systems in Science and Technology

Theory	**Practice**
Class discussion grounded in readings and using Case #4 Mastering KAQ	Team meetings Focussing in on community partner issue Relate partner work to this week's case Schedule workshop with community partner

Required Reading:

Case #4: Alternative Medicines: Homeopathy, Chiropractic, and Acupuncture

Hess, DJ (1995). "Other Ways of Knowing and Doing: The Ethnoknowledges and Non-Western Medicine" and "Cosmopolitan Technologies, Native Peoples and Resistence Struggles," in *Science and Technology in a Multicultural World: The Cultural Politics of Facts and Artifacts.* New York, NY: Columbia University Press: 185-249.

DUE Week 6: Essays on STS

Focusing in on Community Issues

Week 6: Building An Issue Case Informed by the Community

Theory	**Practice**
Modeling a Community Vision and Theory of Change workhop	Team Meetings Preparation for community partner workshops

Required Reading:

Anderson, AA (2008). *The Community Builder's Approach to Theory of Change: A Practical Guide to Theory Development*. New York, NY: The Aspen Institute Roundtable on Community Change. http://www.aspeninstitute.org/atf/cf/%7BDEB6F227-659B-4EC8-8F84-8DF23CA704F5%7D/rcccommbuildersapproach.pdf

Boston Action Tank (2008). *Theory of Change: Mapping Strategies for Long-term Goals*. Boston, MA: Organizers Collaborative. Accessed on April 16, 2009 at http://www.organizerscollaborative.org/files/Theory%20of%20Change-handout.pdf

Week 7: Gaining Insights from the Community

Practice
NO CLASS – Conduct community workshops

Practice
NO CLASS – Conduct community workshops

DUE Week 8: Completed community workshops
DUE Week 8: Journal / Personal Reflection Check-in (schedule one-on-one meeting)

Week 8: Community Voices in the Classroom

Refletcion
Community workshops debriefs[4]
What did we learn about issues?
What did we learn about the process?
How might we create our own cases based on this?

Practice
Team meetings
Work on cases
Prepare for case presentation

Week 9: Creating a Community Problem Case

Theory
Class discussion
Additional discusion about cases
Exploring the components of a case

Practice
Team meetings
Work on cases
Prepare for case presentation

Required Reading:

SGS (2009). "Problem-based learning," *Study Guides and Strategies*. Accessed on April 23, 2009 at: http://www.studygs.net/pbl.htm

Exploring the Environment (2005). "Teacher Pages: Problem-based learning." Accessed on April 23, 2009 at: http://www.cotf.edu/ete/teacher/teacherout.html

DUE Week 10: Team cases & presentations

Week 10: Presenting Team Cases

Presentations
Case Presentations - Groups 1& 2

Presentations
Case Presentations – Groups 3 & 4

4 Will attempt to use the Focused Conversation model detailed here: http://cct.wikispaces.com/FocusedConversation

DUE Week 11: KAQ for assigned case
DUE Week 11: Journal / Personal Reflection Check-in (schedule one-on-one meetings)

THE POLICY PROCESS

Week 11: Turning Community Issues into Policy Statements

Theory	**Practice**
Lecture on the policy process	Team Meetings
Class discussion	Turning cases into policy statements

Required Reading:

Community Toolbox (2009). "Troubleshooting Guide for Solving Problems: Common Problems, Reflection Questions, and Links to Support Tools." Accessed on April 4, 2009 at: http://ctb.ku.edu/en/solveproblem/

Community Toolbox (2009). "Making Community Presentations." Accessed on April 4, 2009 at: http://ctb.ku.edu/en/tablecontents/sub_section_main_1029.htm

Education Commission of the States (2004). A Newcomer's Guide to the Policy Process. Accessed on April 4, 2009 at: www.communitycollegepolicy.org/html/toolkit/downloads/policy_primer.pdf

DUE Week 12: Team Policy Statement
DUE Week 12: Team Evaluation

Week 12: Looking Forward, Looking Backward

Visioning	**Reflecting**
What do the various community issues tell us? What would be possible next steps? What additonal work needs to be done?	What have we learned? What were the challenges? How did working with cases, community, teams go?

Heidi Rademacher
Revised Syllabus
May 9, 2009

Women in Art and Music at the Intersections of Science and Technology

© "Power Shower" 2008
Janet Bloch
http://www.janetbloch.womanmade.net/gallery.html

Class: Thursday, 5:00-8:00 (Pretend Room), Imaginary Building
Instructor: Heidi Rademacher, email: heradema@brandeis.edu
Office Hours: Thursdays 3:00-5:00 and by appointment

Course Description:
In ancient times, scientific and technological knowledge was carried and transmitted through artistic means. Poets, musicians and artists often doubled as architects, engineers, naturalists and anatomists, and many of these duel creators were women. However, following the Industrial Revolution the arts and sciences have been separated and polarized, leaving many people believing that each agenda has no impact on the other. In this course, we will seek to deconstruct that myth. We will examine not only the diversity of ways science and technology have impacted the arts, but specifically, the ways they have intersected with art, music and gender. We seek to find what roles science and technology have played in the lives of women who create art and women who are represented through art. We will ask what biases in knowledge and technologies, that claimed to represent progress, actually promoted male artists and musicians over women in these fields. Specific topics to be considered include women's roles in functional art; art as documentation; technology and artistic resistance; reproduction and images of the body; medicalization and representation of mental illness; instrumental construction and gendered technology; and the role of the mass media in a global society. As we work together through this semester, we will become the investigators of the hidden achievements of the many women who contributed to the arts through science and the sciences through art. We will examine their impact on society and move beyond gendered resources gain a greater understanding of art and music history.

Required Readings:
The book required for this course can be purchased at the campus bookstore. To help students with the costs of textbooks, the majority of readings for this course will be available online. Additionally, copies of the texts will also be on reserve in the library. Readings for this course will amount to approximately 25-50 pages per week. Please complete the readings *on or prior to* the date listed on the syllabus.

Required Book

- Carol Neuls-Bates, Eds., Women in Music (Northeastern University Press, 1996)

Course Requirements:
4 one-page reaction papers @ 5% each =20%
Midterm Project =20%
Final Project =30%
Class participation =30%

One-Page Reaction Papers:
You are required to write four one-page reaction papers throughout this term. Each essay will be a response to material presented for sections II-IX of the course. Responses are due the week immediately following the end of a section. For example, if you wish to respond to Riane Eisler's "Messages from the Past: The World of the Goddess," your essay is due no later than the beginning of class on week three. No late responses will be accepted. Your first response is due no later than week seven. However, if you like, you could be finished with all your responses by then.

Topics: You may respond to any aspect of the unit. Although you have freedom to voice your personal opinion, critique and/or relate to any part of the course materials and discussions, you must create a well-constructed response with both a thesis and contextual evidence (data, quotes, examples, descriptions, ect.)

Format: The object of these exercises is for you to create a concise response to the material presented in class. Therefore, responses must fit onto one 8.5 x 11 piece of paper. You may use any legible 11-point font, but your text must be double spaced.

Grading and Revision: If you wish, you may revise any of the one-page responses for a higher grade. You have two weeks from the date the response is returned to submit a revision.

Midterm and Final Projects: Midterm and Final projects, based on course material and/or discussions, will be described in detail several weeks before the projects are due. These projects are designed to give you a creative license to take material presented in the course and explore it in a way that is meaningful to you. Projects that have been successfully executed in the past include: artistic representations of the themes in Bessie Smith's "A Good Man is Hard to Find" (with an accompanying guide), poster presentations of how technology impacts female classical musicians, text analysis of reproduction and gendered themes in Frida Kahlo's "Henry Ford Hospital," and a power point presentation (and accompanying guide) of sex-stereotyping in jazz instruments. You will have a great deal of freedom to find a venue that best suits your interests. However, I must approve all projects one week prior to the due date.

Class Participation:
Collaborative work is an important element of this course. Therefore, participation is a significant portion (30%) of your grade. Class participation includes: 1) attendance, 2) timely completion of reading assignments, 3) thoughtful contribution to class discussions, and 4) participation in several in-class exercises.

If you are a student with a documented disability on record at the university and wish to have reasonable accommodations made for you in this class, please see me at the beginning of the term.

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Week 1.
I. Introduction. As we begin this course, we first must ask, 'is there a reciprocal relationship between the arts and sciences?' If so, how do the interwoven aspects of the arts and sciences impact women's experiences as artists and musicians? How have women in the arts been challenged by science and technology and how has science and technology been used by women to their artistic advantage? At times the answer to these questions will be clear. At other times we will need to deeply examine the arts as a political tool, a social sounding board, a representation of scientific progress and a model of technology.[1]

[1] The questions presented prior to each unit are designed to stimulate you and initiate reflection on the topic. While we might be able to answer some of these questions through the week's readings,

Class Exercise 1. Creation of a situational map. "The Intersections of Art, Literature, Music, Science and Technology."

Week 2.
II. Entering the Male Sphere: Comparing the Experiences of Women in the Arts and Sciences
How did women enter the male dominated realms of the arts and sciences? How were the experiences of female scientists and female artists similar? How were they different? How can women's experiences in the scientific sphere be examined as art and culture? How can women's experiences in the artistic sphere be examined as science?

- Rossiter, Margaret, "A Manly Profession" in Women Scientists in America: Struggles and Strategies (1984): pp. 73-99. **ONLINE**
- Neuls-Bates, Carol, "Should Women Perform in the Same Orchestra with Men" in (Carol Neuls-Bates, ed.) Women in Music (1996): pp. 202-205.
- Gaze, Delia, "Guilds and the Open Market" in (Delia Gaze, ed.) Dictionary of Women Artists (1997): pp. 28-37.

Week 3.
III. The World of Antiquity: Perspectives on Representation and Production in Functional Art.
How are women represented in ancient art and music? What is the function of Neolithic art? What roles did women play in production? Explore is the roles of "interpretation" and "point of view" in understanding art and music of the past.

Sappho (Ancient Greek Poet and Musician; ca. 625-570 BC)

- Eisler, Riane, "Messages from the Past: The World of the Goddess" in The Chalice & The Blade: Our History, Our Future (1987): pp. 16-28. **ONLINE**
- Rayor, Diane, "Introduction" from Sappho's Lyre: Archaic Lyric and Women Poets of Ancient Greece (1991): **ONLINE**

Week 4.
IV. The Challenges of Women at the Onset European "Fine Art." In what ways did society, anatomy, family, technology, tradition and culture limit the opportunities of women? What was considered "respectable" art and music for women to create/observe? How does this relate to scientific understandings of the time?

Sofonisba Anguissola (Italian Painter; 1532-1625)
Artemisia Gentileschi (Italian Painter; 1593-1652)

- Pendle, Karin, "Musical Women in Early Modern Europe" in Women and Music (2001): pp. 57-96. **ONLINE**
- Castiglione, Baldesar, "The Renaissance Lady" in (Carol Neuls-Bates, ed.) Women in Music (1996): pp. 37-39.

Class Exercise 2. Exploring themes of sex, gender and power through portraits and biblical illustrations.

Week 5.
V. Sexuality, Race and Gender: How Science and Technology Helped Disguise Resistance as Compliance How were women of color exploited in the name of "art" and "science?" How did women use the arts and sciences to resist inequalities? How did technology impact the Blues?... Native art?... the experiences of women of color both inside and outside artistic communities?

Saartjie "Sarah" Baartman (African slave, who's body was exploited as art, science and a sideshow attraction; 1789-1815)
Edmonia Lewis (African American Sculptor; 1845-1911)
Gertrude "Ma" Rainey (African American Blues Singer; 1886-1939)
Bessie Smith (African American Blues Singer; 1894-1937)
Marian Anderson (Opera Singer; 1908-
Betye Saar (African American Assemblage Artist; 1926-)
Faith Ringgold (African American Artist/Writer; 1930-)
Jaune Quick to See Smith (Native American painter; 1940-)

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discussions and activities, the majority of these questions require extensive thought and research. We will examine all of these questions again on the final class of the semester.

- Buick, Kristen P. (1995) "The Ideal Works of Edmonia Lewis: Invoking and Inverting Autobiography". *American Art*, 9(2), pp. 5-19. **[JSTOR ARTICLE]**
- Saar, Betye & Withers, Josephine (1980) "Betye Saar: Art". *Feminist Studies, 6(2),* pp. 336-341. **[JSTOR ARTICLE]**

Week 6.

