## **Notes**

This kritik says that claims about neutral and unbiased objectivity in science are bad. It is a critique of *epistemology*-the study of the standards by which we judge what counts as good evidence or proofs of phenomena. The alternative is situated objectivity – also sometimes called strong objectivity – which is a recognition that our view or observation of phenomena is never complete and that all objective truth claims come from particular perspectives grounded in historical and social conditions.

Key words:

Objectivity: Claiming to know something. Two kinds:

1. Neutral objectivity: the view from nowhere and assumption that who does science does not matter for the outcomes of that science. Belief in scientific neutrality and autonomy from social conditions is necessary to a belief in absolute objectivity.
2. Situated/strong objectivity: the idea that perspective matters for what we know. Workers, for example, may know more about the conditions of global capitalism than their bosses. Different historical actors in different periods have different perspectives on the nature of atoms.

Theory-ladenness: The idea that all “data” is interpreted through theories (prior assumptions and worldviews)—no epistemology is without theory-ladenness, so no epistemology can claim to be better than others.

Constructivism: The idea that reality is somehow a construction, rather than being pre-given. Pre-given means that reality is always the same and unchanging. Constructivism says that reality changes and materializes (like the sedimentation of rocks over time).

Materialism: The idea that there is a material reality that is based in the smallest units of things (we know the world exists because there are atoms and quarks).

Empiricism: Reality is available to our observation.

Realism: the belief in materialism AND that matter can be known through empirical study.

Positivism: An extreme belief in empiricism that puts emphasis on quantification

Mediated: The idea that we can’t just directly observe something—we have to do it through an instrument, apparatus, or another way of knowing something. Even our eyes mediate what we can know about the external world.

Underdetermination: an idea from a dude named Quine. Underdetermination means that multiple theories can explain a single phenomenon, so we can’t say that one of those theories is more true of the others.

Determinism: When we make causal claims about root causes, we are being deterministic. X definitely leads to Y.

Naturalism: A belief in science that explores the natural world. Kind of like realism.

## **Scientific Objectivity Kritik 1NC**

### The affirmative’s investment in scientific objectivity obscures partial and contingent knowledges, privileges intentional agents and knowers, and fulfills the political agenda of humanism, making it impossible to understand the relationality through which the world materializes

Haraway, 1991 [Donna, historian of science and Professor at the History of

Consciousness Board, University of California, Santa Cruz. She received

her doctorate in biology at Yale, *Simians, Cyborgs, and Women*, pg 3-4 ]

The essays show the contradictory matrices of their composition. The examination of the recent history of the term sex/gender, written for a German Marxist dictionary, exemplifies the textual politics embedded in producing standard reference-work accounts of complicated struggles. The Cyborg Manifesto was written to fmd political direction in the 1980s in the face of the hybrids 'we' seemed to have become world-wide. The examination of the debates about 'scientific objectivity' in feminist theory argues for a transformation of the despised metaphors of organic and technological vision in order to foreground specific positioning, multiple mediation, partial perspective, and therefore a possible allegory for feminist scientific and political knowledge. Nature emerges from this exercise as 'coyote'. This potent trickster can show us that historically specific human relations with 'nature' must somehow - linguistically, ethically, scientifically, politically, technologically, and epistemologically - be imagined as genuinely social and actively relational; and yet the partners remain utterly inhomogeneous. 'Our' relations with 'nature' might be imagined as a social engagement with a being who is neither 'it', 'you', 'thou', 'he', 'she', nor 'they' in relation to 'us'. The pronouns embedded in sentences about contestations for what may count as nature are themselves political tools, expressing hopes, fears, and contradictory histories. Grammar is politics by other means. 'What narrative possibilities might lie in monstrous linguistic figures for relations with 'nature' for ecofeminist work? Curiously, as for people before us in Western discourses, efforts to come to linguistic terms with the non-representability, historical contingency, artefactuality, and yet spontaneity, necessity, fragility, and stunning profusions of 'nature' can help us refigure the kind of persons we might be. These persons can no longer be, if they ever were, master subjects, nor alienated subjects, but - just possibly - multiply heterogeneous, inhomogeneous, accountable, and connected human agents. But we must never again connect as parts to wholes, as marked beings incorporated into unmarked ones, as unitary and complementary subjects serving the one Subject of monotheism and its secular heresies. We must have agency - or agencies - without defended subjects.

### And space science is value-laden and speculative – the notion that it can be controlled ignores sources of uncertainty and human error that are ubiquitous to science – perm can’t solve

Daley & Frodeman 2008 [Erin Moore, Robert, “Separated at Birth, Signs of Rapprochement: Environmental Ethics and Space Exploration,” *Ethics and the Environment*, 13 (1), Spring, 135-151]

By 1982—that is, after a large number of landings on the Moon, Mars, and Venus—COSPAR determined that the quantitative measure of risk it had been using (an assessment of the probability that life will replicate on a given planet or celestial body) was based on highly subjective speculation. In response, COSPAR adopted qualitative standards of spacecraft cleanliness based on the different life-detection priorities for planetary bodies. Different types of missions require increasing levels of cleanliness: a fly-by mission has less contamination risk than a lander or sample-return mission, and a mission to Mars or Europa would be held to higher standards than one to a planet deemed unlikely to harbor life (for example, Venus). **This shift in perspective highlights the nature of speculative science:** outside the controlled environment of the lab, science progresses through what is essentially refined guesswork. The **science of space travel makes assumptions** about acceptable levels of risk, but risk (from localized effects to planetary destruction due to human error, technical malfunction, or unanticipated factors) is ubiquitous. How much risk is too much? Rather than being solely addressed through disciplinary science, **risk evaluation involves a consideration of our values**, including our notion of **progress** and the **relationship** between humans, the environment, and technology. Policy makers have long sought scientific certainty to guide legislation, but it has become increasingly obvious that **policy also depends on** a complex and ambiguous network of human **values**, political capital, and public opinion—**issues that cannot be disaggregated from each other**.

The aff’s limited understanding of epistemic validity trades off with situated knowledge and means there is no value to human life—our alternative epistemology saves us from extinction

Code, 2003 [Lorraine, Distinguished Research Professor Emerita of Philosophy at York University in Toronto Canada and a Fellow of the Royal Society of Canada, “What is Natural About Epistemology Naturalized?,” ed. Lynne Hankinson Nelson and Jack Nelson, *Feminist Interpretations of W.V.Quine*, pg 182-3]

Human beings are more—and other—than information processors and problem-solvers; nor can all of their natural epistemic practices be adequately understood as multiples and/or elaborations of these activities. Arguments to the effect that human survival attests to the reliability of “our” perceptual-inferential processes can count at best as the Wrst word, certainly not the last.35 As long as survival, both qualitative and quantitative, varies so widely across the human species, and as long as possibilities of claiming epistemic authority on the basis of information processed and inductions successfully performed are so unevenly distributed, there is more to be told about who “we” are. Hence I am suggesting that naturalism cannot deliver on its promise to relinquish a prioricity in favor of a return to natural cognitive activity if it grants uncontested pride of place, in its study of natural knowledge, to behaviors studied in the laboratory. For, although human beings could not survive were they unable to process information competently, were this all that they could do, the quality of their survival would at best be dubious. When naturalism represents human subjects as essentially solitary, even if reliable, processors of information, the contestability of its constructs is especially apparent. For in individual isolation human survival would not be possible. The abstract individual who figures, implicitly, as the knower is one such construct, a faceless, dispassionate, infinitely replicable “individual” who knows only when he is successful in suppressing interdependence, affect, and meaning, and indeed all aspects of his individuality.36 What Is Natural About Epistemology Naturalized? 183 It is neither ideology nor fancy that prompts natural historians (in Lovibond’s sense) to emphasize the fundamental interdependence of human existence, but reasonably invariant features of the biology of human procreation and maturation. Hence individualism sits uneasily with naturalism. Now, naturalists might maintain that human maturation follows a natural trajectory away from interdependence, toward autonomy, selfsufficiency, and a fully realized individualism of the sort that feminist and other postmodern thinkers have discerned in the man of reason whose works Western philosophy has principally studied.37 But such a vision is plausible only if one overlooks the cognitive interdependence that is an inescapable feature of being born a human infant and living in a culture or social group without which an individual, strictly defined, would be unable even as an adult to know enough to survive. A project of studying natural knowledge-making has, from the outset, to guard against foreclosing on equally natural sources and resources that could enhance its explanatory potential. There are ways of naturalizing with effects less unnatural than those that Quine-derived naturalism yields.

Our alternative is to reject the affirmative’s understanding of objectivity as stemming from neutral and rational observation.

### **Our framework is epistemological. We don’t reject all objectivity – just the kind that claims to be detached and neutral – the alternative is a non-deterministic, situated objectivity**

Haraway, 1991 [Donna, historian of science and Professor at the History of

Consciousness Board, University of California, Santa Cruz. She received

her doctorate in biology at Yale, *Simians, Cyborgs, and Women*, pg 189-90 ]

So, with many other feminists, I want to argue for a doctrine and practice of objectivity that privileges contestation, deconstruction, passionate construction, webbed connections, and hope for transformation of systems of knowledge and ways of seeing. But not just any partial perspective will do; we must be hostile to easy relativisms and holisms built out of summing and subsuming parts. 'Passionate detachment' (Kuhn, 1982) requires more than acknowledged and self-critical partiality. We are also bound to seek perspective from those points of view, which can never be known in advance which promise something quite extraordinary, that is, knowledge potent for constructing worlds less organized by axes of domination. In such a viewpoint, the unmarked category would really disappear \_ quite a difference from simply repeating a disappearing act. The imaginary and the rationalthe visionary and objective vision - hover close together. I think Harding's plea for a successor science and for postmodern sensibilities must be read to argue that this close touch of the fantastic element of hope for transfonnative knowledge and the severe check and stimulus of sustained critical enquiry are jointly the ground of any believable claim to objectivity or rationality not riddled with breath-taking denials and repressions. It is even possible to read the record of scientific revolutions in terms of this feminist doctrine of rationality and objectivity. Science has been utopian and visionary from the start; that is one reason 'we' need it. A commitment to mobile positioning and to passionate detachment is dependent on the impossibility of innocent 'identity' politics and epistemologies as strategies for seeing from the standpoints of the subjugated in order to see well. One cannot 'be' either a cell or molecule \_ or a woman colonized person, labourer, and so on - if one intends to see and see from these positions critically. 'Being' is much more problematic and contingent. Also, one cannot relocate in any possible vantage point without being accountable for that movement. Vision is always a question of the power to see - and perhaps of the violence implicit in our visualizing practices. With whose blood were my eyes crafted? These points also apply to testimony from the position of 'oneself'. We are not immediately present to ourselves. Self-knowledge requires a semiotic-material technology linking meanings and bodies. Self-identity is a bad visual system. Fusion is a bad strategy of positioning. The boys in the human sciences have called this doubt about self-presence the 'death of the subject', that single ordering point of will and consciousness. That judgement seems bizarre to me. I prefer to call this generative doubt the opening of non-isomorphic subjects, agents, and territories of stories unimaginable from the vantage point of the cyclopian, self-satiated eye of the master subject. The Western eye has fundamentally been a wandering eye, a travelling lens. These peregrinations have often been violent and insistent on mirrors for a conquering self - but not always. Western feminists also inherit some skill in learning to participate in revisualizing worlds turned upside down in earth-transforming challenges to the views of the masters. All is not to be done from scratch.

# **Links**

## **Objectivity link: Space**

Scientific knowledge about space is theory laden – observation is not directly accessible

Weinart 2010 [Friedel, prof of social sciences and humanities, University of Bradford (UK), “The role of probability arguments in the history of science,” Studies in History and Philosophy of Science 41]

5. Priors and likelihoods This analysis of the use of probability arguments in the Copernican and Darwinian models respectively harbours some interesting philosophical lessons. Copernicus and Rheticus had no new observational data to offer in support of the heliocentric view. They had no observational evidence in support of a rotating earth. Darwin had no direct evidence in support of natural selection, although evolutionary evidence from anatomy, embryology and homologies called for a naturalistic explanation. Yet the Copernicans and Darwinians appeal to theoretical values: coherence and probability. These values are used as eliminative measures when faced with the choice of two rival hypotheses in the face of particular evidence and not in order to determine the prior probability of the rival hypotheses. In 1543 the geocentric and heliocentric models were observationally equivalent although different in their topologic structures. But the probability arguments persuaded the early Copernicans that their model had cognitive advantages over their rival model, especially in terms of coherence. After the observations of Tycho Brahe of what is now known as a supernova (1572), the trajectory of comets through the solar system (1577–1596) and Galileo’s discovery of the Jupiter moons (1610), the evidence shifted in favour of the Copernican model. But Kepler was interested in the physical causes of planetary motion. He argues in terms of physical parameters such as the rotational velocities of celestial objects. Kepler could rely on Maestlin’s calculations (1596) to argue his case that it is physically more plausible to widen the then known cosmos by the power of 3 than to attribute ‘incalculable speeds’ to the outer sphere of ‘fixed’ stars. The argument is not, as readers of Popper and Kuhn would expect, that the heliocentric model explains more data, explains them better, in greater depth and makes more and better predictions than the geocentric model. The argument is that even in the absence of such cognitive superiority of one model over its rival, the plausibility of physical parameters has to be taken into consideration. On account of such physical considerations the heliocentric model is to be preferred because the heliocentric model makes more probable physical assumptions than the geocentric model. In the history of astronomy these physical assumptions became testable. Similar considerations apply to the Darwinian case. The range of phenomena can be rendered more coherent on the theory of descent with modifications. Therefore the theory of evolution is more plausible than its rival, the theory of special creations. In order to support these conclusions, Darwin argues in favour of the probability of a physical mechanism—the operation of natural selection—for which he had no direct evidence. With his emphasis on plausibility arguments as constraints on the determination of the probability of priors, Salmon has highlighted an important function of such arguments, especially with respect to the problem of priors in subjective Bayesianism. Recall that priors are supposed to express the probability of a hypothesis, in the absence of any particular evidence for it. Salmon would probably accept that they should be ‘informative’ priors, in the sense that there always exists a body of accepted beliefs, in one area, which may guide the assessment of priors in another. For instance, in Darwin’s time, it was generally accepted that the earth was no more than ninety-eight million years old, because this age had been calculated by Lord Kelvin (1863) on the basis of cooling rates of the earth. Kelvin took this estimate to throw doubt on the prior probability of natural selection. Whilst the Darwinians acknowledged that this estimate posed a problem for the theory of natural selection and its emphasis on gradualism, they nevertheless considered the hypothesis of natural selection to be a better explanation of the facts.

## **Objectivity link – Physics**

### There is no such thing as a neutral or objective observer – scientists and instruments of measurement all participate in the physical realities they study

Barad, 2003 [Karen, ph.d. in theoretical particle physics, Professor of Feminist Studies, Philosophy, and History of Consciousness at the University of California, Santa Cruz, “Posthumanist Performativity: Toward an Understanding of How Matter Comes to Matter,” Signs: Journal of Women in Culture and Society 2003, vol. 28, no. 3]

On an agential realist account of technoscientific practices, the “knower” does not stand in a relation of absolute externality to the natural world being investigated—there is no such exterior observational point.36 It is therefore not absolute exteriority that is the condition of possibility for objectivity but rather agential separability—exteriority within phenomena. 37 “We” are not outside observers of the world. Nor are we simply located at particular places in the world; rather, we are part of the world in its ongoing intra-activity. This is a point Niels Bohr tried to get at in his insistence that our epistemology must take account of the fact that we are a part of that nature we seek to understand. Unfortunately, however, he cuts short important posthumanist implications of this insight in his ultimately humanist understanding of the “we.” Vicki Kirby eloquently articulates this important posthumanist point: “I’m trying to complicate the locatability of human identity as a here and now, an enclosed and finished product, a causal force upon Nature. Or even . . . as something within Nature. I don’t want the human to be in Nature, as if Nature is a container. Identity is inherently unstable, differentiated, dispersed, and yet strangely coherent. If I say ‘this is Nature itself,’ an expression that usually denotes a prescriptive essentialism and that’s why we avoid it, I’ve actually animated this ‘itself’ and even suggested that ‘thinking’ isn’t the other of nature. Nature performs itself differently.”38 The particular configuration that an apparatus takes is not an arbitrary construction of “our” choosing; nor is it the result of causally deterministic power structures. “Humans” do not simply assemble different apparatuses for satisfying particular knowledge projects but are themselves specific local parts of the world’s ongoing reconfiguring. To the degree that laboratory manipulations, observational interventions, concepts, or other human practices have a role to play it is as part of the material configuration of the world in its intra-active becoming. “Humans” are part of the worldbody space in its dynamic structuration.

## **Objectivity link: Androcentrism**

### The neutral objective observer is actually the androcentric dominant male view—the alt shatters the myth of neutral objectivity

Jansen 2 [Sue Curry Jansen holds a PhD in sociology and is a Professor of Communications at Muhlenberg College. “Critical communication theory: power, media, gender, and technology” pgs 111-112. Google Books.]

Harding locates three different (and differing) positions in which these feminist critical claims are grounded. First, feminist empiricism, which maintains that sexism and androcentrism are social biases that deform the quest for objective knowledge. Feminist empiricism initially conceived of these biases as errors resulting from faulty implementations of empirical methods. Increasingly, however, scrutiny of scientific empiricism is leading this group to question the adequacy of empiricism per se. As a result, a growing number are abandoning reformist stances and seeking to transform and, in some cases, transcend science. Second, feminist standpoint epistemologies that claim that men have been corrupted by power; this position regards patriarchy as a partial and perverse perspective because it is blind to its own blindness. In contrast, feminist standpoint epistemologies maintain that women's subjugated position requires them to see more, and to see more clearly (the power of the powerless). Because we must all see from some perspective, immaculate perception, objectivity, and pure science are impossible. Therefore advocates of this position maintain that feminism provides "a morally and scientifically preferable grounding for our interpretations and explanations of nature and social life." Third, feminist postmodernism, which assumes that modern life fractures identities. Like many other contemporary strains of critical thought, this view adopts a radical skepticism regarding all universal and universalizing claims about existence, the nature and powers of language, reason, and science. It marks a conscious break with the legacy of the Enlightenment including such ideas as progress and contractual theories of politics. This perspective presents itself as a form of resistance to the reified fictions of the naturalized, essentialized, human of humanism, which have historically oppressed women, as well as men of laboring classes, colonized nations, and racial, ethnic, and sexual minorities by denying them subjectivity. In short, it explodes the myth of male "aperspectivity:" the claim that the dominant male view is the 243 unbiased view, the claim that the "neutral observer" is really neutral and neuter (MacKinnon, Signs, 1982: 515-544). Feminist postmodernism assumes its own claims are more plausible because they are grounded in awareness of fractured identities and in the tensions created by solidarity with and between these identities. Harding explores each of these perspectives in rich detail and presents an exhaustive review of the substantive contributions of scholars working within each perspective. She also takes readers on some interesting excursions of her own with her discussion of Taylorism in science offering an especially stimulating side trip.

### **A masculine framework limits the knowledge we can achieve**

Keller, 1978, American physicist, Professor of History and Philosophy of Science at the Massachusetts Institute of Technology, taught at the State University of New York at Purchase, New York University and in the department of rhetoric at the University of California, Berkeley, B.A. in physics from Brandeis University, studies in theoretical physics at Harvard University graduating with a Ph.D [Evelyn, “Gender and Science” in *Discovering Reality: Feminist Perspectives on Epistemology, Metaphysics, Methodology, and Philosophy Science*, Kluwer Academic publishers, 190- 192]

Science bears the imprint of its genderization not only in the ways it is used, but in the very description of reality it offers – even in the relation of the scientist to that description. To see this, it is necessary to examine more fully the implications of attributing masculinity to the very nature of scientific thought. Having divided the world into two parts – the knower (mind) and the knowable (nature) – scientific ideology goes on to prescribe a very specific relation between the two. It prescribes the interactions which can consummate this union, that is, which can lead to knowledge. Not only are mind and nature assigned gender, but in characterizing scientific and objective thought as masculine, the very activity by which the knower can acquire knowledge is also genderized. The relation specified between knower and known is one of distance and separation. It is that between a subject and object radically divided, which is to say no worldly relation. Simply put, nature is objectified. The “chaste and lawful marriage” is consummated through reason rather than feeling, and “observation” rather than “immediate” sensory experience. The modes of intercourse are defined so as to insure emotional and physical inviolability. Concurrent with the division of the world into subject and object is, accordingly, a division of the forms of knowledge into “objective” and “subjective.” The scientific mind is set apart from what is to be known, i.e., from nature, and its autonomy is guaranteed (or so it has been traditionally assumed) by setting apart its modes of knowing from those in which that dichotomy is threatened. In this process, the characterization of both the scientific mind and its modes of access to knowledge as masculine is indeed significant. Masculine here connotes, as it so often does, autonomy, separation, and distance. It connotes a radical rejection of any commingling of subject and object, which are, it now appears, quite consistently identified as male and female. What is the real significance of this system of beliefs, whose structure now reveals a quite intricate admixture of metaphysics, cognitive style, and sexual metaphor? If we reject the position, as I believe we must, that the associations between scientific and masculine are simply “true” – that they reflect a biological difference between male and female brains – then how are we to account for our adherence to them? Whatever intellectual or personality characteristics may be affected by sexual hormones, it has become abundantly clear that our ideas about the differences between the sexes far exceed what can be traced to mere biology; that once formed these ideas take on a life of their own – a life sustained by powerful cultural and psychological forces. Even the brief discussion offered above makes it evident that, in attributing gender to an intellectual posture, in sexualizing a thought process, we inevitably invoke the large world of affect. The task of explaining the associations between masculine and scientific thus becomes, short of reverting to an untenable biological reductionism, the task of understanding the emotional substructure that links our experience of gender with our cognitive experience. The nature of the problem suggests that, in seeking an explanation of the origins and endurance of this mythology, we look to the processes by which the capacity for scientific thought develops, and the ways in which those processes are intertwined with emotional and sexual development. By so doing, it becomes possible to acquire deeper insight into the structure and perhaps even the functions of the mythology we seek to elucidate. The route I wish to take proceeds along ground laid by psychoanalysts and cognitive psychologists, along a course shaped by the particular questions I have posed. What emerges is a scenario supported by the insights these workers have attained, and held together, it is to be hoped, by its own logical and intuitive coherence.

## **Objectivity link: Inequality**

### Dominant groups use faulty interpretations of the notion of objectivity to cast doubt on marginalized positions – this does NOT contribute to enhanced knowledge of the world and only secures systematic inequalities

Antony, 2003 [Louise, Professor of Philosophy at the University of Massachusetts, Amherst, “Quine as Feminist: The Radical Import of Naturalized Epistemology,” ed. Lynne Hankinson Nelson and Jack Nelson, *Feminist Interpretations of W.V.Quine*, pg 133]

The real problem with the liberal conceptions of objectivity and neutrality begins with the fact that while they are unrealizable, it’s possible for those resting comfortably in the center of a consensus to find that fact invisible. Members of the dominant group are given no reason to question their own assumptions: Their worldview acquires, in their minds, the status of established fact. Their opinions are transformed into what “everybody” knows.54 Furthermore, these privileged individuals have the power to promote and elaborate their own worldview in public forums while excluding all others, tacitly setting limits to the range of “reasonable” opinion.55 Because of the familiarity of its content, the “objectivity” of such reportage is never challenged. If it were, it would be found woefully lacking by liberal standards. That’s because the liberal ideal of objectivity is an unreasonable one; it is not just unattainable, but unattainable by a long measure. But because the challenge is only mounted against views that are aberrant, it is only such views that will ever be demonstrated to be “non-objective,” and thus only marginal figures that will ever be charged with bias.56

### **Objectivity is an impossible epistemic standard—its politically used to marginalize perspectives that don’t uphold it**

Antony, 2003 [Louise, Professor of Philosophy at the University of Massachusetts, Amherst, “Quine as Feminist: The Radical Import of Naturalized Epistemology,” ed. Lynne Hankinson Nelson and Jack Nelson, *Feminist Interpretations of W.V.Quine*, pg 133]

Lorraine Code makes a similar point about the unrealistic stringency of announced standards for knowledge.57 She rightly points out that most of what we ordinarily count as knowledge wouldn’t qualify as such by many proposed criteria. I would go further and say that as with all unrealistically high standards, they tend to support the status quo—in this case, received opinion—by virtue of the fact that they will only be invoked in “controversial” cases, i.e., in case of challenge to familiar or received or “expert” opinion. Since the standards are unreasonably high, the views tested against them will invariably be found wanting; since the only views so tested will be unpopular ones, their failure to pass muster serves to add additional warrant to prevailing prejudices, as well as a patina of moral vindication to the holders of those prejudices, who can self-righteously claim to have given “due consideration” to the “other side.”

## Objectivity link: Theory-ladenness

### Even if objective or neutral knowledge were possible, it would be disastrous – all knowledge is bias and theory-laden

Antony, 2003 [Louise, Professor of Philosophy at the University of Massachusetts, Amherst, “Quine as Feminist: The Radical Import of Naturalized Epistemology,” ed. Lynne Hankinson Nelson and Jack Nelson, *Feminist Interpretations of W.V.Quine*, pg 130-31]

But if the rationalists have turned out to be right about the structure of the mind, it is because they appreciated something that the empiricists missed—the value of partiality for human knowers. Whatever might work for an ideal mind, operating without constraints of time or space, it’s clear by now that complete neutrality of the sort empiricists envisioned would not suit human minds in human environments. A completely “open mind,” confronting the sensory evidence we confront, could never manage to construct the rich systems of knowledge we construct in the short time we take to construct them. From the point of view of an unbiased mind, the human sensory flow contains both too much information and too little: too much for the mind to generate all the logical possibilities, and too little for it to decide among even the relatively few that are generated. The problem of paring down the alternatives is the defining feature of the human epistemic condition. The problem is partly solved, I’ve been arguing, by one form of “bias”—native conceptual structure. But it’s important to realize that this problem is absolutely endemic to human knowledge seeking, whether we’re talking about the subconscious processes by which we acquire language and compute sensory information, or the more consciously accessible processes by which we explicitly decide what to believe. The everyday process of forming an opinion would be grossly hampered if we were really to consider matters with anything even close to an “open mind.”

## **Facts link / AT: Truth defenses**

### **The commitment to facts assumes a false and marked relation between fact and reality- we can epistemologically endorse good theories even if they aren’t based on facts**

Antony, 2003 [Louise, Professor of Philosophy at the University of Massachusetts, Amherst, “Quine as Feminist: The Radical Import of Naturalized Epistemology,” ed. Lynne Hankinson Nelson and Jack Nelson, *Feminist Interpretations of W.V.Quine*, pg 134-5]

The liberal epistemological fantasy, still somewhat at work here, is that there will be formal marks that distinguish good theories from bad. The empiricist version of this fantasy is that the formal mark consists in a proper relation between theory and “fact.” In this case, the good theories are supposed to be the ones that derive in the proper way from the data, whereas the bad ones—the biases, the prejudices, the stereotypes—are the ones that antedate the data. But once we realize that theory infects observation and that confirmation is a multidirectional relation, we must also give up on the idea that the good theories are going to look different from the bad theories. They can’t be distinguished on the basis of their formal relation to the “facts,” because (1) there are no “facts” in the requisite sense; and (2) there are too many good biases whose relation to the data will appear as tenuous as those of the bad ones.

