

*Reflections on
Gender and Science*

Evelyn Fox Keller

1985

YALE UNIVERSITY PRESS
New Haven and London

mothers and (by implication at least) also suggest more responsive and loving roles for fathers. In this way they help to shift the balance of social values, making room for an alternative to those patterns of male and female socialization that reproduce a sexualization of aggression, power, and domination.²⁰ In other words, they provide support for a conception of legitimate power rooted in maternal love as well as in paternal authority: Power, as a result, can be redefined in terms of mutual interests and well-being rather than primarily in terms of conflict.²¹

Such a reconception of power, newly distinct from domination, has radical consequences for human relations, in both the private and public domains.²² What most directly concerns us here, however, is its implications for the relations between science and nature. To explore this possibility, I have first to describe the psychological dynamics that link the desire to dominate human others with the ambition to dominate nature, and hence to a particular set of commitments for science. The next chapter is accordingly devoted to an examination of the cognitive counterparts to the emotional dynamics discussed in this essay.

20. Such a hope is supported by the anthropological findings of Peggy Sanday (as reported in Benderly 1982, pp. 40–43). From a cross-cultural sample Sanday concludes that societies with a high incidence of rape (about one-third of the sample) "tolerate violence and encourage men and boys to be tough, aggressive and competitive. . . . Men mock or scorn women's practical judgment. They also do what they consider women's work and remain aloof from childbearing and rearing. These groups usually trace their beginnings to a male supreme being" (p. 40). In contrast, Sanday's findings as summarized by Benderly lead to the conclusion that "rape-free societies glorify the female traits of nurturance and fertility. Many peoples believe that they are the offspring of a male and female deity or that they descended from a universal womb" (p. 43). As an illustration, Benderly offers the example of the Mbuti Pygmies, who "live in cooperative small bands, men and women sharing both work and decisions. No Mbuti attempts to dominate another, nor do the group as a whole seek to dominate nature. Indeed, they refer to the female terms of endearment, as they would [to] a parent or lover" (p. 42).

21. The work of Jean Baker Miller, Sara Ruddick, and Nancy Hartsock is particularly persuasive for both the possibility and need for such a redefinition.

22. Most thoroughly explored by Hartsock 1983.

CHAPTER SIX

Dynamic Objectivity: Love, Power, and Knowledge

"Again I say the nearest an ordinary person gets to the essence of the scientific process is when they fall in love."

"You fall in love with the object of your curiosity?"

"How can you distinguish even *that*?" she objected. "The very fact that something *became* the object of your curiosity is already *process*. It is a horrible thing to say it in the way you do. Objects of curiosity? I prefer to call them things. You fall in love with a thing. Sometimes you fall in love with a fireplace, or you fall in love with a tree, and I honestly think this is the nearest ordinary people get to the genuine experience of science."

GOODFIELD (1981, p. 229)

As Bacon saw so clearly, knowledge surely does bring us power. It also brings us understanding, our uniquely human way of finding connections in the world. In both these senses, the kinship between knowledge and sexuality seems to be borne out. And just as sexuality is understood differently by different people, so is knowledge. Consider the following exchange, recently reported to me by a colleague. In a class after a reading of Genesis, my colleague had asked his students to think about why it was that the word *knowledge* was used in that text simultaneously in the sexual and the epistemological sense. One student, a young man, responded, "That's obvious! Both are about power!" "Oh no," retorted another student, a young woman. "It's because both are about being in touch."

The student who could have said that both answers were right was not there. Most of us are psychosocially constituted to see love and power as irreconcilable alternatives; we do not know how to speak of them in the same breath. In the preceding essay, it was argued that this opposition between love and power, so central a theme in the emotional development of men and women, is itself responsible for the kinship of power and domination. In the present essay I will explore the cognitive expression of that same disjunction: the opposition between love and knowledge, a disjunction as central to the development of modern science as it is to the making of Western man.¹ I will argue that it is precisely this opposition—forcing a choice as it does between love and power—that makes the equation between knowledge and power a sinister one, and at the same time allows objectivity to become contaminated with domination. This last connection is emotionally constituted; it derives from the continuity between the scientist's world of objects and the "object" (better, subject) world of the child the scientist once was.

