A Sociological Theory of Objectivity

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"Objectivity" has a variety of contested meanings, most of which have been reassessed in the past 10 years or so. Objectivity can, for example, be ascribed to a person's capacity for impartial and disinterested judgment. Sometimes, objectivity is seen as a quality of methods and rules of inquiry that discipline arbitrary and accidental forces impacting on knowledge. In a more specific and technical sense, measures are objective when they covary strongly with each other and across repeated measurements taken independently by several investigators; such measures reliably indicate a theoretical entity. As a property of knowledge, objectivity refers to propositions that capture some independent and external reality. Finally, objectivity can be attributed to social and cultural institutions that are somehow more solid and enduring than individual beliefs.

What these different meanings of objectivity have in common is their "negativity." Originally referring to a positive quality of states in the world, objectivity has, since the Scientific Revolution, become the *absence* of individual, idiosyncratic, accidental, and contingent forces and circumstances. For a long time, the care for this absence has been the exclusive responsibility of philosophers who worship objectivity, together with truth, as the most precious epistemic value of modern science. Philosophers generally agree that objectivity is the distinctive mark of scientific knowledge; disagreements exist over how it is possible, how it can be secured, and for exactly what sorts of propositions objectivity can be achieved. In what follows, I want to *sociologize* objectivity. That is, I deal with objectivity as a special kind of social and communicative "medium" that separates science from other modes of communicating, such as love proposals, legal threats, ideological warfare, and transactions in markets and hierarchies.

Think of scientific knowledge as emerging from the interaction between two forces: Knowers and the known world. Objectivity results when the con-

tributions to knowledge of knowers – be they conceived as transcendental Subjects, empirical minds, or social groups – are reduced or, better still, eliminated in favor of the contributions of the world to that knowledge. In this sense, objectivity is a matter of conduct, of controlling emotions, biases, and interests. Once subjectivity is disciplined, the world can impress itself on knowledge like a seal on wax, without interference from culture or society. Then, there is a good chance that objectivity will result as accurate knowledge of external reality. As both conduct and knowledge, objectivity rises above partial perspectives and idiosyncratic standpoints, and from there allows for inter-subjective consensus as well.

The historical semantics of objectivity gradually shifts from "objectivity" as a quality of the world itself, to a property of knowledge about it (Dear, 1995: Chapter 1). The knower or observer gradually disappears, is rendered invisible and anonymous, and finally turns into a mechanical and replaceable appendix of the instruments. The climax of this development are self-recording devices, where observers enter only as sources of contingent psychological irregularities, which then can be canceled out by statistical averaging procedures, such as least squares or rules for taming outliers (Swijtink, 1987).

This "aperspectival" (Daston, 1992: 599) objectivity can be achieved, it is said, by letting the world select its own representations, with minimal interference and distortion by the interest- and standpoint-driven forces of society, culture, money, and power. In Popperian language, objective knowledge is knowledge without knowing subjects. In Nagel's (1986) famous phrase, it is the "view from nowhere." In Rorty's (1979), no less famous, imagery, objectivity is what the Mirror reflects when all contingencies have been removed.

Taking this view requires special efforts. Objectivity doesn't come easy or naturally. Rather, it requires the painstaking and patient *work* of removing the biases and prejudices which are part and parcel of the profane world (Dear, 1992: 627; Daston, 1991a: 353). Left to themselves, without systematic and prolonged disciplining, training, and control by their scientist-peers, knowers cannot be expected to arrive at objectivity. By themselves, they are victims of the "idols." Avoiding bias and distortion requires a special Ethos and virtue; a heroic and ascetic Weberian denial of idiosyncratic selves and their social memberships (Merton, 1973; Daston, 1991b: 380; Daston and Galison, 1992: 83).

Epistemology has suggested various ways of doing this work, all of which seem to have failed, at least in their strongest foundationalist and absolutist aspirations (cf. Laudan, 1996: 3-25). Some of the most prominent attempts include the Kantian transcendental Subject, the Cartesian Cogito, the neutral and invariant protocol sentences of Logical Positivism, the elusive demarcation criterion separating science as a natural kind from other knowledge, the internal/external distinction between the context of justification and the context of discovery, the ideal speech situation of formal pragmatics, and the rules of scientific method. These devices were all meant to banish or, at least, hold at arm's length all those profane economic or social forces that impacted upon knowers to obscure and distort or bias

their view. The priestly philosophers erected, and anxiously guarded, taboos protecting the sacred institution of objectivity, where science must only be driven by the internal and pure forces of Reason (logic) and Reality (sensory evidence).

Against this philosophical orthodoxy, the antifoundationalist and anti-representationalist consensus in science studies points out that science is "just" a contingent and historical culture or form of life – a communal and local language game without any privileged access to objectivity and truth. Scientific knowledge is "constructed" much like other knowledge; it is local and contextual, maybe "gendered" and politically suspect. The bottom line in current science studies is that nothing special is happening in science. It is an ordinary setting where ordinary people negotiate definitions of situations, and tinker with tools and instruments to achieve practical results. Scientists do not follow some algorithmic and universal "logic of science." As Shapin (1995: 305) says, in his recent review of the field, science studies display the "contingency, informality, and situatedness of scientific knowledge-making." This is consistent with postempiricist, pragmatist, and constructivist philosophies of science which bid farewell to the old promises of absolute objectivity and foundational certainty (Rorty, 1991).

Two conclusions are frequently drawn from the constructivist critique of objectivity. The first conclusion is that objectivity is rhetoric; the second one holds objectivity to be power.

Objectivity as Rhetoric

To view objectivity as rhetoric has become very popular indeed, due to the expansion of semiotics, literary criticism, and discourse analysis into the humanities and social sciences (Fuchs and Ward, 1994). According to this textualist position, objectivity is mainly a set of textual and literary devices to persuade audiences that some statement or proposition accurately represents an independent reality "out there" (see Bazerman, 1988; Woolgar, 1988; Myers, 1993). The rhetoric of objectivity produces an "ideology of representation," where accurate statements, or facts, seem to correspond to external reality (Mulkay, 1985; Hunter, 1990: 5-6).