### The objectivity of facts is a construction of empirical norms of evidence – the foundations of empiricism necessarily include the construction of facts in the determination of truth

Latour, 1993 [Bruno, philosopher, sociologist and anthropologist of science, founder of Actor Network Theory, professor and vice president of research at Sciences Po Paris, *We Have Never Been Modern*, pg. 17-18]

While a dozen civil wars were raging, Boyle chose a method of argument - that of opinion - that was held in contempt by the oldest scholastic tradition. Boyle and his colleagues abandoned the certainties of apodeictic reasoning in favour of a doxa. This doxa was not the raving imagination of the credulous masses, but a new mechanism for winning the support of one's peers. Instead of seeking to ground his work in logic, mathematics or rhetoric, Boyle relied on a parajuridical metaphor: credible, trustworthy, well-to-do witnesses gathered at the scene of the action can attest to the existence of a fact, the matter of fact, even if they do not know its true nature. So he invented the empirical style that we still use today (Shapin, 1984). Boyle did not seek these gentlemen's opinion, but rather their observation of a phenomenon produced artificially in the closed and protected space of a laboratory (Shapin, 1990). Ironically, the key question of the constructivists — are facts thoroughly constructed in the laboratory? (Woolgar, 1988) — is precisely the question that Boyle raised and resolved. Yes, the facts are indeed constructed in the new installation of the laboratory and through the artificial intermediary of the air pump. The level does descend in the Torricelli tube that has been inserted into the transparent enclosure of a pump operated by breathless technicians. ‘Lefaits sont faits’: ‘facts are fabricated’ as Gaston Bachelard would say. But are facts that have been constructed by man artifactual for that reason? No: for Boyle, just like Hobbes, extends God's to man. God knows things because He creates them (Funkenstein, 1986). We know the nature of the facts because we have developed them in circumstances that are under our complete control. Our weakness becomes a strength, provided that we limit knowledge to the instrumentalized nature of the facts and leave aside the interpretation of causes. Once again, Boyle turns a flaw — we produce only matters of fact that are created in laboratories and have only local value - into a decisive advantage: these facts will never be modified, whatever may happen elsewhere in theory, metaphysics, religion, politics or logic.

### **Capturing capital T truth is impossible**

McLaughlin 09, Amy L, Florida Atlantic Unviersity, “Peircean Polymorphism: Between Realism and Anti-realism,” Transactions of the Charles S. Peirce Society, Volume 45, Number 3, Summer 2009, Project Muse. <http://muse.jhu.edu/journals/transactions_of_the_charles_s_peirce_society/v045/> 45.3.mclaughlin.html

We may suppose that those conceptions are best that are closest to capturing reality, i.e., conceptions that come closest to absolute truth. As Nelson Goodman suggests, though, '"[t]he truth, the whole truth, and nothing but the truth' would … be a perverse and paralyzing policy."48 It is worth taking some time to explore the reasonableness of each leg of this statement: why it is perverse or paralyzing to attempt to grasp the whole truth, and why it is perverse or paralyzing to grasp nothing but the truth. The whole truth of any particular matter would be far too much. Trying to capture every feature, every aspect, every nuance is far too much for even the most astute observer. Not only is it impossible, though; it is inadvisable. Were one able to conceptualize an event, e.g., in all of its particularity, the similarity of the event to others would be utterly lost. Indeed, conceiving of an event as similar to another just is neglecting its particularity. Calling two events both instances of oscillation, for example, neglects what is particular about each event. Were it possible to conceive of an event as entirely particular, such a conception would be relatively useless. No expectations could be formed upon its basis. Furthermore, there is a contradiction inherent in the notion of understanding an event entirely in its particularity. Understanding is a form of pattern recognition; it is finding an appropriate category or set of categories to apply to the thing understood.49 [End Page 411] It is clear from the foregoing why Goodman claims that trying to attain the whole truth about any particular matter is "perverse and paralyzing." What about attaining to "nothing but the truth" about a matter? This is a less obviously problematic policy; but it is problematic nonetheless, and for similar reasons. A number of true statements may be made about any matter. However, there will also be some sense in which most, if not all, of these statements are false.50 An example will help to clarify. Suppose we are interested in determining whether an experiment counts as 'replication' of another. Our decision in this matter depends entirely on what features of the set-up we take to be relevant. In this case, as in most others, whichever characterization we accept is not "nothing but the truth." For any claim we make about the sameness of or differences between the experimental arrangements, there will be some sense in which it is not true.51

## **Scientific realism link**

### The affirmative’s realism treats material reality as fixed rather than as in a state of becoming – the alternative is key to understanding the ongoing historical unfolding of reality

Barad, 2003 [Karen, ph.d. in theoretical particle physics, Professor of Feminist Studies, Philosophy, and History of Consciousness at the University of California, Santa Cruz, “Posthumanist Performativity: Toward an Understanding of How Matter Comes to Matter,” Signs: Journal of Women in Culture and Society 2003, vol. 28, no. 3]

Matter, like meaning, is not an individually articulated or static entity. Matter is not little bits of nature, or a blank slate, surface, or site passively awaiting signification; nor is it an uncontested ground for scientific, feminist, or Marxist theories. Matter is not a support, location, referent, or source of sustainability for discourse. Matter is not immutable or passive. It does not require the mark of an external force like culture or history to complete it. Matter is always already an ongoing historicity.26 On an agential realist account, matter does not refer to a fixed substance; rather, matter is substance in its intra-active becoming—not a thing, but a doing, a congealing of agency. Matter is a stabilizing and destabilizing process of iterative intra-activity. Phenomena—the smallest material units (relational “atoms”)—come to matter through this process of ongoing intra-activity. That is, matter refers to the materiality/materialization of phenomena, not to an inherent fixed property of abstract independently existing objects of Newtonian physics (the modernist realization of the Democritean dream of atoms and the void).

## **Measurement/observation link**

### We do not have unmediated access to scientific knowledge through measurement or observation – apparatuses actively change reality – we must be open to the ongoing materialization of that reality instead of accepting scientific facts as pre-given

Barad, 2003 [Karen, ph.d. in theoretical particle physics, Professor of Feminist Studies, Philosophy, and History of Consciousness at the University of California, Santa Cruz, “Posthumanist Performativity: Toward an Understanding of How Matter Comes to Matter,” Signs: Journal of Women in Culture and Society 2003, vol. 28, no. 3]

In my further elaboration of this agential realist ontology, I argue that phenomena are not the mere result of laboratory exercises engineered by human subjects. Nor can the apparatuses that produce phenomena be understood as observational devices or mere laboratory instruments. Although space constraints do not allow an in-depth discussion of the agential realist understanding of the nature of apparatuses, since apparatuses play such a crucial, indeed constitutive, role in the production of phenomena, I present an overview of the agential realist theoretization of apparatuses before moving on to the question of the nature of phenomena. The proposed elaboration enables an exploration of the implications of the agential realist ontology beyond those specific to understanding the nature of scientific practices. In fact, agential realism offers an understanding of the nature of material-discursive practices, such as those very practices through which different distinctions get drawn, including those between the “social” and the “scientific.”22 Apparatuses are not inscription devices, scientific instruments set in place before the action happens, or machines that mediate the dialectic of resistance and accommodation. They are neither neutral probes of the natural world nor structures that deterministically impose some particular outcome. In my further elaboration of Bohr’s insights, apparatuses are not mere static arrangements in the world, but rather apparatuses are dynamic (re)configurings of the world, specific agential practices/intra-actions/performances through which specific exclusionary boundaries are enacted. Apparatuses have no inherent “outside” boundary. This indeterminacy of the “outside” boundary represents the impossibility of closure—the ongoing intra-activity in the iterative reconfiguring of the apparatus of bodily production. Apparatuses are open-ended practices.

### **Apparatuses of measurement are part of scientific phenomenon – the boundaries of knowledge can’t be fixed or stable**

Barad, 2003 [Karen, ph.d. in theoretical particle physics, Professor of Feminist Studies, Philosophy, and History of Consciousness at the University of California, Santa Cruz, “Posthumanist Performativity: Toward an Understanding of

How Matter Comes to Matter,” Signs: Journal of Women in Culture and Society 2003, vol. 28, no. 3]

Importantly, apparatuses are themselves phenomena. For example, as scientists are well aware, apparatuses are not preformed interchangeable objects that sit atop a shelf waiting to serve a particular purpose. Apparatuses are constituted through particular practices that are perpetually open to rearrangements, rearticulations, and other reworkings. This is part of the creativity and difficulty of doing science: getting the instrumentation to work in a particular way for a particular purpose (which is always open to the possibility of being changed during the experiment as different insights are gained). Furthermore, any particular apparatus is always in the process of intra-acting with other apparatuses, and the enfolding of locally stabilized phenomena (which may be traded across laboratories, cultures, or geopolitical spaces only to find themselves differently materializing) into subsequent iterations of particular practices constitutes important shifts in the particular apparatus in question and therefore in the nature of the intra-actions that result in the production of new phenomena, and so on. Boundaries do not sit still.

## **Lab science link**

### **Their reliance on truths derived from laboratory science reify naturalized categories of difference-**

Code, 2003 [Lorraine, Distinguished Research Professor Emerita of Philosophy at York University in Toronto Canada and a Fellow of the Royal Society of Canada, “What is Natural About Epistemology Naturalized?,” ed. Lynne Hankinson Nelson and Jack Nelson, *Feminist Interpretations of W.V.Quine*, pg 180-1]

Yet I am suggesting that even when reason and knowledge-production come under discussion as expressions of our identity as a natural species, there are choices at work determining what counts as “our” natural identity and which of its expressions merit analysis. The very idea of producing a “natural history” of human knowledge-seeking is hampered by our remarkable ignorance, still, of what “we” naturally are: of where nature begins and where cultural or other “artificial” accretions end. Constrained, perhaps, by these imponderables, epistemology, like philosophy in general, has been in the business of naturalizing as it goes. Theories of knowledge, like metaphysical and moral theories, have claimed to derive from and pertain to what human nature is and can permit. Yet their effects have often been to naturalize the very attributes and actions they purport to discover and thence to recommend. Thus women’s rational inferiority has been naturalized in representations of female nature as more emotional than rational, or less rational than male nature; and hierarchical social arrangements have been naturalized in similar assumptions about some people’s—blacks’, women’s, slaves’—incapacity for rational self-governance. (Aristotle, whom one could name as the first naturalist, was notorious in these respects.) Quine-derived naturalized epistemology claims to have a rather different agenda. No longer will it tacitly naturalize as a by-product of its theoretical hypotheses; rather, it will base its conclusions on the nature of human cognitive capacities as these are empirically revealed in the findings of scientific psychology. Yet feminist and non-white, non-affluent philosophers who endorse the hopes that I, with Lovibond, have been voicing will observe that the laboratory, which naturalists who follow the Quine-line choose as the place where knowledge is naturally made, has been designed and usually occupied by afXuent white men, with women and other Others rarely gaining ready access. The laboratory’s accredited occupants have produced much of the knowledge that naturalizes women’s irrationality along with the cognitive inferiority and diminished epistemic authority of other non-standard knowers.

## **Lab science link: Space**

They can’t access their empiricism good args- not all space science can be tested in the laboratory – proves its theory laden and not universal or objective

Cleland, 2002 [Carol E., professor of philosophy and center for astrobiology, UC-Boulder, “Methodological and Epistemic Differences between Historical Science and Experimental Science,” *Philosophy of Science* 69]

1. Introduction. Experimental research is commonly held up as the paradigm of successful (a.k.a. good) science. The role classically attributed to experiment is that of testing hypotheses in controlled laboratory settings. Not all scientific hypotheses can be tested in this manner, however. Historical hypotheses about the remote past provide good examples. Although fields such as paleontology and archaeology provide the familiar examples, historical hypotheses are also common in geology, biology, planetary science, astronomy, and astrophysics. The focus of historical research is on explaining existing natural phenomena in terms of long past causes. Two salient examples are the asteroid-impact hypothesis for the extinction of the dinosaurs, which explains the fossil record of the dinosaurs in terms of the impact of a large asteroid, and the “big-bang” theory of the origin of the universe, which explains the puzzling isotropic threedegree background radiation in terms of a primordial explosion. Such work is significantly different from making a prediction and then artificially creating a phenomenon in a laboratory.

### **Laboratory science reasoning isn’t more rational than speculative historical reasoning**

Cleland, 2002 [Carol E., professor of philosophy and center for astrobiology, UC-Boulder, “Methodological and Epistemic Differences between Historical Science and Experimental Science,” *Philosophy of Science* 69]

One of the purposes of this paper is to sketch such an account. As we shall see, scientists engage in two very different patterns of evidential reasoning, and one of these patterns predominates in historical research and the other in classical experimental research. These differences in evidential reasoning lie at the heart of the charge that historical science is inferior to experimental science vis-a`-vis the testing of hypotheses. But, as I shall also show, it is not an accident that historical research emphasizes one pattern and experimental research the other, nor is it an accident that some investigations utilize both. Using examples from a wide variety of scientific disciplines, I show that these differences in evidential reasoning are underwritten by an objective and pervasive feature of nature, namely, a time asymmetry of causation between present and past events, on the one hand, and present and future events, on the other. Because each practice is tailored to exploit the information that nature puts at its disposal, and the character of that information differs, neither practice may be held up as more objective or rational than the other.

## Single study/experiment link : Space

### Using a single experiment or study to describe scientific truth is epistemologically invalid—space science is developed through interdependent experiments that construct truth

Cleland, 2002 [Carol E., professor of philosophy and center for astrobiology, UC-Boulder, “Methodological and Epistemic Differences between Historical Science and Experimental Science,” *Philosophy of Science* 69]

My sketch of classical experimental science has the advantage of reconciling the almost passionate devotion still expressed by many scientists for falsificationism with the puzzling fact that they rarely reject their target hypotheses in the face of failed predictions. They are engaging in systematic, extended experimentation that sometimes resembles an attempt to falsify a hypothesis and sometimes resembles an attempt to protect a hypothesis from falsification, but is really aimed at something quite different, namely, minimizing the very real possibility of misleading confirmations and disconfirmations in concrete laboratory settings. The historical tendency of philosophers to take the isolated experiment as the descriptive unit of experimental research has obscured this character of classical experimental science. For if one focuses on the construction and evaluation of a solitary experimental test of a target hypothesis, it seems as if researchers are either trying to falsify the hypothesis or save it from falsification. Viewed from a temporally extended perspective, however, things look quite different. The experimental evaluation of a hypothesis involves a series of experiments, each one designed in light of the results of previous experiments. In the face of an ostensibly disconfirming result, auxiliary assumptions are modified. Similarly, auxiliary assumptions are also modified in the face of an ostensibly confirming result, and the test condition itself is eventually removed. In the absence of a series of experiments of this character, most researchers are reluctant to submit their work to a peer reviewed science journal. It is important to be clear about the nature of the interdependency among the experiments in an experimental program. The results of earlier experiments guide the design of later experiments. The 1976 Viking Lander missions to Mars provide a particularly salient illustration of what happens when scientists try to design an experimental program wholly in advance of any data. The Viking Landers were designed to perform robotic experiments testing the hypothesis that Mars had microbes living in its soil. Of particular interest are the “labeled release” (LR) experiments, which generated the most consistently positive results of the three classes of metabolic experiments; for more detail, see Klein et al. 1992, 1221– 1233. The initial results of the LR experiment were positive. When the Martian soil sample in the test chamber was injected with a radioactively labeled bacterial nutrient solution it started evolving radioactive 14CO2, just what one would expect from terrestrial soils containing microbes. Moreover, when the controlled experiment (determined in advance of any data) was performed and the Martian soil sample was “sterilized” by heating it to 160oC for 3 hours, the reaction stopped, strongly suggesting that the initial result really had been biological; this experiment amounted to a test for a false positive. But the data from the LR experiment were not yet all in. When the same soil sample was subjected to another experiment and given a “second helping” of radioactive nutrients several days later, after the initial reaction had leveled off, the anticipated burst of new activity (from hungry Martian microbes) failed to occur. Even more mysteriously, 14CO2 left over from the earlier reaction began disappearing. Scientists were baffled. No one had anticipated results like these. As the Viking Landers fell permanently silent, disagreement over the interpretation of the LR experiments became acrimonious, with alternative theoretical explanations (Oyama et al. 1976; Levin and Straat 1976) being advanced for the puzzling results. To this day, two of the original investigators (Levin and Straat) still insist that they found life. A majority of the scientific community, however, disagrees, contending that the Martian surface contains a strong oxidant. Various candidates, e.g., hydrogen peroxide (Oyama et. al. 1976), high oxidation states of iron (Tsapin et al. 2000), have been proposed for the oxidant. Nevertheless, there is no empirical evidence that the Martian surface is strongly oxidizing.5 The basic problem remains. The LR experiments and their controls produced results that no one had anticipated and there was no possibility of performing suitable additional experiments to adjudicate among the many auxiliary assumptions that became the focus of heated speculation. In retrospect, it was naıve of designers of the experiment to think that they could determine in advance of any experimental data what controls would be adequate to rule out false positives and false negatives. Although my focus has been on the (idealized) practice of an individual researcher (and her co-workers) testing a hypothesis, I am not claiming that her decision to accept or reject a hypothesis is based solely upon her own experimental results, nor am I denying the important Kuhnian insight (1970) that many of the factors involved in a scientific community’s decision to accept or reject a hypothesis are based upon sociological and psychological considerations. I am merely trying to characterize what the scientific community expects of a “good” experimental researcher when she goes about testing a hypothesis in her lab, and I am claiming that it is best understood in terms of an extended series of interdependent experiments, as opposed to the solitary experiment.

### **Experimental scientific results require mediation to interpret data or to be applied to hypotheses—lab science is as contingent as the construction of history**

Cleland, 2002 [Carol E., professor of philosophy and center for astrobiology, UC-Boulder, “Methodological and Epistemic Differences between Historical Science and Experimental Science,” *Philosophy of Science* 69]

This is not to deny that prototypical historical research often involves laboratory work. It is important, however, to be clear about what is actually being investigated in the lab. Most often it is the evidentiary traces, which frequently require sharpening or analysis in order to be identified and properly interpreted. As an example, speculation that life goes back 3.8 billion years rests upon laboratory analysis of carbon isotope ratios in grains of rock as small as 10 lm across weighing only 20x10-15 g (Mojzsls et al. 1996, 56). Sometimes, however, it is a hypothesis bearing a tenuous logical relation to the target hypothesis. A good example is the 1953 Miller-Urey experiments (Miller 1953), which were touted as an experimental test of the hypothesis that life on Earth originated in a “primordial soup” but really amounted to a test of the supposition that some of the most basic building blocks of life (amino acids) can be produced by electrical discharges on a mixture of methane, hydrogen, ammonia, and water. This is not to deny that the Miller-Urey experiments provide some support for the hypothesis that life on Earth began in an electrified primordial soup. The support is not analogous, however, to that offered by a controlled experiment for a target hypothesis. This is brought out clearly by the fact that scientists now know that amino acids can be produced under a wide variety of different conditions (Chyba and Sagan 1992). Furthermore, most scientists currently believe that the origin of life on Earth is incompatible with the conditions of the Miller-Urey experiment; it is thought that the Earth’s early atmosphere did not contain abundant methane or ammonia, and that life probably began on or under the sea floor, near a volcanic vent (Pace 1991). The problem with the Miller-Urey experiment is that the logical relation between the hypothesis actually tested in the lab and the target hypothesis (about the origin of life on Earth) is very convoluted, winding through numerous highly speculative assumptions, ranging from conditions on early Earth to biochemical possibilities for producing amino acids and whole cells. This is fairly typical of experimental work associated with hypotheses about the remote past. I have been describing two different patterns of evidential reasoning, put succinctly, from causes (test conditions) to effects, with the concomitant worries about ruling out false positives and false negatives, and from effects (traces) to causes, with the concomitant worries about ruling out alternative explanations. As we have seen, although one pattern of reasoning predominates in historical research and the other in experimental work, there is overlap. Historians sometimes reason like experimentalists, and vice versa. This is not an accident. Which pattern of reasoning a scientist employs depends upon her epistemic situation, and although the epistemic situation of an historian typically differs from that of an experimentalist, there are some notable exceptions.

## **Models link**

Models are not empirical evidence – they’re based on theoretical conjecture masquerading as objectivity

Weinert 1999 [Friedel, professor of interdisciplinary human studies, University of Bradford (UK), “Theories, Models, and Constraints,” Studies in the History and Philosophy of Science, 30(2)]

Models seek to be consistent with empirical data. But it is well known from the history of science that consistency with data is easily achieved, especially when the data are limited and lack precision. As the empirical findings improve in accuracy and scope, a model may either be discarded or modified. Thus, pre-electron models had to be discarded after Thomson’s discovery of the electron and early estimations of the number of electrons in the atom were modified in Thomson’s model of the atom. Thomson’s plum pudding model also makes clear—as do both the Ptolemaic and Copernican models of the universe—that for a model to be able to acquire empirical validity it must assign a structure to the empirical data which renders the data intelligible. As the history of the discovery of atomic structure shows, this assignment of structure by a model may occur without the guidance of a specific theory.14 Furthermore, the question of the validity of the structure assignment is to be decided by appeal to constraints, either by purely empirical evidence—large-angle scattering showed the inadequacy of the Thomson model— or by theoretical means—Bohr provided theoretical principles to bolster his support of the Rutherford atom model. The model–object, if empirically valid with respect to the available evidence, involves the claim that the model–structure is a realistic representation of the structure underlying the empirical data. It is a significant feature of the history of science that the assignment of a structure to the data by a model typically requires justifications. Thus Thomson at first justified the topologic structure of his atom by stability considerations, later by considerations of atomic weight. He justified his proposition that the number of electrons, n, in an atom was proportional to its atomic weight, A, by appeal to three independent empirical methods (1906, p. 769). Both justification attempts proved to be mistaken. Rutherford at first justified the topologic structure of the nucleus model by the empirical evidence of large-angle scattering and dynamic considerations concerning the mass and kinetic energy of the projectiles. He used the method of eliminative induction to provide empirical evidence in favour of the nucleus model. Such requests for justification were made for many models in the history of science, from the Copernican model of planetary orbits to the Bohr–Rutherford model of the atom. In the cases just mentioned, justifications were provided from below, by empirical evidence.15 Such models came to be regarded as empirically valid rather than just empirically adequate. There are striking examples in astronomy today where the proliferation of empirically adequate models requires more precise empirical data to select the empirically valid one (Fishman and Hartmann, 1998 and Veilleux et al., 1998). Justifications can also be provided from above, by theoretical justifications in the form of theoretical principles and postulates. Although Bohr accepted that the empirical evidence of large-angle scattering spoke in favour of the nucleus model of the atom, he was aware of the essential weakness of empirical–inductive justification: it does not provide general, theoretical frameworks by which to justify the choice of models. Bohr overcame the essential weakness of Rutherford’s nucleus model—its mechanical instability—by a justification of this model, beyond the empirical evidence amassed by Geiger, Marsden and Rutherford, in terms of four general principles concerning the nature of stationary states and the permissible transitions between them (Bohr, 1915, p. 396).16 With the emergence of such general theoretical principles, models become linked to theoretical considerations, which eventually may lead to their embedding in theories. But even when a model displays a significant amount of data consistency with the model structure, as did the nucleus model, it may still be embedded in a ‘false’ theory. Bohr made a significant step towards establishing the quantum theory. When Sommerfeld introduced the third quantum number and theoretically predicted the existence of quantized angular momentum, the theory took on the shape of what became known as the old quantum theory. It was in terms of the old quantum theory that Stern and Gerlach carried out their famous experiment on the space quantization of angular momentum; and they interpreted their result as a crucial experiment, which falsified the classical Larmor theory and confirmed the Sommerfeld theory.

## **Models link: Physics**

### **Scientific models in physics are theory-laden**

Weinert 1999 [Friedel, professor of interdisciplinary human studies, University of Bradford (UK), “Theories, Models, and Constraints,” Studies in the History and Philosophy of Science, 30(2)]

The representational function of models allows us to make a distinction between structural models and theories, despite their proximity. Because representation by means of a model is inherently limited to specific values and to a finite number of relations between the variables the models employs, certain features cannot be represented in a model. Only the theory can give the full generality of the phenomena under consideration: the Heisenberg uncertainty principle, the Pauli principle, the interactions taking place inside the atom, the derivations and calculations, the laws, the mathematical constraints—all these elements belong to the theory proper, although they may be mirrored in the model. Because these additional features are indispensable for a proper description and explanation of quantum-mechanical phenomena, theories are indispensable. The structural model is probably the richest type of model because it combines both algebraic and topologic elements (cf. Roman, 1969, p. 364). This can be seen clearly in the case of the (anomalous) Zeeman effect or the vector model of the hydrogen atom. Both level transitions and orbital lines contain topologic elements but these topologic elements are themselves constrained by the mathematics of the transitions and the probability density of the orbit. Because of its combination of both topologic and algebraic structures, the structural model most resembles theories. It shares many of the constraints imposed on theories but it differs from a theory in its employment of a limited number of parameters to fulfil its representational function, its limited domain and the ad hocness of some of its assumptions. Some of the principles, which Bohr postulated for the nucleus model—classical mechanics for the stationary states and quantum mechanical rules for the transitions—were to undergo significant changes. The coherence of the model, in the sense of interrelatedness, stated above, needed much further improvement: new empirical evidence, new quantum numbers and threedimensionality still waited to be incorporated. Its logical space does not include transtheoretical constraints, methodological norms, rigidity or general exclusion principles.

## **Models link: Climate/ global warming**

Climate models are just possibilities not objective realities – we must acknowledge the scientific uncertainty of trying to predict warming

Betz 2009 [Gregor, University of Stuttgart, Germany, “Underdetermination, Model-ensembles and Surprises: On the Epistemology of Scenario-analysis in Climatology,” Journal of General Philosophy of Science 40]

As climate policy decisions are decisions under uncertainty, being based on a range of future climate change scenarios, it becomes a crucial question how to set up this scenario range. Failing to comply with the precautionary principle, the scenario methodology widely used in the Third Assessment Report of the International Panel on Climate Change (IPCC) seems to violate international environmental law, in particular a provision of the United Nations Framework Convention on Climate Change. To place climate policy advice on a sound methodological basis would imply that climate simulations which are based on complex climate models had, in stark contrast to their current hegemony, hardly an epistemic role to play in climate scenario analysis at all. Their main function might actually consist in ‘foreseeing future ozone-holes’. In order to argue for these theses, I explain first of all the plurality of climate models used in climate science by the failure to avoid the problem of underdetermination. As a consequence, climate simulation results have to be interpreted as modal sentences, stating what is possibly true of our climate system. This indicates that climate policy decisions are decisions under uncertainty. Two general methodological principles which may guide the construction of the scenario range are formulated and contrasted with each other: modal inductivism and modal falsificationism. I argue that modal inductivism, being the methodology implicitly underlying the third IPCC report, is severely flawed. Modal falsificationism, representing the sound alternative, would in turn require an overhaul of the IPCC practice.