The key concept of this analysis, as in the previous essay, is psychological autonomy. But whereas the earlier discussion dealt almost entirely with emotional categories, the focus of this essay is on the interaction between emotional and cognitive experience. Accordingly, we need to look more closely at the interaction between the development of the child's (and the adult's) sense of self and sense of reality; in particular, we need to understand how the meaning we assign to objectivity reflects, and is in part determined by, our understanding of autonomy. To this end, it is useful to introduce two conceptions of objectivity—"dynamic" and "static"—parallel to the two conceptions of autonomy I discussed above. The roles played in the practice (if not in the ideology) of science by these two kinds of objectivity can in turn be seen to parallel the roles played in psychological development by dynamic and static autonomy.

I define objectivity as the pursuit of a maximally authentic, and hence maximally reliable, understanding of the world around oneself. Such a pursuit is dynamic to the extent that it actively draws on the commonality between mind and nature as a resource for

1. Consider, for example, the adage quoted by Bacon, "It is impossible to love and be wise" or, yet more to the point, "Amore et sapere vix Deo conceditur" (Spedding 1869, 12, p. 110).

understanding. Dynamic objectivity aims at a form of knowledge that grants to the world around us its independent integrity but does so in a way that remains cognizant of, indeed relies on, our connectivity with that world. In this, dynamic objectivity is not unlike empathy, a form of knowledge of other persons that draws explicitly on the commonality of feelings and experience in order to enrich one's understanding of another in his or her own right. By contrast, I call static objectivity the pursuit of knowledge that begins with the severance of subject from object rather than aiming at the disentanglement of one from the other. For both static and dynamic objectivity, the ambition appears the same, but the starting assumptions one makes about the nature of the pursuit bear critically on the outcome. Piaget, using slightly different terminology, reminds us:

Objectivity consists in so fully realizing the countless intrusions of the self in everyday thought and the countless illusions which result—illusions of sense, language, point of view, value, etc.—that the preliminary step to every judgment is the effort to exclude the intrusive self. Realism, on the contrary, consists in ignoring the existence of self and hence regarding one's own perspective as immediately objective and absolute. Realism is thus anthropocentric illusion, finality—in short, all those illusions which teem in the history of science. So long as thought has not become conscious of self, it is a prey to perpetual confusions between objective and subjective, between the real and the ostensible. (1972, p. 34)

Dynamic objectivity is thus a pursuit of knowledge that makes use of subjective experience (Piaget calls it consciousness of self) in the interests of a more effective objectivity. Premised on continuity, it recognizes difference between self and other as an opportunity for a deeper and more articulated kinship. The struggle to disentangle self from other is itself a source of insight—potentially into the nature of both self and other. It is a principal means for divining what Poincaré calls "hidden harmonies and relations." To this end, the scientist employs a form of attention to the natural world that is like one's ideal attention to the human world: it is a form of love. The capacity for such attention, like the capacity for love and em-

pathy, requires a sense of self secure enough to tolerate both difference and continuity; it presupposes the development of dynamic autonomy.

Much has been written about this kind of attention, but few authors have granted it the degree of centrality in human development that Ernest Schachtel has. Schachtel departs pointedly from Freud in presupposing a native, "autonomous" interest in the environment on the part of the young child that is at least as great a spur to the emergence of self and reality as are biological needs (1959, p. 252). This interest (or "world-openness"), he argues, is more highly developed in humans than in other animals because of their greater cerebralization. It is the basis of the deep pleasure the child experiences in activity per se, in his or her spontaneous exploration of the world. In contrast to Freud (1949, p. 148), he sees the aim of such "activity-affects" not as the "undoing" of connections, but as the establishment of relations to one's human and natural environment.

Schachtel's positing of a native, even primitive, impulse outward, toward the world—an impulse that is neither in conflict with relatedness nor derivative from the equally primitive impulse toward "embeddedness"—enables him to make an important distinction. It enables him to distinguish the feeling of "oneness" that can be established with the object of such interest from the "oceanic feeling," which Freud could recognize only as a regression to the early infantile state, where self and reality are not yet experienced as separate. Such unity, Schachtel writes, "can be established not only in a regressive way, by the wish to return to the womb, but also in a new way, on a higher level of development, by loving relatedness to others and to the world" (1959, p. 182).