The appearance of correspondence is accomplished by various rhetorical and "inscription devices" – such as externalization, distention, or the passive voice – that eliminate all references to agency, locale, subjectivity, and construction (Latour and Woolgar, 1979/86: 81-88). Gergen (1992: 104) defends this position:

> Linguistic means of separating subject and object, characterizing the objective world, establishing authorial presence (and absence), and cleansing the lens of perception are among the most prominent means of generating the sense of objectivity.

Deleting all modalities and qualifiers that would restrict the scope of statements by connecting them to local and accidental conditions, the "empiricist repertoire" persuades audiences and readers that a text indeed mirrors reality and contains objective knowledge (Gilbert and Mulkay, 1984). Gusfield (1976) characterizes scientific prose as

the "style of non-style," which encourages readers to believe in the objectivity of what is being communicated. Consequently, "when one either fails to employ distention devices or resorts to personalizing descriptors, objectivity is threatened" (Gergen, 1992: 97).

This argument for objectivity as rhetoric has some merits, but overstates its case. Most importantly, the rhetoricist argument gives almost magical powers to the Word, the Text, and Discourse, while ignoring the organizational and material contexts of scientific work. Rhetoric is but a small part of this work, surfacing, as it does, primarily on the public frontstages of scientific presentations. That scientists use rhetoric to persuade others is true but trivial – all organizations, and especially their professional segments, do this extensively (Meyer and Rowan, 1977). The more interesting and less obvious question, though, is when such rhetorically couched claims to objectivity and disinterestedness are likely believed, and when they are met with the suspicious skepticism of *Ideologiekritik – no matter* what rhetorical tropes are being employed by a given text.

Credible claims to objectivity are supported by much more than just rhetoric; they rely on machines, statistics, powerful organizations, professional monopolies, strong networks, and vast amounts of reputational capital (Whitley, 1984). Galison (1985: 356-359) shows how in today's Big Science, the culture and rhetoric of argument are but a small part of large networks of machines, organizations, and interorganizational linkages. Discursive and textual practices are only one of the resources available for today's science to make forceful claims to authoritative and objective knowledge. In fact, rhetoric is probably not even an especially forceful supporter of objectivity, as decades of disbelieved sociological scientism should make evident. Latour (1988: 169) repudiates the textual idealism of rhetoricism strongly: "If all discourse appears to be equivalent, if there seems to be 'language games' and nothing more, then someone has been unconvincing."

The objectivity-as-rhetoric position also has difficulties explaining why some statements are more likely trusted as objective than others, despite the fact that almost all scientific statements are couched in the impersonal and disinterested language of empiricism. Rhetoric may be a part of the differential chances of a statement to become accepted as established knowledge, but cannot, by itself, explain why so many statements disappear unnoticed into the archives despite their objectivist rhetoric. Rhetoric is, at best, a necessary, not sufficient, condition for objectivity.

Objectivity as Power

The critique of objectivity as power has a long and strange history. It starts with German romanticism and its anti-French and antirationalist love for the peculiar and traditional, moves as *Technikkritik* through the teacher-student ties linking Husserl-Heidegger-Marcuse, becomes a staple of Critical Theory's critical theory of instrumental Reason and, via Nietzsche, of Foucault's *Biopower*, and is finally picked up by some segments within the new social movements and their intellectual wings, such as radical Green ecology and parts of postmodern academic feminism (see

Habermas, 1981/84: Chap IV). The critical theory of objectivity holds that objectivity is a weapon to exclude marginal voices from the dominant "logocentric" narratives of Western rationalism and empiricism, spearheaded by science (see Hawkesworth, 1992, for a review). In its grand and totalizing aspirations, objectivity suppresses the local whispers of silenced and colonized Others and their lifeworlds. Objectivity sugarcoats a cold and uncaring instrumental reason that has an insatiable appetite for controlling and manipulating Nature and people. Objectivity hides its masculine will to power behind the impartial and neutral facade of truth and progress (Code, 1992: 2). In Gergen's (1992: 105) words,

> not only does the discourse of objectivity generate and sustain unwarranted hierarchies of privilege – along with an accompanying array of prejudices, hostilities, and conflicts – but many voices are thereby excluded from full participation in the culture's construction of the good and the real.

There are two versions of this critical argument; one moderate, the other radical. The moderate version criticizes not objectivity as such, but only biases and prejudices that are presented in the disguise of objective facts. This remedial strategy does not aim at displacing objectivity altogether but, rather, at debunking false pretensions to objectivity. Such a "revised" objectivity is, in fact, perfectly compatible with objectivity proper, since the goal is to *rescue* "true" objectivity from claims that do not deserve this label.

Not so for the radical version, which has been put forward most vigorously by some segments of postmodern academic feminism. Here, the very notion and goal of objectivity itself are seen as suspect, as the uncaring and imposing tool of a "disembodied" instrumental and male reason that perpetuates oppression and patriarchy. MacKinnon (1987: 50), for example, thinks that "objectivity is the epistemological stance of which objectification is the social process, of which male dominance is the politics, the acted-out social practice." Sprague and Zimmerman (1993: 260) agree that "the very form science takes in our culture equates it with power and domination." Cook and Fonow (1990: 76) blame objectivity for the "political domination of women through their objectification in research." Lorraine Code (1992: 2) assures us that

> it is by now a feminist commonplace that the epistemologies of modernity, in their principled neutrality and detachment, generate an ideology of objectivity that dissociates itself from emotions and values, while granting no epistemological significance to its own cognitive location.

Some radical critics suggest that objectivity is beyond repair and should be replaced by "standpoint epistemologies." These link ways and modes of knowing to interested social locations and positions. Knowledge is always situated and contextual, part and parcel of the ongoing practices of social groups. Each perspective is, therefore, partial, selective, and incomplete. Standpoint epistemologies seek to make the conditions and circumstances of knowledge distributions visible and accountable, denying that there can ever be a neutral and impartial view from nowhere. Rather, there is a multicultural variety of alternative, sometimes incommensurable,

standpoints and perspectives, none of which may claim to be the "only objective one."

Standpoint epistemologies are correct to remind us that all knowledge is part of the world, produced by groups placed in social space and historical time. There is indeed no escaping the worldliness of knowledge to some extraterritorial, transcendental "God's eye" view that was free from any of the empirical constraints and restrictions that actual observers confront. At least since Quine and Kuhn, philosophical naturalism and sociological constructivism have been making great strides in extending empirical science to observers and cognition.