Climate models don’t access their realism arguments – they fail the falsification test

Betz 2009 [Gregor, University of Stuttgart, Germany, “Underdetermination, Model-ensembles and Surprises: On the Epistemology of Scenario-analysis in Climatology,” Journal of General Philosophy of Science 40]

Falsificationism, as a methodology for climatology, suffers the specific problem that every climate model is, strictly spoken, falsified with regard to some empirical aspect of our climate system, such as regional precipitation patterns, oceanic temperature profile, atmospheric circulation, seasonal cycle, etc. Excluding all models that make wrong predictions or have false empirical implications would simply leave us with no climate model at all.11 If, moreover, ‘unrealistic assumptions’ count as falsifications, too, one can argue with Winsberg (2006) that it would be counter-productive not to make use of models with contrary-to-fact assumptions since these might nevertheless be reliable and successful.

### **Climate models can only be possible, not probable**

Betz 2009 [Gregor, University of Stuttgart, Germany, “Underdetermination, Model-ensembles and Surprises: On the Epistemology of Scenario-analysis in Climatology,” Journal of General Philosophy of Science 40]

4 Methodological Consequences of Model-underdetermination Model-underdetermination and the plurality of models it induces change the way we have to interpret the results of climate models. If rival climate models are epistemically on an equal footing, their (contrary) empirical implications cannot be considered true anymore, but must be understood as mere possibility statements. The argument starts with the underdetermination thesis (A14 Possible, not true): (1) Model-underdetermination: Criteria of scientific success determine several rival climate models which should be adopted according to standards of scientific rationality. (2) Any two rival climate models have incompatible empirical implications about past, present, and future climate. (3) THUS: Empirical implications of our best climate models (i.e. those that should be adopted according to standards of scientific rationality) are inconsistent (from 1, 2). (4) Inconsistent empirical statements cannot be considered true. (5) THUS: Empirical implications of our best climate models cannot be considered as true statements about past, present and future climate (from 3,4). (6) Empirical implications of our best climate models are epistemically on an equal footing. (7) If rival scientific hypotheses which are epistemically on an equal footing cannot be considered as true statements, they are mere possibility-statements. (8) THUS: Empirical implications of our best climate models are modal sentences stating what is possibly true about our climate system (from 5, 6, 7). Note that a Bayesian might challenge premiss (7), yet the inadequacy of that approach when applied in climate science has been exposed above. So climate simulation results are just modal sentences. What this indicates—though not strictly implies—is an important fact about climate policy decisions, namely that they are decisions under uncertainty.16 In other words: climate policy has to be based on knowledge about the possible consequences of our actions without us being able to assign probabilities to the alternative outcomes. Epistemically, such kinds of decisions require that the full range of possible future outcomes, or ‘‘scenarios’’, is specified for each alternative action.17 Thence the question arises how we set up the range of future scenarios. I see two alternative general methodological principles which can guide the scenario construction: modal inductivism, and modal falsificationism.

### Warming models are manipulated scientific knowledge

Hamilton, 07, (Mark Hamilton) (Global warming: Is it as bad as it's made out to be?) (<http://www.helium.com/items/465249-global-warming-is-it-as-bad-as-its-made-out-to-be>)

The risks associated with global warming are almost certainly far less worrisome than some of our more strident climate alarmists claim. Our economic system and way of life have critics. The specter of catastrophic climate change caused by the way we use energy provides, for some, a pretext to retool our civilization. Some alarmists even make silly movies based on ridiculous scientific claims, intended to scare us into accepting draconian carbon taxes. That said, the risk from continuing human-caused warming is nonzero. But we can't quantify it very well yet, and we must remember that all risks need to be considered and balanced against each other. **Knowledge of climate and global warming is not nearly as comprehensive as climate alarmists typically claim**. Unfortunately, there is no way to intelligently discuss global warming without understanding some of the related science. Here's what we know: the average global temperature has increased about .6oC over the last 150 years of industrialization and about .15oC over the last decade; concentrations of atmospheric CO2, a greenhouse gas, have increased about 35% during that time period; the "base" temperature increase from a doubling of CO2, all other factors being held constant, is about 1oC. Of course, all other factors are not held constant. If they were, the risk of damaging warming would be small. Climate is extremely complex, and parameters related to temperature interact with each other in myriad ways. It is these interactions, or feedbacks, that the legitimate scientific debate over global warming is about. Computer models attempt to simulate the effects of these feedbacks and predict future temperatures. The latest official IPCC temperature increase prediction from a doubling of CO2 (assumed to occur in the late 21st century) is ~3o+/-1.5oC. So the IPCC models say that 2/3 of the warming is due to feedbacks. The problem is that the science behind many of the feedback relationships is poorly understood. An accurate model would need to precisely represent the relationship between CO2, methane, clouds, water vapor (by far the most important greenhouse gas), plant growth, albedo, aerosols, ocean currents, polar ice caps, and so on and so on. No computer model has ever accurately predicted future climate for any significant period of time.

## **Time/postdating link**

### The notion of newness or progress is based on the arbitrary replacement of things in a temporal system – it isn’t an ontological absolute

Latour, 1993 [Bruno, philosopher, sociologist and anthropologist of science, founder of Actor Network Theory, professor and vice president of research at Sciences Po Paris, *We Have Never Been Modern*, pg. 72]

What is the source of the very modern impression that we are living a new time that breaks with the past? Of a liaison, a repetition that in itself has nothing temporal about it (Deleuze, 1968)? The impression of passing irreversibly is generated only when we bind together the cohort of elements that make up our day-to-day universe. It is their systematic cohesion, and the replacement of these elements by others rendered just as coherent in the subsequent period, which gives us the impression of time that passes, of a continuous flow going from the future toward the past - of a stepladder, as Péguy says. Entities have to be made contemporary by moving in step and have to be replaced by other things equally well aligned if time is to become a flow. Modern temporality is the result of a retraining imposed on entities which would pertain to all sorts of times and possess all sorts of ontological statuses without this harsh disciplining.

## **Causality link**

### Traditional notions of causality are deterministic – our alternative sees the future as open and unfolding – avoids determinism but allows us to try to understand the materiality of phenomena

Barad, 2003 [Karen, ph.d. in theoretical particle physics, Professor of Feminist Studies, Philosophy, and History of Consciousness at the University of California, Santa Cruz, “Posthumanist Performativity: Toward an Understanding of How Matter Comes to Matter,” Signs: Journal of Women in Culture and Society 2003, vol. 28, no. 3]

What is the nature of causality on this account? What possibilities exist for agency, for intervening in the world’s becoming? Where do the issues of responsibility and accountability enter in? Agential intra-actions are causal enactments. Recall that an agential cut effects a local separability of different “component parts” of the phenomenon, one of which (“the cause”) expresses itself in effecting and marking the other (“the effect”). In a scientific context this process is known as a “measurement.” (Indeed, the notion of “measurement” is nothing more or less than a causal intra-action.)29 Whether it is thought of as a “measurement,” or as part of the universe making itself intelligible to another part in its ongoing differentiating intelligibility and materialization, is a matter of preference.30 Either way, what is important about causal intraactions is the fact that marks are left on bodies. Objectivity means being accountable to marks on bodies. This causal structure differs in important respects from the common choices of absolute exteriority and absolute interiority and of determinism and free will. In the case of the geometry of absolute exteriority, the claim that cultural practices produce material bodies starts with the metaphysical presumption of the ontological distinction of the former set from the latter. The inscription model of constructivism is of this kind: culture is figured as an external force acting on passive nature. There is an ambiguity in this model as to whether nature exists in any prediscursive form prior to its marking by culture. If there is such an antecedent entity then its very existence marks the inherent limit of constructivism. In this case, the rhetoric should be softened to more accurately reflect the fact that the force of culture “shapes” or “inscribes” nature but does not materially produce it. On the other hand, if there is no preexistent nature, then it behooves those who advocate such a theory to explain how it is that culture can materially produce that from which it is allegedly ontologically distinct, namely nature. What is the mechanism of this production? The other usual alternative is also not attractive: the geometry of absolute interiority amounts to a reduction of the effect to its cause, or in this case nature to culture, or matter to language, which amounts to one form or another of idealism. Agential separability presents an alternative to these unsatisfactory options. 31 It postulates a sense of “exteriority within,” one that rejects the previous geometries and opens up a much larger space that is more appropriately thought of as a changing topology.32 More specifically, agential separability is a matter of exteriority within (material-discursive) phenomena. Hence, no priority is given to either materiality or discursivity.33 There is no geometrical relation of absolute exteriority between a “causal apparatus” and a “body effected,” nor an idealistic collapse of the two, but rather an ongoing topological dynamics that enfolds the spacetime manifold upon itself, a result of the fact that the apparatuses of bodily production (which are themselves phenomena) are (also) part of the phenomena they produce. Matter plays an active, indeed agential, role in its iterative materialization, but this is not the only reason that the space of agency is much larger than that postulated in many other critical social theories.34 Intra-actions always entail particular exclusions, and exclusions foreclose any possibility of determinism, providing the condition of an open future.35 Therefore, intra-actions are constraining but not determining. That is, intra-activity is neither a matter of strict determinism nor unconstrained freedom. The future is radically open at every turn. This open sense of futurity does not depend on the clash or collision of cultural demands; rather, it is inherent in the nature of intra-activity—even when apparatuses are primarily reinforcing, agency is not foreclosed. Hence, the notion of intra-actions reformulates the traditional notion of causality and opens up a space, indeed a relatively large space, for material-discursive forms of agency.

## **SETI/ET link**

SETI signals don’t provide sure knowledge of alien life – empiricism fails

Race, 2008 [Margaret S., SETI Institute, “Communicating about the discovery of extraterrestrial life: different searches, different issues,” Acta Astronautica 62]

The nature of and evidence for ET life differs markedly between these two systematic search efforts. By definition, if ETI signals are discovered, they will be presumed to emanate from an intelligent and advanced civilization, capable of deliberately devising technologies that can send detectable signals beyond their home location. Even if we detect and verify a signal, we will be unable to know details about the nature of the life form or its biochemistry and physiology, or whether it even persists at present. Likewise, while positive indications for a ‘habitable’ extrasolar planet could convey exciting information about earth-like planets with possible biogenic atmospheres potentially conducive to life as we know it, we are unlikely to know much about the persistence or type of organisms or the biochemical processes behind observed phenomena. For both SETI and extrasolar planet exploration, even if additional studies and searches are undertaken to learn more about a particular discovery, they are unlikely to yield a full understanding about the newly discovered life forms or result in direct experience or interaction with them.

## **Asteroids link**

### The science of asteroid detection is fabricated and constructed through science fiction

Felicity Mellor 7, Lecturer in Science Communication at Imperial College London, Colliding Worlds: Asteroid Research and the Legitimization of War in Space, Social Studies of Science 37: 514, http://sss.sagepub.com/content/37/4/499.full.pdf

Despite their own use of the narrative form and their explicit references to works of science fiction, the asteroid scientists expressed concerns about the proximity of their science to science fiction. They frequently complained of a ‘giggle factor’ (Verschuur, 1996: vi; Lewis, 1997: 220; Ailor, 2004: 6; Morrison et al., 2004: 354) and would insist on a clear separation between ‘science fact’ and ‘science fiction’ (Steel, 1995: 2, 247; Kring, 2000: 169). This double strategy of appealing to science fiction while creating distance from it is also found in popularizations of other areas of science. As I have argued elsewhere (Mellor, 2003), this appeal to science fiction should not simply be dismissed as a popular hook aimed to draw readers into the ‘real’ science. As noted above, in the case of impact-threat science, although the references to science fiction are more common in popular accounts, they can also be found in some peer-reviewed papers and policy documents. The means of framing a text, be it popular or technical, is not some innocent bolt-on device, but fundamentally structures how we conceptualize the subject. Articulating a science of asteroids necessarily involves imagining asteroids. The asteroid scientists’ references to fictional narratives suggest that the technoscientific imaginary on which they drew was shared with, and informed by, the narratives of science fiction. Like the civilian scientists, the US defence scientists interested in the impact threat also worked in a community influenced by science fiction. Indeed, in some sectors of the military planning community, including those in which the promoters of SDI moved, explicit links with science fiction authors were cultivated regularly. As Chris Hables Gray (1994) has noted, ‘militaristic science fiction and military policy coexist in the same discourse system to a surprising degree’ (see also Franklin, 1988; James, 1994: 200). The Air Force Academy held annual ‘Nexus’ conferences on science fiction and military policy, and other conferences, such as the ‘Futurist’ conferences, also brought together military policy-makers and science fiction authors. At one typical conference held in 1985 at Ohio Air Force base, the authors present included prominent proponents of SDI such as Jerry Pournelle (Seed, 1999: 192). Pournelle was director of ‘organizational support’ for the Heritage Foundation’s High Frontier project, which campaigned for SDI, and he was chair of a panel that in 1984 had published the pro-SDI tract, Mutually Assured Survival (Gray, 1994). He was also, for many years, the editor of the annual anthology series ‘There Will Be War!’, which mixed pro-war science fiction stories with pro-SDI non-fiction to claim that war was inevitable.

## Get off the rock link

### The aff’s get off the rock claims are rooted in science fiction construction of the fear of asteroids

Felicity Mellor 7, Lecturer in Science Communication at Imperial College London, Colliding Worlds: Asteroid Research and the Legitimization of War in Space, Social Studies of Science 37: 519-520, http://sss.sagepub.com/content/37/4/499.full.pdf

The construal of asteroids as acting agents, of astronomy as the means to salvation, and of human intervention in space as a moral cause, were also elements of the stories told in the fictional works. Direct references to works of science fiction in the writings of the asteroid scientists were therefore just the most explicit traces of the asteroid scientists’ dependence on narratives of technological salvation. Science and science fiction existed in a mutually reinforcing relationship in which civilian scientists, defence experts and science fiction writers all narrated the impact threat. As science and fiction became aligned, asteroids became incorporated into the world of narrative cause-and-effect with its movement towards closure. The asteroid scientists’ reliance on such narratives meant that they could not avoid the closure demanded by their stories – they were subject to a narrative imperative. Regardless of their personal feelings about weapons in space, they regularly met with defence scientists to discuss weapons technologies to deflect or destroy an incoming asteroid, for only this could provide a satisfactory resolution to their impact stories. Despite their suspicions about each other’s motives, the civilian and defence scientists’ dependence on similar narratives of technological salvation meant that they were both drawn towards the same endings.

## Astrophysics link

### **Empirical view of Science Doesn’t Apply to Astrophysics**

Hacking 1989 (Ian, Ph.D Cambridge, Professor at Stanford University, Philosophy of Science, Vol. 56, No. 4, pp. 578, http://www.jstor.org/stable/187781)

Van Fraassen is fundamentally in error when he holds that all science is a matter of empirical adequacy and saving the phenomena. He holds this erroneous view because, like almost all philosophers, he is totally theory-oriented, and thereby blind to experiment. Natural (experimental) science is a matter not of saving phenomena but of creating phenomena in the sense of my (1983, chap. 13). But in astrophysics we cannot create phenomena, we can only save them. We believe in the reality of many entities postulated by theory because we can construct devices that use those entities in order to interfere in other aspects of nature, and to investigate the inner constitution of matter (my 1983, chap. 16). People, it has been said, are tool-making animals. When we use entities as tools, as instruments of inquiry, we are entitled to regard them as real. But we cannot do that with the objects of astrophysics. Astrophysics is almost the only human domain where we have profound, intricate knowledge, and in which we can be no more than what van Fraassen calls constructive empiricists. Eddington (1920) used a few lines from Milton

Astrophysics is Limited to Observation

Hacking 1989 (Ian, Ph.D Cambridge, Professor at Stanford University, Philosophy of Science, Vol. 56, No. 4, pp. 560, http://www.jstor.org/stable/187781)

This is a fine poser for the alert child to put to the schoolteacher, but no one worries much about it. One element of the experimental method is observation, is it not? In astronomy we are largely restricted to observation, so our science is in certain ways truncated. But that is a fact of life, a fact about our size and powers, as opposed to the size and powers of the sun, the galaxy or the universe. A school teacher as alert as the pupil may even respond with a historical message. In the beginning of Western science there was (aside from geometry, which went its own way) only observation. Only the solar system was obliging enough to suggest to us firm quantitative regularities that gave us the concept of a law of nature. Only in astronomy founded upon observation were we able to make strikingly precise predictions of phenomena and ephemera. Then in the seventeenth century a long tradition of merely empirical tinkering with nature closer to home was transformed into that experimental method whereby we create phenomena about which we can frame laws as exact as those hitherto known only for astronomy. Astronomy, according to this reply of the schoolteacher, is not a counterexample to the identity of scientific method and experimental method. It just happens that we are able to study the nature of the macrocosmos without interfering with it, simply by observing it. Indeed were this not the case, we would probably never have attained to our conception of law of nature at all. The full experimental method of intervention in nature is needed for the microcosmos. Doubtless we would learn more about our galaxy were we able to explore it and manipulate it. We certainly will learn more about our solar system by exploring it, and experimenting on bits of it just as we now experiment on rocks from the moon. But it happens that in astronomy we can get by without the full experimental method engineered into being in the seventeenth century.

## **Biology link**

### **Criticizing on the affirmative’s biological representations is key to re-formulating biological origin narratives and re-thinking science through a feminist lens**

Haraway, 1991 [Donna, historian of science and Professor at the History of

Consciousness Board, University of California, Santa Cruz. She received

her doctorate in biology at Yale, *Simians, Cyborgs, and Women*, pg 71-]

Do feminists have anything distinctive to say about the natural sciences? Should feminists concentrate on criticizing sexist science and the conditions of its production? Or should feminists be laying the foundation for an epistemological revolution illuminating all facets of scientific knowledge? Is there a specifically feminist theory of knowledge growing today which is analogous in its implications to theories which are the heritage of Greek science and of the Scientific Revolution of the seventeenth century? Would a feminist epistemology informing scientific enquiry be a family member to existing theories of representation and philosophical realism? Or should feminists adopt a radical form of epistemology that denies the possibility of access to a real world and an objective standpoint? Would feminist standards of knowledge genuinely end the dilemma of the deavage between subject and object or between non-invasive knowing and prediction and control? Does feminism offer insight into the connections between science and humanism? Do feminists have anything new to say about the vexed relations of knowledge and power? Would feminist authority and the power to name give the world a new identity, a new story? Can feminists master science? These large questions may be usefully broached in a meditation on four recent books addressed to one little corner of contemporary natural science - the debate about biological determinism and human nature. One thing is undeniable about biology since its early formulations in the late eighteenth and early nineteenth centuries: biology tells tales about origins, about genesis, and about nature. Further, modern feminists have inherited our story in a patriarchal voice. Biology is the science of life, conceived and authored by a word from the father. Feminists have inherited knowledge through the paternal line. The word was Aristotle's, Galileo's, Bacon's, Newton's, Linnaeus's, Darwin's; the flesh was woman's. And the word was made flesh, naturally. We have been engendered. Sandra Gilbert and Susan Gubar (1979), in their study of nineteenth-century women writers, discuss women's travail to construct a voice, to have authority, to author a text, to tell a story, to give birth to the word. To author is to have the power to originate, to name. Women who seek to produce natural knowledge, like our sisters who learned to write and speak, also must decipher a text, the book of nature, authored legitimately by men. Gilbert and Gubar, analysing the extraordinary influence of Milton's justification of the ways of God on nineteenth-century female writers seeking to tell stories, suggest that all of us begin in some sense as Milton's daughters, forced to read a book in a language that signifies our lack, our difference. TheMadwoman in the Attic asserts that Milton's literary daughters adopted two main strategies for gaining authority: they either reinterpreted the origin story to get it right the second time, or they rebelliously proclaimed a totally new story. In deep similarity, feminists taking responsibility for modern origin stories - that is, for biology - may try to get the story right, to clean up shoddy science about evolution and brains and hormones, to show how biology really comes out right with no conflict between reason and authority. Or feminists may more boldly announce a completely new birth. In both cases, feminists are contesting for a voice. And so rhetorical strategies, the contest to set the terms of speech, are at the center of feminist struggles in natural science. The four books discussed in this chapter may be read primarily as entries in the contest of rhetorical strategies for setting the terms that define good science. How should we know whom to believe? After examining these four books, the stories they tell, and the modes of telling they adopt in their attempt to prove authority, we may return to the questions of the opening paragraph with a new ear.

## **DNA/ Molecular biology/ Genetics link**

DNA /molecular biology data is not objective – its mediated by the social history of physics

Kember 2003 [Sarah, Reader in new technologies of communications, Goldsmiths college, London, Cyberfeminism and Artificial Life, pg 25-27]

The story of scientific enlightenment is based on the inversion of epistemological binaries: surface and interior, invisible and visible, light and dark, masculine and feminine. It is a story which constantly needs to be retold, or ‘a drama in need of constant reenactment at ever-receding recesses of nature’s secrets’ (41). In molecular biology, the drama is heightened as Watson and Crick’s stated aim was a ‘calculated assault on the secret of life’ (Keller 1992: 42). Like Steven Rose, Evelyn Fox Keller attributes this unusual and unfashionable hubris in biological research to the influence of physics. Rather than giving biology new skills, physics gave it a whole new attitude and conviction that life’s secrets could be found. It enabled biology to claim ‘that in the decoding of the mechanism of genetic replication, life’s secret had been found’ (43). In his introduction to the 1999 edition of The Double Helix, Steve Jones reframes James Watson’s hubristic tale as ‘as much an account of the sociology of science as of science itself’ (Jones 1999: 1). Chiefly, he reflects on the conflict between science and feminism which is played out through the characterisation and narrativisation of Rosalind Franklin: ‘Watson’s discussion (somewhat redeemed by a curiously embarrassed postscript) of the role of Rosalind Franklin in the work (“The thought could not be avoided that the best home for a feminist was in another person’s lab”) is particularly offensive to the modern reader’ (Jones 1999: 2). Rank sexism does not, he maintains, detract from Watson and Crick’s cleverness and their right to ‘feigned modesty’ at having discovered the structure of DNA: ‘It has not escaped our notice that the specific pairing we have postulated immediately suggests a possible copying mechanism for the genetic material’ (in Jones 1999: 3). Between 1953 and 1967 Crick contributed to the quest to crack the code and reveal the secret of life or how, exactly, DNA ‘makes’ proteins. The ‘so-called code’ consists of sixty-four codons (units consisting of three bases) ‘specifying the assembly of twenty amino-acids into myriads of exquisitely complex proteins’ (Kay 2000: 3). Watson’s subsequent work on RNA produced his central dogma ‘that DNA makes RNA makes protein’ although ‘he had not then known what “dogma” actually meant’ and was ‘confused’ in his assertion of the one-way, linear flow of information: ‘the flow of information may be reversed’ (Jones 1999: 4). What appeared, in 1953, to be a clear and legible code, now appears to be somewhat ‘baroque’ in Jones’s terms. Far from being a simple set of instructions, DNA may actually have a highly convoluted structure (4). Jones points out that the current realisation that ‘the working genes of higher organisms make up only a small proportion of their DNA’ came as something of a shock to the founders of molecular biology, and he seems to substantiate the idea that genetic language is not only ambiguous (Kay), but also largely empty, redundant, even partially extinct and far from revelatory: Often genes themselves are interrupted by strings of bases that code for nothing. The whole sequence, discontinuous though it may be, is read off into RNA and – with a perversity alien to physics – edited to cut out redundant sections. Even worse, much of the DNA consists of repeats of the same sequence. A series of letters is followed by its mirror image, and then back to the original, thousands of times. Scattered among all this are the corpses of genes that expired long ago, and can be recognised as such only by their similarity to others that still function. The image of genetic material has changed. No longer is DNA a simple set of instructions. Instead, it is a desert of rigidity and waste mitigated by decay. (Jones 1999: 4) More Beckett than baroque then, the death of genetic language informs the beginning of the end (the end of the beginning) of the story of life as told by and against molecular biology at the start of the twenty-first century.

## **Sociobiology / evolutionary biology link**

Sociobiology/evolutionary biology are not apolitical—their genetic determinism justifies the status quo and promote eugenics

Kember 2003 [Sarah, Reader in new technologies of communications, Goldsmiths college, London, Cyberfeminism and Artificial Life, pg 34-35]

Sociobiology is that discipline which claims to identify biological and specifically genetic causes of human social behaviour. It may stop short of advocating public policy (unlike evolutionary psychology) and is primarily a naturalised view of society. But the naturalisation of social phenomena is itself a deeply political act (it is the politics of de-politicisation) which justifies the status quo and absolves us of the (respons)ability to act. Sociobiology is no less political than eugenics by virtue of being non-interventional – the basic ideology (of genetic determinism) is the same. Lewontin describes sociobiology as ‘the ruling justifying theory for the permanence of society as we know it’ (1993: 89). It combines both evolutionary and molecular biology and is often translated in coffee-table books, magazines, newspapers and, of course, popular science books. For Lewontin, ‘sociobiology is the latest and most mystified attempt to convince people that human life is pretty much what it has to be and perhaps even ought to be’ (1993: 89). Lewontin identifies three steps in the construction of sociobiological theory. The first involves describing what human nature is like and identifying the key features which are common to all people everywhere and throughout time. The second step is to argue that those universal features or characteristics are genetic, and the third step is to explain and justify why those genes and not others have come to define human nature. Natural selection is given the principal role in the third and final step and accounts for the inevitability not only of individuals but also of society. Through the course of natural selection, the kinds of genes – and therefore the kinds of societies – we have are regarded as being the only ones we could have. They are the inevitable outcome of natural law; the struggle for existence and the survival of the fittest. And if ‘3 billion years of evolution have made us what we are’ then what is the point in trying to effect change through one hundred days of revolution’ (Lewontin 1993: 90) or a few decades of feminism?