The perceptual tools developed to meet this interest in the world are part of what he calls "allocentric," or other-centered, perception. They require a "complete focusing of all the perceiver's perceptual and experiential faculties on the object, so that it is experienced in the fullest possible way"—a form of attention that, in turn, presupposes "a temporary eclipse of all the perceiver's ego-centric thoughts and strivings, of all preoccupations with self and self-esteem, and a full turning towards the object. . . . The oneness of allocentric perception leads not to a *loss* of self, but to a heightened feeling of aliveness" (p. 181). He cites Rilke for a description

of the state of mind necessary for such perception: "In order to have an object speak to you, you must take it for a certain time for the only one that exists, the only phenomenon which, through your devoted and exclusive love, finds itself placed in the center of the universe" (Schachtel 1959, p. 225).

For Schachtel, allocentric perception is perception in the service of a love "which wants to affirm others in their total and unique being." It is an affirmation of objects as "part of the same world of which man is part" (p. 226). In turn, and by contrast with perception that is dominated by need or self-interest (autocentric perception), it permits a fuller, more "global" understanding of the object in its own right. "This is the reason," Schachtel argues, "why love sees more than hatred. Hatred can be astute in perceiving every possibility for attack, but even though such astuteness may lead to penetrating insights . . . they always concern only part of the other and they are 'partial' to those parts which will serve as the points of attack. But hatred is unable to see its object in its totality" (p. 226).

Such intense interest in the world, and such total absorption in the object before one, is especially familiar in young children. But the capacity for employing this kind of attention in the pursuit of objective knowledge of the world requires more than interest; it requires the development of the capacity to distinguish self from other. Above all, in Schachtel's view, it requires sufficient confidence in one's own and others' abilities to satisfy one's needs to permit the employment of attention relatively free of need and anxiety. Thus, although he departs strongly from Freud in positing a native autonomous interest in the environment on the part of the child, Schachtel rejoins traditional psychoanalytic theory (and object relations theory) in his account of the development of the tools of allocentric perception. The pursuit of objectivity, in this view, has a twofold requirement: first, the survival of the child's native interest in the world, and second, the development of the capacity for focusing on objects as separate and distinct from one's own needs, desires, and individual perspective. Allocentric perception, akin to what I have called dynamic objectivity, emerges from the joining of other-centered interest and the tools of "focal attention." Conversely, its failure may result either from the inhibition of native interest, from inadequate development of the perceptual and cognitive tools that reflect the child's growing sense of autonomy, or from an interaction between

the two in which interest in the world itself is subverted to the service of personal needs and anxieties.

For our purposes, it is this last developmental turn—the turn from allocentricity to “secondary autocentricity” (what would more commonly be called instrumentalism) that is of primary importance. Although Schachtel recognizes that “man could not live without the perspective of this secondary autocentricity,” he goes on to say, “It can block his view of reality and lead to stagnation in a closed, autocentric world” (p. 166). The issue is whether the perception of objects is delimited by “the perspective of how they will serve a certain *need* of the perceiver, or how they can be *used* by him for some purpose” (p. 167); that is, whether the perception of objects is restricted to that of “objects-in-use.” Even though for most of us science is the most obvious expression of object-centered interest, for Schachtel it is not. For him, poets and artists offer more familiar models of allocentric perception.

The reason for this is straightforward. Although he recognizes that the requirements for creativity in science and art are essentially similar, if not the same, he notes that more often scientific objects tend to be perceived primarily as “objects-in-use”:

The scientist, in these cases, looks at the object with one or more hypotheses and with the purpose of his research in mind, and thus “uses” the object to corroborate or disprove a hypothesis, but does not encounter the object as such, in its own fullness. Also, modern natural science has as its main goal prediction, i.e. the power to manipulate objects in such a way that certain predicted events will happen. This means that only those aspects of the object are deemed relevant which make it suitable for such manipulation or control. . . . Thus it becomes an object-in-use. . . . In their [scientists’] attempt . . . to fit some object or phenomenon into some system, preconception, or hypothesis, one can often observe a blinding of themselves toward the pure and full being of the object itself. Perception, then, may become almost an act of aggressive violence in which the perceiver, like Procrustes with his hapless victims, cuts off those aspects of the object which he cannot use for his purposes. (p. 171)