Much more controversial, though, is the suggestion that some standpoints, notably those of marginal, excluded, and oppressed groups, are more privileged than other standpoints in their relationship to truth and objectivity. Haraway (1991: 191), for example, prefers "subjugated" standpoints "because they seem to promise more adequate, sustained, objective, transforming accounts of the world." Hartsock (1983: 159) predicts that in "systems of domination the vision available to the rulers will be partial and perverse," while Harding (1986: 26) promises that "by starting research from women's lives, we can arrive at empirically and theoretically more adequate descriptions and explanations – at less partial and distorting ones." McCarl Nielsen (1993: 25) argues that "the implication for developing a specifically feminist epistemology is that a woman's perspective (if transformed through consciousness-raising) will lead to more accurate, more complex knowledge."

The Standpoint Paradox

Making standpoints visible in their effects on knowledge can lead to two possible outcomes. The first is a pronounced and unmitigated relativism that restricts claims to validity to the social and cultural radius of a standpoint and its occupants. This kind of relativism allows for as many legitimate views and valid knowledges as there are standpoints, with no systematic privileges afforded any one standpoint, and no independent and neutral methods for reaching agreements between various standpoints. This strong localism and contextualism implies that basic controversies cannot be resolved rationally because it is always possible to retreat into the trenches of a standpoint, and claim that nobody else can really understand. Paradoxically, strong relativism obliges all arguments and points of view to make themselves *weaker* in admitting to their own narrow limitations:

> Those ideas that are validated as true by African-American women, African-American men, Latina lesbians, Asian-American women, Puerto-Rican men, and other groups (!) with distinctive standpoints, with each group using the epistemological approaches growing from its unique standpoint, thus become the most 'objective' truths. Each group speaks from its own standpoint and shares its own partial, situated knowledge (Collins, 1990: 236).

As opposed to relativism, the second possible effect of making standpoints visible is not to limit, but to *strengthen* the cognitive authority of the more comprehensive standpoint from which this visibilization can be accomplished. By making standpoints visible and accountable, one can become aware of the

selective biases and partial viewpoints they introduce into knowledge. The idea, then, is to transcend a standpoint to arrive at a more complete picture of the world. This picture is more complete now because it includes not only the previous view, but also the relationship between it and the previous standpoint (Nagel, 1986: 5). Removing biases and distortions then affords the more reflexive, higher-order, standpoint a less distorted and biased access to truth. These higher levels of awareness are what most standpoint epistemologies strive for; they do not want to relativize but to privilege their own views (Brown, 1994: 162).

But then, standpoint epistemologies move back toward traditional objectivity, closer to the very "view from nowhere" they set out to dismantle. Either the standpoint of the oppressed is but one of many possible and justifiable alternatives, in which case it cannot claim any special privileges. Or, the oppressed and marginal are in a privileged position to overcome bias and partiality, in which case their knowledge will be *superior* to that of the ruling classes. It is superior because it is less partial, less selective, less distorted, and more accurate – in other words, more objective. It is aware of its "situatedness" and "con-textuality" – but in this awareness becomes *less* partial and biased.

As a result, radical critics of objectivity restlessly oscillate between the postmodern relativism of pluralistic and diverse standpoints, and the privileged perspective that emerges when standpoints and locations are overcome to permit a more comprehensive and complete, or objective, view (e.g., Calas and Smircich, 1992: 244). Mary Hawkesworth (1992: 468) captures this paradox:

> Objective inquiry cannot be attained within the preserve of privilege – whether it be the privilege of whites, the middle class, or men. The feminist argument for the inclusion of women and people of color within philosophy and science can be understood not in terms of standpoint theories that suggest that specific individuals or groups have privileged access to truth, *but rather in the demands of objectivity* (my emphasis).

Some Empirical Difficulties with the Critical Theory

In addition to these logical and conceptual problems, the radical critical theory of objectivity is also empirically questionable, for several reasons. To begin with, it is prone to confuse certain philosophical pronouncements on scientific method with actual scientific work itself. Sprague and Zimmerman (1993: 256-261), for example, chide "positivism" for its domineering attitude and alleged neglect of the "subjective" and "emotional" components of knowing. Their assumption is that "positivism" is a correct description of actual science, so that criticizing positivism amounts to criticizing scientific work in general.

But, by now, there is widespread agreement that philosophy of science, especially positivism, is a very poor guide to actual science. This result of science studies finds even the approval of many practicing scientists (e.g., Weinberg, 1992/94: Chapter 7). Criticizing Fox Keller's biography of McClintock and her allegedly "feminine feeling for the organism," Richards and Schuster (1989: 704) correctly point out that

> method discourse abstracts from and floats above the proper cognitive and social complexity of scientific fields, and so it misses everything that now appears of importance in understanding the dynamics of science.

As a result, the radical critique of objectivity does not measure up well to what is known about actual scientific work. Take the laboratory ethnographies. All the ethnographic evidence about how scientists actually do their research shows that it resembles playful tinkering, practical reasoning, and mundane sense-making much more than controlled and systematic intervention and manipulation (e.g., Knorr-Cetina, 1981; Lynch, 1985; Latour and Woolgar, 1986). This is especially true at the innovative and highly uncertain frontiers, where no rigid mechanics of method exists at all, and where controversies make discoveries very uncertain. Here, work is often playful, experimental, and driven by trials and errors because the world is not yet well understood at all. There may be "planned interventions," but they are notoriously prone to failure and revision. At the frontiers, there is not enough certainty and consensus for instrumental control and phallogocentric domination.

Observers of research fronts report that work looks surprisingly "interpretive" here (Ziman, 1978/91: 138), and that discovery resembles more artistic creation, not technocratic engineering. Goodman (1978) captures this aesthetic dimension in his metaphor of creative science as a way of "world-making." Innovative science is too uncertain and controversial to have a firm and relentless grip on its victimized objects. At the frontiers, scientific work is often intensely personal and passionate – a far cry from the cold and uncaring machine of instrumental reason (Hilts, 1982: 12; Polanyi, 1958/64: 143). Creative scientists follow their "hunches" and "smells" rather than uncaring logic or disinterested method (Thorne, 1994: 64 f.). Many scientists describe their discoveries as a will to beauty and elegance, not power (e.g., Chandrasekhar, 1987; Weinberg, 1992/94: Chapter VI).