- (2002) "The Hottentot Venus is Going Home". *The Journal of Blacks in Higher Education, 35,* p. 63. **[JSTOR ARTICLE]**

Class Exercise 3. Documentary: "The Life and Times of Sara Baartman: The Hottentot Venus." Return to the questions proposed at the beginning of the semester as you watch this film.

Week 7.

- Pendle, Karin, "American Women in Blues and Jazz" in Women and Music (2001): pp. 463-467. **ONLINE**
- Anderson, Marian, "An American Pioneer for Minorities" in (Carol Neuls-Bates, ed.) Women in Music (1996): pp. 273-277.

Class Exercise 4. Composition of 12-Bar Blues.

Week 8.
MINI PRESENTATIONS OF MIDTERM PROJECTS

Week 9.
VI. The Body, the Spirit, the Mind How did medicalization and psychology impact women in the arts? What opportunities were available? What new challenges did women in the arts face? How did new understandings about the body impact science?...art?...music? How did biases in medical and technical knowledge impact women's artistic experiences?

Elizabeth "Tex" Williams (African American Women's Army Corp photographer; 1924-)
Frida Kahlo (Mexican painter; 1907-1954)
Cindy Sherman (American photographer; 1954-)

- Udall, Sharyn. (2003). Frida Kahlo's Mexican Body. *Women's Art Journal, 24(2),* pp. 10-14. **[JSTOR ARTICLE]**
- Skim the WAS museum website, "WWar Two" http://userpages.aug.com/captbarb/femvets5.html

Week 10.

- Canadian AIDS Treatment Information Exchange, "Body Maps: Women Navigating the Positive Experience in Africa and Canada." Retrieved from http://www.catie.ca/bodymaps/index.shtml

Class Exercise 5. Body Mapping

Sign up for groups for collaborative research exercise

Week 11.
VII. Sex in the Symphony Do artistic/musical artifacts embody social values and biases in their own right? How are artifacts gendered? What challenges do gendered artifacts create for women in the arts? How can science and technology be used to create more egalitarian artistic communities?

Class Exercise 6. Collaborative Research

- Please skim the readings for your assigned group. Readings and detailed instructions on how to prepare for this exercise can be found at http://sicw.wikispaces.com/GRSTRademacher09

- Note: You **DO NOT** need to read all the articles.

Week 12.
VIII. The Global Media Age Today we live in a global mass media society. How is gender represented in contemporary art and music? How does advertising use art and technology? Is this harmful to women?

- Kathy Bruin, "Please Don't Feed the Models" in Bitchfest (2006). **ONLINE**
- Kimberle Crenshaw, "Beyond Racism and Misogyny" (1993). Retrieved from http://www.bostonreview.net/BR16.6/crenshaw.html

Class Exercise 7. Art, Advertising, Technology and Misogyny
Documentary: "Killing Us Softly 3: Advertising's Image of Women"

Week 13.- Break No Classes

Week 14.
IX. The New Resistance How do women continue to resist a sexist and misogynistic society through art, literature and music? How are art, literature and music used to create a more harmonious society? What roles do science and technology play in this new resistance?

Shahzia Sikander (Pakistani/American painter; 1969-)
Sandy Skoglund (American photographer, installation artist; 1946-)
Agnes Denes (American Environmental Artist;1931-)

- Green Museum, "What Is Environmental Art?" (2009). Retrieved from http://www.greenmuseum.org/what_is_ea.php
- Skim the guerillagirls' website, http://www.guerillagirls.com/index.shtml
- Jennifer Pozner, "How to Reclaim, Reframe and Reform the Media: A Feminist Advocacy Guide" in Bitchfest (2006). **ONLINE**

Week 15.
MINI PRESENTATIONS OF FINAL PROJECTS

Week 16.
Final Class. Concluding discussion. What have we learned? Where do we go from here?

Exploring the role of Reproductive Technologies in Gay-Parented Families in the United States

Katie Plocheck
Thesis Proposal
April 27, 2009

I. Thesis Topic

Over the past few decades, the number of lesbian and gay couples with children in the U.S. has steadily increased, establishing these groups as popular topics of academic inquiry. Many scholars, for instance, have examined constructions of gay familyhood, including divisions of labor and representation of the family in the broader public (Carrington). Others have researched gay individuals and couples without children—an endeavor which invariably illuminates the reality of the social environment in which they exist (Weston, Lewin). Yet while this research alone has been integral to the expanding corpus on gay studies, I intend to augment this literature by exploring how gay parents who utilize various reproductive technologies renegotiate and reconcile themselves among both the homosexual and heterosexual communities, including the values and belief systems inherent to them. My focus on the gay-parented family is important in this context, as I aver that it is within the family that overt intersectionality with hetero-hegemonic values and culture occurs.[1] Specifically, many anthropologists have claimed that traditional hegemonic understandings of family in the U.S. revolve around biogenetic[2] connections and blood (Schneider, 1981). Obviously, many other family structures—including those parented by gay adults—have leveraged vastly different kinds of binding ties, such as love, which I will later explore in more depth. Here, I seek to explore how gay-parented families that utilize reproductive technologies reinforce or resist "heteronormative"[3] formulas, and particularly, how biological ties function in their constituent lives.

Since 1981, when the first successful in-vitro fertilization case in the U.S. occurred, many advances have been made in the science and use of reproductive technologies. Hence, same-sex couples have ever-increasing options for bringing children into the world, including implanting one's sperm into a gestational carrier or planting one's sperm and another individual's egg into a gestational carrier, to name just a few. Cat Cora for one, a chef on the popular TV series Iron Chef, recently became pregnant with her partner's egg and a donor's sperm. Her partner, Jennifer, concurrently became pregnant using Cat's egg and the sperm of the same donor. This procedure was procured so the family could be as biologically linked as possible barring the act of procreative sexual intercourse. Such developing arrangements shed a new and complicated light on the role of biology in the creation of family, and they become rich terrain for

[1] This is not meant to suggest that gay individuals or parents otherwise exist in an altogether separate culture, only that the family serves as a significant representation of hegemonic cultural values and belief systems. Thus, this intersection becomes especially poignant.

[2] Biogenetic in this case means the generation of living organisms from other living organisms with a shared, genetic connection.

[3] I place the term "heteronormative" in quotes to note that there exists no normal or normative family, only an understanding of the values, beliefs and structures that should be leveraged in creating it.

understanding such emerging questions as: What are the meanings being placed on reproductive technologies? How do these meanings vary based on different technologies being used and how were the technologies chosen by the families?

II. Methodology

I propose to answer these questions by:

a) Reviewing literature to identify what is known about the numbers, experiences and the frameworks of interpretation which already exist

b) Conducting an in-depth ethnography among six,[4] same-sex couples who have conceived with the use of reproductive technologies in the two socially and politically distinct regions of Houston, TX and Boston, MA (in order to assess if the meanings they place upon them vary regionally). This includes in-depth, in person interviews conducted with the couples together and separately.

c) Couples will be recruited based on existing contacts, friendship networks and snowball sampling methods. I would like for my sample to be as demographically and ethnically representative as possible, as well as represent couples who have used a range of reproductive technological procedures—from "homemade" to more technologically advanced.

III. Background Information

To provide a preview of this research, let me give an initial sketch of the issues and findings I have encountered thus far.[5] The political and social contexts in which gay-parented families exist in the U.S. tend to discredit both their solidarity and validity as social entities. Even within this context, however, many gay partnerships and families have embraced marriage (socially if not legally) and family with open-arms, viewing it as a means to release the chains that restrict them to the social margins. In doing so, many critics both within the gay and straight communities have chastised gay-parented families for becoming "heteronormative" in the way they "do" family[6], including division of labor, parenting style, family organization and the types of values they uphold and inculcate into their children.

Even amid allegations of conformity, however, such families are considered an alternative form of kinship. They do not conform to what anthropologist David Schneider suggested is the dominant American model—those families who are based both on shared biogenetic substance and enduring, diffuse solidarity and who hail from a two parent, heterosexual model. Many critics of Schneider's findings claim, however, that this model of family is extremely limited when considering not only different sexualities, but

[4] These six couples will be evenly divided between three gay and three lesbian couples in order to dimensionalize the role that gender plays in these processes.

[5] This is in no way a comprehensive overview of literature that touches upon gay families or networks, but merely serves to expose the main issues and concerns that are commonly found in social scientific research around such issues.

[6] "Doing" family stems from Butler's definition of "doing" gender. In this sense, family is an institution that is culturally created and performed according to certain sanctions and proscriptions (Butler, 421).

different ethnicities and social classes to name only a few. Further, different types of kinship systems based on biogenetic ties, including matrilineal and matrilocal[7] exist in several non-U.S. societies, revealing that other configurations are indeed viable. Switching back to the U.S. however, much has changed in the social fabric of America in the time since Schneider wrote his seminal text, but as evidenced by the current social milieu that precludes gay individuals from certain rights available to hegemonic families, it is obvious this dominant model persists as the one that controls legislation and surrogacy rights, among other things.

Many different types of gay families (not necessarily gay-parented families) have generally been approached with this notion of alternative kinship in mind. Kath Weston conducted fieldwork in the San Francisco bay area in the early 90s to understand more clearly "chosen" families—those networks of love and care that gay individuals maintained in their lives, often, but not always, to replace the biological families who often rejected them. "Chosen families," according to the literature, are not imitative or derivative of the dominant model of American kinship, but interestingly, have gained momentum as a term only in the "context of the cultural belief in the power of blood ties" (Hayden, 45). United by choice and love, not by biological ties or the expectation of creating them, these families set themselves apart from the dominant model of American kinship and its often touted maxim that "blood is thicker than water." In this way, chosen families, by their very existence, weaken the traditional "bedrock" of American kinship—the foundation upon which the socio-cultural pillars of heterosexual, procreative relationships and biogenetic ties have been erected. Yet such enervation of the foundation may resemble small cracks more than gaping fault lines. If anything, this traditional foundation is gaining stability through non-traditional means.

While many family arrangements based on homosexual relationships have existed throughout history and gay communities still exist in dense networks, more insular and "traditional" gay family units have become increasingly prevalent. Even more, children conceived in the relationships are becoming more prevalent—an addition which provides arable ground for exploring the presence and implications of dominant familial frameworks. The increasing presence of the gay-parented family is no doubt correlated to more liberalized social climates, including the legalization of gay marriage in the states of Massachusetts, Vermont, Connecticut and most recently, Iowa and Maine. Interestingly though, as social climates become more open, gay parents appear to be shifting back to more traditional modes. While past literature claims that chosen networks of gay individuals are distinctive, gay parents, specifically, appear to be less distinctive and more similar to heteronormative families both in the way they perceive themselves and in the way they go about doing family.

My previous research has explored constructions and self-perceptions of gay-parented families to understand if they are, in fact, conforming to more dominant modes. What I discovered was that they considered themselves very normal and non-transformative, and indeed, they seemed to be. In fact, in considering themselves quite ordinary, many of them leveraged dominant American values such as love, solidarity and endurance to stake their claims as valid social, political and emotional entities. And while

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[7] Matrilocal: of or pertaining to residence with the wife's family or tribe; Matrilineal: inheriting or determining descent through the female line.

I agree that they are equally entitled to such common ideas, the way these notions function in broader society makes them unique. Many of the families I spoke to—especially those in more conservative regions—responded with a sense of defensiveness around their particular situation. Others claimed to go about life in a way that simply felt natural to them. When interviewing gay parents, anthropologist Nancy Levine discovered that the language they used varied in different scenarios. For example, when applying for adoption, gay parents claimed that they are likely to voice more conventional family values than they would in other social contexts (Levine, 380). In this way, it could be hypothesized that gay-parented families have learned to "adapt" to power constructs by naturalizing the very structures and identities that oppress them for the purposes of their own liberation. In other words, while they may claim they are acting with a level of agency, there are very limited formulas that they can apply in order to be deemed "normal."

Historically, reactions to this type of restriction has manifested in overt rebellions or in small to large-scale insurrections. Law theorist Brenda Cossman has discussed a different, more unorthodox approach to oppression, however. She has written that in order to gain legitimacy, gay individuals (not necessarily families) must de-eroticize, de-politicize and privatize themselves. This act of assimilation actually functions as resistance against the dominant model as they are emulating it in order to disband power. Hence, theorists claim that while gay-parented families may appear to be doing something very similar to hetero-hegemonic families, the way these similar notions function is distinctively different.