### **No evidence for inherited aggression**

Kember 2003 [Sarah, Reader in new technologies of communications, Goldsmiths college, London, Cyberfeminism and Artificial Life, pg 25-27]

Among the universal human characteristics identified within sociobiology are; warfare, male sexual dominance, love of private property and hatred of strangers (Lewontin 1993: 91). These are formed against an environmental background of scarcity, competition and survival of the fittest. For Lewontin, step one of the sociobiological argument already betrays an ‘obvious ideological commitment to modern entrepreneurial competitive hierarchical society’ and to a deeper ideology of individualism (93) This individualism is reinforced by the assertion of genes for entrepreneurship, male dominance, aggression and so on. The evidence that these characteristics are genetic is, to say the least, circular: ‘Often, it is simply asserted that because they are universal they must be genetic’ (94). There is, Lewontin suggests, no evidence for the hereditability of traits such as aggression or dominance. Genetics judges things to be heritable if they are shared by close relatives (it is a study of similarity and difference between relatives), but ‘similarity between relatives arises not only for biological reasons but for cultural reasons as well, since members of the same family share the same environment’ (96). In fact, claims for the hereditability of certain characteristics are often based on the simple observation that parents and children resemble each other in some way. Clearly, the observation that parents and children are similar ‘is not evidence of their biological similarity’ (96).

## **AT: Evolutionary biology / aggression is human nature**

Evolutionary biology arguments for the naturalness of aggression reinforce domination and are theory-laden, not neutrally objective

Haraway, 1991 [Donna, historian of science and Professor at the History of

Consciousness Board, University of California, Santa Cruz. She received

her doctorate in biology at Yale, *Simians, Cyborgs, and Women*, pg 21- ]

Primatology has focused on two major themes in interpreting the significance of animals for understanding human life - sex and economics, reproduction and production. The crucial transitions from a natural to a political economy and from biological social groups to the order of human kinship categories and systems of exchange have been basic concerns. These are old questions with complex relations to technical and ideological dimensions of biosocial science. Our understandings of both reproduction and production have double-edged possibilities. On the one hand, we may reinforce our vision of the natural and cultural necessity of domination; on the other, we may learn to practise our sciences so as to show more clearly the now fragmentary possibilities of producing and reproducing our lives without overwhelming reliance on the theoretical categories and concrete practices of control and enmity. Theories of animal and human society based on sex and reproduction have been powerful in legitimating beliefs in the natural necessity of aggression, competition, and hierarchy. In the '92os, primate studies began to claim that all primates differ from other mammals in the nature of their reproductive physiology: primates possess the menstrual cycle. That physiol 22 ogy was asserted to be fraught with consequences, often expressed in the fantasy-inspiring 'fact' of constant female 'receptivity'. Perhaps, many have thought and some have hoped, the key to the extraordinary sociability of the primate order rests on a sexual foundation of society, in a family rooted in the glands and the genes. Natural kinship was then seen to be transformed by the specifically human, language-mediated categories that gave rational order to nature in the birth of culture. Through classifying by naming, by creating kinds, culture would then be the logical domination of a necessary but dangerous instinctual nature. Perhaps human beings found the key to control of sex, the source of and threat to all other kinds of order, in the categories of kinship. We learned that in naming our kind, we could control our kin. Only recently and tentatively have primatologists seriously challenged the indispensability of these sorts of explanations of nature and culture. Biosocial theories focusing on production rest on a fundamental premise: humankind is self-made in the most literal sense. Our bodies are the product of the tool-using adaptation which predates the genus Homo. We actively determined our design through tools that mediate the human exchange with nature. This condition of our existence may be visualized in two contradictory ways. Gazing at the tools themselves, we may choose to forget that they only mediate our labour. From that perspective, we see our brains and our other products impelling us on a historical course of escalating technological domination; that is, we build an alienated relation to nature. We see our specific historical edifice as both inevitable human nature and technical necessity. This logic leads to the superiority of the machine and its products and ensures the obsolescence of the body and the legitimacy of human engineering. Or, we may focus on the labour process itself and reconstruct our sense ofnature, origins, and the past so that the human future is in our hands. We may return from the tool to the body, in its personal and social forms. This chapter is about efforts to know the body in the biosocial conditions of production and reproduction. Our bodies, ourselves.

## **Evolution link**

The ideology of evolution relies upon science that upholds domination and racism through things like sociobiology’s attempts to claim that one population is biologically superior to another—this produces new forms of otherization that prevent our liberation

Haraway, 1991 [Donna, historian of science and Professor at the History of

Consciousness Board, University of California, Santa Cruz. She received

her doctorate in biology at Yale, *Simians, Cyborgs, and Women*, pg 7-8]

The concept of the body politic is not new. Elaborate organic images for human society were richly developed by the Greeks. They conceived the citizen, the city, and the cosmos to be built according to the same principles. To perceive the body politic as an organism, as fundamentally alive and as part of a large cosmic organism, was central for them (Collingwood, 1945). To see the structure of human groups as a mirror of natural forms has remained imaginatively and intellectually powerful. Throughout the early period of the industrial revolution, a particularly important development of the theory of the body politic linked the natural and political economy on multiple levels. Adam Smith's theory of the market and of the division of labour as keystones of future capitalist economic thought, with Thomas Malthus's supposed law of the relation of population and resources, together symbolize the junction of natural forces and economic progress in the formative years of capitalist industrialism. The permeation of Darwin's evolutionary theory with this form of political economy has been a subject of considerable analysis from the nineteenth century to the present (Young, 1969). Without question, the modern evolutionary concept of a population, as the fundamental natural group, owes much to classical ideas of the body politic, which in turn are inextricably interwoven with the social relationships of production and reproduction. The union of the political and physiological is the focus of this chapter. That union has been a major source of ancient and modem justifications of domination, especially of domination based on differences seen as natural, given, inescapable, and therefore moral. It has also been transformed by the modern biobehavioural sciences in ways we must understand if we are to work effectively for societies free from domination. The degree to which the principle of domination is deeply embedded in our natural sciences, especially in those disciplines that seek to explain social groups and behaviour, must not be underestimated. In evading the importance of dominance as a part of the theory and practice of contemporary sciences, we bypass the crucial and difficult examination of the conlml as well as the social function of science. We leave this central, legitimating body of skill and knowledge to undermine our efforts, to render them utopian in the worst sense. Nor must we lightly accept the damaging distinction between pure and applied science, between use and abuse of science, and even between nature and culture. All are versions of the philosophy of science that exploits the rupture between subject and object to justify the double ideology of firm scientific objectivity and mere personal subjectivity. This anti-liberation core of knowledge and practice in our sciences is an important buttress of social control.'

## **General relativity link**

Theory of general relativity is not epistemically valid – its at odds with Bohr’s quantum mechanics

Vanderburgh 2003 [William, professor of philosophy, Wichita State University, “The Dark Matter Double Bind: Astrophysical Aspects of the Evidential Warrant for General Relativity,” Philosophy of Science, 70, October] GR = general relativity

To be clear from the outset, I am not challenging the available tests of GR. GR has proven to be highly empirically successful in the realms in which it has been tested, and these tests do provide strong epistemic support for the theory. I am arguing that the available tests of GR do not provide sufficient evidential warrant for the confidence in the universal applicability of GR typical amongst physicists and philosophers of science. GR is usually taken to yield empirically adequate predictions not just for systems of the types on which detailed tests have actually been carried out, but for all others as well—including large scale dynamical structures such as galaxies and clusters of galaxies, and even the universe as a whole. Even when it is acknowledged that GR must strictly speaking be false since it is incompatible with quantum mechanics, it is nevertheless assumed that the eventual theory of quantum gravity will make predictions empirically equivalent to those of GR for all phenomena above the Planck scale. However, this assumption is insufficiently warranted in the present evidential context: it turns out that there are even reasons to doubt the empirical adequacy of GR at galactic and greater scales. So although I am not challenging the available tests of GR, I am challenging the usual interpretation of the evidential import of those tests. I am, moreover, insisting on being careful about what counts as an epistemically significant ‘‘test’’ of a gravitation theory.

### **General relativity is invalid at a universal scale – proves that knowledge about physics and space is situational and historical**

Vanderburgh 2003 [William, professor of philosophy, Wichita State University, “The Dark Matter Double Bind: Astrophysical Aspects of the Evidential Warrant for General Relativity,” Philosophy of Science, 70, October] GR = general relativity

4. The Dark Matter Double Bind. GR is usually taken to apply not merely to all dynamical systems but even to the universe as a whole. As in the case of Newton’s argument to UG, for GR an inductive generalization is made from a set of locally obtained pieces of evidence, where these pieces of evidence are consistent with each other and ideally involve independent agreeing measures of theoretical parameters from several distinct phenomena. Given the epistemic strength of the independent measures of the parameters of UG obtained via Reasoning from Phenomena (Harper 2002), Newton’s extension of the principle of mutual gravitation to all bodies whatsoever is the step of the argument on which the inductive risk is focused (Smith 2002, 160). As is now known, Newton’s bet here failed. Generalizing the inverse square law to all gravitational phenomena whatsoever merely on the basis of (what are now understood to be) weak field, low velocity tests, turned out to be a mistake. In the same way, it is epistemically risky to extend GR to all dynamical systems regardless of scale merely on the basis of stellar system scale tests. This extension might nevertheless be unworrisome were it not for the astrophysical dynamical discrepancy, one possible cause of which is that GR does not apply at galactic and greater scales. Simply put, GR plus the assumption that the visible matter is all the matter present in large scale dynamical systems leads to predictions that are incompatible with the observations. While the focus here is on the evidence for GR’s applicability to galaxies and clusters, it is also worth pointing out that there are also difficulties in trying to establish GR’s applicability to the cosmos as a whole. Ellis has argued (1999, 1985) that cosmology not only in fact relies on untested assumptions, but must rely on substantive untestable assumptions (e.g., the Cosmological Principle—the universe is homogeneous and isotropic on large scales) in order to make it possible to acquire information about the universe as a whole. Ellis argues that the large scale spacetime structure of the universe cannot be uniquely determined by purely observational tests. It follows, Ellis points out, that various hypotheses regarding large scale structure remain viable in the face of any cosmological evidence that might be obtained. A related fact, relevant to the present discussion, is that some of the empirically viable alternative cosmological hypotheses will be ones based on gravitation theories other than GR. If it is impossible to determine the large scale structure of the universe by purely empirical means, it follows that it is impossible to establish on empirical grounds alone what law of gravity holds for the universe as a whole: one would need to know the large scale structure before one could begin to assess whether a given gravitation theory is even consistent with that structure. These considerations cast into doubt Will’s claim (1993, 310–319) that cosmology has been a testing ground for gravitation theories since the 1920s. It is true that various cosmological observations (for example, the Hubble recession and the cosmic microwave background) have been taken as confirming that the universe satisfies the Friedman-Robertson-Walker spacetime model, and therefore GR (because the Friedman-RobertsonWalker model is a solution to the GR field equations). But if Ellis’s arguments are correct, this supposed confirmation is illusory or weak. Certainly, it does not reach the level of precision and power achieved by the stellar system scale tests of GR; the supposed ‘‘confirming evidence’’ in the cosmological case really amounts to no more than showing that GR is consistent with the available cosmological observations given plausible but rather strong and evidentially un- or under-supported assumptions. Given different (equally unsupported) assumptions, the cosmological observations would be consistent with universe models based on alternative gravitation theories. If there were some way to confirm one set of assumptions over the others, progress could perhaps be made toward deciding what the correct theory of the large scale structure of the universe is, and this would make possible the confirmation of a theory of gravitation at cosmic scales relative to its rivals. There seems to be no way to do this, and so the cosmological arena appears to offer no opportunity for evidentially distinguishing GR from its rivals. Aversion of Ellis’s argument may or may not stand up to closer scrutiny. (One hurdle is that Ellis pitches his claims in terms of a naıve verificationism; I contend that the conclusion will hold once the argument is re-cast in more appropriate epistemic terms, but will not make the case here.) In any event the main argument of this paper does not depend on it. There is a much more serious problem that indicates at the very least a current lack of evidential warrant for GR as compared to actual and potential rivals at galactic and greater scales, and that perhaps even indicates the impossibility of being able to test GR against rivals at those scales. The problem in question is ‘‘the dark matter double bind,’’ which goes as follows. Consider in general what must be shown in order to establish that some dynamical law is empirically adequate with respect to a given system. Minimally, this would require showing that the law’s predictions agree with the observed motions. In order to derive a prediction of the motions, however, the law must be conjoined with hypotheses about the number and distribution of bodies in the system, their masses, and their instantaneous velocities. Thus, in order to check whether or not GR’s predictions of the motions within a given spiral galaxy, say, agree with the observed motions, one would first need to import background information about the mass distribution within the galaxy. But the astrophysical dynamical discrepancy raises doubts about exactly this information. The mass distribution could be inferred from the observed motions plus some dynamical law, if it were known which law applied to the system in question—but that is exactly what is to be determined. Thus the dark matter double bind: In order to evaluate the empirical adequacy of any gravitation theory at galactic and greater scales, the mass distribution in dynamical systems at those scales must first be known—but because of the astrophysical dynamical discrepancy the mass distribution is not known. In order to infer the mass distribution from the observed motions, a gravitational law must be assumed—but such a law cannot legitimately be assumed, since the very thing at issue is which gravitational law ought to be taken to apply at galactic and greater scales.

### **Dark matter double bind disproves the universality of general relativity theory**

Vanderburgh 2003 [William, professor of philosophy, Wichita State University, “The Dark Matter Double Bind: Astrophysical Aspects of the Evidential Warrant for General Relativity,” Philosophy of Science, 70, October] GR = general relativity

In conclusion, the existence of the dark matter double bind entails that the available dynamical evidence cannot license distinguishing GR from its rivals at galactic and greater scales. This is of no consequence for stellar system scale interactions, where there is solid evidence that GR saves the phenomena better than all rivals so far evaluated. But if we are concerned to find out about galaxies and clusters, to study their long term evolution, to theorize about the large scale structure and evolution of the universe as a whole, or to draw philosophical implications about the nature of space and time from physical theories, it ought to give us pause to consider that it is not known whether GR or some other substantially different gravitation theory applies above the scale of stellar systems. GR might well be universally applicable, but in the present evidential context that has not been established. It is possible that GR is simply the short scale limit of some other relativistic gravitation theory. The only available evidential constraint on potential successor theories is that they be able to account for the stellar system scale phenomena as well as or better than GR. Exploring the relations between merely possible rival theories in this context helps to illuminate the kinds of evidential and methodological considerations that will need to be brought to bear in order to reach a solution to the dark matter problem, and to decide which theory of gravity applies at galactic and greater scales.

## **Overview effect link**

The overview effect is a god-trick – only partial perspective via our alternative can overcome the transcendence of supposedly neutral objectivity

Haraway, 1991 [Donna, historian of science and Professor at the History of

Consciousness Board, University of California, Santa Cruz. She received

her doctorate in biology at Yale, *Simians, Cyborgs, and Women*, pg 189-90 ]

A tribute to this ideology of direct, devouring, generative, and unrestricted vision, whose technological mediations are simultaneously celebrated and presented as utterly transparent, the volume celebrating the 100th anniversary of the National Geographic Society closes its survey of the magazine's quest literature, effected through its amazing photography, with two juxtaposed chapters. The first is on 'Space', introduced by the epigraph, 'The choice is the universe - or nothing' (Bryan, 1987, p. 352). Indeed. This chapter recounts the exploits of the space race and displays the colour enhanced 'snapshots' of the outer planets reassembled from digitalized signals transmitted across vast space to let the viewer 'experience' the moment of discovery in immediate vision of the 'object'." These fabulous objects come to us simultaneously as indubitable recordings of what is simply there and as heroic feats of techno-scientific production. The next chapter is the twin of outer space: 'Inner Space', introduced by the epigraph, 'The stuff of stars has come alive' (Bryan, 1987, p. 454). Here, the reader is brought into the realm of the infinitesimal, objectified by means of radiation outside the wave lengths that 'normally' are perceived by hominid primates, Le., the beams of lasers and scanning electron microscopes, whose signals are processed into the wonderful full-colour snapshots of defending T cells and invading viruses. But of course that view of infinite vision is an illusion, a god-trick. I would like to suggest how our insisting metaphorically on the particularity and embodiment of all vision (though not necessarily organic embodiment and including technological mediation), and not giving in to the tempting myths of vision as a route to disembodiment and second-birthing, allows us to construct a usable, but not an innocent, doctrine of objectivity. I want a feminist writing of the body that metaphorically emphasizes vision again, because we need to reclaim that sense to find our way through all the visualizing tricks and powers of modem sciences and technologies that have transformed the objectivity debates. We need to learn in our bodies, endowed with primate colour and stereoscopic vision, how to attach the objective to our theoretical and political scanners in order to name where we are and are not, in dimensions of mental and physical space we hardly know how to name. So, not so perversely, objectivity turns out to be about particular and specific embodiment, and definitely not about the false vision promising transcendence of all limits and responsibility. The moral is simple: only partial perspective promises objective vision. This is an objective vision that initiates, rather than closes off, the problem of responsibility for the generativity of all visual practices. Partial perspective can be held accountable for both its promising and its destructive monsters. All Western cultural narratives about objectivity are allegories of the ideologies of the relations of what we call mind and body, of distance and responsibility, embedded in the science question in feminism. Feminist objectivity is about limited location and situated knowledge, not about transcendence and splitting of subject and object. In this way we might become answerable for what we learn how to see. These are lessons which I learned in part walking with my dogs and wondering how the world looks without a fovea and very few retinal cells for colour vision, but with a huge neural processing and sensory area for smeUs. It is a lesson available from photographs of how the world looks to the compound eyes of an insect, or even from the camera eye of a spy satellite or the digitally transmitted signals of space probe-perceived differences 'near' Jupiter that have been transformed into coffee table colour photographs. The 'eyes' made available in modem technological sciences shatter any idea of passive vision; these prosthetic devices show us that all eyes, including our own organic ones, are active perceptual systems, building in translations and specific ways of seeing, that is, ways of life. There is no unmediated photograph or passive camera obscura in scientific accounts of bodies and machines; there are only highly specific visual possibilities, each with a wonderfully detailed, active, partial way of organizing worlds. All these pictures of the world should not be allegories of infinite mobility and interchangeability, but of elaborate specificity and difference and the loving care people might take to learn how to see faithfully from another's point of view, even when the other is our own machine. That's not alienating distance; that's a possible allegory for feminist versions of objectivity. Understanding how these visual systems work, technically, socially, and psychically ought to be a way of embodying feminist objectivity.

### **Our link turns the affirmative – total vision doesn’t lead to revolutionary results – it is an optical illusion that perpetuates the myth of neutral objectivity**

Haraway, 1991 [Donna, historian of science and Professor at the History of

Consciousness Board, University of California, Santa Cruz. She received

her doctorate in biology at Yale, *Simians, Cyborgs, and Women*, pg 193-194]

Positioning is, therefore, the key practice grounding knowledge organized around the imagery of vision, as so much Western scientific and philosophic discourse is organized. Positioning implies responsibility for our enabling practices. It follows that politics and ethics ground struggles for the contests over what may count as rational knowledge. That is, admitted or not, politics and ethics ground struggles over knowledge projects in the exact, natural, social, and human sciences. Otherwise, rationality is simply impossible, an optical illusion projected from nowhere comprehensively. Histories of science may be powerfully told as histories of the technologies. These technologies are ways of life, social orders, practices of visualization. Technologies are skilled practices. How to see? Where to see from? What limits to vision? What to see for? Whom to see with? Who gets to have more than one point of view? Who gets blinkered? Who wears blinkers? Who interprets the visual field? What other sensory powers do we wish to cultivate besides vision? Moral and political discourse should be the paradigm of rational discourse in the imagery and technologies of vision. Sandra Harding's claim, or observation, that movements of social revolution have most contributed to improvements in science might be read as a claim about the knowledge consequences of new technologies of positioning. But I wish Harding had spent more time remembering that social and scientific revolutions have not always been liberatory, even if they have always been visionary. Perhaps this point could be captured in another phrase: the science question in the military. Struggles over what will count as rational accounts of the world are struggles over how to see. The terms of vision: the science question in colonialism; the science question in extenninism (Sofoulis, 1988); the science question in feminism.

### Vision-related objectivity is a god-trick – the idea that you can see all of something trades off with partial perspectives

Haraway, 1991 [Donna, historian of science and Professor at the History of

Consciousness Board, University of California, Santa Cruz. She received

her doctorate in biology at Yale, *Simians, Cyborgs, and Women*, pg 193 ]

The split and contradictory self is the one who can interrogate positionings and be accountable, the one who can construct and join rational conversations and fantastic imaginings that change history.9 Splitting, not being, is the privileged image for feminist epistemologies of scientific knowledge. 'Splitting' in this context should be about heterogeneous multiplicities that are simultaneously necessary and incapable of being squashed into isomorphic slots or cumulative lists. This geometry pertains within and among subjects. The topography of subjectivity is multidimensional; so, therefore, is vision. The knowing self is partial in all its guises, never finished, whole, simply there and original; it is always constructed and stitched together imperfectly, and therefore able to join with another, to see together without claiming to be another. Here is the promise of objectivity: a scientific knower seeks the subject position not of identity, but of objectivity; that is, partial connection. There is no way to 'be' simultaneously in all, or wholly in any, of the privileged (subjugated) positions structured by gender, race, nation, and class. And that is a short list of critical positions. The search for such a 'full' and total position is the search for the fetishized perfect subject of oppositional history, sometimes appearing in feminist theory as the essentialized Third World Woman (Mohanty, 1984). Subjugation is not grounds for an ontology; it might be a visual clue. Vision requires instruments of vision; an optics is a politics of positioning. Instruments of vision mediate standpoints; there is no immediate vision from the standpoints of the subjugated. Identity, including self-identity, does not produce science; critical positioning does, that is, objectivity. Only those occupying the positions of the dominators are self-identical, unmarked, disembodied, unmediated, transcendent, born again. It is unfortunately possible for the subjugated to lust for and even scramble into that subject position - and then disappear from view. Knowledge from the point of view of the unmarked is truly fantastic, distorted, and so irrational. The only position from which objectivity could not possibly be practised and honoured is the standpoint of the master, the Man, the One God, whose Eye produces, appropriates, and orders all difference. No one ever accused the God of monotheism of objectivity, only of indifference. The god-trick is self-identical, and we have mistaken that for creativity and knowledge, omniscience even.

## **Overview effect link - Gaze**

The affirmative’s reliance on the gaze as a conduit of objectivity assumes uncontrolled mastery and consumption of the world.

Haraway, 1991 [Donna, historian of science and Professor at the History of

Consciousness Board, University of California, Santa Cruz. She received

her doctorate in biology at Yale, *Simians, Cyborgs, and Women*, pg 188-189]

THE PERSISTENCE OF VISION7 I would like to proceed by placing metaphorical reliance on a much maligned sensory system in feminist discourse: vision. Vision can be good for avoiding binary oppositions. I would like to insist on the embodied nature of all vision, and so reclaim the sensory system that has been used to signify a leap out of the marked body and into a conquering gaze from nowhere. This is the gaze that mythically inscribes all the marked bodies, that makes the unmarked category claim the power to see and not be seen, to represent while escaping representation. This gaze signifies the unmarked positions of Man and White, one of the many nasty tones of the world objectivity to feminist ears in scientific and technological, late industrial, militarized, racist and male dominant societies, that is, here, in the belly of the monster, in the United States in the late 1980s. I would like a doctrine of embodied objectivity that accommodates paradoxical and critical feminist science projects: feminist objectivity means quite simply situated knowledges. The eyes have been used to signify a perverse capacity - honed to perfection in the history of science tied to militarism, capitalism, colonialism, and male supremacy - to distance the knowing subject from everybody and everything in the interests of unfettered power. The instruments of visualization in mullinationalist, postrnodernist culture have compounded these meanings of dis-embodiment. The visualizing technologies are without apparent limit; the eye of any ordinary primate like us can be endlessly enhanced by sonography systems, magnetic resonance imaging, artificial intelligence-linked graphic manipulation systems, scanning electron microscopes, computer-aided tomography scanners, colour enhancement techniques, satellite surveillance systems, home and office VDTs, cameras for every purpose from filnting the mucous membrane lining the gut cavity of a marine worm living in the vent gases on a fault between continental plates to mapping a planetary hemisphere elsewhere in the solar system. Vision in this technological feast becomes unregulated gluttony; all perspective gives way to infinitely mobile vision, which no longer seems just mythically about the god-trick of seeing everything from nowhere, but to have put the myth into ordinary practice. And like the god-trick, this eye fucks the world to make techno-monsters. Zoe Sofoulis (1988) calls this the cannibal-eye of masculinist extra-terrestrial projects for excremental second birthing.

## **Overview effect link- Alt solves**

### The view from above masquerades as non-contextual and neutral objectivity – our alternative enables partial and situated vision which solves their impact and avoids our link

Haraway, 1991 [Donna, historian of science and Professor at the History of

Consciousness Board, University of California, Santa Cruz. She received

her doctorate in biology at Yale, *Simians, Cyborgs, and Women*, pg 195-6]

Above all, rational knowledge does not pretend to disengagement: to be from everywhere and so nowhere, to be free from interpretation, from being represented, to be fully self-contained or fully formalizable. Rational knowledge is a process of ongoing critical interpretation among 'fields' of interpreters and decoders. Rational knowledge is power-sensitive conversation (King, '987a): knowledge:community::knowledge:power hermeneutics:semiology::critical interpretation:codes. Decoding and transcoding plus translation and criticism; all are necessary. So science becomes the paradigmatic model not of closure, but of that which is contestable and contested. Science becomes the myth not of what escapes human agency and responsibility in a realm above the fray, but rather of accountability and responsibility for translations and solidarities linking the cacophonous visions and visionary voices that characterize the knowledges of the subjugated. A splitting of senses, a confusion of voice and sight, rather than clear and distinct ideas, becomes the metaphor for the ground of the rational. We seek not the knowledges ruled by phallogocentrism (nostalgia for the presence of the one true Word) and disembodied vision, but those ruled by partial sight and limited voice. We do not seek partiality for its own sake, but for the sake of the connections and unexpected openings situated knowledges make possible. The only way to find a larger vision is to be somewhere in particular. The science question in feminism is about objectivity as positioned rationality. Its images are not the products of escape and transcendence of limits, i.e., the view from above, but the joining of partial views and halting voices into a collective subject position that promises a vision of the means of ongoing finite embodiment, of living within limits and contradictions, i.e., of views from somewhere.