Ironically, the critique of objectivity as totalizing power is totalizing itself – it does not have a good eye for variations and differences between various ways of doing science. It assumes, essentialistically, that all science is of one piece, molded into one uniform "logic" or masculine drive for control and technological manipulation (Fox Keller, 1990: 54). But some science involves decades-long experimental collaborations between hundreds of coworkers gathered around huge pieces of equipment, while other science is more solitary mental work, such as writing philosophical essays on the essays of other philosophers. What can be gained by forcing all of this into one "logic"? There is simply too much variation in the ways of doing science for all of it to follow some unitary instrumental interest in control. In addition, "women" are too diverse to subscribe to one epistemic framework, unless one defends traditional definitions of "essential femininity" (Longino, 1990: 188). In fact, the critics of objectivity repeat the main error of epistemology – there is not one method or logic to science, but many method*s* and logic*s*, tailored to particular specialties, their means of production, and their social structures.

To be sure, there *are* some areas in science where "control" is more possible

and prominent – these are areas of Kuhnian normal science which are comparatively routine and predictable, often with a focus on direct technical "applications." Structurally, such areas resemble Weberian bureaucracies. They come closest to instrumental reason. But normal scientific pockets of higher certainty are not even the most visible and prestigious areas. The methodical routines of established science are themselves quickly undermined by perpetual change and innovation. That is, any strongholds of certainty are temporary; any instrumental control is highly precarious and provisional.

In fact, as science develops, it *increases* uncertainty by unfolding and elaborating complexity, and by extending into the infinite in all directions (Gell-Mann, 1994; Dyson, 1988). Science advances – but these advances typically *caution* against all-too-eager attempts at intervention and control. As complexity increases, so does the number of unknowns and uncertainties. Control requires a much more complete and secure knowledge of the world than science-in-the-making can provide. Control requires drastic simplifications, which cannot be delivered by rapidly advancing research frontiers. Their business is novelty, not routine.

Objectivity and Social Status

Objectivity, then, is neither logically nor empirically tied to domination and control. This hypothesis resonates rather well with recent social and cultural histories of objectivity. Ted Porter (1995), for example, makes the convincing case, for numerous social fields, that objectivity is actually a sign of *weakness*, not strength. Claims to objectivity and neutrality – often backed up by numbers, statistics, and standards – are most likely raised when bureaucratic decisions or scientific actions need to be explicitly justified because they are under attack. When this happens, "objectivity" is mobilized as a defense: Decisions and actions are justified in terms of impersonal rules and regulations when the discretion of decision makers and "experts" seems no longer trustworthy. Objectivity is invoked to defend credibility in crisis; it is a "democratizing" technology of rules that minimizes the personal discretion and arbitrariness of leaders and elites.

Peter Novick (1988: 45 ff.) also shows how the "objectivity question" in the American Historical Profession was tangled up in conflicts over professional autonomy and discretion. Objectivity was most frequently invoked when professional historians had to defend themselves against criticism and competition from amateurs, when it was no longer possible to rely on the "natural" authority of expertise. In this situation, professional historians grounded their work in the detached and impersonal rules of historiographic methodology. Objectification was a strategy of defense and justification in a situation of questioned professional discretion and expertise.

In this sense, the "subjectivity" so cherished by feminist standpoint epistemologies may actually be a much more "elitist" and "domineering" epistemic strategy than objectivity. Supporting this point, Mark Schneider (1993: 7, 83) has documented the resistance of cultural and scientific virtuosos against the objective codification of their skills. Charismatic virtuosos resent and resist objec-

tivity; they rely on tacit and informal discretion and personal judgment to protect their areas of expertise from public inspection and accountability. Once skills are codified and taylorized by objective methods, they can no longer be mystified as a privileged subjective possession and become, at least in principle, accessible to anyone. Virtuosos emphasize the "subjective dimension" of their respective crafts to distinguish their elite status culture from that of "normal" and routine practitioners. That is, defenses of objectivity indicate *embattled* and scrutinized institutions, not firm strongholds of domination and power. Power is most firm when it appears as grounded in the special skills possessed only by charismatic virtuosos who do not share how they know what they know.

Likewise, the cultural semantics of objectivity is inclusive, not exclusive, as its critics maintain. Objectivity, in its modern 17th century sense of removing particular perspectives and contingent constraints on knowledge, seeks to *broaden* the community of knowers to include those not privileged enough to attend the scholastic universities, where knowledge was monopolized by religious elites:

> Aperspectival objectivity became a scientific value when science came to consist in large part of communications that crossed boundaries of nationality, training, and skill. Indeed, the essence of aperspectival objectivity is communicability, narrowing the range of genuine knowledge to coincide with that of public knowledge (Daston, 1992: 600).

Again, it may be the more personal, tacit, subjective, and emotional aspects of knowing that, contrary to feminism, are associated with elitism and social power. For the more personal and emotional one's standpoint becomes, the less it remains subject to public inspection and critical appraisal. *Intuition*, not objectivity, is elitist because it claims that it cannot be known how it knows what it knows – unlike objectivity, intuition cannot be measured, replicated, and accounted for. The will to power enthrones subjectivity and intuition, not objectivity, as above and beyond public control. Wasn't the sharpest critic of objectivity, Nietzsche, also a relentless enemy of democratic culture? He wasn't much of a feminist, either.