The role of reproductive technologies becomes very compelling within this space. The realm of technology, historically synonymous with authority and hegemonic power, *seems* to be (though further research will tell) yet another node of power that gay parents are leveraging in order to construct themselves as a family. Perhaps most striking is that gay parents, in desiring children, also desire biogenetic connectedness with their children—a characteristic reflective of the hegemonic system that seeks to dissemble them. Given this, it is necessary to understand the meanings and function of reproductive technologies in the lives of gay parents.

For some time, new and increasingly available reproductive technologies have offered hope to gay parents wishing to conceive. The spread and implementation of these technologies, however, have encountered stern opposition from conservative politicians and activists intent on reversing these liberalizing trends. Indeed, the use of reproductive technologies is only one obstacle in the rocky socio-cultural terrain gay parents must navigate daily in their struggle for legitimacy. In the past, many children in gay-parented families were products of heterosexual relationships. Now, however, many couples are making the conscious decision to bring children into the relationship together via reproductive technologies. What is compelling about such practices is not only a desire to have children, but that many of the narratives taking place around having children integrate desires to have a shared, biogenetic connection. Brian, a respondent from my previous research who resides in Houston, TX commented on the fact that he and his partner George would like to have another child, so their daughter Arya, who was conceived by a surrogate carrying George's sperm and a friend's egg could have a biological sibling. When asked why the biological connection was important, Brian claimed it was simply important that Arya has biological links in her life—links that, according to David Schneider, are exclusively reflective of heteronormative ideals. Certainly, gay parents can leverage such ideals without being conformist or heteronormative. In fact, their utilization of these technologies may on the one hand serve—however unintentionally—to destabilize the link between heterosexuality and parenthood, reinventing traditional kinship structures. On the other hand, they may also reinforce traditional, heteronormative ideals about the imperative to reproduce, as well as the imperative to have "normalized" familial structures. Or there may be something else altogether taking place. In my previous research around family construction, the use of reproductive technologies was often mentioned. Now, I am interesting in further exploring the use and meanings of various reproductive technologies. In doing so, it may also be interesting to explore adoption procedures and understand why parents opt for either adoption or reproductive technologies.

Much literature has already looked at the role reproductive technologies play in the construction of the family from a social perspective. *Queering Reproduction*, written by sociologist Laura Mamo, is one such book that examines who seek out and use reproductive technologies. Mamo claims that reproduction as an increasingly medicalized procedure in that the people who utlize them are seen as fertility patients not only for their physical conditions, but also because of their sexual identities. In doing so, she discusses how medical technology has the capacity to reconfigure social structures, individual subjectivities and notions of kinship. While similar to my own research inquiries, Mamo focuses more on the legal and ethical issues parents face when using reproductive technologies, as well as how they navigate the medical system and less on how such uses affect traditional kinship structures. Though written previously to Mamo, Corinne Hayden's argument extends Mamo's take on kinship by focusing on the implications that reproductive technologies have on gay, namely lesbian, family construction.

Research like this has provided a solid framework for exploring the themes I am interested in. Both Mamo and Hayden's work focuses exclusively on lesbian relationships, however, a purview which inevitably leads to a commentary on the role of the women in reproduction, as opposed to understanding how reproductive technologies are functioning in all types of "postmodern" family structures. While such an approach is necessary for operationalizing the role that gender may play in these processes, I seek to examine both genders. The dimension of gender is very important in this context. Beyond simple male and female sex, the meaning of reproductive technologies is most likely affected by gender roles. For example, women, due to their natural reproductive capacities (i.e. a womb), may have more access to less expensive and time-consuming procedures. Men, for example, may face more criticisms in the reproductive arena due to their reproductive incapacity and their role as "mothers."

In examining what reproductive technologies mean to gay parents, as well as how they function in the lives of gay parents, my research will add to the literature on gay-parented families by:

1. Exploring how genetics continue to construct both individual and familial identities in alternate kinship settings.
2. Understanding how important genetics are to identity construction, and how science and technology, more broadly, aid in the construction of "naturalized" family identities.

3. Offering an important discourse on what constitutes relatedness.
4. Examining the role that not only different sexualities, but also that different genders play in these above processes.

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Unlike many others that came before her, Benkov's study was one of the first to explore gay and lesbian parenthood. As a psychologist, Benkov explores the obstacles, including navigating antipathetic social contexts, that often ail the gay-parented community. In doing so, she discusses psychological treatment, social services, legal systems, as well as adds psychological commentary on the children that exist in such arrangements, challenging many mainstream assumptions.

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In this brief but comprehensive piece, Levine exposes the issues surrounding alternative forms of kinship, including how same-sex marriage and new reproductive technologies shake the traditional frameworks that often define dominant kinship structures. Though she never takes an overt stand regarding how such relationships and technologies function within society, she gives an excellent overview of previous theoretical work as well as documents variant types of kinship practices in other non-U.S. cultures.

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Queering Reproduction is one of the first books to look at the use of reproductive technologies among gay individuals—lesbians specifically—from a sociological perspective. Drawing on in-depth interviews with lesbians who have been or are seeking to become pregnant, Laura Mamo describes how reproduction has become a medicalized process for lesbians, who are, at the time of procedure, turned into fertility patients not (or not only) because of their physical conditions but also because of their sexual

identities. Mamo claims that this medicalization of reproduction has begun to shape queer subjectivities in both productive and troubling ways, both challenging the notion that heterosexuality is at the core of procreation while also reinforcing traditional, heteronormative ideals about motherhood and the social imperative to reproduce.

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Thompson's recent book draws upon an interdisciplinary approach—science and technology studies, feminist theory, and historical and ethnographic analyses individuals who have used reproductive technologies—to discuss the meanings of reproductive technologies in the lives of the people who use them. This includes an excursion of the political, technological and personal dimensions of such technologies. In what she calls the "ontological choreography" of reproductive technologies—the dynamics by which technical, scientific, kinship, gender, emotional, legal, political, financial, and other matters are coordinated—she uses the stories of patients to address questions that have generally been relegated to scientific fields only. Reproductive technologies, says Thompson, are part of a greater social tendency to transform social problems into biomedical questions, but that such biomedical phenomena can be used to see the resulting changes in the relations between science and society.

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Questions to consider while reviewing:

Is it clear and readable?

Does it make sense and tell a cohesive story?

Does the research seem compelling?

Is the background relevant and/or pertinent?

What other critiques or feedback do you have?

Framework for Critique

Believing: "Try to believe everything I have written, even if you disagree or find it crazy. At least pretend to believe it. Be my friend and ally and give me more evidence, arguments, and ideas to help we make my case better."

Doubting: "Try to doubt everything I have written, even if you love it. Take on the role of enemy and find all the arguments that can be made against me. Pretend to be someone who hates my writing. What would he or she notice?”

Culture and Conditions:
Toward Visual Depictions of Women in Science

The Culture of Science

That the culture of science has been antagonistic to women has been widely discussed and described in Science, Technology and Society and feminist literature (see for example Arditti 1980, [STS handbook], Rossiter 1982, Rossiter 1995, Ker Conway 1992). The path for women in science has been a difficult one, beginning with their exclusion from the academy, continuing through the refusal of the scientific establishment to acknowledge their accomplishments, to the continuing difficulty (at least for American women) to secure leadership positions when they choose to have families as well. Rita Arditti, in her 1980 essay titled "Feminism and Science," describes her own coming of age in the 1950s and 1960s culture of science. She only gradually came to the realization that women were not well served by the culture of science in the U.S.. Her attempts to call male colleagues' attention to inequities were dismissed and considered trivial compared with the ongoing Vietnam War, or met with comments that she was being "difficult" and "oversensitive" (p. 362). She argues ultimately that science suffers as a result of such narrow vision, and envisions science influenced by a feminist perspective:

> A feminist perspective in science would involve the creation of an environment that maximizes the development of minds and bodies... conversion of an exploitative "value free" technology to a commitment to humane technology...assessed by the impact it has in bringing meaningful change in social relations....
>
> Since science does not progress only by inductive analytical knowledge, the importance of imagination and emotion in the creative process should be obvious.... A feminist perspective would re-introduce and re-legitimize the intuitive approach. The benefits of this in terms of new knowledge might well be incalculable. (Aditti 1980, pp 365-366)

Why is it important that women who are not themselves practicing scientists understand the culture of science? Contemporary women are bombarded with messages from the science establishment (the pharmaceutical industry, agribusiness, and the medical profession) regarding modern miracles of science. Television commercials tout the benefits of everything from medication to treat "restless leg syndrome" to the vaccine against HPV (human papilloma virus, one cause of cervical cancer). Are women equipped to assess these cure-all promotions? Will they realize that the system itself accrues the benefits of these advances, which really offer only limited advantages to the average woman? Again, Arditti (1980) asserts that science requires a transformation to a "more humane" approach that takes into account the consequences and ramifications of its outcomes (p. 364); she credits her own "learning about the past and present position of women in science" with a realization that all women can and should contribute to this transformation (p. 363).

Statement of Purpose

In a previous inquiry,[1] I proposed that installation art – for several reasons, but especially by virtue of its focus on interaction between the art and the viewer – could be an excellent means for exposing women especially to the culture of science. This proposal stretches this possibility in two directions:

1. Illustrating concepts and conditions highlighted by Margaret Rossiter in her two-volume history of women scientists in America (Rossiter 1982, 1995).

2. Providing an opportunity for women to explore and discuss conditions and cultural situations that they experience throughout their own science careers.

For this expanded investigation, I have used Rossiter's histories as a definitive description of the culture of science from women's point of view. I have found both volumes to be invaluable for learning about and understanding the history of women in science. Indeed, the stories of women working in the scientific realm were limited prior to the publication of Rossiter's first volume of Women Scientists in America. Biographies of individual women scientists were few and far between (Rossiter 1995, pp 533-534) and focused on the uniqueness of the most famous women's skill and accomplishments. As a young woman entering college in 1982 to study biochemistry, I had read biographies of Elizabeth Blackwell and Marie Curie, but did not personally have any female role models, and was the first in my family to go to college at all. My mother was vocally opposed to my studying science – because she herself was not interested – and until I arrived at Connecticut College I had not had a female science teacher. What I

[1] "Installation art as a means to engage women in critical thinking about the cultural dimensions of science: A Guide." DiBona, Pam. 2009. accessed 4/27/09 at: http://sicw.wikispaces.com/file/view/PAD+GRST09+Guidebook.pdf

wouldn't have given to have been directed to Rossiter's first volume! Her description provides a seemingly 360-degree view of the world of science for women up to 1940, including conditions in multiple work venues, recognition (or lack thereof) of women's accomplishments by award committees and professional associations, and scientific training available to women during that period. Instead, all Biochemistry students were directed by our (male) professor to read James Watson's *The Double Helix* (Watson, 1968) as an illustration of "how science really works." Certainly not an inspiring example for female *or* male undergraduates.

Rossiter's subsequent volume, covering the period up to 1972, was published in 1995, a year after I began my graduate work in Environmental Science. My graduate program's faculty included no female professors; our sister Biology program housed only one woman at the time, who was marked by a failed tenure bid at Brandeis University, and thus not seen as a good model by any of the (obviously ignorant) graduate students. Again, I was not aware of Rossiter's valuable resource, but was inspired by Jill Ker Conway's compilation of women's autobiographies published in 1992, taking inspiration from the accomplishments of women scientists included in the volume as I worked to maintain my focus on finishing my thesis. This volume also provides insights into the conditions for U.S. women in science during the same period (roughly 1892 to 1980), drawing trends from among the seven women highlighted. Of course, the limited cases outlined by Ker Conway resulted in a history that was not nearly as comprehensive of an analysis as chronicled in Rossiter's two volumes.

It is in light of my own experience that I seek to help other women see the culture of science – current and past – for what it is, identifying not only the barriers to success but identifying means through which women have found fulfillment and success in the sciences.

Women in Science, 1840 to 1972

The history of women in science from 1840 to 1972[2] is characterized by discrimination in nearly all fields and work venues, and prejudice against women at multiple levels – concerns that the study of math and science was "unnatural" for women, and that any focus on arenas other than motherhood would undermine stable society and the greater good; once inside the door, women were marginalized, relegated to "women's topics" of study (e.g., home economics) or

[2] This section is drawn from Rossiter's introductions to her volumes (1982 pp xv-xviii; 1995 pp xv-xviii)

subordinate data-processing positions. Later, as women became more emboldened, the male-dominated system erected new barriers to participation: the tenure system, anti-nepotism rules (which nearly always kept the wives from employment rather than the husbands), and quotas.