Schachtel is describing a relation to objects that is a familiar

concomitant of objectivism in general. To sever subject from object is to deny the “experiential realization of the kinship between oneself and the other” that is the essence of dynamic objectivity and that is, in Schachtel’s terms, necessary to the perception of an object in its own right. It is possible to draw further and more specific connections between the vicissitudes of autonomy and its cognitive counterparts in normal behavior by looking at extreme forms of self-other interactions—forms classified as pathological. For this, I want to return to Shapiro’s *Autonomy and Rigid Character* (1981), as well as to his earlier work, *Neurotic Styles* (1965). In the latter work, Shapiro described the cognitive counterparts of obsessive-compulsive and paranoid psychology; for completeness, I will add some remarks about the cognitive counterparts of sadism.

The central concern of the obsessive-compulsive is control, not so much of others as of oneself. Shapiro writes: “In his psychology, self-direction is distorted from its normal meaning of volitional choice and deliberate, purposeful action to a self-conscious directing of his every action, to the exercise, as if by an overseer, of a continuous willful pressure and direction on himself and even . . . [on] his own wants and emotions” (1965, p. 36). Under this harsh regime, attention is subject to the same kind of control as is the rest of behavior, leading to a kind of focus so intensely sharp and restricted that it precludes peripheral vision, the fleeting impression, the hunch, the over-all feeling of an object. The consequence is loss of conviction: truth is inferred rather than experienced, the basis for judgment and decisions is sought in rules rather than feeling. The obsessive-compulsive “will not say, ‘It is true,’ but will say something like ‘It must be,’ or ‘It fits’” (1965, p. 50). And what does not fit is not acknowledged: “The rigid or dogmatic compulsive person simply ignores the unusual; he narrowly follows his own line of thought and goes right by anything out of the way” (1965, p. 62).

The cognitive style of the paranoid, although similar in some ways, is ultimately quite different. Grounded in the fear of being controlled by others rather than in apprehension about the loss of self-control, in the fear of giving in to others rather than to one’s own unwelcome impulses, the attention of the paranoid is rigid, but it is not narrowly focused. Rather than ignore what does not fit, he or she must be alert to every possible clue. Nothing—no detail, however minor—eludes scrutiny. Everything *must* fit. The paranoid

delusion suffers not from lack of logic but from unreality. Indeed, its distortion derives, at least in part, from the very effort to make all the clues fit into a single interpretation. Once accomplished, the logic is such as to leave no room for an alternative interpretation; the pieces are locked into place by the closeness of their fit. So convincing is the result that "nothing but" that interpretation can be imagined. In some ways, the paranoid resembles the quintessentially meticulous scientist. Normally, however, scientists recognize that their interpretation cannot account for every detail—that there is always, and inevitably, a certain trade-off between logic and realism.

A second, and perhaps even more crucial, distinction between paranoid and scientific perception can be found in the influence of subjective forces on the interpretation.² For the paranoid, interpretation is determined primarily by subjective need—in particular, by the need to defend against the pervasive sense of threat to one's autonomy. As in the obsessive-compulsive style, the organizing principle is vigilance—for the paranoid, vigilance against external threat; for the obsessive-compulsive, against internal threat. In both cases vigilance serves to bolster a sense of autonomy that is hypertrophied to the point of fragility—a sense of autonomy that, "because it is so frail, can be maintained only in this remarkably rigid and exaggerated form" (Shapiro 1965, p. 80). In both cases the very fact of such vigilance—even while it sharpens some forms of perception and may be extremely useful for many kinds of scientific work—also works against all those affective and cognitive experiences that require receptivity, reciprocity, or simply a relaxed state of mind. The world of objects that emerges is a world that may be defined with extraordinary accuracy in many respects, but it is one whose parameters are determined principally by the needs of the observer.