Some Suggestions for a New Objectivity

I believe we need to rescue objectivity from both orthodox philosophy *and* standpoint epistemologies. This appears to be the plan of some former radical critics of objectivity as well, many of whom now search for a more defensible, less grandiose kind of objectivity, instead of throwing out the baby with the bath water, and ending up with relativism and nihilism. In a recent review, Forman (1995) registers just such a general trend toward moderation in critiques of objectivity, motivated by a concern not to abandon general, if not universal, standards of reasonableness altogether. Fox Keller (1995: 13) now feels the need to emphasize that "shared measures of competence, some degree of consensus about standards, and some notion of academic freedom are certainly necessary to the viability of intellectual inquiry." Pickering (1991: 418) now intends to "recapture an appreciation of the objectivity of science," and the feminist his-

torians Appleby, Hunt, and Jacob (1994: 247) have recently scolded standpoint skeptics for being "oblivious to the danger of inventing a new absolutism based on subjectivity and relativism." Natter, Schatzki, and Jones (1995: 8), in their introduction to a recent essay collection on a "new" objectivity, realize that

> the fact that the human epistemological condition renders traditional objectivity impossible raises the challenge of how to fashion a successor to the received ideal that is both consistent with this condition and yet able to constitute a meaningful and practical alternative to willfulness and nihilism.

To be sure, this "new" objectivity will be much less than what the philosophers had hoped to find. There seems to be widespread agreement now that objectivity is not, and cannot, be universal and foundational, somehow above and beyond society and time. All knowledge is in and of this world; it cannot be otherwise. Therefore, the question, "who is the observer?", is the central question for any constructivist philosophy and sociology of science. However, once the old privilege of otherworldly objectivity is denied, it cannot be replaced by a new privilege, i.e., that of a particular standpoint. As we shall see, objectivity is actually very fragile and precarious, not cold and menacing. In fact, objectivity shares certain traits with love; *philia* is their common origin, trusting their common process.

If the old absolutist and foundationalist notion of objectivity as timeless and invariant knowledge is no longer acceptable, what kind of objectivity will take its place? While there is widespread agreement on the need to dismiss traditional otherworldly objectivity, its replacement candidates are few and controversial. Surprisingly, most of the scattered suggestions that have been offered so far are rather pedestrian, in some ways taking us back to a pre-critical stage of epistemology.

Take, for example, Appleby, Hunt, and Jacob's (1995: 247 ff.) "practical realism." For practical realists, "words result (!) from contact with the world" (p. 248). In making statements, they rely less on philosophers and their rules but on "intuitive wisdom" (p. 248). Despite the inescapable tentativeness and imperfections of knowledge, practical realism aims for "accuracy and completeness" (p. 248). There is an independent reality of objects out there after all, and they are "capable of being 'captured' in the mind by words that point back out toward the thing itself" (p. 250). This happy state of affairs encourages the practical realist "to get out of bed in the morning and head for the archives, because there they can uncover evidence" (p. 251).

Pickering's (1991,1995) "pragmatic realism" is not much more innovative, despite its being presented in the fashionable idiom of postmodernism. For Pickering, a new objectivity appreciates that "knowledge is somehow disciplined by the otherness with which it engages," and is involved in a "continual struggle with resistant otherness in the material world (1991: 418)." Coming dangerously close to anthropocentric Aristotelianism, Pickering (1995: 6) invests the world with "material agency," which is to say that "the world is continually doing things."[1] Material agency, we are told, is "temporally emergent," but only "in relation to practice," which is "the work of extending, rather than reproducing, scientific culture – in the sense of building new machines and so on (1995: 14)."

If I follow Pickering here, he means to say that new machines did not exist before.

Upholding at least part of the core dogma of traditional realism, Pickering (1995: 183) believes that this material agency "leaks into and infects our representations of it in a nontrivial and consequential fashion," and that our knowledge is, at least in part, a function of "how the world is (p. 185)." On this fairly solid realist basis,[2] objectivity is whatever manages to survive the "mangle of practice," Pickering's central metaphor.[3] Mangling scientists cope with material agency by modeling their plans and goals into an unknown and uncertain future, and by tuning and re-tuning their plans and goals when material agency creates trouble for them. This mangling takes place within an existing scientific culture, which "constitutes the surface of emergence for the intentional structure of scientific practice, and such practice consists in the reciprocal tuning of human and material agency, tuning that can itself reconfigure human intentions" (21). Piling metaphor on metaphor, Pickering defines tuning as a "dance of agency":

> The dance of agency, seen asymmetrically from the human end, thus takes the form of a dialectic of resistance and accommodation, where resistance denotes the failure to achieve an intended capture of agency and practice, and accommodation an active human strategy of response to resistance, which can include revisions to goals and intentions as well as to the material form of the machine in question and to the human frame of gestures and social relations that surround it (22).

As far as I can tell, this means that scientists have goals, that they use machines to accomplish them, that these goals sometimes cannot be achieved, and then have to be changed somehow. The "mangle of practice" appears to be little more than a postmodern restatement of pragmatist trial-and-error methods (the "dialectic of resistance and accommodation").

As a final example, Gieryn (1994: 342-3) and Longino (1990: 62- 82) offer a list of criteria that must be met if and when a "new" objectivity is to be possible. For Gieryn, objectivity must tolerate various viewpoints without "preemptive epistemic denunciation," encourage dialogues between opposing approaches without committing category mistakes, reward critical examination of presuppositions instead of dogma, appreciate the complexity of the world, and remain open for revisions of knowledge. This list is hardly objectionable, but does not advance us much further than the classical virtues of epistemological liberalism and individualism, as already endorsed by the empiricism of the analytical tradition, and the critical rationalism of Popper and his followers.

Longino's suggestions for a new objectivity are surprisingly pedestrian as well. Science takes place in a "public space" that encourages mutual criticism through peer review within the shared standards of a more or less egalitarian community that believes in a world independent of perception. Since the institutions of peer review and mutual criticism are "social," objectivity is social as well. Objective knowledge, then,

> is produced by a community (ultimately the community of all scientific practitioners) and transcends the contributions of any individual or even of any subcommunity within the larger community. Once propositions, theses, and hypotheses are developed, what

> will become scientific knowledge is produced collectively through the clashing and meshing of a variety of points of view (Longino 1990:69).

What distinguishes this account from Merton's (1973) Ethos of Science? I do not see much new in the "new" objectivity at all and believe it, in many ways, to be a step back before the postempiricist and constructivist revisions in the philosophy and sociology of science.

In contrast to these approaches, I want to build upon Luhmann's theory of self-referential, or autopoietic, social systems.[4] It seems to me that, at present, this theory is the only one to offer a novel notion of objectivity – one that neither reduces objectivity to power or rhetoric, nor goes back to a more traditional, preconstructivist and realist objectivity.