There were many women who did persist and found fulfillment in scientific pursuits, though they tend to be invisible, not admitted into professional societies and unrecognized for even significant work by award-granting bodies. Rossiter (1982, p. xi) recounts her own "astonishment" when she first found the lists of women in old *American Men [sic] of Science* directories. She reveals the stories women who found satisfaction in playing some role in the advancement of science for the benefit of humanity, who raised families while providing critical support to theoretical work. Ker Conway (1992), in compiling several of these women's autobiographical narratives, provides some insight into why and how they stayed on in spite of often difficult circumstances. A few examples from those autobiographies:

- "Research is a passion with me…" (Margaret Morse Nice [1883-1974])
- "Trying to make it up to Father for being a girl…" (S. Josephine Baker [1873-1945])
- "…not [drawing] attention to my femininity." (S. Josephine Baker)
- Denying the existence of discrimination; supportive immediate supervisors (e.g., Margaret Mead [1901-1978] and Margaret Floy Washburn [1871-1939])
- Engaging in research topics – like child development – compatible with family life (Dorothy Reed Mendenhall [1874-1964])
- "I may have been underpaid, I may have occupied subordinate positions for many years, but my source of inspiration has always been direct." (Cecilia Payne Gaposchkin [1900-1979])
- "'The last man on Raratonga who knows anything about the past will probably die today. I must hurry.'" (Margaret Mead)

Visualizing Women in Science, 1840 to 1972

Several concepts and themes emerge for the purposes of turning history into experiential art, both the characteristics of successful women and the culture and conditions in which they operated:

Culture and Conditions	Characteristics
Marginalization	Persistent
Double-standard	Resistant
Underutilization	Self-confident
Exploitation	Extraordinary
Circumscription	Adventuresome
Containment	Innovative
Restriction	Passionate
Invisibility	Courageous
Frustration	Stubborn
Disappointment	Inspired

Figures 1 through 13 provide examples of how these themes and concepts can be illustrated visually. The examples include images taken from the internet as well as three-dimensional depictions developed by participants in a "visualizing women in science" workshop.

From this collection of visual ideas, I will create an installation, suitable for a museum of science, art museum, or public installation[3] that incorporates the following:

- Separate entries for men and women, with realms exclusive to each.
    - The female realm is characterized by:
        - Multiple adjacent and constricted, orderly workspaces suitable for data processing
        - Lower elevation, low ceilings
    - The male realm incorporates:
        - Separate, elaborate workbenches symbolizing Discovery, Theory, Experimentation, and Research, with free movement among the four.
        - Higher elevation, open skylights.
- Service windows connecting the two realms, through which women provide information, data, and other support to men.
- Barriers or gates restricting movement from the female to male realms, which provide females views into the male realm, labeled as:
    - Tenure system
    - Anti-nepotism rules
    - Unrealistic performance standards

[3] Potential venues include: the American Visionary Art Museum in Baltimore MD (www.avam.org), the MIT museum in Cambridge MA (www.mit.edu/museum), and the annual Burning Man festival in the Black Rock Desert of Nevada (burningman.com).

- Arbitrary standards for professional status
- Exclusive club and association membership

These gates can be opened only when the viewer/participant dons one or more characteristics of successful women scientists, represented by, for example:

- Marie Curie masks (extraordinary skill)
- Large hiker's backpacks (adventurous, persistent nature)
- Horse blinkers (stubbornness, focus)

Figure 14 is a concept map used to develop sketches of the spaces; Figures 15 and 16 are models of how these themes can be translated into three dimensions. Figure 17 is a draft floorplan for the installation, while Figures 18 through 20 are schematic views of the installation. Finally, Figure 21 is a photograph of a women's workspace at the Harvard College Observatory in 1892 which would provide cues for the female space.

Concurrent Workshops and Lectures

I propose several public workshops in association with the installation to facilitate discussion about the contemporary culture of science, in light of the past (as represented by the installation itself). These would include:

- Hands-on sessions with working female scientists. Graduate students taking part in a Spring 2009 Boston-area Graduate Women Studies Consortium course, "Gender, Race, and the Complexities of Science and Technology" took part in a pilot workshop in which they were asked to build spaces – using Legos, dollhouse furniture, and clay – to depict the culture of science described by Rossiter (1982, 1995). Figures 2, 3, 5, 7, 8, 10, 11, 15, and 16 are examples of their work. A similar project and discussion could be undertaken by working scientists asked to depict contemporary conditions for women in science.

- Discussions with science teachers about means for introducing girls to the topic of gender discrimination in the sciences. While this type of discussion has not been empirically shown to inspire girls to pursue science, girls who learned about discrimination as part of an intervention reported higher belief in the value of science, and increased self-efficacy in science (Weisgram and Bigler, 2007).

- Presentations by STS researchers about the implications and impacts of current science culture on women. Potential U.S.-based invitees are: Rita Arditti, Anne Fausto-Sterling, Henry Etzkowitz and/or Carol Kemelgor (see Etzkowitz et al., 2000), Pnina Abir-Am (see Abir-Am 2005, 2006), Virginia Valian (see Valian 1999), and others.

Learning from History

In 2005, Lawrence Summers, then President of Harvard University, sparked "the debate that won't go away" (Abir-Am, 2006) when he suggested at a conference that, since fewer girls than boys have top scores on science and math tests in late high school, perhaps genetic, rather than social, differences explain why so few women are successful in these fields. At the same time, I was between jobs, exploring the range of career options open to me, and began to investigate the possibility of working on promoting women in science. Unfortunately, solutions at the systems level were hard to find.

A Google search using the terms "women in science policy" produces some efforts to identify policies that perpetuate the male-dominated culture and conditions of science. First, the National Women's Research Council (2004):

Issue	Recommendation
1. Primary Education	*Encourage young people to seek career advice from both inside and outside the family; increase computer use from a young age, including for social purposes*
2. Higher Education	*Set a goal of 30% female faculty in fields where women are under-represented; augment student and young faculty support programs for both genders in higher education institutions*
3. Language and Framing	*Discuss careers in terms of "pathways" and not "pipelines"; increase sensitivity of biased language*
5. Gender Differences	*Encourage women to apply for funding and prizes in the sciences; put women on the judging committees for prizes; emphasize collaboration, quality of work, and mentorship as well as publication as criteria for success*

Following close on the heels of Summers' statement, the National Science Foundation funded a research project to survey the historical research on women in science for the purposes of identifying the true reasons for unequal representation (Abir-Am, 2005). The "guiding hypotheses" for the study were persistent tokenism, federal government agencies' failure to address the gender bias in universities (shown to be "more discriminatory than either industry or government"), lack of public attention to the issue of women in science between 1995 and 2005, poor media coverage of the topic, and lack of spokespeople and leaders for gender equality (Abir-Am, 2006).

In a recent online search, I was unable to identify any U.S.-based organizations calling for action on these policy recommendations. Instead, multiple organizations offer programs and encouragement for girls and women as they negotiate the still male-oriented culture of science—working within the current system. For example:

- University-based Women in Science programs at Stony Brook, Universities of Washington, Wisconsin, and Indiana; and Dartmouth and Purdue Universities.
- Programs administered by scientists' professional associations, including the Association for Women in Science (http://www.awis.org/about/missions.html), American Women's Medical Association (www.amwa-doc.org).
- Private efforts, funded by international corporations like L'Oreal (http://www.lorealusa.com/_en/_us/index.aspx?direct1=00008&direct2=00008/00001) and local organizations like the Cognitive Engineering Research Institute in Arizona (http://www.cerici.org/specialprograms/wins.html), the Saturday Academy in Oregon (http://www.saturdayacademy.org/Default.aspx?tabid=97), and the Lowell Institute in Massachusetts, which funds the Women in Science program at the New England Aquarium (http://www.neaq.org/education_and_activities/teacher_resources/school_programs/women_in_science_program.php)

I believe this focus, while helpful for the girls and women who are able to take part in such programs, is too narrow to make the systemic change needed in the larger arena of the culture of science.

Next Steps

This project has renewed my wish to promote awareness of the culture of science among women. In my environmental advocacy work, my mode of action includes calling for systemic change, complemented by personal contact with impacted parties; I see the workshops and lecture/discussions associated with the installation as an example of the latter approach. I am extra-motivated when there is an injustice to correct!

This thinking leads to several possible goals and next steps. I could, for example:

- Start a new nonprofit organization to advocate for changes in policy that encourage and accommodate women in science. The installation, and the workshops, could be a traveling program that launches the new organization by raising awareness of the issue.

- With an existing nonprofit organization as a fiscal agent, pursue and secure funding to execute the planned installation, then take a leave of absence from my current position to install the piece.

- Develop a virtual installation, a computer-generated setting available on the web, with associated messaging and opportunities for online discussion and advocacy.

Walking through this installation, women will be stepping into the shoes of their predecessors, experiencing their conditions, and feeling the impact of the culture in which they operated. My hope is that this experience will increase self-confidence in future women scientists, provide a perspective by which they can recognize remaining barriers and advocate for change, and show them that all barriers are made to be crossed.

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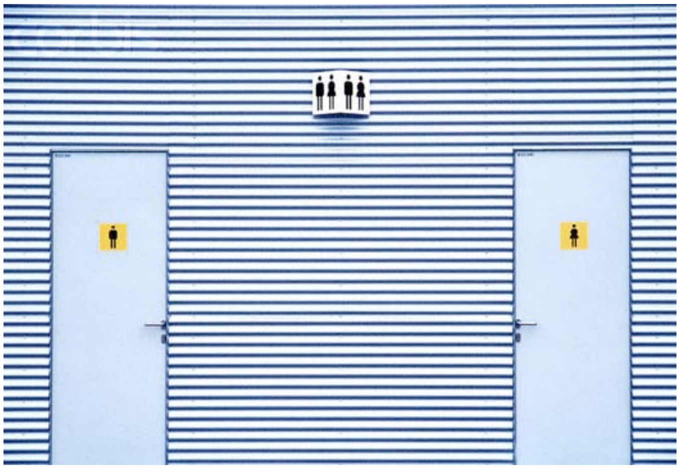