## **ALife god trick link**

ALife is the god-trick par excellence—it perpetuates the myth of autonomous and neutral observers

Kember 2003 [Sarah, Reader in new technologies of communications, Goldsmiths college, London, Cyberfeminism and Artificial Life, pg 75-76]

Where Helmreich’s work raises questions about the relationship between epistemology and subjectivity within a scientific discipline which normalises and naturalises biological, masculine and heterosexual discourses, there is, I think, scope for further investigation into the gaps and fissures of dominant ALife epistemology, not least through a more extensive examination of the complexity of current debate in biology, biotechnology and the life sciences. There is also much more to be said about the role of the subject in ALife since this, more than any other aspect, situates the discipline and challenges its claims to ahistorical, apolitical (evolutionary) autonomy. It is through the involvement and intervention of other subjects and subjectivities that the construction of alternative epistemologies and different configurations of power become possible. Power, as it is currently configured is monolithic. It passes from the creator to the creations of ALife worlds but is neither shared nor contested. The power of the creator is embodied in the creation through narratives which closely model those of monotheistic Judaeo-Christian religion. It is clear that ALife represents the ‘god-trick’ (Haraway 1991a) par excellence. This is the trick of transcendent, disembodied vision, or of seeing everything from nowhere. The notion of the god-trick which Haraway developed specifically in the context of medical imaging and other scientific visualising technologies, has greater depth than Foucault’s (1987) ungendered instrumental concept of panopticism and is realised in the visual display of programs from Tierra to Creatures which offer users a God’s eye view of artificial worlds. To my mind, ALife is also an example of another kind of god-trick which I have referred to elsewhere as that of autonomous creation (Kember 1998). The god-trick of autonomous creation is that of creating life without reference to, or dependence upon the other of the female body. Autonomous creation is masculine and it subsumes the maternal function, thereby rendering it obsolete. Most often associated with the medical and visual technologies of ‘assisted’ reproduction (Franklin 1993, 1997; Treichler and Cartwright 1992; Treichler et al. 1998) autonomous creation allows science to father itself and confers a god-like status on scientists. Helmreich locates ALife within a widespread mythical, religious, literary and scientific tradition ‘of attempting to manufacture living things’ which is premised on ‘a sort of masculine birthing’ (1998a: 5). He also demonstrates that there is more than a degree of selfconsciousness in the creationist acts of at least some of the ALife Gods. Tierra is on one level, an allegory of creation. The ‘seed’ or ‘ancestor’ program is planted in the soil or earth, and constitutes the origin of life. The seed is both masculine and divine: ‘In tales of procreation, males, made in the image of a masculine god, plant their active “seed” in the passive, receptive, yielding, and nutritive “soil” of females, “fertilising” them’ (Delaney in Helmreich 1998a: 115). The gendering of form and matter in Langton’s vision parallels seed and soil and is classical if not divine.13 Nevertheless Langton is knowingly designated the ‘father’ of ALife. The ‘genetic’ code for Ray’s ancestor is ‘0666god’ – ‘a designation that suggests that the programmer is a kind of Faustian figure, playing at a devilishly digital divinity’ (117). The tightly inflated balloon of such playfully serious omnipotence is threatened less by the slow puncture of agency escaping or transubstantiating into the emergent complexity of artificial forms and environments than it is by the prick (as it were) of womb envy. As Helena says, ‘Women create things, right?’ and ‘maybe men would like to give birth to something and here it is, this is it’ (121). And no mess either. The computer is a contained, pristine birthing environment which can be turned off and walked away from at will. Power is so much more appealing without the attendant responsibility, which is why the story of Frankenstein will not cease to be of relevance within a patriarchal technoscientific culture. Helena also echoes a familiar feminist refrain that science does not stop at mimicking the maternal or creative function; it attempts to supersede it: ‘They’re saying to us, “we’re going to beat you guys. We’re going to create entire worlds” ’ (121). A creationist discourse is simultaneously a colonialist one when it deals with the ‘discovery’, naming and controlling of new worlds by white European and American men. Thomas Ray’s plan for a global Network Tierra, and a new environment to be filled with digital organisms leads Helmreich to insist on the ‘terratorial metaphor’ and the ‘colonial imagination’ with its creationist underpinnings (94). The combination of creationism and colonialism is indicative not just of masculinity but of race. Cyberspace cowboys owe much to their ancestors: That many Artificial Life practitioners are white men who grew up reading cowboy science fiction is not trivial. The location of SFI [Santa Fe Institute] in New Mexico, a place associated with the days of westward frontier expansion, is also fitting, and acts as a resource for imagery enabling the crafting of computers as worlds. (Helmreich 1998a: 95)

# **Science bad impacts**

## **Science bad impacts – Status quo social order**

### Science legitimizes the existing social order and provides empirical justification for state totalitarianism and violence

Nhanenge, 07, (Jytte Nhanengo) (Nhanengo have masters from U South Africa, “ECOFEMINSM: TOWARDS INTEGRATING THE CONCERNS OF WOMEN, POOR PEOPLE AND NATURE INTO DEVELOPMENT, uir.unisa.ac.za/bitstream/10500/570/1/dissertation.pdf)

Society is assumed a static entity, where no changes are possible. By promoting a permanent character, social science legitimizes the existing social order, while obscuring the relations of domination and subordination, which is keeping the existing power relations inaccessible to analysis. The frozen order also makes it impossible to develop alternative explanations about social reality. It prevents a historical and political understanding of reality and denies the possibility for social transformation by human agency. The prevailing condition is seen as an unavoidable fact. This implies that human beings are passive and that domination is a natural force, for which no one is responsible. This permits the state freely to implement laws and policies, which are controlling and coercive. These are seen as being correct, because they are based on scientific facts made by scientific experts. One result is that the state, without consulting the public, engages in a pathological pursuit of economic growth. Governments support the capitalist ideology, which benefits the elite only, while it is destroying nature and increasing poverty for women and lower classes. The priority on capitalism also determines other social policies. There are consequently no considerations for a possible conflict between the aims of the government for social control and economic efficiency and the welfare needs of various social groups. Without having an alternative to the existing order, people become dis-empowered. Ultimately, the reaction is public apathy, which legitimates authorative governments. Thus, social science is an ideology, which is affirming the prevailing social, political and economic order. (Reitzes 1993: 36-39, 41-42). In reality, it is a contradiction to apply the scientific method to social policy making. Any social policy change will alter social relations and affect the relative welfare of classes of people, which makes social decision making normative. Social policy is related to politics, which is an extension of ethics. Since values and facts are different categories, one cannot apply indisputable empirical facts to social values. It is therefore impossible to legitimize political decisions with reference to scientific knowledge. Social decision-making is a political process. When science is applied to political and normative questions, it becomes an ideology, which supports the dominant interests. Thus, the state reproduces conditions for domination. In case the contradictions become too pronounced, and the power of the state is challenged, then the ideology becomes violent. The consequence is totalitarianism. It is a situation where the state sets limits to what is permissible to think and teach, if necessary by coercion. Conclusively social science manipulates reality to serve the vested interests of specific social groups. The result is a dominant and violent ideology masked as science. (Reitzes 1993: 32, 34, 42-45). Shiva also finds that scientific knowledge is directed towards violence and economic profits: 80% of scientific research is devoted to the war industry. War is aimed at violence against the perceived enemy and civilians, sometimes a country's own population. Also in peaceful domains does science relate to violence. It exploits nature for maximization of profit. Science can only include the quantifiable, profit generating properties of a resource system. Thus properties which are not profitable, but which are qualitative and stabilise ecological processes, are ignored and destroyed. The focus on power and control for profit means that science misses out on much of what is important for nature and people. Thus, science and technology choose nuclear energy, experimenting on animals and spreading deadly pesticide, while they are overlooking the lest profitable, but sustainable organic farming and solar energy. Consequently, science focuses on violence and profit, which destructs human and natural well-being. (Shiva 1989: 23; Des Jardins 2001: 255).

## Science bad impacts – Androcentrism

### The structure of science is permeated by androcentric thinking about objectivity

Keller, 1978, American physicist, Professor of History and Philosophy of Science at the Massachusetts Institute of Technology, taught at the State University of New York at Purchase, New York University and in the department of rhetoric at the University of California, Berkeley, B.A. in physics from Brandeis University, studies in theoretical physics at Harvard University graduating with a Ph.D [Evelyn, “Gender and Science” in *Discovering Reality: Feminist Perspectives on Epistemology, Metaphysics, Methodology, and Philosophy Science*, Kluwer Academic publishers, 187- 190]

“The requirements of...correctness in practical judgements and objectivity in theoretical knowledge ... belong as it were in their form and their claims to humanity in general, but in their actual historical configuration they are masculine throughout. Supposing that we describe these things, viewed as absolute ideas, by the single word ‘objective’, we then find that in the history of our race the equation objective = masculine is a valid one” (George Simmel, quoted by Homey, 1926, p. 200). In articulating the commonplace, Simmel steps outside of the convention of academic discourse. The historically pervasive association between masculine and objective, more specifically between masculine and scientific, is a topic which academic critics resist taking seriously. Why is that? Is it not odd that an association so familiar and so deeply entrenched is a topic only for in- formal discourse, literary allusion, and popular criticism? How is it that formal criticism in the philosophy and sociology of science has failed to see here a topic requiring analysis? The virtual silence of at least the non- feminist academic community on this subject suggests that the association of masculinity with scientific thought has the status of a myth which either cannot or should not be examined seriously. It has simultaneously the air of being “self-evident” and “nonsensical” – the former by virtue of existing in the realm of common knowledge (i.e., everyone knows it), and the latter by virtue of lying outside the realm of formal knowledge, indeed conflicting with our image of science as emotionally and sexually neutral. Taken seriously, it would suggest that, were more women to engage in science, a different science might emerge. Such an idea, although sometimes expressed by non- scientists, clashes openly with the formal view of science as being uniquely determined by its own logical and empirical methodology. The survival of mythlike beliefs in our thinking about science, the very archetype of antimyth, ought, it would seem, to invite our curiosity and demand investigation. Unexamined myths, wherever they survive, have a subterranean potency; they affect our thinking in ways we are not aware of, and to the extent that we lack awareness, our capacity to resist their influence is undermined. The presence of the mythical in science seems particularly inappropriate. What is it doing there? From where does it come? And how does it influence our conceptions of science, of objectivity, or, for that matter, of gender? These are the questions I wish to address, but before doing so it is necessary to clarify and elaborate the system of beliefs in which science acquires a gender – which amount to a “genderization” of science. Let me make clear at the outset that the issue which requires discussion is not, or at least not simply, the relative absence of women in science. While it is true that most scientists have been, and continue to be, men, the make-up of the scientific population hardly accounts, by itself, for the attribution of masculinity to science as an intellectual domain. Most culturally validated intellectual and creative endeavors have, after all, historically been the domain of men. Few of these endeavors, however, bear so unmistakably the connotation of masculine in the very nature of the activity. To both scientists and their public, scientific thought is male thought, in ways that painting and writing – also performed largely by men – have never been. As Simmel observed, objectivity itself is an ideal which has a long history of identification with masculine. The fact that the scientific population is, even now, a population that is overwhelmingly male, is itself a consequence rather than a cause of the attribution of masculinity to scientific thought. What requires discussion is a belief rather than a reality, although the ways in which reality is shaped by our beliefs are manifold, and also need articulating. How does this belief manifest itself? It used to be commonplace to hear scientists, teachers, and parents assert quite baldly that women cannot, should not, be scientists, that they lack the strength, rigor, and clarity of mind for an occupation that properly belongs to men. Now that the women’s movement has made offensive such naked assertions, open acknowledgment of the continuing belief in the intrinsic masculinity of scientific thought has become less fashionable. It continues, however, to find daily expression in the language and metaphors we use to describe science. When we dub the objective sciences “hard” as opposed to the softer, i.e., more subjective, branches of knowledge, we implicitly invoke a sexual metaphor, in which “hard” is of course masculine and “soft,” feminine. Quite generally, facts are “hard,” feelings “soft.” “Feminization” has become synonymous with sentimentalization. A woman thinking scientifically or objectively is thinking “like a man”; conversely, a man pursuing a nonrational, nonscientific argument is arguing “like a woman.” The linguistic rooting of this stereotype is not lost among children, who remain perhaps the most outspoken and least self-conscious about its expression. From strikingly early ages, even in the presence of astereotypic role models, children have learned to identify mathematics and science as male. “Science,” my five-year-old son declared, confidently bypassing the fact that his mother was a scientist, “is for men!” The identification between scientific thought and masculinity is so deeply embedded in the culture at large that children have little difficulty internalizing that identification. They grow up not only expecting scientists to be men, but also perceiving scientists as more “masculine” than other male professionals, than, for example, those in the arts. Numerous studies of masculinity and femininity in the professions confirm this observation, with the “harder” sciences as well as the “harder” branches of any profession consistently characterized as more masculine. In one particularly interesting study of attitudes prevalent among English schoolboys, a somewhat different but critically related dimension of the cultural stereotype emerges. Hudson (1972) observes that scientists are perceived as not only more masculine than are artists, but simultaneously as less sexual. He writes: The arts are associated with sexual pleasure, the sciences with sexual restraint. The arts man is seen as having a good-looking, well-dressed wife with whom he enjoys a warm sexual relation; the scientists as having a wife who is dowdy and dull, and in whom he has no physical interest. Yet the scientist is seen as masculine, the arts specialist as slightly feminine (p. 83). In this passage we see the genderization of science linked with another, also widely perceived image of science as antithetical to Eros. These images are not unrelated, and it is important to bear their juxtaposition in mind as we attempt to understand their sources and functions. What is at issue here is the kind of images and metaphor with which science is surrounded. If we can take the use of metaphor seriously, while managing to keep clearly in mind that it is metaphor and language which are being discussed, then we can attempt to understand the influences they might exert – how the use of language and metaphor can become hardened into a kind of reality. One way is through the internalization of these images by scientists themselves, and I will discuss more explicitly how this can happen later in the paper. As a first step, however, the imagery itself needs to be explored further. If we agree to pursue the implications of attributing gender to the scientific mind, then we might be led to ask, with what or with whom is the sexual metaphor completed? And, further, what is the nature of the act with which this now desexualized union is consummated? The answer to the first question is immediate. The complement of the scientific mind is, of course, Nature – viewed so ubiquitously as female. “Let us establish a chaste and lawful marriage between Mind and Nature” wrote Bacon (quoted by Leiss, 1972, p. 25), thereby providing the prescription for the birth of the new science. This prescription has endured to the present day – in it are to be found important clues for an understanding of the posture of the virgin groom, of his relation toward his bride, and of the ways in which he defines his mission. The metaphoric marriage of which science is the offspring sets the scientific project squarely in the midst of our unmistakably patriarchal tradition. Small wonder, then, that the goals of science are so persistently described in terms of “conquering” and “mastering” nature. Bacon articulated this more clearly than today’s self-consciousness could perhaps permit when he urged: “I am come in very truth leading you to Nature with all her children to bind her to your service and make her your slave” (Farrington, 1951, p. 197). Much attention has been given recently to the technological abuses of modern science, and in many of these discussions blame is directed toward the distortions of the scientific program intrinsic in its ambition to dominate nature – without, however, offering an adequate explanation of how that ambition comes to be intrinsic to science. Generally such distortions are attributed to technology, or applied science, which is presumed to be clearly distinguishable from pure science. In the latter, the ambition is supposed to be pure knowledge, uncontaminated by fantasies of control. While it is undoubtedly true that the domination of nature is a more central feature of technology, it is impossible to draw a clear line between pure and applied science. History reveals a most complex relation between the two, as complex perhaps as the interrelation between the dual constitutive motives for knowledge – those of transcendence and power. It would be naïve to suppose that the connotations of masculinity and conquest affect only the uses to which science is put, and leave untouched its very structure.

### The objectivity of science genders truth

Keller, 1978, American physicist, Professor of History and Philosophy of Science at the Massachusetts Institute of Technology, taught at the State University of New York at Purchase, New York University and in the department of rhetoric at the University of California, Berkeley, B.A. in physics from Brandeis University, studies in theoretical physics at Harvard University graduating with a Ph.D [Evelyn, “Gender and Science” in *Discovering Reality: Feminist Perspectives on Epistemology, Metaphysics, Methodology, and Philosophy Science*, Kluwer Academic publishers, 197-200]

Thus it is that, for all of us – male and female alike – our earliest experiences incline us to associate the affective and cognitive posture of objectification with masculine, while all processes which involve a blurring of the boundary between subject and object tend to be associated with the feminine. The crucial question of course is: What happens to these early associations? While the patterns which give rise to them may be quasi-universal (though strongest, no doubt, in our own form of nuclear family), the conditions which sustain them are not. It is perhaps at this point that specific cultural forces intrude most prominently. In a culture which validates subsequent adult experiences that transcend the subject-object divide, as we find for example in art, love, and religion, these early identifications can be counter- acted – provided, that is, that such experiences are validated as essentially human rather than as “feminine” experience. However, in a culture such as ours, where primary validation is accorded to a science which has been premised on a radical dichotomy between subject and object, and where all other experiences are accorded secondary, “feminine” status, the early identifications can hardly fail to persist. The genderization of science – as an enterprise, as an intellectual domain, as a world view – simultaneously reflects and perpetuates associations made in an earlier, prescientific era. If true, then an adherence to an objectivist epistemology, in which truth is measured by its distance from the subjective, has to be re-examined when it emerges that, by this definition, truth itself has become genderized. It is important to emphasize, even repeat, that what I have been discussing is a system of beliefs about the meaning of masculine and feminine, rather than any either intrinsic or actual differences between male and female. Children of both sexes learn essentially the same set of ideas about the characteristics of male and female – how they then make use of these ideas in the development of their gender identity as male or female is another question. The relation between the sexual stereotypes we believe in and our actual experience and even observation of gender is a very complex one. It is crucial, however, to make a vigilant effort to distinguish between belief and reality, even, or especially, when the reality which emerges is so influenced by our beliefs. I have not been claiming, for example, that men are by nature more objective, better suited for scientific work, nor that science, even when characterized by an extreme objectivist epistemology, is intrinsically masculine. What I have been discussing are the reasons we might believe all of the above to be true. These beliefs may in fact lead to observed differences between the sexes, though the question of actual differences between men and women in a given culture is ultimately an empirical one. The subsequent issue of how those possible differences might be caused by cultural expectations is yet a separate issue, and requires separate discussion. Without getting into the empirical question of sex differences, about which there is a great deal of debate, it seems reasonable to suggest that we ought to expect that our early beliefs about gender will be subject to some degree of internalization. To return, then, to the issue of gender development, it is important to recognize that, although children of both sexes must learn equally to distinguish self from other, and have essentially the same need for autonomy, to the extent that boys rest their very sexual identity on an opposition to what is both experienced and defined as feminine, the development of their gender identity is likely to accentuate the process of separation. As boys, they must undergo a twofold “disidentification from mother” (Greenson, 1968) – first for the establishment of a self-identity, and second for the consolidation of a male gender identity. Further impetus is added to this process by the external cultural pressure on the young boy to establish a stereotypic masculinity, now culturally as well as privately connoting independence and autonomy. The cultural definitions of masculine as what can never appear feminine, and of autonomy as what can never be relaxed, conspire to reinforce the child’s earliest associations of female with the pleasures and dangers of merging, and male with both the comfort and the loneliness of separateness. The boy’s internal anxiety about both self and gender is here echoed by the cultural anxiety; together they can lead to postures of exaggerated and rigidified autonomy and masculinity which can – indeed which may be designed to – defend against that anxiety and the longing which generates it. Many psychoanalysts have come to believe that, because of the boy’s need to switch his identification from the mother to the father, his sense of gender identity tends always to be more fragile than the girl’s. Her sense of self-identity may, however, be comparatively more vulnerable. It has been suggested that the girl’s development of a sense of separateness may be to some degree hampered by her ongoing identification with her mother. Although she too must disentangle herself from the early experience of oneness, she continues to look toward her mother as a model for her gender identity. Whatever vicissitudes her relation to her mother may suffer during subsequent development, a strong identification based on common gender is likely to persist – her need for “disidentification” is not so radical. Cultural forces may further complicate her development of autonomy by stressing dependency and subjectivity as feminine character- istics. To the extent that such traits become internalized, they can be passed on through the generations by leading to an accentuation of the symbiotic bond between mother and daughter (see, e.g., Chodorow, 1974). It would seem, then, appropriate to suggest that one possible outcome of these processes is that boys may be more inclined toward excessive and girls toward inadequate delineation – growing into men who have difficulty loving and women who retreat from science. What I am suggesting, then, and indeed trying to describe, is a network of interactions between gender development, a belief system which equates objectivity with masculinity, and a set of cultural values which simultaneously elevates what is defined as scientific and what is defined as masculine. The structure of this network is such as to perpetuate and exacerbate distortions in any of its parts – including the acquisition of gender identity.

### The masculinity of science leads to sexism and patriarchy

Keller, 1978, American physicist, Professor of History and Philosophy of Science at the Massachusetts Institute of Technology, taught at the State University of New York at Purchase, New York University and in the department of rhetoric at the University of California, Berkeley, B.A. in physics from Brandeis University, studies in theoretical physics at Harvard University graduating with a Ph.D [Evelyn, “Gender and Science” in *Discovering Reality: Feminist Perspectives on Epistemology, Metaphysics, Methodology, and Philosophy Science*, Kluwer Academic publishers, 201-203]

It is impossible to conclude a discussion of the genderization of science with- out making some brief comments on its social implications. The linking of scientific and objective with masculine brings in its wake a host of secondary consequences which, however self-evident, may nevertheless need articulating. Not only does our characterization of science thereby become colored by the biases of patriarchy and sexism, but simultaneously our evaluation of masculine and feminine becomes affected by the prestige of science. A circular process of mutual reinforcement is established in which what is called scientific receives extra validation from the cultural preference for what is called masculine, and, conversely, what is called feminine – be it a branch of knowledge, a way of thinking, or woman herself – becomes further devalued by its exclusion from the special social and intellectual value placed on science and the model science provides for all intellectual endeavors. This circularity not only operates on the level of ideology, but is assisted by the ways in which the developmental processes, both for science and for the child, internalize ideological influences. For each, pressures from the other operate, in the ways I have attempted to describe, to create distortions and perpetuate caricatures. Neither in emphasizing the self-sustaining nature of these beliefs, nor in relating them to early childhood experience, do I wish to suggest that they are inevitable. On the contrary, by examining their dynamics I mean to emphasize the existence of alternative possibilities. The disengagement of our thinking about science from our notions of what is masculine could lead to a freeing of both from some of the rigidities to which they have been bound, with profound ramifications for both. Not only, for example, might science become more accessible to women, but, far more importantly, our very conception of “objective” could be freed from inappropriate constraints. As we begin to understand the ways in which science itself has been influenced by its unconscious mythology, we can begin to perceive the possibilities for a science not bound by such mythology. How might such a disengagement come about? To the extent that my analysis rests on the crucial importance of the gender of the primary parent, changing patterns of parenting could be of special importance.6 But other developments might be of equal importance. Changes in the ethos that sustains our beliefs about science and gender could also come about from the current pressure, largely politically inspired, to re-examine the traditionally assumed neutrality of science, from philosophical exploration of the boundaries or limitations of scientific inquiry, and even, perhaps especially, from events within science itself. Both within and without science, the need to question old dogma has been pressing. Of particular interest among recent developments within science is the growing interest among physicists in a process description of reality – a move inspired by, perhaps even necessitated by, quantum mechanics. In these descriptions object reality acquires a dynamic character, akin to the more fluid concept of autonomy emerging from psychoanalysis. Bohr himself perspicaciously provided us with a considerably happier image than Bacon’s – one more apt even for the future of physics – when he chose for his coat of arms the yin-yang symbol, over which reads the inscription: Contraria Sunt Complementa. Where, finally, has this analysis taken us? In attempting to explore the significance of the sexual metaphor in our thinking about science, I have offered an explanation of its origins, its functions, and some of its consequences. Necessarily, many questions remain, and it is perhaps appropriate, by way of concluding, to articulate some of them. I have not, for example, more than touched on the social and political dynamics of the genderization of science. This is a crucial dimension which remains in need of further exploration. It has seemed to me, however, that central aspects of this problem belong in the psychological domain, and further, that this is the domain which tends to be least accounted for in most discussions of scientific thought. Within the particular model of affective and cognitive development I have invoked, much remains to be understood about the interconnections between cognition and affect. Though I have, throughout, assumed an intimate relation between the two, it is evident that a fuller and more detailed conception is necessary. Finally, the speculations I offer raise numerous questions of historical and psychological fact. I have already indicated some of the relevant empirical questions in the psychology of personality which bear on my analysis. Other questions of a more historical nature ought also to be mentioned. How, e.g., have conceptions of objectivity changed with time, and to what extent have these conceptions been linked with similar sexual metaphors in other, prescientific eras, or, for that matter, in other, less technological cultures? Clearly, much remains to be investigated; perhaps the present article can serve to provoke others to help pursue these questions.

## Science bad impacts – Ethics

### The aff’s Cartesian rationality makes ethical action impossible

Plumwood, 93, (Val Plumwood, teaches in the Department of Philosophy at the University of Tasmania, Australia, and in the past had held positions at North Carolina State University, the University of Montana, and the University of Sydney, who was prominent in the development of radical ecosophy from the early 1970s through the remainder of the 20th century) (Feminism and the Mastery of Nature) (pg 141) (<http://wxy.seu.edu.cn/humanities/sociology/htmledit/uploadfile/system/20100924/20100924024121433.pdf>)

We have seen how the exclusions of reason are multiple and how the meanings and boundaries of the concept of nature shift to encompass changing social circumstances and opportunities for colonisation and mastery. It is not only the concept of nature which has this flexibility, but also that of reason. With **the rise of science reason** takes on the Cartesian sense of objectivity (disengagement from internal sources of error in nature as the body, the senses and emotions) and **strips the natural world of ends and of the intentional elements which make an ethical response to it impossible**. With the rise of capitalism, the variations on the reason/nature story which develop in tandem with the emerging systems of individual appropriation and distribution turn on a concept of the individual, and of individual rationality, which denies both human social others and earth others in its concept of the rational egoist subject of social and economic life. The new conception of reason expressed in economic and in liberal theory continues to deny and background those areas previously excluded as nature—the nonhuman, the reproductive and bodily sphere the labor of those colonised as nature—treating these now in the form of invisible inputs to the rational economy. It adds to this an intensified instrumentalism as the economic subject comes increasingly to the fore, and the new form of mastery comes to define rationality as egoism, and sociality as an instrumental association driven by self-interest.