Objectivity as Medium

As a medium, objectivity is *not* correspondence realism, *not* a set of rules or methods, and *not* an extra-worldly view from nowhere. Rather, it is a mode of communication. Following Parsons's theory of symbolically generalized media of exchange, Luhmann argues that such media – among them love, money, power, and truth or objectivity – make the acceptance of communications more likely when the sheer number, selectivity, and contingency of all communications make such acceptance *prima facie* rather unlikely. Media reduce the "improbabilities of communication." Communication becomes improbable when neither copresence nor stratification secure the directness of understanding, or cognitive privileges for those at the top. Communication becomes improbable to the extent that individual minds with unique and special inner experiences cannot be expected to share mental states through mutual empathy and introspection. Communication becomes improbable when writing extends possible audiences so much that there are no longer any guarantees that a communication will actually reach someone. Even if some communication is eventually being picked up, chances are that it will not be understood, and even if it is being understood, it may still be rejected. When it is no longer plausible to rely on some pre-established social harmony, an overarching value consensus, or transcendental states of natural agreement between all civilized and reasonable people, media of communication make sure that communications can nevertheless be coupled to previous and future communications.

This coupling occurs when some communication is used as the premises for subsequent communications. Then, a structure is being built up in which not everything remains equally likely. Media generalize coupling; they decouple coupling from immediately shared experiences, from blind trust in certain charismatic individuals, and from privileged insights that are deemed valid in all possible worlds. Media step in when communicative success can no longer be taken for granted because there are too many possibilities of knowledge and experience, and too many reasons for others not to listen or to say "no."

Media of communication achieve some structure and consistency when all structure and consistency must be accomplished, and can no longer be taken for granted, or anchored in some a priori state of affairs. The coupling of communications remains precarious and re-

versible, though: Any structure can be undone. Media do not and cannot decide exactly what will be communicated, and how other communications will respond to these communications. Media can only determine in what way communications will be coupled insofar as coupling takes place at all. But it may not, and then there is only noise, no structure.

A medium is not a thing or an instrument; rather, it is a basic mode of communication that determines what kinds of things one can do or say in a given system, such as politics, law, science, or love. Media are open and closed at the same time: Communications in a given system must employ one specific medium, but this choice does not yet determine what exactly will be communicated. Objectivity organizes communications on a more abstract level than theories or plans. A medium only decides what *kinds* of communications can take place in a given area, and what *sorts* of experiences count as information there.

Media use "binary codes" to assign all communications to either one of two values. For example, the medium of truth/objectivity signals that scientific communications should not be understood and evaluated as love proposals or legal threats, but as statements about the world that can be true or false, objective or subjective. Again, the medium and its binary code do not decide which statements are true or false, but only make sure that future communications, if and insofar as they occur in and as part of science, refer to previous and current communications as true or false, not as beautiful, just, or powerful. That is, media establish a "basic difference" that remains constant in the coming and going of singular truths and falsities, at least as long as the autopoiesis of the system continues.

Science employs the medium of objectivity or truth. Truth and objectivity do not indicate a privileged access to the world. They do not refer to knowledge that corresponds to some external reality. They do not place knowers in an extramundane position with a view from nowhere. They do not even make sure that knowledge will eventually approximate reality in some asymptotic and teleological process of gradual perfection. Rather, truth and objectivity either *happen* (in which case there *is* science), or do not happen. They do not occur outside of society.[5] They do not indicate states of the world, but states of a social system, science. Truth and objectivity are not somehow above and beyond practice, but symbolize the unity of this very practice in all of its actual diversity. But this coupling remains an internal achievement of the system; it does not bring the states of the system into some sort of isomorphism or correspondence with the states of the world. The world as it is, the thing in itself, remains unknown and unknowable. The theory of media and codes is antirealist and constructivist. It dismisses traditional objectivity, and does not return to a precritical stage in epistemology.

Media and their binary codes are not communications themselves, although one can communicate *about* them on a second level, as I do here. If this second-order communication occurs again in science, as it does here, it must also employ the medium.[6] This means that the medium and its code, unlike the communications they frame, cannot be

questioned without questioning and disturbing the system as such. Or, in science objectivity can only be questioned objectively, not subjectively.[7] If this happens just the same, irritations occur that test the limits of the medium. If something is subjective, it cannot be part of established scientific knowledge. If something is objective, the assumption is that others would accept this as well, even if they are not present, and even if they cannot be reached and consulted at the moment.

The Binding Effect of Objectivity

This is the "binding" effect of the medium, or its role in mutually coupling and interlocking communications. Objectivity is not factual consensus, but the factual *presumption* that a factual consensus applies to others as well. Objectivity is empirical; it either mediates communications or not, but, at the same time, points beyond the accidents of time and place. In science, communications can and must question whether other communications are, in fact, true and objective, but they cannot dismiss truth and objectivity altogether without irritating or even interrupting the operations of the system as such. If objectivity questions itself ("Is it objective or subjective to distinguish between objective and subjective?"), paradoxes and paralyzing self-refutations occur which may exit science, and lead to other kinds of discourse, such as drama, edification, personal confession, or even silence (Ashmore, 1989).[8]

Objectivity means that one can, at least in principle, decide whether statements are true or false, or one can delay this decision until later, when more is known. If they are false, the code attributes this to its opposite value, subjectivity or error, which rules out, at least for the time being, that false or "merely subjective" statements can serve as the premises for any subsequent statements. Falseness and subjectivity are warning signals at the entrance of blind alleys which do not promise any good results and so can safely be ignored, at least for the moment. In this way, truth and objectivity do not determine what will eventually be the case, but their negative values at least exclude the pursuit of subjectivity and error. But these values can be assigned only by communications, not by the world.

As a rule, the medium and its code interpret false statements as "honest" mistakes, not as wicked deceptions or an insurmountable inability to know better. If statements are true, they are true regardless of kinship or sexual attraction or social standpoint. If they are false, they are false because someone has made a mistake, not because they intend to deceive, or are white and male and can't know any better. Alternatively, probabilities can be assigned. Whichever, the important assumption is that this decision is not based on love or power but on arguments and evidence. These can usually be ranked according to more or less shared criteria of good vs. bad evidence, convincing vs. unconvincing arguments, etc. There can, of course, be disagreements about what counts as good and bad evidence, or sound vs. flawed reasoning. But the code cannot consider the possibility that truth claims are altogether unrelated to arguments and evidence.