Figure 1. Marginalization, double-standard, segregation

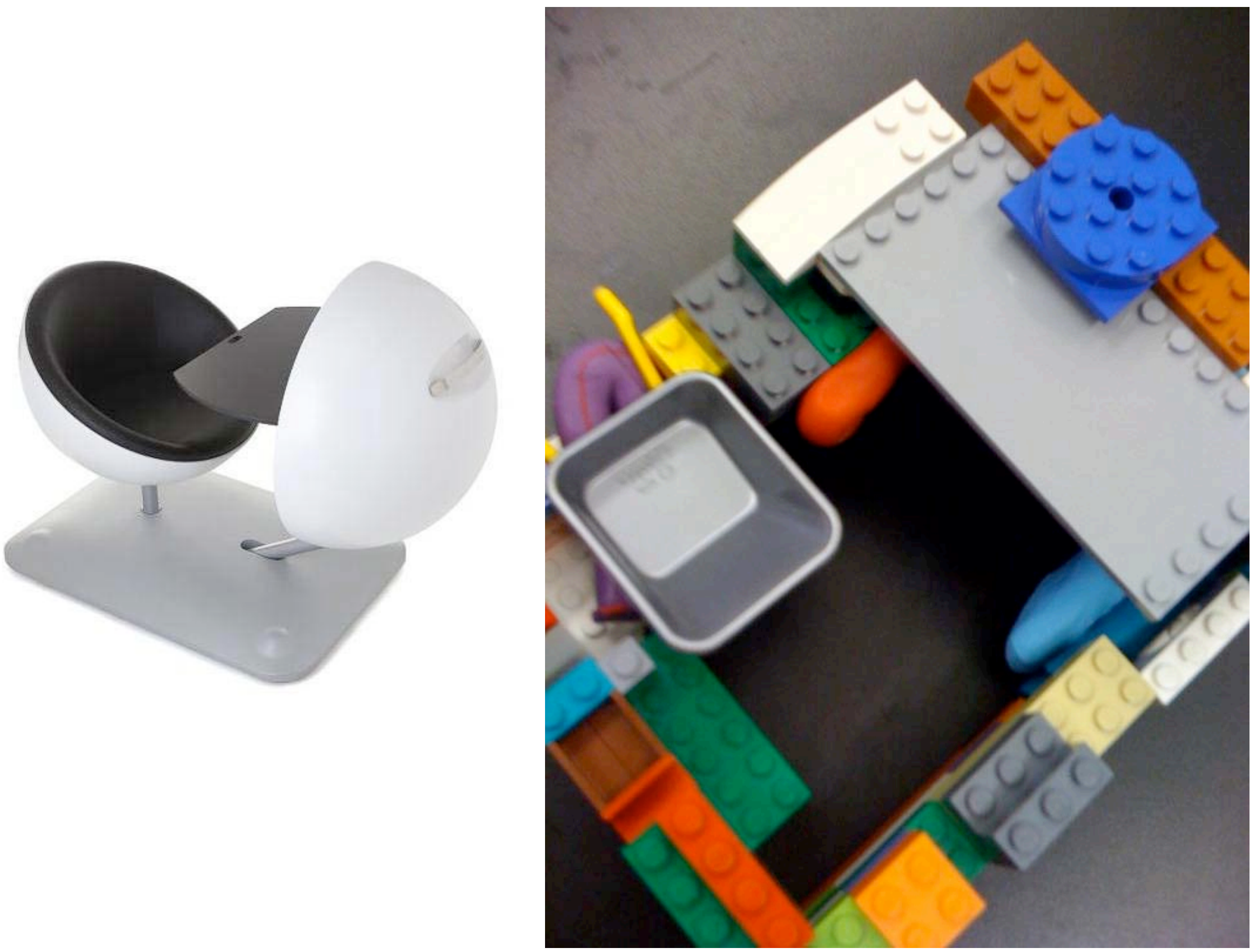

Figure 2. Containment/constraint

Figure 3. Circumscription

Figure 4. Underutilization

Figure 5. Restriction

Figure 6. Exploitation

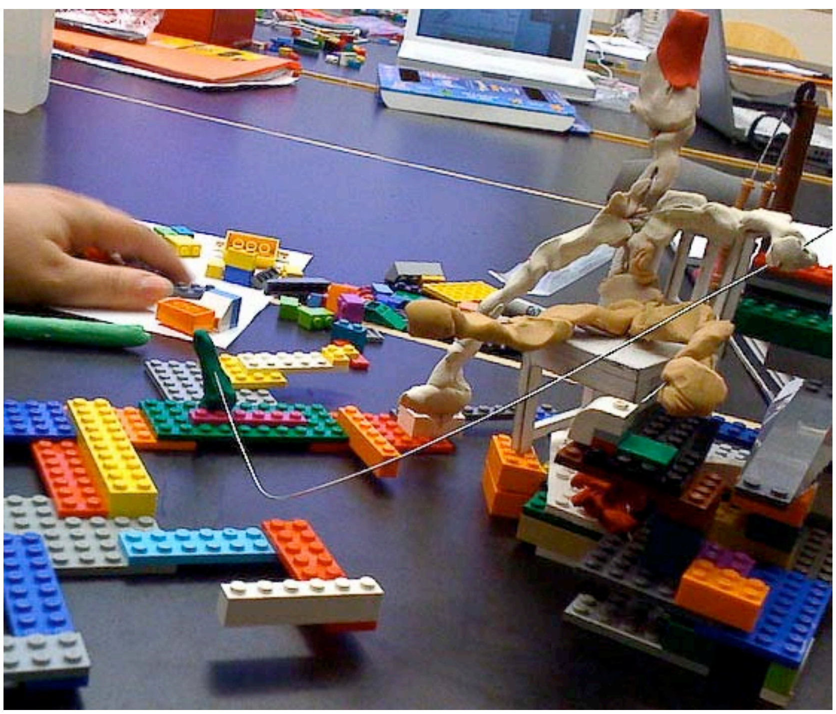

Figure 7. Frustration/Persistence (the large figure on the right is poking at the female figure who has entered the male realm.)

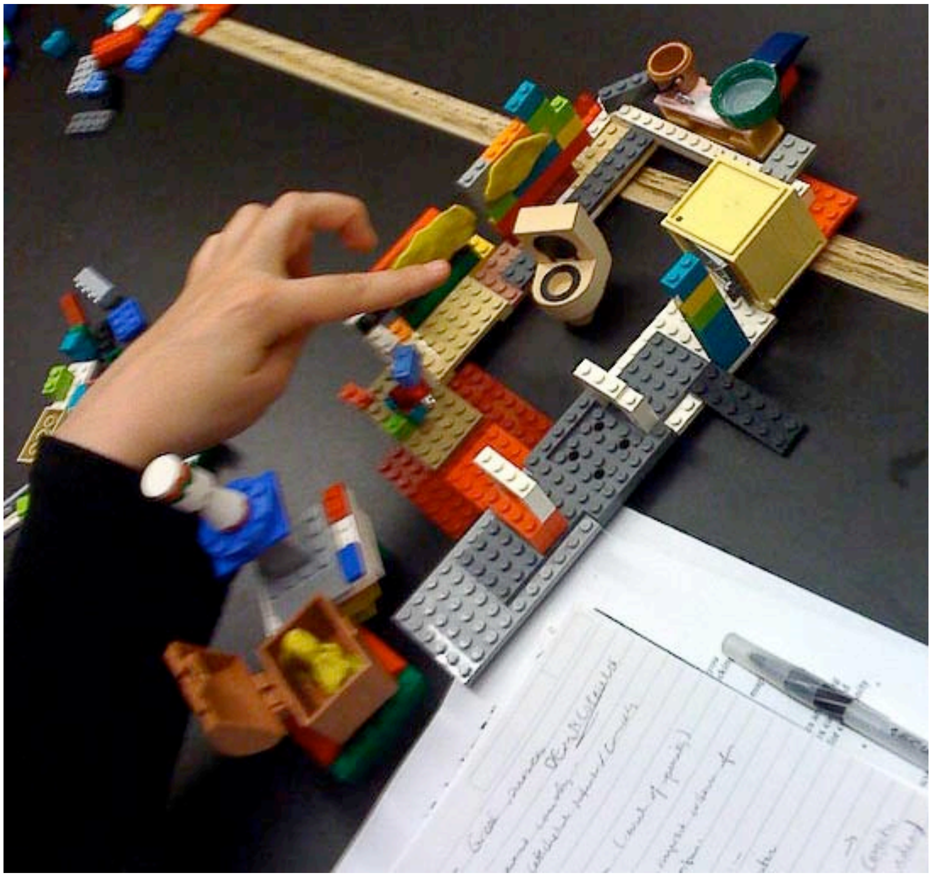

Figure 8. Invisibility (the artist is pointing to proposed wall murals that "[would be] difficult to see, but show women doing science.")

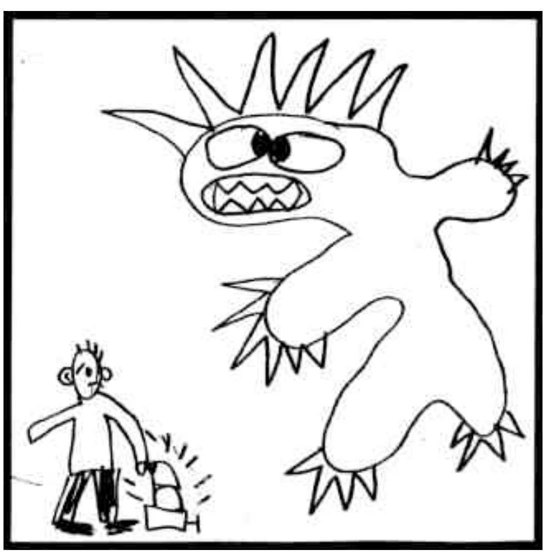

Figure 9. Courageous

Figure 10. Adventurous

Figure 10. Persistent, innovative (depicting hurdles and alternate pathways)

Figure 11. Passionate, inspired

Figure 12. Self-confident

Figure 13. Extraordinary (Marie Curie)

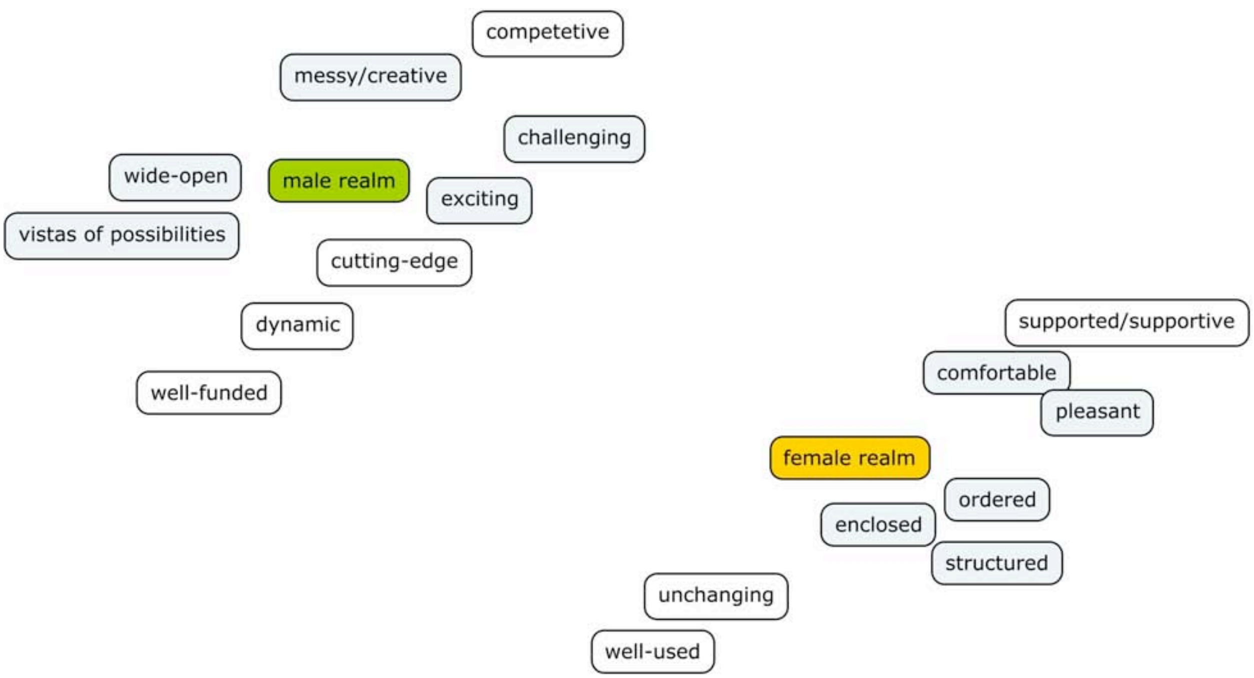

Figure 14. Concept map toward designing a space representing the male and female realms of science culture.

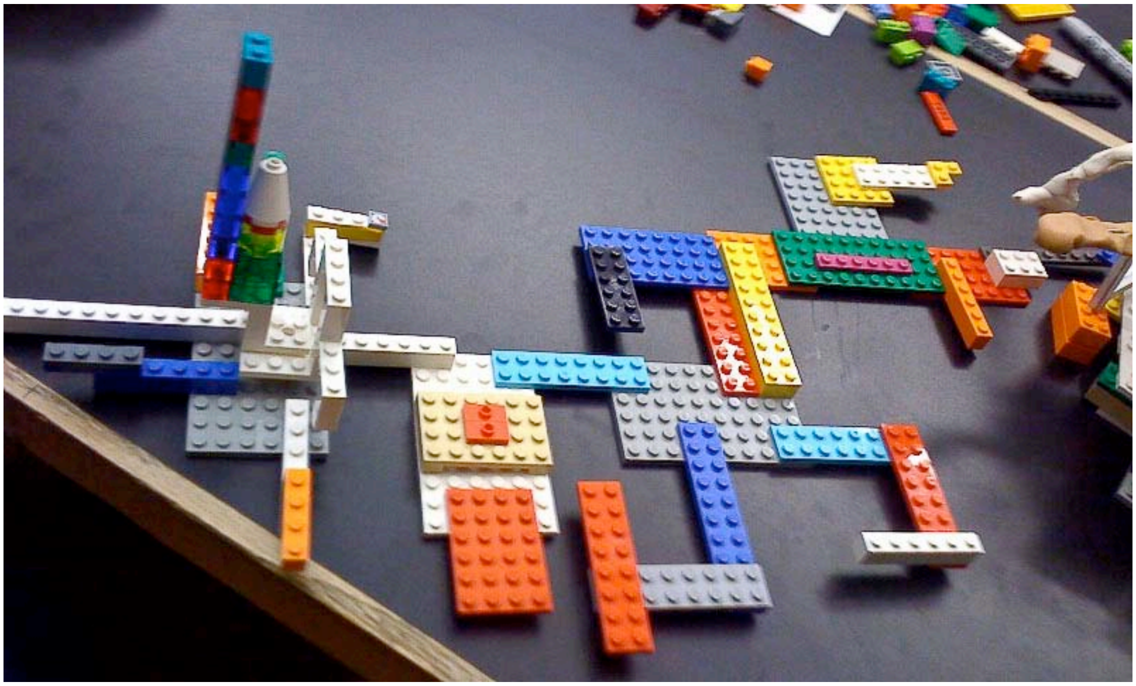

Figure 15. Male realm: freedom to move about and follow personal interests

Figure 16. Female realm: pleasant in itself (note the colors and soft walls), yet contained.