# Alternative/framework

## Alternative – Standpoint epistemology

### The alternative is a critical consciousness of different standpoints and their epistemic effects

Wylie 3 [Alison Wylie is a Professor in the Department of Philosophy at the University of Washington and holds a PhD in philosophy. “Science and Other Cultures” pgs 31-32 [Google](http://books.google.com/books?id=kkn3ifKKc9wC&lpg=PA26&ots=UNfpawNkum&dq=Alison%20Wylie%2C%20%E2%80%9CWhy%20Standpoint%20Matters%2C%E2%80%9D%20in%20Science%20and%20Other%20Cultures&lr&pg=PA32#v=onepage&q&f=false) Books ]

Standpoint in the sense that particularly interests standpoint theorists is our differential capacity to develop the kind of a standpoint on knowledge production that is a “project” (Weeks, 101), a critical consciousness about the nature of our social location and the difference it makes epistemically. Standpoint theory is itself such a project, carried out both through the kinds of social research that take seriously the understanding of insiders—c.g., feminist research that starts from women’s experience and women’s lives (Smith 1990; Harding 1991)—and by feminist philosophers who are intent on creating a politically sophisticated, robustly social form of naturalized epistemology and philosophy of science. In either case, what is at stake is the jointly empirical and conceptual question of how power relations inflect knowledge: what systematic limitations are imposed by the social location of different classes or collectivities of knowers, and what potential they have for developing an understanding of this structured epistemic partiality. On standpoint theory so conceived, it is necessarily an open question what features of location and/or standpoint are relevant to specific epistemic projects. For example, although any location or standpoint that “disappears gender” should be suspect,19 we cannot assume that gender is uniquely or fundamentally important in structuring our understanding, or that a feminist standpoint will be the key to understanding the power dynamics that shape what we know. The project of developing critical consciousness—a jointly empirical, conceptual, and social-political enterprise—is the only way to answer questions about the epistemic relevance of a standpoint (in either sense) to specific epistemic projects. But then the normative question reasserts itself: is there any basis for claiming that we should privilege the knowledge produced by those who occupy a particular location or standpoint? Does an analysis of the epistemic effects of a social location or achieved standpoint provide a basis for justification or does it reinforce a social constructivism that ultimately gives rise to corrosive relativism? The inversion thesis that underpins most forms of feminist standpoint theory suggests that, when standpoint is taken into account, often the epistemic tables are turned. Those who are economically dispossessed, politically oppressed, socially marginalized and are therefore likely to be discredited as epistemic agents—e.g., as uneducated, uninformed, unreliable—may actually have a capacity, by virtue of their standpoint, to know things that those occupying privileged positions typically do not know, or are invested in not knowing (or, indeed, are invested in systematically ignoring and denying). It is this thesis that Hekman contests when she objects that no argument has been given for attributing greater objectivity to such standpoints.

### The alt solves- critical consciousness is the best way to engage critical enquiry while looking for the standpoint least affected by domination and manipulation

Haraway 91 [Donna Haraway has won the J. D. Bernal award from the Society for Social Studies of Science, the highest possible award, for her work in the feminist critique of science and has lectured in feminist theory and techno-science at the European Graduate School in Switzerland. “Simians, Cyborgs, and Women: The Reinvention of Nature”, pages unknown. <http://science.consumercide.com/haraway_sit-knowl.html> ]

Many currents in feminism attempt to theorize grounds for trusting especially the vantage points of the subjugated; there is good reason to believe vision is better frozen below the brilliant space platforms of the powerful (Hartsock, 1983a; Sandoval, n.d.; Harding, 1986; Anzaldúa, 1987). Linked to this suspicion, this chapter is an argument for situated and embodied knowledges and against various forms of unlocatable, and so irresponsible, knowledge claims. Irresponsible means unable to be called into account. There is a premium on establishing the capacity to see from the peripheries and the depths. But here a serious danger of romanticizing and/or appropriating the vision of the less powerful while claiming to see from their positions. To see from below is neither easily learned nor unproblematic, even if 'we' 'naturally' inhabit the great underground terrain of subjugated knowledges. The positionings of the subjugated are not exempt from critical reexamination, decoding, deconstruction, and interpretation; that is, from both semiological and hermeneutic modes of critical enquiry. The standpoints of the subjugated are not 'innocent' positions. On the contrary, they are preferred because in principle they are least likely to allow denial of the critical and interpretative core of all knowledge. They are savvy to modes of denial through repression, forgetting, and disappearing acts -- ways of being nowhere while claiming to see comprehensively. The subjugated have a decent chance to be on to the god-trick and all its dazzling -- and, therefore, blinding -- illuminations. 'Subjugated' standpoints are preferred because they seem to promise more adequate, sustained, objective, transforming accounts of the world. But how to see from below is a problem requiring at least as much skill with bodies and language, with the mediations of vision, as the 'highest' techno-scientific visualizations.

### Both relativism and totalization fail- critical consciousness of partial perspectives is key to solve

Haraway 91 [Donna Haraway has won the J. D. Bernal award from the Society for Social Studies of Science, the highest possible award, for her work in the feminist critique of science and has lectured in feminist theory and techno-science at the European Graduate School in Switzerland. “Simians, Cyborgs, and Women: The Reinvention of Nature”, pages unknown. <http://science.consumercide.com/haraway_sit-knowl.html> ]

Such preferred positioning is as hostile to various forms of relativism as to the most explicitly totalizing versions of claims to scientific authority. But the alternative to relativism is not totalization and single vision, which is always finally the unmarked category whose power depends on systematic narrowing and obscuring. The alternative to relativism is partial, locatable, critical knowledges sustaining the possibility of webs of connections called solidarity in politics and shared conversations in epistemology. Relativism is a way of being nowhere while claiming to be everywhere equally. The 'equality' of positioning is a denial of responsibility and critical enquiry. Relativism is the perfect mirror twin of totalization in the ideologies of objectivity; both denythe stakes in location, embodiment, and partial perspective; both make it impossible to see well. Relativism and totalization are both 'god-tricks' promising vision from everywhere and nowhere equally and fully, common myths in rhetories surrounding science. But it is precisely in the politics and epistemology of partial perspectives that the possibility of sustained, rational, objective enquiry rests.

So, with many other feminists, I want to argue for a doctrine and practice of objectivity that privileges contestation, deconstruction, passionate construction, webbed connections, and hope for transformation of systems of knowledge and ways of seeing. But not just any partial perspective will do; we must be hostile to easy relativisms and holisms built out of summing and subsuming parts. 'Passionate detachment' (Kuhn, 1982) requires more than acknowledged and self-critical partiality. We are also bound to seek perspective from those points of view, which can never be known in advance, which promise something quite extraordinary, that is, knowledge potent for constructing worlds less organized by axes of domination. In such a viewpoint, the unmarked category would really disappear -- quite a difference from simply repeating a disappearing act. The imaginary and the rational -- the visionary and objective vision -- hover close together. I think Harding's plea for a successor science and for postmodern sensibilities must be read to argue that this close touch of the fantastic element of hope for transformative knowledge and the severe check and stimulus of sustained critical enquiry are jointly the ground of any believable claim to objectivity or rationality not riddled with breath-taking denials and repressions. It is even possible to read the record of scientific revolutions in terms of this feminist doctrine of rationality and objectivity. Science has been utopian and visionary from the start; that is one reason 'we' need it.

## Alt solves – environment

### Embracing Feminism solves—reconstructing what is scientific knowledge can solve for the environment

J. Ann Tickner 92, (J. Ann Tickner) (Tickner is a Prof of IR at USC, M.A. Yale and Ph.D Brandeis, “Gender in International Relations: Feminist Perspectives on Achieving International Security,”)( 124-6)

Since women have not been well represented in national and international institutions dealing with the environment, their contribution to working for ecological security has been largely at the grassroots level. For example, the Chipko movement, which began with women hugging trees as a protest against cutting them down in the Chamoli district of Uttar Pradesh in 1973, met with some success when Indian prime minister Indira Gandhi issued a fifteen-year ban on the commercial felling of the forests of Uttar Pradesh. Women are also taking part in projects of reforestation; Kenya's Green Belt Movement, started in 1977 by the National Council of Women, involves women in the establishment of "Green Belt communities" and small tree nurseries.69 The kind of knowledge that women bring to these various environmental movements is gained from experience as producers and providers for daily household needs. However, the belief that this type of knowledge cannot be "scientific" has kept it from being recognized by development and environmental "experts" as well as foreign policymakers. As long as metaphors such as "global housekeeping" associate ecological security with the devalued realm of women, it will not become an issue of priority on the foreign policy agendas of states or in the mainstream discipline of international relations. While it has paid little direct attention to environmental issues, the conventional discipline of international relations has relied to a great extent on modernity's mechanistic view of nature in framing its assumptions about the behavior of states in the international system. Feminist perspectives on ecology reveal not only the hierarchical relationship between humans and nature that has grown out of this worldview but also the extent to which this unequal relationship interacts with other forms of domination and subordination, including gender relations. The hierarchical dualisms discussed in this chapter, such as culture/nature, civilized/wild, North/South, rich/poor, public/private, and international/local, have been characteristic of the way in which we describe world politics and the interaction of states with their natural environment. A feminist perspective would argue that not until the boundaries of inequality and domination these dualisms represent are transcended can true ecological security be achieved. Only through the emergence of a system of values that simultaneously respects nature, women, and adversity of cultures-- norms that have been missing from the historical practices of international statecraft-- can models that promise an ecologically secure future be devised.

## Framework/alt – need phil consid in space policy

Ethical and epistemological questions are key parts of the debate on space science

Daley & Frodeman 2008 [Erin Moore, Robert, “Separated at Birth, Signs of Rapprochement: Environmental Ethics and Space Exploration,” *Ethics and the Environment*, 13 (1), Spring, 135-151]

With an aggressive NASA agenda for future life-detection missions, the space science and policy communities will need to develop thoughtful strategies regarding biological and/or political risk of the discovery of life. Philosophical, psychological and theological issues (the possibility, for instance, of sudden societal unrest or greatly increased cult activity), in addition to ethical considerations, will **necessarily play a central role** in any such thinking. The development of a comprehensive strategy for addressing this discovery will require interdisciplinary work that includes philosophers, theologians, and social scientists, as well as space scientists and policy makers.8

## Framework – Epistemology key to survival

### All scientific description is value-laden and leads to real world impacts – the best epistemological practice should win because its key to survival

Code, 2003 [Lorraine, Distinguished Research Professor Emerita of Philosophy at York University in Toronto Canada and a Fellow of the Royal Society of Canada, “What is Natural About Epistemology Naturalized?,” ed. Lynne Hankinson Nelson and Jack Nelson, *Feminist Interpretations of W.V.Quine*, pg 196-7]

The question remains, can naturalism proceed, normatively, and not merely descriptively, as some critics allege? I have two responses. First, even if it does come out, for now, as primarily descriptive, it will not be purely descriptive, if my arguments have any cogency. For descriptions are always value-laden. They are products of location and choice; they begin (and end) within theoretical presuppositions and background assumptions that are always contestable, even though they may afford nodal points at which action is possible. It is not as though good descriptions are easily achieved, nor are they final. Articulating good, plausible descriptions and circulating them well are among the most difficult tasks, and once inserted into the public domain they become catalysts of ongoing deliberation. If it should turn out that epistemology has systematically misdescribed all but a select part of cognitive activity, then better descriptions are crucial to ongoing survival. A second, related, response centers on an ambiguity in the sense of “description” that evidently prompts worries about naturalism’s “mere descriptiveness”; worries that naturalists violate prohibitions against deriving is from ought. Such pitfalls need to be distinguished from the working hypotheticals that naturalists establish, appealing to consequential patterns in the natural (and human-natural) world: “If you want to succeed in doing X, then you [had] best do Y.”83 For Bruner, narrative descriptions are always normative; it is impossible to “argue any of these interpretations without taking a moral stance and a rhetorical posture.”84 An ecology-modeled epistemology brings such a moral stance directly into its epistemic deliberations, insisting on the obligation to answer for oneself, to maintain skepticism about overweening authority, and to work toward better ways of establishing community.

## **Epistemology – Ontology inseparable**

### Epistemological and ontological questions are inseparable

Barad, 2003 [Karen, ph.d. in theoretical particle physics, Professor of Feminist Studies, Philosophy, and History of Consciousness at the University of California, Santa Cruz, “Posthumanist Performativity: Toward an Understanding of

How Matter Comes to Matter,” Signs: Journal of Women in Culture and Society 2003, vol. 28, no. 3]

There is an important sense in which practices of knowing cannot be fully claimed as human practices, not simply because we use nonhuman elements in our practices but because knowing is a matter of part of the world making itself intelligible to another part. Practices of knowing and being are not isolatable, but rather they are mutually implicated. We do not obtain knowledge by standing outside of the world; we know because “we” are of the world. We are part of the world in its differential becoming. The separation of epistemology from ontology is a reverberation of a metaphysics that assumes an inherent difference between human and nonhuman, subject and object, mind and body, matter and discourse. Onto-epistem-ology—the study of practices of knowing in being— is probably a better way to think about the kind of understandings that are needed to come to terms with how specific intra-actions matter.

## **Epistemology impact - underdetermination**

### Knowledge about the universe is always underdetermined and choices are arbitrary without epistemic justification

Beisbart 2010 [Claus, professor at Institut fur Philosophie und Politikwissenschaft, Technische Universitat Dortmund, Germany, “Can We Justifiably Assume the Cosmological Principle in Order to Break Model Underdetermination in Cosmology?,” Journal of General Philosophy of Science 40]

As it happens, the attempts to obtain knowledge about the universe face a serious underdetermination problem: Several markedly different models of the theory relevant for cosmology, viz. of Einstein’s General Theory of Relativity, are compatible with our evidence. Which one shall we choose? If there are no additional epistemic reasons for preferring one or the other model, any choice will be arbitrary. And if we only pick a model arbitrarily, we cannot claim to have obtained objective knowledge about the universe. Cosmology in the sense of the ambitious project would have failed. And we could not solve this problem by gaining further data, either. But maybe there are in fact epistemic reasons for picking one of the models. In the last nine decades, cosmology has very much been shaped by the Cosmological Principle (CP, for short). According to that principle, the universe is spatially homogeneous and isotropic at large scales. The intuitive picture is that, at each particular time, different parts of space look more or less the same (spatial homogeneity). Furthermore, for any potential observer at any time, observations are not different for different directions (spatial isotropy around any observer at any time). Clearly, the principle can help us pick a unique model of the universe. If the universe is isotropic and homogeneous and if our observations provide a fair sample of the whole universe, then we can safely project the properties that we find in the observable universe to the whole universe. This would leave us with one model (see below for qualifications). But the adoption of the CP only pushes the problem one step back. What are the grounds on which we may justifiably assume the CP? If there are no sufficient epistemic reasons to adopt it, then the threat of underdetermination is as forceful as before.

## Alt/FW – Ethics key – Space

### Debating about the ethics and epistemology of scientific knowledge is key to understanding space

Daley & Frodeman 2008 [Erin Moore, Robert, “Separated at Birth, Signs of Rapprochement: Environmental Ethics and Space Exploration,” *Ethics and the Environment*, 13 (1), Spring, 135-151]

By the early 1990s, the twin assumptions that our valuing of nature is solely a matter of ethics, and that our ethical claims must be grounded in science, were ready for reevaluation. The development of environmental philosophy (a new traditionalism, in that it looked back to the pre 19th century categories of natural philosophy and cosmology) is increasingly giving epistemological, aesthetic, religious, and metaphysical concerns about nature equal status with ethics.3 The wider range of environmental philosophy is better situated to describe our interests and experiences at places such as the Grand Canyon. People go to the Grand Canyon for reasons of aesthetics (its beauty), theology (the awe it inspires), or metaphysics (it gives us a new sense of one’s place in the universe), not ethics. Moreover, the wider concerns of environmental philosophy are more consistent with our responses to and concerns with the extraterrestrial realm. While issues such as the possible biological contamination of other planets and space debris have clear ethical dimensions, the expansion of our understanding of the cosmos through instruments such as the Hubble Space Telescope is much more a matter of aesthetics (e.g., Hubble’s stunning pictures) and metaphysics (our growing appreciation of the long view of cosmic history) than ethics. Humans tend to acknowledge ethical responsibilities to what is close at hand. The thought of environmental ethics in outer space, where few will go in our lifetimes and nothing is known to live, is quite simply unfathomable to most. But despite all this, the cosmic environment continues to awe, delight, and inspire generation after generation.

## **AT: The K is about theory/representation**

### **Theoretical concepts are rooted in material reality – our K has real world impacts**

Barad, 2003 [Karen, ph.d. in theoretical particle physics, Professor of Feminist Studies, Philosophy, and History of Consciousness at the University of California, Santa Cruz, “Posthumanist Performativity: Toward an Understanding of

How Matter Comes to Matter,” Signs: Journal of Women in Culture and Society 2003, vol. 28, no. 3]

According to Bohr, theoretical concepts (e.g., “position” and “momentum”) are not ideational in character but rather are specific physical arrangements. 18 For example, the notion of “position” cannot be presumed to be a well-defined abstract concept, nor can it be presumed to be an inherent attribute of independently existing objects. Rather, “position” only has meaning when a rigid apparatus with fixed parts is used (e.g., a ruler is nailed to a fixed table in the laboratory, thereby establishing a fixed frame of reference for specifying “position”). And furthermore, any measurement of “position” using this apparatus cannot be attributed to some abstract independently existing “object” but rather is a property of the phenomenon—the inseparability of “observed object” and “agencies of observation.” Similarly, “momentum” is only meaningful as a material arrangement involving movable parts. Hence, the simultaneous indeterminacy of “position” and “momentum” (what is commonly referred to as the Heisenberg uncertainty principle) is a straightforward matter of the material exclusion of “position” and “momentum” arrangements (one requiring fixed parts and the complementary arrangement requiring movable parts).19

## **AT: The K focuses on language/discourse/reps**

### Discourse is not the words we say but the things that agents do -- only our alternative can highlight the agency of non-human things in the construction of phenomenona

Barad, 2003 [Karen, ph.d. in theoretical particle physics, Professor of Feminist Studies, Philosophy, and History of Consciousness at the University of California, Santa Cruz, “Posthumanist Performativity: Toward an Understanding of How Matter Comes to Matter,” Signs: Journal of Women in Culture and Society 2003, vol. 28, no. 3]

Discursive practices are often confused with linguistic expression, and meaning is often thought to be a property of words. Hence, discursive practices and meanings are said to be peculiarly human phenomena. But if this were true, how would it be possible to take account of the boundarymaking practices by which the differential constitution of “humans” and “nonhumans” are enacted? It would be one thing if the notion of constitution were to be understood in purely epistemic terms, but it is entirely unsatisfactory when questions of ontology are on the table. If “humans” refers to phenomena, not independent entities with inherent properties but rather beings in their differential becoming, particular material (re)configurings of the world with shifting boundaries and properties that stabilize and destabilize along with specific material changes in what it means to be human, then the notion of discursivity cannot be founded on an inherent distinction between humans and nonhumans. In this section, I propose a posthumanist account of discursive practices. I also outline a concordant reworking of the notion of materiality and hint at an agential realist approach to understanding the relationship between discursive practices and material phenomena.

### **Scientific practices are materially discursive – our alternative allows us to study material realities without resorting to representationalism**

Barad, 2003 [Karen, ph.d. in theoretical particle physics, Professor of Feminist Studies, Philosophy, and History of Consciousness at the University of California, Santa Cruz, “Posthumanist Performativity: Toward an Understanding of

How Matter Comes to Matter,” Signs: Journal of Women in Culture and Society 2003, vol. 28, no. 3]

Discourse is not a synonym for language.24 Discourse does not refer to linguistic or signifying systems, grammars, speech acts, or conversations. To think of discourse as mere spoken or written words forming descriptive statements is to enact the mistake of representationalist thinking. Discourse is not what is said; it is that which constrains and enables what can be said. Discursive practices define what counts as meaningful statements. Statements are not the mere utterances of the originating consciousness of a unified subject; rather, statements and subjects emerge from a field of possibilities. This field of possibilities is not static or singular but rather is a dynamic and contingent multiplicity. According to Foucault, discursive practices are the local sociohistorical material conditions that enable and constrain disciplinary knowledge practices such as speaking, writing, thinking, calculating, measuring, filtering, and concentrating. Discursive practices produce, rather than merely describe, the “subjects” and “objects” of knowledge practices. On Foucault’s account these “conditions” are immanent and historical rather than transcendental or phenomenological. That is, they are not conditions in the sense of transcendental, ahistorical, cross-cultural, abstract laws defining the possibilities of experience (Kant), but rather they are actual historically situated social conditions. Foucault’s account of discursive practices has some provocative resonances (and some fruitful dissonances) with Bohr’s account of apparatuses and the role they play in the material production of bodies and meanings. For Bohr, apparatuses are particular physical arrangements that give meaning to certain concepts to the exclusion of others; they are the local physical conditions that enable and constrain knowledge practices such as conceptualizing and measuring; they are productive of (and part of) the phenomena produced; they enact a local cut that produces “objects” of particular knowledge practices within the particular phenomena produced. On the basis of his profound insight that “concepts” (which are actual physical arrangements) and “things” do not have determinate boundaries, entails a much more intimate relationship between concepts and materiality. In order to better understand the nature of this relationship, it is important to shift the focus from linguistic concepts to discursive practices.

### **The material and discursive are mutually constituting**

Barad, 2003 [Karen, ph.d. in theoretical particle physics, Professor of Feminist Studies, Philosophy, and History of Consciousness at the University of California, Santa Cruz, “Posthumanist Performativity: Toward an Understanding of

How Matter Comes to Matter,” Signs: Journal of Women in Culture and Society 2003, vol. 28, no. 3]

On an agential realist elaboration of Bohr’s theoretical framework, apparatuses are not static arrangements in the world that embody particular concepts to the exclusion of others; rather, apparatuses are specific material practices through which local semantic and ontological determinacy are intra-actively enacted. That is, apparatuses are the exclusionary practices of mattering through which intelligibility and materiality are constituted. Apparatuses are material (re)configurings/discursive practices that produce material phenomena in their discursively differentiated becoming. A phenomenon is a dynamic relationality that is locally determinate in its matter and meaning as mutually determined (within a particular phenomenon) through specific causal intra-actions. Outside of particular agential intra-actions, “words” and “things” are indeterminate. Hence, the notions of materiality and discursivity must be reworked in a way that acknowledges their mutual entailment. In particular, on an agential realist account, both materiality and discursive practices are rethought in terms of intraactivity. On an agential realist account, discursive practices are specific material (re)configurings of the world through which local determinations of boundaries, properties, and meanings are differentially enacted. That is, discursive practices are ongoing agential intra-actions of the world through which local determinacy is enacted within the phenomena produced. Discursive practices are causal intra-actions—they enact local causal structures through which one “component” (the “effect”) of the phenomenon is marked by another “component” (the “cause”) in their differential articulation. Meaning is not a property of individual words or groups of words but an ongoing performance of the world in its differential intelligibility. In its causal intraactivity, “part” of the world becomes determinately bounded and propertied in its emergent intelligibility to another “part” of the world. Discursive practices are boundary-making practices that have no finality in the ongoing dynamics of agential intra-activity.

# Answers to

## AT: Perm

### Perm fails- even their seemingly progressive politics distances itself from the feminist critique

Harding 8 [Sandra Harding is the former director of the UCLA Center for the Study of Women and has been consulted by the Pan-American Health Organization, the United Nations Development Fund for Women, and the United Nations Commission on Science and Technology regarding the viewpoints of the feminist and postcolonialist movements. “Sciences from Below: Feminisms, Postcolonialities, and Modernities (Next Wave: New Directions in Women's Studies)” Pg 5. http://library.nu/docs/ZKG4H6B5YT/Sciences from Below%3A Feminisms%2C Postcolonialities%2C and Modernities (Next Wave%3A New Directions in Women%26%23039%3Bs Studies)]]

Even work that is otherwise innovatively progressive—work which understands, for example, that we must transform politics and social relations in order to transform sciences into more competent knowledge production and service to democratic social tendencies—remains captive to exceptionalism and triumphalism insofar as it distances itself from the insights of feminist and postcolonial science studies. Consequently, even this progressive work is doomed to failure since it does not access the resources necessary to bring about the projects of democratic political and scientific transformation to which these authors aspire. It provides analyses of modernity, its strengths and limitations, only "from above" when it avoids taking the standpoint of women and the world's other least-advantaged citizens on such topics. It is doomed to the loss of both competence and legitimacy in the eyes of the vast majority of the world's citizens—losses already fully under way today, as we shall see. The account here is intended to contribute to the different project of looking at modernity and its sciences "from below."

## **AT: Scientific method solves impact**

### The scientific method is not neutral- it is a lie designed to preserve the status quo—history shows that situated objectivity is key

Harding 86 [Sandra Harding is the former director of the UCLA Center for the Study of Women and has been consulted by the Pan-American Health Organization, the United Nations Development Fund for Women, and the United Nations Commission on Science and Technology regarding the viewpoints of the feminist and postcolonialist movements. “The Science Question in Feminism” Pgs. 25-26. Google Books.]

Moreover, though empiricism holds that scientific method is sufficient to account for historical increases in the objectivity of the picture of the world that science presents, one can argue that history shows otherwise. It is movements for social liberation that have most increased the objectivity of science, not the norms of science as they have in fact been practiced, or as philosophers have rationally reconstructed them. Think, for instance, of the effects of the bourgeois revolution of the fifteenth to seventeenth centuries, which produced modern science itself; or of the effects of the proletarian revolution of the nineteenth and early twentieth centuries. Think of the effects on scientific objectivity of the twentieth-century deconstruction of colonialism. We shall also see that a key origin of androcentric bias can be found in the selection of problems for inquiry, and in the definition of what is problematic about these phenomena. But empiricism insists that its methodological norms are meant to apply only to the “context of justification”—to the testing of hypotheses and interpretation of evidence—not to the “context of discovery” where problems are identified and defined. Thus a powerful source of social bias appears completely to escape the control of science’s methodological norms. Finally, it appears that following the norms of inquiry is exactly what often results in androcentric results. Thus, feminist attempts to reform what is perceived as bad science bring to our attention deep logical incoherences and what, paradoxically, we can call empirical

## **AT: K rejects science/ science good**

Feminist criticism of science is not about saying science is a made-up lie – its about questioning the myth of neutral, impersonal, and unmediated objectivity—their science good arguments are NOT offense

Haraway, 1991 [Donna, historian of science and Professor at the History of

Consciousness Board, University of California, Santa Cruz. She received

her doctorate in biology at Yale, *Simians, Cyborgs, and Women*, pg 8-11 ]

Recognition of that fact has been a major contribution by feminist theorists. Women know very well that knowledge from the natural sciences has been used in the interests of our domination and not our liberation, birth control propagandists notwithstanding. Moreover, general exclusion from science has only made our exploitation more acute. We have learned that both the exclusion and the exploitation are fruits of our position in the social division of labour and not of natural incapacities.2 But if we have not often underestimated the principle of domination in the sciences, if we have been less mesmerized than many by the claims to value-free truth by scientists as we most frequently encounter them - in the medical marketplace (Gordon, 1976; Reed, 1978) - we have allowed our distance from science and technology to lead us to misunderstand the status and function of natural knowledge. We have accepted at face value the traditional liberal ideology of social scientists in the twentieth century that maintains a deep and necessary split between nature and culture and between the forms of knowledge relating to these two putatively irreconcilable realms. We have allowed the theory of the body politic to be split in such a way that natural knowledge is reincorporated covertly into techniques of social control instead of being transformed into sciences of liberation. We have challenged our traditional assignment to the status of natural objects by becoming anti-natural in our ideology in a way which leaves the life sciences untouched by feminist needs.' We have granted science the role of a fetish, an object human beings make only to forget their role in creating it, no longer responsive to the dialectical interplay of human beings with the surrounding world in the satisfaction of social and organic needs. We have perversely worshipped science as a reified fetish in two complementary ways: (I) by completely rejecting scientific and technical discipline and developing feminist social theory totally apart from the natural sciences, and (2) by agreeing that ‘nature' is our enemy and that we must control our 'natural' bodies (by techniques given to us by biomedical science) at all costs to enter the hallowed kingdom of the cultural body politic as defined by liberal (and radical) theorists of political economy, instead of by ourselves. This cultural body politic was clearly identified by Marx: the marketplace that remakes all things and people into commodities. 10 I think it is possible to build a socialist-feminist theory of the body politic that avoids physiological reductionism in both its forms: (I) capitulating to theories of biological determinism of our social position, and (z) adopting the basically capitalist ideology of culture against nature and thereby denying our responsibility to rebuild the life sciences. I understand Marxist humanism to mean that the fundamental position of the human being in the world is the dialectical relation with the surrounding world involved in the satisfaction of needs and thus in the creation of use values. The labour process constitutes the fundamental human condition. Through labour, we make ourselves individually and collectively in a constant interaction with all that has not yet been humanized. Neither our personal bodies nor our social bodies may be seen as natural, in the sense of existing outside the self-creating process called human labour. What we experience and theorize as nature and as culture are transformed by our work. All we touch and therefore know, including our organic and our social bodies, is made possible for us through labour. Therefore, culture does not dominate nature, nor is nature an enemy. The dialectic must not be made into a dynamic of growing domination.4 This position, a historical materialism based on production) 11 contrasts fundamentally with the ironically named historical materialism based on reproduction that I have tried to outline above.