If decisions about truth are changed later, and they always will be, then this

is interpreted to mean that *learning* has occurred. One did not know then what one knows now. The medium *cannot* attribute theory changes to accidental shifts in tastes or political balances of power, unless this is itself done with good reasons and evidence. If something other than truth and objectivity is suspected to operate in science, this is cause for alarm among those doing this science, and can only be taken by them as a challenge to do it better, to restore the truth and objectivity. If, say, "interests" or "ideologies" are documented to have an effect on research, this very documentation itself can only happen in the medium of truth ("it is true that this interest has caused this finding"). And if some finding has indeed been caused by some interest, this is cause for *suspicion*, not celebration of the "situatedness" of all knowledge.

This means that the medium and its code interpret, say, the history of science as the progressive elimination of error, and its future as approximation to truth. An outside observer, of course, may question this on another level, as the sociology of science does and must do, but this questioning must then recommend itself as a "more realistic" or "more adequate" alternative. Kuhn (1962/70), for example, could question the old realist dogma that the history of science moved knowledge closer and closer to truth – but he could do so only by suggesting that his way of doing historiography was "more realistic" than the older Whiggish scientific hagiography. The medium can, without further ado, deal, say, with debunkings of rational reconstructions of science's history, and it can deal with "externalist" histories that emphasize power struggles and historical accidents in the development of science. But objectivity cannot admit the possibility that externalist histories are *themselves* not evaluated on the basis of argument and evidence. If it did, there would be no science. An externalist history can demonstrate that the air-pump's victory over Leviathan was an accident, but it cannot be interpreted and evaluated itself as just another accident.

In other words, the code of objectivity has an ineradicable "blind spot" which follows it around like a shadow. As long as one is doing science, and offering one's communications *as* scientific communications, there is no stepping free of the code. Radical critiques of objectivity "jam" this code; they produce irritations because they argue against argument, or argue that there is no argument, only rhetoric or power. This is what Habermas (1990) calls the "performative contradiction" of postmodernism. The code is the internal humming of science; it is what one would hear if one could listen not just to communications, but to communication itself.

Trusting

All media and codes are backed up by trust. In science, one trusts in objectivity. The vast majority of scientific communications are accepted on trust, not upon independent confirmation, replication, or open-ended discourse. Trust generalizes the readiness to link one's own communications to those of others. As with truth and objectivity, trust is itself not a communication, though it can be communicated about. When that happens, however, trust may already be eroding.

Trust can coalesce around a person, as in love, around social status, as in early modern gentlemen science (Shapin, 1994), or around procedures, as in modern science (Megill, 1991: 310-11). One trusts that samples have been drawn so as to assure their representativeness, that instruments have been tested and calibrated properly to avoid measurement artifacts, that missing values have been substituted according to established rules, or that good reasons could be given in case that didn't happen. One trusts that proper methods for controlling alternative explanations of outcomes were followed, and that a paper was scrutinized by competent experts before being published. Nevertheless, it remains possible to dismiss the review process as untrustworthy and overly political, especially if one's papers are frequently rejected. But such a dismissal shows disappointment in objectivity, and indicates the wish to get rid of power, not objectivity. In addition, one may also trust in reputation, as long as it is distributed by and within science, and not by, say, fashion or charity. This trust in procedural objectivity explains the continuing significance of "method" in science, despite all the critical debunkings by ethnographers who have observed – hopefully according to some method – that scientists do not follow any methods in their actual work.

In science, suspending trust becomes an option only when repeated efforts at removing persistent and glaring inconsistencies and anomalies fail (Fuchs and Westervelt 1996). Most anomalies can be attributed to subjective error or incomplete knowledge. In this way, their resolution can be postponed until sometime in the future. This makes it possible to reconcile the *fact* of disagreement among scientists with the assumption that only one truth and only one objectivity exist. But if all re-normalizing explanations for drastic inconsistencies and stunning deviations fail, one may finally be ready, if still very reluctantly, to consider the possibility of fraud.

In fraud trials, trust is *locally* suspended. Fraud busters expect to find motives for, and acts of, deception. Failures of trust in science are typically blamed on individuals' lack of honesty and integrity (Broad and Wade, 1982). Individual scientists betrayed the truth because of selfish interests and ideological partisanship. These individuals can then be sanctioned, while the rest of science remains exempt from distrust. Personalized failures of trust do not routinely extend to the entire apparatus of objectivity. If they did, science would grind to a halt, and could only deal with this one theme of distrust, nothing more. One reason for this is that one can only suspect very few people and their communications of fraud at any particular time. Distrust is very exhausting and impolite, especially among colleagues. Even in fraud trials, one continues to trust most other scientists and their statements, especially those that reveal and rectify a fraud. That is, discoveries of fraud cannot themselves be suspected fraudulent or, if they are, then *this* discovery must not be fraudulent, and so on. That is, one must continue to trust in truth and objectivity Therefore, distrust can only spread to small corners of the world, leaving the huge rest intact and unquestioned, at least for the time being.

In contrast to fraud, *global* failures of trust in science are very rare. They might

happen in true Kuhnian revolutions and, to a lesser extent, in pre- or multiparadigmatic fields with high internal fragmentation into separate schools and camps which believe in incompatible foundational myths and ideologies. In these serious crises, science turns into ideology–what Kuhn (1962/70) calls "incommensurability" of worldviews, standpoints, and perspectives. In fact, the very language of "standpoints" and "perspectives" already signals systematic and prolonged crises in communication and trust. This difference in scale separates incommensurability from fraud, which is more local and individual.