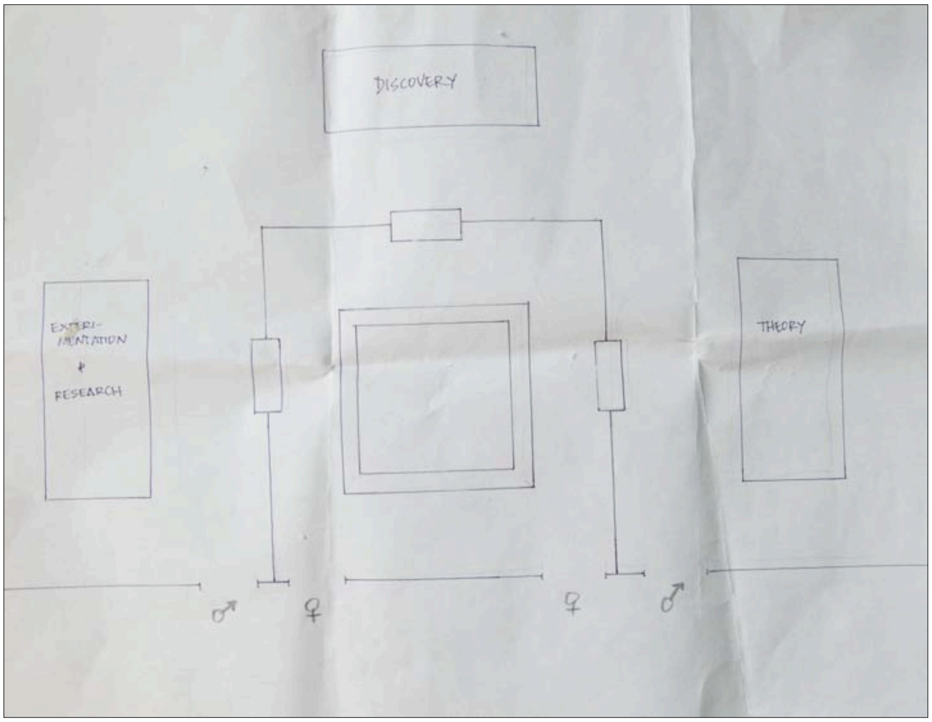

Figure 17. Proposed floorplan for the installation (not drawn to scale). The center box is the female realm, with windows and gates for glimpses of and restricted entrance to the male realms of experimentation and research, discovery, and theory.

Figure 18. Entrance to the female realm.

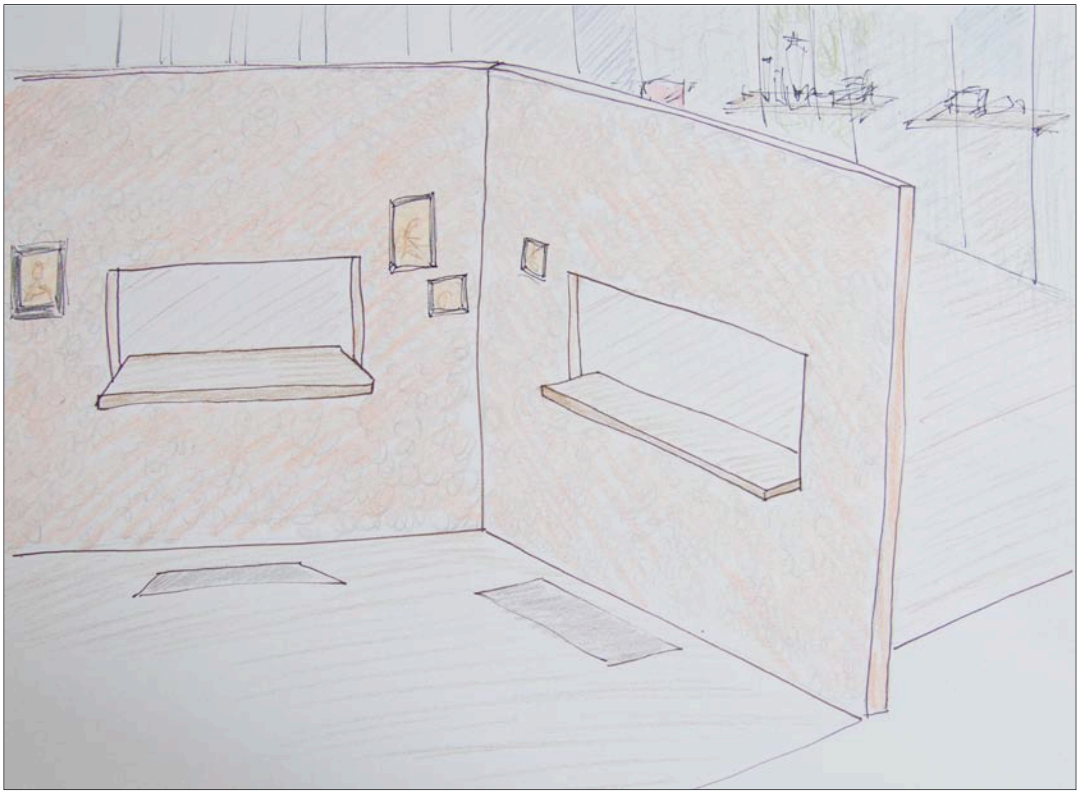

Figure 19. The female realm (cutaway view; note difference in floor elevations).

Figure 20. The male realm. Each window looks out on the larger world of science, in this example astronomy, biology, and physics/energy.

Figure 21. The Harvard Observatory employed women to classify stellar spectra. This photograph published in 1892 in *New England Magazine* (Rossiter, 1982 p.55).

Independent Power Projects Community Workshop

By Sally Paddock

****The time allotted for each session may vary depending on the total amount of time reserved for the workshop**

****Location of the workshop will vary and will be chosen in consultation with community members. Accessibility of the location and scheduled timing for the workshop will be considered and every effort will be made to ensure that the workshop is conveniently located and timed for as many community members as possible.**

<u>Introduction</u> (Read Aloud)

Critics of British Columbia's Run-of-River Independent Power Projects (RoR IPPs) have referred to the recent sell-off of the province's rivers as the "new gold rush;" they believe that the hundreds of water licenses that are being sold around the province will only lead to increases in the cost of power for residents of British Columbia, will strip the province from any future control over the rivers, are already undermining the processes of democracy, and will not fulfill the promise of renewable energy that the Liberal Party of British Columbia purports to be committed to. Proponents of the RoR IPP's, however, believe that the projects are the environmentally cleanest form of energy available and that they provide good business for the province. Political incumbents, media personnel, scientists and environmental activists are all currently involved in the decisions that are bringing rapid and irreversible changes to the citizens of British Columbia.

Communities and community members, however, have also played a vital role in decision-making regarding IPPs and need to continue to make their voices heard and to be involved with decision-making now and in the future. It is the communities and individuals of the province who will suffer or benefit from IPP decisions in the years to come. This workshop, then, is designed to bring community members of every age, gender, political persuasion and ethnic background together in an attempt to share ideas about IPPs and to work together towards common community goals.

The purpose of this workshop is threefold: 1) To understand how the proliferation of the Run-of-River (RoR) Independent Power Projects are affecting and will affect individuals, groups and various organizations within the community, including First Nations community members; 2) To learn how to better communicate our various interests, concerns, ideas, resources and skill-sets with each other; and 3) To generate ideas and plans of action regarding the RoR's in order to establish common sustainable goals which we can work towards as a community.

<u>Session One – Brief Introductions (15 minutes)</u>

Everyone will be given a chance to introduce themselves and to briefly explain what prompted them to come to the workshop. Depending on the number of participants, this may be done in smaller groups or with the larger group.

Session Two – Overview of RoR IPP's in British Columbia (30 minutes)

Presented by Sally Paddock (and other organizers TBA)

Presentation Outline: "Who Are the RoR Players?"

Government: Specifically the provincial government (Liberals); federal government tangentially involved

- BC Hydro has traditionally a publicly owned and operated its energy industry. Since 1994, it has provided $8.8 billion in revenue to the province for infrastructure, social programs, etc.
- In the 1980's, the gas division was sold but foreign ownership of any divisions of BC Hydro was prohibited. This changed when the BC Liberals came to power in 2001; Kinder-Morgan (U.S. Based) bought the gas division.
- Also in 2001, 1/3 BC Hydro sold to Bermuda based Accenture
- In 2002, power generation was the last segment of the publicly owned and operated company which was publicly owned and operated; this, despite 75% of BC residents opposing privatization of power (www.citizensforpublicpower.ca/issues/bc_hydro
- Personal Conclusion: The BC Liberal party supports the proliferation of the IPPs so vehemently, and against the public will, because there is a direct increase in party support from the corporate sector and the Liberals receive immediate funds from the water licenses ($5000 - $10,000). IPP's must sell energy back to the province at fixed rate for a fixed term (10-40 yrs) but after this period is up, what happens to the rivers, the energy and the IPPs is no longer under public control or subject to public scrutiny
- Currently, the electricity rate for residential customers in British Columbia is the 2nd lowest rate when compared with all major cities in North America

Scientists: Presumably engineers, fish and wildlife biologists, those conducting environmental assessments, and others.

- Very little information provided on scientific involvement or comment, that I have read about as a non-specialist. 49 Megawatt and less IPPs do not require an environmental assessment. (See the Ashlu "49-Megawatt" outcry)
- Each IPP is required to environmentally monitor their own project, but it is up to each owner/developer how they do that and who they contract to do it. There have been complaints.

Example: Miller Creek Oil spill, disappearing of Harlequin ducks and tailed frogs, an alarm malfunction which caused water depletion, stranding fish, etc.

- You will see on one of the documentaries in the resource section at the bottom that a proposed project developer reported that there was a barrier which migrating fish could not trespass, and the documentary-maker found some fish that had indeed passed over the barrier.
- The Navigable Waters Protection Act (NWPA), a required environmental assessment at a federal level, will be talked about later.
- Major Complaint/Concern: there has been no comprehensive, large-scale study on the environmental impact of these projects. Studies have only been done on a case-by-case basis (if at all). No such study is planned, either.
- Personal Conclusion: Cashing in on the “green” and “renewable” labels.

Industry: Any IPP developer, owner, administrator, etc.

- Some IPPs are very large: Plutonic, now 50% owned by GE; a major contributor to Liberal party
- Some IPPs are very small: Different First Nations have received grants from EcoTrust and Local granting agencies and municipalities; some IPP's are locally-based developers. These IPPs are generally proposing projects in the 5-10 Megawatt range; there is one IPP in a First Nation community that had previously been relying on a diesel generator.
- Personal conclusion: It is not a case of “public good, private bad”. But it is poorly planned and incapable of being monitored.

First Nations: As titled land owners, distinctly governed; as IPP developers themselves

- This is outlined in detail in the Jack Woodward Video, found in the resource section
- Major Points: No treaties have been signed in British Columbia, this is unique for Canada and the United States; it means that land and resources in the province have always been in dispute, and never legally appropriated by the province. Before 1951, it was illegal for First Nations members to approach courts. Now, more than 100% of land in British Columbia is involved in land-claims
- A 2007 case was the first to set a benchmark in the courts for how land-claim disputes would be settled. 45% of claimed territory was given in title which means full ownership and full rights

to economic potential were granted to the First Nation. 100% of the claimed land was granted for First Nation rights which include a requirement on the part of federal government to do wildlife assessments BEFORE projects.