## **AT: K rejects science / science good**

### **Feminist science can re-appropriate science without fetishizing objectivity**

Haraway, 1991 [Donna, historian of science and Professor at the History of

Consciousness Board, University of California, Santa Cruz. She received

her doctorate in biology at Yale, *Simians, Cyborgs, and Women*, pg 22-23]

More particularly, this chapter is about the debate since approximately '930 in primate studies and physical anthropology about human nature - in male bodies and female ones. The debate has been bounded by the rules of ordinary scientific discourse. This highly regulated space makes room for technical papers; grant applications; informal networks ofstudents, teachers, and laboratories; official symposia to promote methods and interpretations; and finally, textbooks to socialize new scientists. The space considered in this chapter does not provide room for outsiders and amateurs. One of the peculiar characteristics of science is thought to be that by knowing past regularities and processes we can predict events and thereby control them. That is, with our sciences - historical, disciplined forms of theorizing about our experience - we both understand and construct our place in the world and develop strategies for shaping the future. How can feminism, a political position about love and power, have anything to do with science as I have described it? Feminism, I suggest, can draw from a basic insight of critical theory. The starting point of critical theory - as we have learned it from Marx, the Frankfurt school, and others is that the social and economic means of human liberation are within our grasp. Nevertheless, we continue to live out relations of domination and scarcity. There is the possibility of overturning that order of things. The study of this contradiction may be applied to all our knowledge, including natural science. The critical tradition insists that we analyse relations of dominance in consciousness as well as material interests, that we see domination as a derivative of theory, not of nature. A feminist history of science, which must be a collective achievement, could examine that part of biosocial science in which our alleged evolutionary biology is traced and supposedly inevitable patterns oforder based on domination are legitimated. The examination should play seriously with the rich ambiguity and metaphorical possibilities of both technical and ordinary words. Feminists reappropriate science in order to discover and to define what is 'natural' for ourselves.' A human past and future would be placed in our hands. This avowedly interested approach to science promises to take seriously the rules of scientific discourse without worshipping the fetish of scientific objectivity.

## **AT: Social constructivism bad/realism good**

### **Both realism and constructivism endorse a view of reality as separate from its representations – our kritik adopts a third position that questions the individual atomism of their assumptions**

Barad, 2003 [Karen, ph.d. in theoretical particle physics, Professor of Feminist Studies, Philosophy, and History of Consciousness at the University of California, Santa Cruz, “Posthumanist Performativity: Toward an Understanding of How Matter Comes to Matter,” Signs: Journal of Women in Culture and Society 2003, vol. 28, no. 3]

Liberal social theories and theories of scientific knowledge alike owe much to the idea that the world is composed of individuals—presumed to exist before the law, or the discovery of the law—awaiting/inviting representation. The idea that beings exist as individuals with inherent attributes, anterior to their representation, is a metaphysical presupposition that underlies the belief in political, linguistic, and epistemological forms of representationalism. Or, to put the point the other way around, representationalism is the belief in the ontological distinction between representations and that which they purport to represent; in particular, that which is represented is held to be independent of all practices of representing. That is, there are assumed to be two distinct and independent kinds of entities—representations and entities to be represented. The system of representation is sometimes explicitly theorized in terms of a tripartite arrangement. For example, in addition to knowledge (i.e., representations), on the one hand, and the known (i.e., that which is purportedly represented), on the other, the existence of a knower (i.e., someone who does the representing) is sometimes made explicit. When this happens it becomes clear that representations serve a mediating function between independently existing entities. This taken-for-granted ontological gap generates questions of the accuracy of representations. For example, does scientific knowledge accurately represent an independently existing reality? Does language accurately represent its referent? Does a given political representative, legal counsel, or piece of legislation accurately represent the interests of the people allegedly represented? Representationalism has received significant challenge from feminists, poststructuralists, postcolonial critics, and queer theorists. The names of Michel Foucault and Judith Butler are frequently associated with such questioning. Butler sums up the problematics of political representationalism as follows: Foucault points out that juridical systems of power produce the subjects they subsequently come to represent. Juridical notions of power appear to regulate political life in purely negative terms. . . . But the subjects regulated by such structures are, by virtue of being subjected to them, formed, defined, and reproduced in accordance with the requirements of those structures. If this analysis is right, then the juridical formation of language and politics that represents women as “the subject” of feminism is itself a discursive formation and effect of a given version of representationalist politics. And the feminist subject turns out to be discursively constituted by the very political system that is supposed to facilitate its emancipation. (1990, 2) In an attempt to remedy this difficulty, critical social theorists struggle to formulate understandings of the possibilities for political intervention that go beyond the framework of representationalism. The fact that representationalism has come under suspicion in the domain of science studies is less well known but of no less significance. Critical examination of representationalism did not emerge until the study of science shifted its focus from the nature and production of scientific knowledge to the study of the detailed dynamics of the actual practice of science. This significant shift is one way to coarsely characterize the difference in emphasis between separate multiple disciplinary studies of science (e.g., history of science, philosophy of science, sociology of science) and science studies. This is not to say that all science studies approaches are critical of representationalism; many such studies accept representationalism unquestioningly. For example, there are countless studies on the nature of scientific representations (including how scientists produce them, interpret them, and otherwise make use of them) that take for granted the underlying philosophical viewpoint that gives way to this focus—namely, representationalism. On the other hand, there has been a concerted effort by some science studies researchers to move beyond representationalism. Ian Hacking’s Representing and Intervening (1983) brought the question of the limitations of representationalist thinking about the nature of science to the forefront. The most sustained and thoroughgoing critique of representationalism in philosophy of science and science studies is to be found in the work of philosopher of science Joseph Rouse. Rouse has taken the lead in interrogating the constraints that representationalist thinking places on theorizing the nature of scientific practices.5 For example, while the hackneyed debate between scientific realism and social constructivism moved frictionlessly from philosophy of science to science studies, Rouse (1996) has pointed out that these adversarial positions have more in common than their proponents acknowledge. Indeed, they share representationalist assumptions that foster such endless debates: both scientific realists and social constructivists believe that scientific knowledge (in its multiple representational forms such as theoretical concepts, graphs, particle tracks, photographic images) mediates our access to the material world; where they differ is on the question of referent, whether scientific knowledge represents things in the world as they really are (i.e., “Nature”) or “objects” that are the product of social activities (i.e., “Culture”), but both groups subscribe to representationalism. Representationalism is so deeply entrenched within Western culture that it has taken on a commonsense appeal. It seems inescapable, if not downright natural. But representationalism (like “nature itself,” not merely our representations of it!) has a history. Hacking traces the philosophical problem of representations to the Democritean dream of atoms and the void. According to Hacking’s anthropological philosophy, representations were unproblematic prior to Democritus: “the word ‘real’ first meant just unqualified likeness” (142). With Democritus’s atomic theory emerges the possibility of a gap between representations and represented—“ appearance” makes its first appearance. Is the table a solid mass made of wood or an aggregate of discrete entities moving in the void? Atomism poses the question of which representation is real. The problem of realism in philosophy is a product of the atomistic worldview. Rouse identifies representationalism as a Cartesian by-product—a particularly inconspicuous consequence of the Cartesian division between “internal” and “external” that breaks along the line of the knowing subject.

### **Realism is a by-product of history, not an argument for actual access to reality- our rejection of the idea of objectivity is the only way to see past it and better understand agency, causality, and action**

Barad, 2003 [Karen, ph.d. in theoretical particle physics, Professor of Feminist Studies, Philosophy, and History of Consciousness at the University of California, Santa Cruz, “Posthumanist Performativity: Toward an Understanding of

How Matter Comes to Matter,” Signs: Journal of Women in Culture and Society 2003, vol. 28, no. 3]

In other words, the asymmetrical faith in our access to representations over things is a contingent fact of history and not a logical necessity; that is, it is simply a Cartesian habit of mind. It takes a healthy skepticism toward Cartesian doubt to be able to begin to see an alternative.6 Indeed, it is possible to develop coherent philosophical positions that deny that there are representations on the one hand and ontologically separate entities awaiting representation on the other. A performative understanding, which shifts the focus from linguistic representations to discursive practices, is one such alternative. In particular, the search for alternatives to social constructivism has prompted performative approaches in feminist and queer studies, as well as in science studies. Judith Butler’s name is most often associated with the term performativity in feminist and queer theory circles. And while Andrew Pickering has been one of the very few science studies scholars to take ownership of this term, there is surely a sense in which science studies theorists such as Donna Haraway, Bruno Latour, and Joseph Rouse also propound performative understandings of the nature of scientific practices.7 Indeed, performativity has become a ubiquitous term in literary studies, theater studies, and the nascent interdisciplinary area of performance studies, prompting the question as to whether all performances are performative.8 In this article, I propose a specifically posthumanist notion of performativity—one that incorporates important material and discursive, social and scientific, human and nonhuman, and natural and cultural factors. A posthumanist account calls into question the givenness of the differential categories of “human” and “nonhuman,” examining the practices through which these differential boundaries are stabilized and destabilized.9 Donna Haraway’s scholarly opus—from primates to cyborgs to companion species—epitomizes this point.

## **AT: Social constructivism bad**

### Our K is NOT social constructivism – our thesis is that nature and scientific facts are not pre-given precisely because matter as a non-human actor with agency actively participates in the construction of further material phenomena

Barad, 2003 [Karen, ph.d. in theoretical particle physics, Professor of Feminist Studies, Philosophy, and History of Consciousness at the University of California, Santa Cruz, “Posthumanist Performativity: Toward an Understanding of

How Matter Comes to Matter,” Signs: Journal of Women in Culture and Society 2003, vol. 28, no. 3]

I have proposed a posthumanist materialist account of performativity that challenges the positioning of materiality as either a given or a mere effect of human agency. On an agential realist account, materiality is an active factor in processes of materialization. Nature is neither a passive surface awaiting the mark of culture nor the end product of cultural performances. The belief that nature is mute and immutable and that all prospects for significance and change reside in culture is a reinscription of the nature/ culture dualism that feminists have actively contested. Nor, similarly, can a human/nonhuman distinction be hardwired into any theory that claims to take account of matter in the fullness of its historicity. Feminist science studies scholars in particular have emphasized that foundational inscriptions of the nature/culture dualism foreclose the understanding of how “nature” and “culture” are formed, an understanding that is crucial to both feminist and scientific analyses. They have also emphasized that the notion of “formation” in no way denies the material reality of either “nature” or “culture.” Hence, any performative account worth its salt would be ill advised to incorporate such anthropocentric values in its foundations. A crucial part of the performative account that I have proposed is a rethinking of the notions of discursive practices and material phenomena and the relationship between them. On an agential realist account, discursive practices are not human-based activities but rather specific material (re)configurings of the world through which local determinations of boundaries, properties, and meanings are differentially enacted. And matter is not a fixed essence; rather, matter is substance in its intra-active becoming—not a thing but a doing, a congealing of agency. And performativity is not understood as iterative citationality (Butler) but rather iterative intra-activity.

## **AT: Realism outweighs discourse**

### Discourse and materiality are mutually constitutive – neither is the root cause of the other

Barad, 2003 [Karen, ph.d. in theoretical particle physics, Professor of Feminist Studies, Philosophy, and History of Consciousness at the University of California, Santa Cruz, “Posthumanist Performativity: Toward an Understanding of How Matter Comes to Matter,” Signs: Journal of Women in Culture and Society 2003, vol. 28, no. 3]

Matter is not simply “a kind of citationality” (Butler 1993, 15), the surface effect of human bodies, or the end product of linguistic or discursive acts. Material constraints and exclusions and the material dimensions of regulatory practices are important factors in the process of materialization. The dynamics of intra-activity entails matter as an active “agent” in its ongoing materialization. Boundary-making practices, that is, discursive practices, are fully implicated in the dynamics of intra-activity through which phenomena come to matter. In other words, materiality is discursive (i.e., material phenomena are inseparable from the apparatuses of bodily production: matter emerges out of and includes as part of its being the ongoing reconfiguring of boundaries), just as discursive practices are always already material (i.e., they are ongoing material (re)configurings of the world). Discursive practices and material phenomena do not stand in a relationship of externality to one another; rather, the material and the discursive are mutually implicated in the dynamics of intra-activity. But nor are they reducible to one another. The relationship between the material and the discursive is one of mutual entailment. Neither is articulated/articulable in the absence of the other; matter and meaning are mutually articulated. Neither discursive practices nor material phenomena are ontologically or epistemologically prior. Neither can be explained in terms of the other. Neither has privileged status in determining the other.

## **AT: Realism/Objectivity good**

### **Underdetermination disproves realism – approaching anything objectively would make it impossible to make conclusions**

Antony, 2003 [Louise, Professor of Philosophy at the University of Massachusetts, Amherst, “Quine as Feminist: The Radical Import of Naturalized Epistemology,” ed. Lynne Hankinson Nelson and Jack Nelson, *Feminist Interpretations of W.V.Quine*, pg 131]

This point is one that Quine has emphasized over and over in his discussions of the underdetermination of theory by data. If we had to rely on nothing but logic and the contingencies of sensory experience, we could never get anywhere in the process of forming an opinion, because we would have too many choices. There are an infinite number of distinct and incompatible hypotheses consistent with any body of data, never mind that there are always more data just around the corner, and never mind that we’re logically free to reinterpret the “data” to save our hypotheses. If we really had to approach data gathering and theory building with a perfectly open mind, we wouldn’t get anywhere.

## **AT: the K is relativism**

Standpoint epistemologies aren’t relativism

Haraway, 1991 [Donna, historian of science and Professor at the History of

Consciousness Board, University of California, Santa Cruz. She received

her doctorate in biology at Yale, *Simians, Cyborgs, and Women*, pg 190-192 ]

Many currents in feminism attempt to theorize grounds for trusting especially the vantage points of the subjugated; there is good reason to believe vision is better from below the brilliant space platforms of the powerful (Hartsock, 1983a; Sandoval, n.d.; Harding, 1986; Anzaldua, 1987). Linked to this suspicion, this chapter is an argument for situated and embodied knowledges and against various fomIS of unlocatable, and so irresponsible, knowledge claims. Irresponsible means unable to be called into account. There is a premium on establishing the capacity to see from the peripheries and the depths. But here lies a serious danger of romaticizing and!or appropriating the vision of the less powerful while claiming to see from their positions. To see from below is neither easily learned nor unproblematic, even if 'we' 'naturally' inhabit the great underground terrain of subjugated knowledges. The positionings of the subjugated are not exempt from critical re-examination, decoding, deconstruction, and interpretation; that is, from both semiological and hermeneutic modes of critical enquiry. The standpoints of the subjugated are not 'innocent' positions. On the contrary, they are preferred because in principle they are least likely to allow denial of the critical and interpretative core of all knowledge. They are savvy to modes of denial through repression, forgetting, and disappearing acts - ways of being nowhere while claiming to see comprehensively. The subjugated have a decent chance to be on to the god-trick and all its dazzling - and, therefore, blinding - illuminations. 'Subjugated' standpoints are preferred because they seem to promise more adequate, sustained, objective, transforming accounts of the world. But how to see from below is a problem requiring at least as much skill with bodies and language, with the mediations of vision, as the 'highest' techno-scientific visualizations. Such preferred positioning is as hostile to various forms of relativism as to the most explicitly totalizing versions of claims to scientific authority. But the alternative to relativism is not totalization and single vision, which is always finally the unmarked category whose power depends on systematic narrowing and obscuring. The alternative to relativism is partial, locatable, critical knowledges sustaining the possibility of webs of connections called solidarity in politics and shared conversations in epistemology. Relativism is a way of being nowhere while claiming to be everywhere equally. The 'equality' of positioning is a denial of responsibility and critical enquiry. Relativism is the perfect mirror twin of totalization in the ideologies of objectivity; both deny the stakes in location, embodiment, and partial perspective; both make it impossible to see well. Relativism and totalization are both 'god-tricks' promising vision from everywhere and nowhere equally and fully, common myths in rhetorics surrounding Science. But it is precisely in the politics and epistemology of partial perspectives that the possibility of sustained, rational, objective enquiry rests.

## **AT: Antony - Naturalized epistemology**

### **Naturalism links to ALL of the reasons why dedication to science as the arbiter of objectivity is gross and problematic**

Code, 2003 [Lorraine, Distinguished Research Professor Emerita of Philosophy at York University in Toronto Canada and a Fellow of the Royal Society of Canada, “What is Natural About Epistemology Naturalized?,” ed. Lynne Hankinson Nelson and Jack Nelson, *Feminist Interpretations of W.V.Quine*, pg 178-9]

Designating physical and psychological science as the places where natural knowledge-making occurs ignores, and hence effectively denaturalizes (both normatively and descriptively), the practices and wisdoms of extra-scientific, non-mainstream, marginalized people, practices whose effectiveness is often empirically demonstrable. Naturopathic medicine, women’s traditional healing practices, Native medicine, the myriad knowledgeable dimensions of allgemeine Alltäglichkeit, the much-maligned “folk psychology,” and the narrative knowledge and meaning-making practices that shape and inform human lives, unfettered by the stringent dictates of scientific-instrumental rationality are all excluded from critical evaluation. Withholding the (honorific) label “knowledge,” a priori, from the workable deliverances of such practices reaffirms the hegemony of a narrowly conceived science as the arbiter of what counts as knowledge and of its practitioners as paradigmatically worthy knowers. Such exclusions relieve scientific knowers from any need to reconsider the theoretical underpinnings of their projects or to engage seriously with knowledge-producing institutions beyond a narrowly, demarcated subset, thus truncating the promise that many feminists, and other Others, have held out for a naturalistic revival. Because its construction of “the natural” denigrates the credibility of knowledge made in places other than the laboratory and equally integral to responsible epistemic conduct, Quinean naturalism neither exposes what Lovibond calls “the unequal part played by different social groups in determining standards of judgement” nor does it engage with reason “in all its historical and cultural particularity.”

### Naturalized epistemology fails – its reductive, uncritical of scientific psychology, and uses bad representations of humanity and nature

Code, 2003 [Lorraine, Distinguished Research Professor Emerita of Philosophy at York University in Toronto Canada and a Fellow of the Royal Society of Canada, “What is Natural About Epistemology Naturalized?,” ed. Lynne Hankinson Nelson and Jack Nelson, *Feminist Interpretations of W.V.Quine*, pg 174 ]

In this essay, then, I endorse Lovibond’s hopes for a naturalistic engagement with questions about knowledge when the aspirations of “the epistemological project” are under strain from postmodern, postcolonial, and postpatriarchal critiques. I offer some suggestions about how feminists can make the most of the rich possibilities a well conceived (natural historical) naturalism has to offer. Yet I engage critically with naturalism’s most successful North American version—the line that claims an originary debt to the work of W. V. Quine—regarding features that, in my reading, limit its promise. My contention will be that the transformative potential of this strand of naturalism is thwarted in three principal ways which are interconnected, mutually informative, and yet separable. First, naturalistic venerations of physical science as the only “institution of knowledge-production” worthy of analysis tend to generate an excessive and reductive scientism. Second, Quinean naturalists’ consequent reliance on scientific psychology and cognitive science as uncontested sources of exemplary knowledge of human cognitive functioning begs the question about the epistemic status of psychology itself. Third, naturalism works with contestable representations of “nature,” both physical and human. I elaborate the first and second set of issues in the next section of this essay, and the third in section three. In section four I sketch out a version of naturalism that could enable feminists to reclaim the promise that I, with Lovibond, see in epistemology naturalized.

### Naturalized epistemology proves the idea of neutral science is bad – it leads to epistemic chaos

Antony, 2003 [Louise, Professor of Philosophy at the University of Massachusetts, Amherst, “Quine as Feminist: The Radical Import of Naturalized Epistemology,” ed. Lynne Hankinson Nelson and Jack Nelson, *Feminist Interpretations of W.V.Quine*, pg 130]

Naturalized epistemology tells us that there is no presuppositionless position from which to assess epistemic practice, that we must take some knowledge for granted. The only thing to do, then, is to begin with whatever it is we think we know, and try to figure out how we came to know it: Study knowledge by studying the knower. Now if, in the course of such study, we discover that much of human knowledge is possible only because our knowledge seeking does not conform to the Dragnet model, then we will have good empirical grounds for rejecting perfect objectivity as an epistemic ideal. And so we come back to the second of the two strategies I outlined for challenging the ideal of objectivity. Is there a case to be made against the desirability of epistemic neutrality? Indeed there is, on the grounds that a genuinely open mind, far from leading us closer to the truth, would lead to epistemic chaos. As I said in the second section, empirical work in linguistics and cognitive science is making it increasingly clear how seriously mistaken the empiricist view of the mind actually is. From Chomsky’s groundbreaking research on the acquisition of language, through David Marr’s theory of the computational basis of vision, to the work of Susan Carey, Elizabeth Spelke, Barbara Landau, Lila Gleitman, and others in developmental psychology, the evidence is mounting that inborn conceptual structure is a crucial factor in the development of human knowledge.51 Far from being the streamlined, uncluttered logic machine of classical empiricism, the mind now appears to be much more like a bundle of highly specialized modules, each natively fitted for the analysis and manipulation of a particular body of sensory data. General learning strategies of the sort imagined by classical empiricists, if they are employed by the mind at all, can apply to but a small portion of the cognitive tasks that confront us. Rationalism is vindicated.

### Naturalism is uncritical scientism masquerading as realism

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The Quinean naturalists have an impressive record of scientific and technological successes to cite as evidence when they represent natural science as the best knowledge of how the physical world works that human beings have produced and when they read this record of success to show that scientiWc method is pretty much in order as it stands. Kornblith—I think rightly—asserts that philosophy “does not have the credentials . . . to dictate how science itself should be carried out.”24 But neither does science have the credentials to dictate how philosophy—and hence epistemology— should be carried out. I am suggesting that naturalism escalates into an uncritical scientism when it ignores this cautionary point.25 Arthur Danto’s definition underscores my claim. Naturalism, he says, is “a species of philosophical monism according to which whatever exists or happens is natural in the sense of being susceptible to explanation through methods which, although paradigmatically exempliWed in the natural sciences, are continuous from domain to domain of objects and events. . . .” For naturalists, there neither exist nor could exist “any entities or events which lie, in principle, beyond the scope of scientific explanation.”26 It is the “monism” that gives pause, with its echoes of the old, reductive “unity of science” credo. Thus, although naturalism’s focus on human cognitive activity indeed counts as a radical departure from older commitments to a decontextualized a prioricity, its affirmations of the scientificity of all knowledge yield a new a priori that exerts an equivalently restrictive, reductive pressure.

### **Naturalism is based on circular assumptions about the validity of psychology**

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There is, moreover, a troubling circularity in the assumption, central to Quinean naturalism, that scientific psychology can yield definite explanations of natural human knowledge-making.27 At issue in this inquiry are, precisely, the scope and limits of scientific explanation: its capacity to yield these very conclusions. Nor has the debate between cognitive science and folk psychology been won, despite the rhetorical strategy cognitive scientists deploy in labelling the opposition with so trivializing a name that it cannot expect a serious hearing. While the scientific and epistemic status of scientific psychology remains within the debate, it cannot, without begging the question, be enlisted whole to establish conclusions that serve, rather, to contest its own epistemic warrant.

### **Naturalized philosophy keeps positivist empiricism unquestioned**

Code, 2003 [Lorraine, Distinguished Research Professor Emerita of Philosophy at York University in Toronto Canada and a Fellow of the Royal Society of Canada, “What is Natural About Epistemology Naturalized?,” ed. Lynne Hankinson Nelson and Jack Nelson, *Feminist Interpretations of W.V.Quine*, pg 178 ]

The temporal and local contingency of its own hegemony makes it still more difficult for science to justify arrogating to itself dominion over the whole natural history of human beings. Joseph Rouse, for example, notes that although philosophy has “made common cause with the sciences” within the English-speaking world, “relations between philosophy and the sciences have been rather different in much of Continental Europe . . . [where] the concern has been to situate the sciences with respect to other social interests and practices.”29 And ongoing post-Wittgensteinian challenges in Anglo-American philosophy to the global pretensions of “scientiWc” social science attest further to the local contingency of the status of natural science as the paradigmatic institution of knowledge production.30 In short, Quinean naturalism keeps too many positivist empiricist presuppositions intact, especially the presuppositions that scientific knowledge alone merits epistemological attention and that it alone can provide truly explanatory accounts.