During profound crises, *anything* the opposite camp suggests, not just certain contributions of individual scientists, may be seen as fundamentally flawed, or even unintelligible. This is when the medium and its code fail to secure the ongoing autopoiesis of science itself, not just the acceptance of individual statements or theories. In this case, it does not really matter whether the camps involved are the ethnos vs. rational choicers, mechanical corpuscularians vs. scholastic Peripatetics, or phallogocentric white males vs. the caring yet oppressed. In radical breakdowns of trust, communication itself is disturbed or even interrupted. The networks of cognitive and social interaction fragment or break up entirely. The separate camps accuse each other of not being able to see what the other can see because they are victims of structural and ideological blinders they cannot begin to comprehend, much less overcome. That is, not only does one's opponent not know, but he is also unable or unwilling to learn. The less they communicate, the more the opponents really do start living in different social and intellectual worlds, as Kuhn suspected. But this cognitive incommensurability is, at least in part, a *result* of network breakdown, not its sole cause, as Kuhn would have it.

Global ideological distrust turns science into politics and intellectual warfare. But this is the exception, not the rule, at least in "mature" sciences that produce some facts. Usually, failures of trust are local, individualized, and then observed as fraud and misconduct.

Some Possible Objections

Let me deal with some possible objections at this point. Science *can* consider the impact of interests and social forces, even upon scientific knowledge. In fact, this consideration lies at the very heart of any sociology of knowledge. However, insofar as it considers this suggestion as a *scientific* communication, it must again exempt it from suspicions about motives. To communicate that science is power *as* a scientific communication, one must employ the medium of objectivity, and offer some arguments and evidence for this observation. Coercing others, or buying their support, are not valid options; *pure* and *naked* Machiavellianism will hurt a scientist's ambition much more than it will benefit same.[9] Science *can* consider the possibility that some of its knowledge is due to social interests and power struggles, but it cannot, at least not at the same time, consider *this* communication as nothing but a strategic move in a power game. Or, if it does, then *this* next communication must suspend suspiciousness and start trusting in arguments and evidence. What is more, the insight that

some science is influenced by power and interests can only be interpreted (*by those doing this science, not by their observers,*) as a call to remedy this situation and restore objectivity.

Similarly, science can consider the possibility that some of it is sexist and uncaring and reflects a male drive to dominate. If this turns out to be the case, then other science must find data and arguments to rectify this deficit and obtain better or more unbiased insights. In other words, it must learn, and assume that all fellow scientists are willing and able to do so, too. This is, if you wish, the "moral order" of science, or its special mode of solidarity (Rorty, 1991: 21-34; Shapin, 1994).

This moral order implies that science *cannot*, for example, consider the possibility that *all* of it, or its entire medium and code, is sexist. For there is simply no place in science from which this observation could be made. If it was made inside of science and circulated as a scientific communication, then it would have to claim that it was not sexist itself. But that would mean that not all of science was sexist, after all. Or, the claim that science is sexist is interpreted as coming from outside, in which case it is perceived on the inside as an ideological attack, not a scientific communication (Gross and Levitt, 1994; Wolpert, 1992; Labinger, 1995). In this case, science will counterattack, and the result is ideological skirmishes, not science. This is exactly the state of affairs in the highly polemical current debates over Science and Technology Studies (Fuchs 1996). There is no third possibility; the code can only accommodate objective/subjective, or true/false, but not objective/subjective/sexist, or true/false/politically incorrect (Luhmann, 1992: 195,208).

Objectivity cannot, for example, survive the recommendation that women should be "recognized as privileged observers partly because they have developed abilities to understand phenomena through intuition and emotionality" (Sprague and Zimmerman, 1993: 259). But which phenomena? All of them? Who decides this, and on what grounds? Objectivity breaks down when it is claimed a priori, for all possible worlds and without any evidence at all, that "gender is not simply one of a number of political statuses that require a critical consciousness, but (...) it is privileged even over class as a basic and inescapable limitation on individual thought" (Loughlin, 1993: 8). Is this thought limited as well? If not, how can it escape the inescapable? If so, shouldn't the next move be to remove this limitation? Are all women privileged or just feminists? Who gets to decide this, women or feminists?

Notes

1 After following the Parisian actor-network theorists in their radical notion of symmetry between Society and Nature, Pickering (1995: 15, 17) is then quick to add that human beings do have intentions, while material things do not. This, of course, raises the problem of how material agency can be symmetrical to human agency when things do not have intentions. In fact, intentions *constitute* agency.

2 Pickering, of course, is at pains to distinguish his "pragmatic" from "correspondence realism." The former adopts a "performative," not "representational," attitude, and supposes that reality is "interactively stabilized," instead of stable. But, insofar as the central credo of realism is

that the world selects, at least in part, its own representations, the gap between the two realisms does not seem to be all that dramatic.

3 Pickering himself is not quite content with this metaphor, because "if pressed too hard, the mangle metaphor quickly breaks down" (1995: 23, n.37). The mangle is *not* "shirts in, shirts out" – that would not be constructivist enough. It is also different from mangling in the sense that "my teddy bear was terminally mangled in a traffic accident" – that is too destructive. Pickering also seems unsure what mangles are as domestic technologies; the philosopher Suppe told him that "mangles were devices to speed up the ironing." This conflicts, however, with Pickering's sense of the mangle as the "unpredictable transformations worked upon whatever gets fed into the old-fashioned device of the same name used to squeeze the water out of the washing" (p. 23). In this confusing situation, the best thing to do is "to try to take the metaphor seriously enough but not too seriously."

4 I cannot do justice to this theory here, but Luhmann (1989) is a good introduction. My sources are Luhmann (1979: 48-60; 1986: 18-33; 1989: 36-50; 1990: Chapter 4; 1992: 167-361; 1995: Chapter 3).

5 They do, of course, occur outside of science. But only science specializes in the systematic construction and deconstruction of truth claims in the special medium of objectivity.

6 This does *not*, of course, mean that one cannot also communicate about science's evilness, its dangers for morality, or its costs. But such communications are not part of science. One can debate the merits and perils of using embryos for research, and one can outlaw such research, but if it occurs anyway, its illegality has no bearing whatever on its truth.

7 This remains, of course, a possibility for, say, law or politics, where science can be criticized as illegal or too expensive.

8 Gieryn (1994: 324), for example, starts his essay on objectivity by telling part of his life(his)story. It is good enough to know that he "recycles and composts religiously;" few of us can say as much. But I'm not sure what this does to his argument. Should it be recycled or composted?

9 This is what Latour (1987) does not realize in his political warfare theory of science.

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