- The Province of British Columbia, then, is knowingly selling land and water rights under penalty by the court. Taxpayers of the province will have to compensate in the future for the illegal acts of the Liberal government. The Supreme Court has said that the Liberals are "skating on constitutionally-thin ice"
- There is further confusion regarding which First Nations government body is responsible for negotiating leases or deals for land/water. Elected band councils usually just have rights, under the Indian Act, to make decisions that involve reserve land; Hereditary Chiefs usually have decision-making authority over off-reserve territories. For outside investors: Both the land and the party making the deal are in dispute and court decisions are only a matter of time.
- Personal Conclusion: This affects all British Columbia residents. IPP's are potentially a good thing for First Nations communities. But how the province is conducting many of the decisions is also illegal. Some First Nations have been intimately involved with other community activists in trying to halt projects. Others are participating in projects. There are over 200 different First Nations in BC.

Communities: Taxpayers, utility customers, voters, community infrastructure, whole municipalities, possible IPP owners, recreationalists, etc.

- All British Columbia residents are affected by this: taxpayers could potentially lose provincial income generated from BC Hydro and previously designated for infrastructure and social services; taxpayers could potentially have to compensate for the selling of illegal water licenses. Taxpayers could also become IPP owners themselves.
- Utility costs will likely rise, especially in the long-term; a certain percentage of "renewable energy" may be required in the future, but there is no reason why that can't be a public energy.
- Regional districts have lost their re-zoning authorities for IPPs since 2006. The Squamish-Lilloet Regional District (SLRD) rejected a proposal for the Ashlu project based on community and environmental concerns. In response, the Liberal government passed Bill-30 which took re-zoning authority out of municipalities rights. Community involvement and the democratic process was ignored and usurped. These decisions are also affecting recreationalists, roads are being destroyed, etc.

Activist Groups: Wilderness committees, kayakers (NWPA), concerned citizens, lawyers, first nations groups, journalists, etc.

- In the resource section, you will find many activist groups. There are many groups with titles like "Save Our Rivers," "River Alliances", etc. You will notice that many kayakers are involved as well. Yes, kayakers are concerned about their own recreational rights. But recreationalists in BC are also some of the most environmentally-aware and active groups of people in the province. Many become involved in their sports because they are low environmental-impact (climbing, skiing, etc) sports. Kayakers also play a politically important role
- Canadian NWPA: since late 19th century, the NWPA ensured that any proposed obstruction to navigable waters went through an approval process of the Ministry of Transport. The Ministry of Transport then was required to conduct an environmental assessment. Public consultation was required. Many projects over the last years and decades have been approved, but what is important was that proving that a waterway was navigable (hence, the kayakers) ensured that an environmental assessment and public announcement for any proposed project took place. Under new budget proposals (for purposes of economic stimulus plan), a proposal for changing the NWPA is included. The proposal says that it is at the discretion of the Minister of Transport to classify any waterway as worth protecting or not. Any bridges or dams or "bombs" do not necessarily need approval and therefore they do not need an EA. Public consultation would no longer be required for purposes of speeding up projects and cutting through red-tape.

<u>Session Three – Group Discussions (60 minutes)</u>

Before we split into groups, each workshop participant will first be given an opportunity to write down or gather their own thoughts about why they came to the workshop, why they are interested and/or concerned about the RoRs and how they feel the RoRs will affect them directly as individuals, and how RoRs will affect their communities, their province and future generations of the province.

Groups of 2-5 people will then get together and share their perspectives and discuss how their various perspectives are related (how they are similar and different). After about 20 minutes, participants will again gather and each group will be given time to share their various perspectives with the larger group.

Break (10 minutes)

Session Four – Abbreviated Research (75 minutes)

The purpose of this session is to allow participants time to research their personal and group interests and concerns by exploring ways that other communities around the province have responded to similar concerns. Based on the interests and concerns that were voiced in session three, workshop organizers will direct participants to various websites including those of political parties, non-profits, community groups, news agencies, databases, researchers and correlative international sites. Hard-copies of various articles will also be available. Participants will be encouraged, ahead of time, to bring laptops; extra laptops and materials, however, will also be available.

After a 45 minute research period, the larger group will then gather and each group will be given time to discuss any relevant material or ideas they came across. By exploring information, events and projects outside of the community, the hope is that ideas for local action can be sparked.

Session Five – Brainstorming Action Plans (60 minutes)

Based on the previous session, each group will again split up to discuss particular actions or goals for the local community regarding possible RoR projects in the area or in neighboring areas of the province. After about 15 minutes, the larger group will come together again to share ideas for action.

Depending on the size of the larger group, total ideas should be limited to approximately ten ideas. Again, depending on the size of each group and number of participants, each group must choose their top 2-3 ideas to submit to the entire group. There will be a brief discussion period devoted to outlining what would need to happen for each idea to be pursued or accomplished, including materials, financial resources, time commitment, number of people involved, etc.

Each workshop participant will then be asked to rate which ideas they feel they would personally like to pursue. Each participant will get three votes. They can apply their three votes to three different projects, all to one project, etc. There will then be a larger discussion about the resources, finances, commitment-level, skill-sets, etc. which will be needed to pursue the action that was rated highest. The aim of such a discussion will be to encourage workshop participants to pursue that particular action. Of course, as each participant becomes more familiar with each other and the various interests of the group, participants would also be encouraged to explore other actions apart from the chosen action of the workshop.

It is likely in a community of diverse interests and individuals that opinions will vary and that the highest rated action plan will not necessarily be popular with everyone. A trained workshop facilitator will be on-hand to help with this process but there will also be discussion on how the interests of each community member can, potentially, be met with the agreed upon project.

Evolving Resources for Research and Information

1.
http://www.ippbc.com/ The Independent Power Producers Association of BC

This is the website of IPP industry members. Personally, I would check out "Quick Facts" and "Members in the News" (contains articles of minor and major players, including local businesses and corporations like GE) in the Industry News tab. I would also look into seeing what it takes to join the association in order to get privileges to all of the site. Other points of interest, for me at least, are all the articles and attention on the site devoted to trying to subdue fears of the public. For me, that means that the public is doing a pretty good job of being heard.

2.
http://www.bc-creeks.org/index.php/ category/third-party-articles/ Scroll to video "Jack Woodward on Tsilhqot'in Nation" (June 12, 2008); other resources are also on this page.

I have found this video to be the best and most condensed introduction to many First Nations issues in British Columbia, including history, politics, law and civil rights. The speaker (a lawyer) is primarily reflecting on one recent case and how it will play a large role in the future of IPPs in the province. I found the video strangely riveting and informative. As a warning, though: it is a video of one guy speaking to a camera for about 45 minutes.

3.
http://www.ippwatch.info/w/
Contains a VERY brief history of the hydro industry in British Columbi, but it has good maps, statistics of active and licensed IPPs and other resources.

What I found most informative was, under Resources, the "Integrated Land Management Bureau" (Resource List); "Political Contributors Search List" (Political Resources); "Private Power Producers".

4.
http://www.citizensforpublicpower.ca/issues/water Another citizens group site containing valuable resources. The article on this page is a good summary of the issue. Specific attention should be made of the Ashlu Project in the Squamish-Lilloet Regional District. A quick online search of the controversial Bill 30 for British Columbia will elaborate on this issue.

The documentary at the end of this article "49 Megawatts" is an impassioned plea by a local guy at a citizens' meeting for the public to take a stand. The resources site on this website is also useful, especially the "Fact Sheet".

5.
http:// www.bc-creeks.org/index.php/tla-o-qui-aht-plan-green-power-project/#more-159
An example of a First Nations community initiating a small IPP in their territory.
Many other articles on this site as well.

6.
http://www.youtube.com/watch?v=WPtddgUqr4o&feature=related
http://www.youtube.com/watch?v=brHBeFb3qw0
If you want more aesthetic, personal, and shorter videos to watch, here's two of the many youtube videos made my local kayakers, regarding the Ashlu dam / Bill 30 issue. Approximately 5 minutes each. I recommend the first one.

http://www.youtube.com/watch?v=PTAdhi3wcsM&feature=related
You can compare the above videos with this Youtube video of Plutonic power which has entered into a 50/50 profit sharing agreement with GE for RoR IPPs.

7.

http://water.usgs.gov/waterwatch/

Website of the US Geological Survey, including information on real-time monitoring of water flow data in US rivers

8.

http://www.lwbc.bc.ca/03water/licencing/

This site outlines the required process for obtaining a British Columbia water license.

9.

www.raincoastresearch.org and www.adopt-a-fry.org

Websites describing the work of Alexandra Morton, a biologist who has been researching the wild pacific salmon populations off the the coast of British Columbia for years and who has been raising money to obtain a moratorium on coastal Atlantic salmon fish farms.

10.

www.bcliberals.com and www.bcndp.ca

Websites of the BC Liberal party and BC NDP party, respectively.

11.

www.icacan.ca

A website for positive social action, including information for youth leadership workshops.

12.

http://www.grmw.org/projects/monitoring.shtml#grmw

Website for the Grande Ronde Model Watershed which describes its water-monitoring procedures

Action-Plan Suggestions from previous workshops:

Acquire US Geological Survey flow monitors as a tool to publicly monitor water-levels of streams and rivers where RoR's are located.

Research what is required to acquire an IPP water license

Find out how local universities are participating in research, especially regarding a province-wide environmental assessment.

Research the process of obtaining a province-wide moratorium on new RoR projects. A comparison with the recent moratorium on salmon farms is a good starting point.

Discuss opponents: Who is going to “hate” the actions.

Research results of the privatization of other public resources or services, like health, education, etc.

<u>Action Plan Draft Example</u>: Public Flow Monitoring of RoR IPPs

Needs: Flow Monitors (Money); GIS Software and Technical Expertise (Money and Community Commitment); a website; educational workshops on how to read/understand the data (Money and Personal Commitment); access to IPP projects across the province to install flow monitors; legislation permitting the use of the the monitors; continuous financial support; networking with community and activist groups across the province to for the sharing of information and information interpretation.

On a Scale of 1 to 10: Nurses Assessing Patients' Pain in the Emergency Department

Research Proposal
Vanessa Lopes Muñoz

Gender, Race and the Complexities of Science and Technology
Peter Taylor & Anne Fausto-Sterling
May 11, 2009

Introduction

One of the challenges in health care is making sure everyone gets the best treatment available - treatment that is recognized to be the most effective for their condition or set of symptoms[1]. What treatment people should receive is established through scientific studies, which are translated into protocols in health care facilities, and applied by health care providers that assess patients' needs. Protocols do not always result in the standardization of how providers assess patients' needs. In this project, I examine two broad questions. First, how do nurses use protocols for pain assessment, the pain scale[2], as part of their overall assessment of a patients' condition and needs? Secondly, how do nurses use information that patient tells them about their pain alongside other sources of information and indicators of pain?

Pain management has become an institutionalized part of medical care. Health care providers are expected to identify and treat the pain of patients as part of providing quality patient care. Pain is currently among the more subjective of symptoms that are measured in the hospital because it involves the use of patients' self-report and physiological signs (such as increased heart rate). There are studies about patients' subjective experience of pain and the tension between patient experience and professional judgment, usually based on biomedical knowledge or professional ethics. These studies do not focus on the ways that healthcare professionals are also bound to follow standards or protocols that may serve to mediate this tension between patient experience and professional knowledge.

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[1] For discussion of quality of care, see Institute of Medicine reports, The Quality Chasm (1999) and To Err is Human (2001). For discussion of racial disparities in treatment, see LeVeigh et al. 2008; Smedley, Stilt, Nelson 2001; Heins et al. 2006; Pletcher 2008.
[2] Pain scales are used as a standard way to measure how much pain a patient is feeling. They require that health care providers ask patients to report their pain

Using Timmermans and Berg's (1997) conception of the use protocols by health care providers, I intend to examine how nurses use pain scales to assess patient pain. I focus on nurses because they are central to the initial recording of symptoms and the assessment of patients. There are two sets of questions guiding this study. The first set of questions is about how pain scales are used by nurses. What techniques do nurses use to assess pain? In what circumstances do they modify or change the protocol? The second set of questions focus on the interplay between responses to pain scales and other indicators of pain. What relevance do nurses assign to varying types of information about a patients' pain? Does this vary based on the patients' characteristics including their health status, or their perceived race, class, sex? How do nurses use pain scales to affirm or disaffirm other indicators of pain (or lack of pain)? What role does information about pain play in the overall assessment of the patient's condition?

To address these questions, I propose conducting an ethnographic study. I would observe interactions between nurses and patients in a hospital emergency room for a period of 9 months and interview 40 nurses about their experiences of dealing with patients suffering from pain.

In the following sections, I will review literature about the subjective nature of pain and the tension between patients' experience of pain and professional understandings of pain. I will outline Timmermans and Berg's conceptualization of protocols and explain how I will use this in my own work. I will then review my research questions and methods. I conclude by discussing the importance and possible implications of this project.