## **AT: Antony - Naturalized epistemology – post-humanism link**

Naturalized epistemology relies upon the notion of an autonomous and intentional human agent

Code, 2003 [Lorraine, Distinguished Research Professor Emerita of Philosophy at York University in Toronto Canada and a Fellow of the Royal Society of Canada, “What is Natural About Epistemology Naturalized?,” ed. Lynne Hankinson Nelson and Jack Nelson, *Feminist Interpretations of W.V.Quine*, pg 175-6]

Guided by their commitment to deriving normative recommendations from the demonstrated scope and limits of human cognition, naturalists study psychological experiments that show how people justify their beliefs, generalize to new conclusions, correct perceptual errors, conserve information in memory, assimilate testimony, and accommodate or resist novelty, to cite just a few examples.14 Taking the findings of such research seriously enables epistemologists to tailor their normative demands to what people can achieve epistemically, to how they tend to process evidence and respond to incongruities. Thus, for example, exhortations about how knowers should go about justifying their probabilistic conclusions that extend beyond available evidence may be tempered by readings of Kahneman and Tversky’s experiments that show, repeatedly, how “people regularly violate [a] basic tenet of probabilistic reasoning.”15 The aim is not for naturalists to learn to tolerate this violation, thus turning the “is” into an “ought.” It is, rather, to enable them to offer manageable guidelines within which to urge improvement, or to be well placed to assess the extent of epistemic culpability, say, when a subject fails “to recover or activate something from long-term memory.”16 This, then, is the physical human subject who becomes the new epistemic subject; the human being as processor of knowledge as information, whose experiential input is quite inadequate to account for the “torrential output” that emerges in its knowledge of “the three-dimensional external world and its history.”17 Because people can survive only to the extent that they can process the information available from their environments, understanding their information processing capacities should yield an epistemology more adequate to human purposes than one that directs its recommendations toward an ideal of epistemic perfection that no human knower could achieve. And naturalism’s commitment to studying how real people perform in experimental situations prompts Alvin Goldman to commend it for maintaining contact with “epistemic folkways.”18

## **AT: Feminism bad**

No link - Our kritik isn’t about female embodiment – its about orientation and epistemology

Haraway, 1991 [Donna, historian of science and Professor at the History of

Consciousness Board, University of California, Santa Cruz. She received

her doctorate in biology at Yale, *Simians, Cyborgs, and Women*, pg 193 ]

Feminist embodiment, then, is not about fixed location in a reified body, female or otherwise, but about nodes in fields, inflections in orientations, and responsibility for difference in material-semiotic fields of meaning. Embodiment is significant prosthesis; objectivity cannot be about fixed vision when what counts as an object is precisely what world history turns out to be about.

# **Posthumanism K**

## **Posthumanism 1NC**

Agency is not something that subjects and objects have – its something that agents do - focus on intentionality trades off with a post-humanist understanding of both human and non-human agency that are key to recognizing opportunities for responsibility and ethics

Barad, 2003 [Karen, ph.d. in theoretical particle physics, Professor of Feminist Studies, Philosophy, and History of Consciousness at the University of California, Santa Cruz, “Posthumanist Performativity: Toward an Understanding of

How Matter Comes to Matter,” Signs: Journal of Women in Culture and Society 2003, vol. 28, no. 3]

A posthumanist formulation of performativity makes evident the importance of taking account of “human,” “nonhuman,” and “cyborgian” forms of agency (indeed all such material-discursive forms). This is both possible and necessary because agency is a matter of changes in the apparatuses of bodily production, and such changes take place through various intra-actions, some of which remake the boundaries that delineate the differential constitution of the “human.” Holding the category “human” fixed excludes an entire range of possibilities in advance, eliding important dimensions of the workings of power. On an agential realist account, agency is cut loose from its traditional humanist orbit. Agency is not aligned with human intentionality or subjectivity. Nor does it merely entail resignification or other specific kinds of moves within a social geometry of antihumanism. Agency is a matter of intra-acting; it is an enactment, not something that someone or something has. Agency cannot be designated as an attribute of “subjects” or “objects” (as they do not preexist as such). Agency is not an attribute whatsoever—it is “doing”/“being” in its intra-activity. Agency is the enactment of iterative changes to particular practices through the dynamics of intra-activity. Agency is about the possibilities and accountability entailed in reconfiguring material-discursive apparatuses of bodily production, including the boundary articulations and exclusions that are marked by those practices in the enactment of a causal structure. Particular possibilities for acting exist at every moment, and these changing possibilities entail a responsibility to intervene in the world’s becoming, to contest and rework what matters and what is excluded from mattering.

## **Agential realism alternative**

### Our alternative is agential realism – we must consider human and nonhuman forms of agency in the materialization of scientific realities rather than treating them as pre-given – the alt is mutually exclusive because the affirmative’s logic relies upon the autonomy of scientific observation

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How Matter Comes to Matter,” Signs: Journal of Women in Culture and Society 2003, vol. 28, no. 3]

What is needed is a robust account of the materialization of all bodies—“ human” and “nonhuman”—and the material-discursive practices by which their differential constitutions are marked. This will require an understanding of the nature of the relationship between discursive practices and material phenomena, an accounting of “nonhuman” as well as “human” forms of agency, and an understanding of the precise causal nature of productive practices that takes account of the fullness of matter’s implication in its ongoing historicity. My contribution toward the development of such an understanding is based on a philosophical account that I have been calling “agential realism.” Agential realism is an account of technoscientific and other practices that takes feminist, antiracist, poststructuralist, queer, Marxist, science studies, and scientific insights seriously, building specifically on important insights from Niels Bohr, Judith Butler, Michel Foucault, Donna Haraway, Vicki Kirby, Joseph Rouse, and others.13 It is clearly not possible to fully explicate these ideas here. My more limited goal in this article is to use the notion of performativity as a diffraction grating for reading important insights from feminist and queer studies and science studies through one another while simultaneously proposing a materialist and posthumanist reworking of the notion of performativity. This entails a reworking of the familiar notions of discursive practices, materialization, agency, and causality, among others.

## Posthumanism/ non-human agency link

### The affirmative places agency in humans alone—instead we should think about agency and causality through relations of humans and non-human objects and instruments of measurement in order to understand how scientific truths are constructed

Barad, 2003 [Karen, ph.d. in theoretical particle physics, Professor of Feminist Studies, Philosophy, and History of Consciousness at the University of California, Santa Cruz, “Posthumanist Performativity: Toward an Understanding of How Matter Comes to Matter,” Signs: Journal of Women in Culture and Society 2003, vol. 28, no. 3]

With this background we can now return to the question of the nature of phenomena. Phenomena are produced through agential intra-actions of multiple apparatuses of bodily production. Agential intra-actions are specific causal material enactments that may or may not involve “humans.” Indeed, it is through such practices that the differential boundaries between “humans” and “nonhumans,” “culture” and “nature,” the “social” and the “scientific” are constituted. Phenomena are constitutive of reality. Reality is not composed of things-in-themselves or thingsbehindphenomena but “things”-in-phenomena.23 The world is intraactivity in its differential mattering. It is through specific intra-actions that a differential sense of being is enacted in the ongoing ebb and flow of agency. That is, it is through specific intra-actions that phenomena come to matter—in both senses of the word. The world is a dynamic process of intra-activity in the ongoing reconfiguring of locally determinate causal structures with determinate boundaries, properties, meanings, and patterns of marks on bodies. This ongoing flow of agency through which “part” of the world makes itself differentially intelligible to another “part” of the world and through which local causal structures, boundaries, and properties are stabilized and destabilized does not take place in space and time but in the making of spacetime itself. The world is an ongoing open process of mattering through which “mattering” itself acquires meaning and form in the realization of different agential possibilities. Temporality and spatiality emerge in this processual historicity. Relations of exteriority, connectivity, and exclusion are reconfigured. The changing topologies of the world entail an ongoing reworking of the very nature of dynamics.

## **Posthumanism link - objects**

The affirmative locates agency in human actors, which directly trades off with our alternative focus on the material-discursive practices of non-human agents in producing reality

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Discursive practices are not speech acts, linguistic representations, or even linguistic performances, bearing some unspecified relationship to material practices. Discursive practices are not anthropomorphic placeholders for the projected agency of individual subjects, culture, or language. Indeed, they are not human-based practices. On the contrary, agential realism’s posthumanist account of discursive practices does not fix the boundary between “human” and “nonhuman” before the analysis ever gets off the ground but rather enables (indeed demands) a genealogical analysis of the discursive emergence of the “human.” “Human bodies” and “human subjects” do not preexist as such; nor are they mere end products. “Humans” are neither pure cause nor pure effect but part of the world in its open-ended becoming.

## **Posthumanism link - objects**

The aff’s representation of objects of knowledge as static things to be studied denies their agential potential

Haraway, 1991 [Donna, historian of science and Professor at the History of

Consciousness Board, University of California, Santa Cruz. She received

her doctorate in biology at Yale, *Simians, Cyborgs, and Women*, pg 198-9]

Situated knowledges require that the object of knowledge be pictured as an actor and agent, not a screen or a ground or a resource, never finally as slave to the master that closes off the dialectic in his unique agency and authorship of 'objective' knowledge. The point is paradigmatically clear in critical approaches to the social and human sciences, where the agency of people studied itself transforms the entire project of producing social theory. Indeed, coming to terms with the agency of the 'objects' studied is the only way to avoid gross error and false knowledge of many kinds in these sciences. But the same point must apply to the other knowledge projects called sciences. A corollary of the insistence that ethics and politics covertly or overtly provide the bases for objectivity in the sciences as a heterogeneous whole, and not just in the social sciences, is granting the status of agent/actor to the 'objects' of the world. Actors come in many and wonderful forms. Accounts of a 'real' world do not, then, depend on a logic of 'discovery', but on a power-charged social relation of 'conversation'. The world neither speaks itself nor disappears in favour of a master decoder. The codes of the world are not still, waiting only to be read. The world is not raw material for humanization; the thorough attacks on humanism, another branch of 'death of the subject' discourse, have made this point quite clear. In some critical sense that is crudely hinted at by the clumsy category of the social or of agency, the world encountered in knowledge projects is an active entity. In so far as a scientific account has been able to engage this dimension of the world as object of knowledge, faithful knowledge can be imagined and can make claims on us. But no particular doctrine of representation or decoding or discovery guarantees anything. The approach I am recommending is not a version of 'realism', which has proved a rather poor way of engaging with the world's active agency. My simple, perhaps simple-minded, manoeuvre is obviously not new in Western philosophy, but it has a special feminist edge to it in relation to the science question in feminism and to the linked questions of gender as situated difference and of female embodiment. Ecofeminists have perhaps been most insistent on some version of the world as active subject, not as resource to be mapped and appropriated in bourgeois, Marxist, or masculinist projects. Acknowledging the agency of the world in knowledge makes room for some unsettling possibilities, including a sense of the world's independent sense of humour. Such a sense of humour is not comfortable for humanists and others committed to the world as resource. Richly evocative figures exist for feminist visualizations of the world as witty agent. We need not lapse into an appeal to a primal mother resisting becoming resource. The Coyote or Trickster, embodied in American Southwest Indian accounts, suggests our situation when we give up mastery but keep searching for fidelity, knowing all the while we will be hoodwinked. I think these are useful myths for scientists who might be our allies. Feminist objectivity makes room for surprises and ironies at the heart of all knowledge production; we are not in charge of the world. We just live here and try to strike up non-innocent conversations by means of our prosthetic devices, including our visualization technologies. No wonder science fiction has been such a rich writing practice in recent feminist theory. I like to see feminist theory as a reinvented coyote discourse obligated to its enabling sources in many kinds of heterogeneous accounts of the world.

## **Root cause/individual actor link**

### Focus on single and root causes as pre-given denies the entwinement of matter and discourse

Barad, 2003 [Karen, ph.d. in theoretical particle physics, Professor of Feminist Studies, Philosophy, and History of Consciousness at the University of California, Santa Cruz, “Posthumanist Performativity: Toward an Understanding of

How Matter Comes to Matter,” Signs: Journal of Women in Culture and Society 2003, vol. 28, no. 3]

Material conditions matter, not because they “support” particular discourses that are the actual generative factors in the formation of bodies but rather because matter comes to matter through the iterative intraactivity of the world in its becoming. The point is not merely that there are important material factors in addition to discursive ones; rather, the issue is the conjoined material-discursive nature of constraints, conditions, and practices. The fact that material and discursive constraints and exclusions are intertwined points to the limited validity of analyses that attempt to determine individual effects of material or discursive factors.28 Furthermore, the conceptualization of materiality offered by agential realism makes it possible to take account of material constraints and conditions once again without reinscribing traditional empiricist assumptions concerning the transparent or immediate given-ness of the world and without falling into the analytical stalemate that simply calls for a recognition of our mediated access to the world and then rests its case. The ubiquitous pronouncements proclaiming that experience or the material world is “mediated” have offered precious little guidance about how to proceed. The notion of mediation has for too long stood in the way of a more thoroughgoing accounting of the empirical world. The reconceptualization of materiality offered here makes it possible to take the empirical world seriously once again, but this time with the understanding that the objective referent is phenomena, not the seeming “immediately given-ness” of the world.

### **Exclusive focus on human outcomes draws artificial boundaries between human and non-human and misunderstands causality as an ongoing and complex process**

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All bodies, not merely “human” bodies, come to matter through the world’s iterative intra-activity—its performativity. This is true not only of the surface or contours of the body but also of the body in the fullness of its physicality, including the very “atoms” of its being. Bodies are not objects with inherent boundaries and properties; they are material-discursive phenomena. “Human” bodies are not inherently different from “nonhuman” ones. What constitutes the “human” (and the “nonhuman”) is not a fixed or pregiven notion, but nor is it a free-floating ideality. What is at issue is not some ill-defined process by which human-based linguistic practices (materially supported in some unspecified way) manage to produce substantive bodies/bodily substances but rather a material dynamics of intra-activity: material apparatuses produce material phenomena through specific causal intraactions, where “material” is always already material-discursive—that is what it means to matter. Theories that focus exclusively on the materialization of “human” bodies miss the crucial point that the very practices by which the differential boundaries of the “human” and the “nonhuman” are drawn are always already implicated in particular materializations. The differential constitution of the “human” (“nonhuman”) is always accompanied by particular exclusions and always open to contestation. This is a result of the nondeterministic causal nature of agential intra-actions, a crucial point that I take up in the next section.

## **Atomization link**

### The affirmative’s separation of scientific knowledge from the objects involved in the production of that knowledge mirrors the liberal humanist atomization of subjects. This is flawed metaphysics that denies the interrelation of material and social realities

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Thingification—the turning of relations into “things,” “entities,” “relata”— infects much of the way we understand the world and our relationship to it.15 Why do we think that the existence of relations requires relata? Does the persistent distrust of nature, materiality, and the body that pervades much of contemporary theorizing and a sizable amount of the history of Western thought feed off of this cultural proclivity? In this section, I present a relational ontology that rejects the metaphysics of relata, of “words” and “things.” On an agential realist account, it is once again possible to acknowledge nature, the body, and materiality in the fullness of their becoming without resorting to the optics of transparency or opacity, the geometries of absolute exteriority or interiority, and the theoretization of the human as either pure cause or pure effect while at the same time remaining resolutely accountable for the role “we” play in the intertwined practices of knowing and becoming. The postulation of individually determinate entities with inherent properties is the hallmark of atomistic metaphysics. Atomism hails from Democritus. 16 According to Democritus the properties of all things derive from the properties of the smallest unit—atoms (the “uncuttable” or “inseparable”). Liberal social theories and scientific theories alike owe much to the idea that the world is composed of individuals with separately attributable properties. An entangled web of scientific, social, ethical, and political practices, and our understanding of them, hinges on the various/ differential instantiations of this presupposition. Much hangs in the balance in contesting its seeming inevitability.

## **Autonomous object link**

### Objects and things are not independent and pre-given but the result of ongoing intra-actions that produce knowledge—our kritik shifts understanding causality away from linear progress and toward complexity

Barad, 2003 [Karen, ph.d. in theoretical particle physics, Professor of Feminist Studies, Philosophy, and History of Consciousness at the University of California, Santa Cruz, “Posthumanist Performativity: Toward an Understanding of How Matter Comes to Matter,” Signs: Journal of Women in Culture and Society 2003, vol. 28, no. 3]

Therefore, according to Bohr, the primary epistemological unit is not independent objects with inherent boundaries and properties but rather phenomena. On my agential realist elaboration, phenomena do not merely mark the epistemological inseparability of “observer” and “observed”; rather, phenomena are the ontological inseparability of agentially intra-acting “components.” That is, phenomena are ontologically primitive relations—relations without preexisting relata.20 The notion of intraaction (in contrast to the usual “interaction,” which presumes the prior existence of independent entities/relata) represents a profound conceptual shift. It is through specific agential intra-actions that the boundaries and properties of the “components” of phenomena become determinate and that particular embodied concepts become meaningful. A specific intraaction (involving a specific material configuration of the “apparatus of observation”) enacts an agential cut (in contrast to the Cartesian cut—an inherent distinction—between subject and object) effecting a separation between “subject” and “object.” That is, the agential cut enacts a local resolution within the phenomenon of the inherent ontological indeterminacy. In other words, relata do not preexist relations; rather, relatawithinphenomena emerge through specific intra-actions. Crucially then, intra-actions enact agential separability—the local condition of exterioritywithinphenomena. The notion of agential separability is of fundamental importance, for in the absence of a classical ontological condition of exteriority between observer and observed it provides the condition for the possibility of objectivity. Moreover, the agential cut enacts a local causal structure among “components” of a phenomenon in the marking of the “measuring agencies” (“effect”) by the “measured object” (“cause”). Hence, the notion of intra-actions constitutes a reworking of the traditional notion of causality.21

## **Posthumanism link – Modernity**

### Modernity over-emphasizes human agency at the expense of non-humans

Latour, 1993 [Bruno, philosopher, sociologist and anthropologist of science, founder of Actor Network Theory, professor and vice president of research at Sciences Po Paris, *We Have Never Been Modern*, pg. 13 ]

Modernity is often defined in terms of humanism, either as a way of saluting the birth of ‘man’ or as a way of announcing his death. But this habit itself is modern, because it remains asymmetrical. It overlooks the simultaneous birth of ‘nonhumanity’ — things, or objects, or beasts — and the equally strange beginning of a crossed-out God, relegated to the sidelines. Modernity arises first from the conjoined creation of those three entities, and then from the masking of the conjoined birth and the separate treatment of the three communities while, underneath, hybrids continue to multiply as an effect of this separate treatment. The double separation is what we have to reconstruct: the separation between humans and nonhumans on the one hand, and between what happens and what happens on the other.

## **Postumanism – science impact/fw**

### Discussions about modern science should focus on the increasing complexity and enlistment of non-human actors, not teleological progress

Latour, 1993 [Bruno, philosopher, sociologist and anthropologist of science, founder of Actor Network Theory, professor and vice president of research at Sciences Po Paris, *We Have Never Been Modern*, pg. 108-109]

Sciences and technologies are remarkable not because they are true or efficient — they gain these properties in addition, and for reasons entirely different from those the epistemologists provide (Latour, 1987) - but because they multiply the nonhumans enrolled in the manufacturing of collectives and because they make the community that we form with these beings a more intimate one. The extension of the spiral, the scope of the enlistments it will bring about, the ever-increasing lengths to which it goes to recruit these beings, are what characterize the modern sciences, not some epistemological break that would cut them off for ever from their prescientific past. Modern knowledge and power are different not in that they would escape at last the tyranny of the social, but in that they add many more hybrids in order to recompose the social link and extend its scale. Not only the air pump but also microbes, electricity, atoms, stars, second-degree equations, automatons and robots, mills and pistons, the unconscious and neurotransmitters. At each turn in the spiral, a new translation of quasi-objects gives new impetus to the redefinition of the social body, of subjects and objects alike. Sciences and technologies, for ‘Us,’ do not reflect society any more than Nature reflects social structures for ‘Them.’ No one is fiddling with mirrors. It is a matter of constructing collectives themselves on scales that grow larger and larger. There are indeed differences, but they are differences in size. There are no differences in nature - still less in culture.

# Misc.

## AT: Cede the political

Debating space science isn’t politically relevant and doesn’t qualify for consideration via democratic epistemology

Wilholt 2006 [Torsten, professor of the Philosophy of Science, University of Bielefeld, “Scientific Autonomy and Planned Research: The Case of Space Science,” Poiesis and Praxis 4(4), 253-265]

The example of the Deep Space Climate Observatory shows that there are in fact cases of space science projects with foreseeable politically relevant results.Further examples surely can be found, **especially in the area of earth observation. However,** they contrast with a large number of projects that lie clearly beyond the reach of the argument from democracy. The search for gravitational waves, the geology of Mars and the quest for dark matter may exemplify this point**. It is noticeable that** among the projects that do not seem to be able to derive a claim to autonomy from the argument from democracy there are particularly many that are less application-oriented and rather associated with basic science**. Thus it seems** that if there is any hope at all of countering the external instrumentalization of space science with a substantiated claim for freedom of research, it will have to rest on yet another argument**.**

## AT: Cede the political / Social epistemology justifies scientific autonomy

### Space science research doesn’t qualify for social epistemology – too many political constraints and not enough democratic relevance

Wilholt 2006 [Torsten, “Scientific Autonomy and Planned Research: The Case of Space Science,” Poiesis and Praxis 4(4), 253-265]

**An advantage of** the argument from social epistemology **is that it** holds for all disciplines that make an effort to produce new knowledge in innovative ways.Insofar as a strong common interest in this new knowledge exists, the argument can help to support the claim that there is an obligation of the public to facilitate free research within these disciplines by providing the required means. (The common interest in question may arise from the relevance of the new knowledge to the solution of our problems or to our understanding of the world and our place within it.) The argument is thus stronger than the argument from autonomy; **at the same time,** it has a wider scope than the argument from democracy. **11** Let us assume that the research projects of space science can be considered as pursuing knowledge that is at large in the common interest. **Still,** a difficult obstacle lies in the way of applying the argument from social epistemology to the case of space science. It is built into the kind of freedom of research that can be supported by the argument. The argument from social epistemology capitalizes on epistemic advantages that result from the pluralism of approaches which is brought about by the free competition of rivaling projects**.** The principle of freedom of research that is supported by the argument must therefore include free choice of projects on the level of research groups or even individual researchers in order to guarantee a pluralism of actually implemented approaches**.** In space science, it is doubtful whether this kind of pluralism can exist at all. The capacity of space flight is limited by its excessive cost**, such that only a small number of selected projects can actually be executed.** Like other areas of Big Science, space science is doomed to be planned science due to limited resources. **(Note that the present situation in space science may foreshadow a more general future predicament of science organization, as innovative scientific research is generally becoming ever more expensive.)** The resources for space science will always be subject to political deliberation and hence be limited not only by natural constraints. After all, the knowledge aims of space science are at best one matter of public interest among many others, against which they have to be balanced. In a world of scarce resources, free choice of research projects in space science on the level of research groups or even individual scientists is thus an unrealistic fiction**.** If any principle of scientific autonomy was to be applicable to space science, it would therefore have to be the kind of principle that operates on the level of disciplines **(or even the scientific community) and stipulates that decisions about the inception and continuation of research projects must be free from extra-disciplinary (or extra-scientific) intervention. But this kind of claim is generally hard to justify – except maybe for the limited domain where the argument from democracy holds sway**. It is far from obvious that intradisciplinary decisions more often achieve the goal of increasing the kind of new knowledge that is in the public interest than extra-disciplinary ones. It might be adduced that good decisions in planning research require concentrated specialized knowledge and competence**, which is usually found rather within than without the scientific disciplines. However,** that insight amounts to no more than a plea for competently informed research decisions. Decision-makersshould of course make use of the best expertise available, but that alone does not entail that the sciences must decide autonomously**.**

## Misc AT: Cede the political

Freedom from government control over space research is key to democracy

Wilholt 2006 [Torsten, professor of the Philosophy of Science, University of Bielefeld, “Scientific Autonomy and Planned Research: The Case of Space Science,” Poiesis and Praxis 4(4), 253-265]

**A second argument that might be called the argument from democracy holds promise of strengthening the principle of freedom of research**. The democratic process presupposes**, among other things,** the citizens’ capacity to form wellfounded beliefs about the possible consequences of governmental and legislative decisions **and to develop reasoned preferences among them**. These tasks **obviously** require knowledge**. Theorists of democracy have therefore derived a right to free inquiry from these presuppositions (Dahl 1985, cf. Brown & Guston 2005, 9). This second root of the principle of freedom of research also goes back at least to Enlightenment thought,2 as evidenced most strikingly by a report that was submitted in 1792 to the Legislative National Assembly in Paris by the Marquis de Condorcet. He had been commissioned to propose ideas for the new organization of Science and Education in post-revolutionary France. In the report, he wrote: Finally, no public power must have the authority, not even the standing, to prevent the development of new truths or the teaching of such theories that contradict its particular politics or its present interests. (Condorcet 1792, 453) Accordingly, he suggests that entities which are independent from the government should be in charge of the appointment of professors, the oversight of textbooks, and similar things. He explains that the continuous progress of the republic calls for unremitting criticism, and that a public authority interfering with academic matters would thereby “contradict the purpose of the whole social institution: the perfecting of the laws.” (Ibid., 523) Today**, the plausibility of an argument from democracy for freedom of research has rather increased**.** Participation in democratic processes **now virtually always** requires knowledge about complex affairs by far surpassing whatever knowledge might be produced by the citizens’ private research efforts**. They are therefore** reliant on knowledge institutions**, including not only varied and independent media, but also a public science that must be largely independent from the government and from the parties involved in the political process.** This independence must extend, not only to free communication of scientific knowledge, but also to independent decision-making concerning the inception and continuation of research projects. If, **for example,** citizens are to put trust into the findings of **academic** toxicology concerning the toxicity of certain substances, then academic toxicologists have to be able to select and carry out research projects in a way that is free from political interference**.** The bearing of the argument from democracy on the case of space science may be less obvious than in the case of toxicology. But a recent example can demonstrate the relevance**. The administrators of** NASA **recently** decided to halt **a mission called** Deep Space Climate Observatory **(Lawler 2006a). The satellite, though almost completed, was put in moth-balls and might never be launched. The first plans for this mission had been set up during the time of the Clinton administration, when it had been strongly supported by vice-president Al Gore.** The satellite’s most important purpose would have been to provide reliable data about the earth’s changing albedo **(i.e. its reflectivity of the sunlight).** NASA explains that the costs for launching the satellite are too high, **which is consistent with its large number of recent terminations of science missions for budget reasons (Reichhardt 2006a, Lawler 2006b).** However, the earth’s albedo is one of the decisive and controversial quantities in the scientific study of climate change **(Charlson et al. 2005).** In view of **the** Bush **administration’s wellknown** stance on climate policy and its well-documented attempts to suppress scientific evidence for human-caused climate change **(UCS 2005, 5–8),** the relevance of the termination of the **Deep Space Climate Observatory** mission for the democratic process can not be easily dismissed.NASA’s decision may have been an act of anticipatory obedience or it may have resulted from a more immediate form of political influence – in either case the citizens’ interest in independent, robust knowledge was not served well**. The argument from democracy is a strong argument in the sense that protecting the preconditions of the democratic process certainly deserves high priority. What may be questioned is the scope of a principle of freedom of research as supported by an argument from democracy. In order to support the well-informed and unmanipulated judgment of citizens with respect to political decisions,** it may suffice to guarantee independent research decisions to the scientific disciplines only with respect to such projects that can be expected to result in politically relevant knowledge. This would certainly include projects in climate research, while mapping the stars, for example, does not seem to have a discernable relevance for the democratic process**. (To be sure, it is always possible that research projects produce knowledge which then surprisingly gains previously unexpected relevance for seemingly unrelated matters. However, if the relevance is truly unforeseeable in advance, then there is also no danger of targeted manipulation through meddling with prior research decisions.) The argument from democracy is therefore a strong argument for a principle with limited scope – limited to research projects of political relevance.**