Literature

In this section I will review some of the literature on subjective experiences of pain and studies of the tension between patient experience and professional judgment, usually based on biomedical knowledge or professional ethics. The tension identified in these studies is typically framed in terms of differences in experience or knowledge. However, external standards, such as hospital protocols, often mediate this relationship. I propose using Timmermans and Berg's conceptualization of protocols to understand the way that nurses use pain scales to assess patients' pain.

There are numerous studies about patient subjective experiences with chronic pain and how these subjective experiences conflict or are negotiated within biomedical approaches to treatment. Studies of pain sufferers tend to analyze the ways that patients interpret their pain, and the use of narratives to cope with pain and maintain a coherent identity (Werner and Malterud 2003; Jackson 1992; Kleinman, 1992; Kotarba 1979; Kugelman 1999). In Jackson's (1992) study of patients at a pain clinic, she finds that patients found it difficult to reconcile their experience with pain with the pain clinic's language for explaining pain. These studies identify significant aspects of patient experience and the discrepancies that can occur between patient experience of pain and providers interpretations of pain. However, these studies are typically limited to chronic pain and pain conditions that have a contested status within traditional medicine.

There are studies about differences in the ways that providers and patients think about pain (Whelan, 2003; Eccleston, Williams, Stainton Rogers. 1997; AANA 2003; Nash. 1999; Haskard, DiMatteo, Heritage 2009). For example, patients suffering from chronic pain often do not want to think about their pain as untreatable or psychological (not having a physical origin) yet medical professionals often classify chronic pain in this way (Kotarba 1979). Providers may also have concerns about the risks of drug addictions resulting from pain medications that may make them reluctant to treat patient pain (Becker et al. 2009; Conrad and Schneider 1980).

Studies of biomedical models of measuring patients' pain experience tend to critique provider methods of assessing pain and the search for verifiable physiological causes. In an analysis of pain scales developed by the gynecological community to measure endometriosis pain, Whelan (2003) argues that these scales do not measure pain, but rather the patient's accounts of pain. Using the pain scale shifts attention away from the pain itself to the patient's accounts of pain. Rather than being an objective measure of patient conditions, Whelan argues, pain scales are products of the epistemological communities that create them.

Various studies elaborate on the tension between patients and health care providers. This tension is usually framed as being a conflict between patient experience and professional judgment, based on knowledge and professional ethics. By limiting these studies to differences in individual patients and individual sufferers, we may be missing other external factors that shape interactions between patients and providers. The external factor that I will focus on in this study is the use of mandatory protocols. Given the increasing bureaucratization of hospitals and national push for standardization of care, it is likely that provider relationships with patients are often mediated by standards and regulations that are external to individual differences in experience or knowledge. Looking more closely at the ways that providers use protocols and how they enter into the interaction between providers and patients may illuminate additional factors that shape tensions between providers and patients. In a study of two medical protocols

(ABC and FRAM-6[3]), Timmermans and Berg (1997) examine how protocols are used and maintained in work practice by actors with their own goals and trajectories. Building upon Bruno Latour's discussion of universality in science, they elaborate on the nature of the tension between new networks that occur when new protocols are adopted and existing networks. They also argue that numerous actors, rather than one central actor, are actively involved in implementing and maintaining the protocol, which many actors use and modify to meet their own goals[4].

Timmermans and Berg's study of protocols is useful in explaining how healthcare providers adapt protocols based on scientific knowledge into their existing routines. Pain scales have been widely used among health care workers since 2001 when professional medical associations recognized pain as the 5th vital sign and the national hospital accreditation agency mandated its use. While the protocol for using pain scales is an attempt to standardize information about patients' pain experience, pain scales are unique because input from patients are built into the protocol[5]. In this sense pain scales are both a part of work practice and also largely influenced by the interaction and communication between providers and patients. In this study, I intend to examine the ways that healthcare providers use pain scales and how they balance this protocol with other indicators of how much pain a patient is experiencing.

[3] ABC is an international protocol used in CPR. FRAM-6 is a protocol used to treat patients for whom chemotherapy has failed; this protocol is used for clinical studies with these patients.
[4] While most STS scholars have focused on scientists applying protocols, as Timmermans & Berg (1997) have shown medical providers can also function as applied users of science.
[5] We see this in the development and testing of new pain scales that can be used by non-English speakers, persons with cognitive disabilities and children.

Research Design and Methods

In order to understand how health providers use pain scales as part of a range of available information to assess pain that patients are experiencing, I will use participant observation and in-depth interviewing. I will conduct interviews with 40 registered nurses and observe for 9 months in one hospital Emergency Department.

Nurses are the focus of this study because they are central to the recording of symptoms and are first to assess patients when they enter the hospital. The interpretation and recording of information that nurses do are part of hospital records, which are shared with doctors and other health care providers, billing forms, and a patients' lifelong medical record.

The Emergency room is a useful site because patients often enter emergency departments suffering from a range of conditions; oftentimes conditions that providers are not initially aware of [6]. The influx of new patients may make collecting information about symptoms more salient in this setting than in in-patient units, clinics, or private physicians offices where patients and providers may have ongoing relationships or medical records. ER patients are disproportionately uninsured and may not have seen a doctor in a substantial amount of time. This is the case even in more affluent hospitals in urban areas.

I will observe at a hospital that is actively incorporating health care quality improvement efforts. To measure a hospital's use of health care quality efforts I will use rankings from a national hospital accreditation agency and a nationally recognized quality organization. Although not all hospitals are incorporating quality measures, all

[6] The exception to this is that there are "regulars," usually locals without health insurance, that go to Emergency departments regularly.

hospitals use some protocols in providing treatment. By observing at a hospital with programs to improve quality of patient care, I expect to have more opportunities to closely observe how nurses implement standardized ways of dealing with pain.

<u>Observation</u>

I will conduct participant observation in one hospital for 9 months. I will observe in an unobtrusive manner, mostly by asking nurses for permission to "shadow" them during a work shift. I will observe during day and night shifts about 3 times a week. I will try not to be intrusive while observing (Bosk 1979; Lareau 2003; Lofland and Lofland 1995; Weiss 1994). The days when I am not working will be spent writing detailed field notes. Field notes will be written within 24 hours of conducting an observation. When possible, I will request permission to collect relevant documents from both hospitals, including hospital policies and blank copies of administrative forms that health care providers use to document pain.

I will use participant observation to answer my research questions in the following way:

1. What techniques do nurses use to assess pain?

To study the assessment of patients, I will observe how nurses chart or record what patients tell them, whether and how they repeat the information back to patients, and how they talk to patients about their condition. For example, nurses may use language like, "since you are in considerable pain," "a lot of pain," etc. I will also look for the ways they respond to patients talking about their pain, do they demonstrate sympathy, sadness, concern, disbelief? I will observe what nurses say to coworkers or doctors about their patient. For example, when nurses speak with doctors about the patients' condition, how do they describe the patients' pain? Do they make reference to things they patient has told them, the appearance of the patient, the particular condition a patient has?

2. In what circumstances do nurses modify or change the protocol (pain scale)?
To answer this question, I will look for whether nurses read the pain scale script in its entirety. I will look for whether they add information or explanations, and if so, in what circumstances? What happens if a patient does not understand the question or is unable to reply?

My second set of questions seeks to understand the interplay between pain scale protocols and other indicators of pain. I will use observations to answer these questions in the following way:

3. What relevance do nurses assign to varying types of information about a patients' pain? And does this vary based on the patients' characteristics including their health status, or the nurses' perception of the patients' race, class, sex?
I will look for signs that nurses use pain scale information in their assessment of patients' pain. I will look for variability in how much weight nurses assign to different types of information. For example, some nurses may rely on patients' appearance while others may rely more heavily on patients' heart rate and yet others may rely mostly on what patients report as their level of pain. Are there cases when nurses veer from their norm? I will look for examples of nurses making exceptions or weighing information differently for some patients than others. I will look for signs that nurses are consistent in the way they assess pain for all patients. I will also look for counterevidence - signs that external

factors, such as time constraints, directives or opinions by supervisors, and regulations and *not* patients, lead to changes in their normal assessment of pain.

4. How do nurses use pain scales against or in support of other indicators of pain?
I will observe to see if when nurses speak about indicators of pain, such as patients' appearance, their illness, they also reference the patients' response to pain scales? I will look for instances when nurses are leaning in one direction, but use information for the pain scale to affirm or change their impression of a patients' pain state. For example, if a nurse believed a patient was in severe pain, but the patient states that they are only experiencing pain mild pain, how does the nurse assess the patient at this point? This may also come up in cases where family members may provide one narrative about a patients' pain and the patient may provide another account.

5. What role does information about pain play in the overall assessment of the patient's condition?
I will be attentive to instances when nurses make statements about the general condition of a patient. I will look for examples when pain is a part of this explanation and times when it is not. I will look for signs that whether or not a patient is in pain is central to a nurses' understanding of a patients' condition.

<u>Interviews</u>

I will conduct interviews during the last 2 months that I am conducting participant observations. Most interviews will be conducted in English because I expect that registered nurses will speak English fluently. Interviews with nurses will be conducted in their homes if possible. If they prefer to conduct the interview elsewhere, I will avoid conducting interviews in the workplace. Interviews will last about 90 minutes depending on how much respondents have to tell me. After interviews I will write field notes about the setting where interviews were conducted as well as the tone of the interview. All interviews will be recorded and transcribed verbatim.

In interviews I will ask nurses about experiences with patients that are in pain. I will ask about how they began using the pain scale, when it is helpful and when it is a hindrance. I will listen for signs that nurses identify with some patients, illnesses, or situations. I will ask nurses to tell me stories about patients that they believed were in serious pain, moderate pain, or not in pain at all. I will listen for cues about how they understood that patients were in pain. I will ask about times when they believed their coworkers handled a patients pain well and times when they believed coworkers were mistaken in their assessment of a patients' pain.

Analysis

I will code field notes and interviews for themes about how nurses assess a patients' pain. Events and themes that emerge from field notes will be used to guide interviews (Bosk 1979). I will use NVIVO software to code interviews and field notes. I will write analytic memos as I am coding interviews to see what themes are emerging (Lareau 2003).

Conclusion

This project aims to examine the ways that scientific knowledge, which gets translated into standards and protocols, is applied among health care providers.

Oftentimes standard procedures are developed to create uniformity of treatment in different locations and for different people (Timmermans and Berg 1997). In the case of pain treatment, this is an especially delicate task because medical protocols such as the pain scale are explicitly incorporating patients' subjective experience. By conducting observations in a hospital emergency room and interviews with nurses, I intend to explore the ways that providers use different types of information, including pain scales, to assess patients' pain.

This work may inform policies about how to improve standards and protocols that are used in hospitals. I may find that there are certain aspects of protocols that make them difficult for healthcare providers to follow or that protocols are not well integrated into the natural interaction between providers and patients. At a time when there is increasing awareness in differential treatment, often resulting in African Americans and other minority groups receiving inferior care, it is critical to understand how protocols that are intended to standardize care are actually used by health care providers. Standardizing best practices have been proposed as a solution to the health disparities problem, yet we know very little about how health care providers use protocols in the midst of complex interactions with patients, workplace demands, and expectations of their coworkers. Understanding how healthcare providers use protocols as they make decisions about how to treat patients may provide insight into different factors that structure differences in care.

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Appendix.

<u>Interview Guide</u>

Tell me about how you became a nurse?

Probe about nursing school – surprises? Things you really enjoyed.

Probe about how they began working in this particular hospital.

Walk me through what you do when you are assigned a new patient. Who assigns it? How do you start? When you walk into the room – what's usually on your mind? What are your first steps.

Do patients often come in for pain? Tell me about that.
Can you think of a time a patient came in with a lot of pain and you felt like you really handled it well. Tell me about that.

Probe: What's it like for you when a patient is in pain.

Think back to the last patient you had who was in a lot of pain. Tell me about that.

Can you think of a time when a patient came in with a lot of pain and you felt like things did not go as well. Tell me about that.

If they mention treatment of pain, ask them how they treat pain. Do they need doctor to order medication? How do they get meds?

Do you ever work in pediatrics? Tell me about that.

Probe about family members of patients.

Give them vignettes of patients with different types of pain – ask them questions like: Some E.D. get patients where they don't know what's wrong with them.

Can you think of a time when you were in pain while at work. Tell me about that.