A similar claim can be made for the cognitive focus that derives from a relation to objects premised on domination. For the sadistic personality, relations to others are determined primarily by the yardstick of power. The strength of one's own will is measured by another's submission. Correspondingly, understanding and compe-

2. The relevance of subjective need for a particular interpretation may be difficult to judge if the interpretation is coherent. As a consequence, the falsity of a "good" paranoid interpretation may finally be evident only in the impeccability of its logic.

tence—ordinarily goals of intrinsic value—come to have value mainly to the extent that they serve to promote mastery, or domination. Perception itself is put at the service of the need to dominate. It is aimed at detecting vulnerability, points of weakness, susceptibility to attack.

But one need not look as far as the pathology of sadism for evidence of the cognitive use of perception in the interests of domination or, more generally, for defensive or offensive purposes. Such evidence is suggested by the manner in which many quite normal individuals approach the new and unknown, as well as by the language they use to describe these encounters. In particular, I have in mind the aggression expressed in the common rhetoric of science. I do not mean simply the aggression described by Schachtel, whereby the scientist "cuts off those aspects of the object which he cannot use for his purposes," but rather a kind of aggression that reflects a basic adversarial relation to the objects of study. The biologist T. S. Painter, for example, took pleasure in telling graduate students that "research is much like deer hunting. You have to be in the right place at the right time to see your prey and, of course, you must carry a loaded gun and know how to use it" (Painter 1971, p. 33). In the effort to "master" nature, to "storm her strongholds and castles," science can come to sound like a battlefield. Sometimes such imagery becomes quite extreme, exceeding even the conventional imagery of the warrior or hunter. Note, for example, the language in which one scientist describes his pursuit: "I liked to follow the workings of another mind through these minute, teasing investigations to see a relentless observer get hold of Nature and squeeze her until the sweat broke out all over her and her sphincters loosened" (quoted in Ehrenreich and English 1978, p. 69). Problems, for many scientists, are to be "attacked," "conquered," or "licked."³ If subtler means fail, one resorts to "brute force," to the "hammer and tongs" approach. Even in gentler discourse, where problems are merely to be "solved," the underlying assumption is that in their solution, they will disappear; the process is perceived as one of clearing the field of obstacles. The complementary notion that the goal of solving problems is to reveal new questions, new perspec-

3. "I'll beat the bastard" was the phrase habitually employed by one scientist cited by Anthony Storr in *The Dynamics of Creation* (1972).

lives, new understanding, may also be present but is considerably less in evidence.

Few, if any, of the scientists who speak in this manner could be described as sadistic, paranoid, or obsessive-compulsive personalities. But many of the same concerns about autonomy that are manifested in acute form in pathology are, in milder form, virtually ubiquitous in the human population. If they appear especially prominent among scientists, that is because science, as described by an objectivist ideology, is a welcoming sanctuary for such concerns. A science that advertises itself by the promise of a cool and objective remove from the object of study selects for those individuals for whom such a promise provides emotional comfort. Similarly, I suggest that a science that promises power and the exercise of dominion over nature selects for those individuals for whom power and control are central concerns. And a science that conceives of the pursuit of knowledge as an adversarial process selects for those who tend to feel themselves in adversarial relation to their natural environment. The connections among these three components of scientific ideology lie not in their intellectual cohesion but in the cohesion of the emotional needs to which they appeal.

My argument, then, is that the specific kinds of aggression expressed in scientific discourse reflect not simply the absence of a felt connection to the objects one studies but also the subjective feelings many children (and some adults) experience in attempting to secure a sense of self as separate from the more immediate objects of their emotional world. The contest many scientists feel themselves engaged in, either with nature as a whole or with the particular objects they study, reflects the contest they feel themselves engaged in with human others. Similarly, the need to dominate nature is, in this view, a projection of the need to dominate other human beings; it arises not so much out of empowerment as out of anxiety about impotence. The feelings of power such domination brings are not only *like* the sense of power that can be derived from subjecting others to one's will; they are the very same feelings. In this sense, then, the dream of dominion over nature, shared by so many scientists, echoes the dream that the stereotypic son hopes to realize by identifying with the authority of his father. But such dreams are

by their very nature self-limiting. They prevent the son from ever getting to know the real mother. And so, it could be argued, they similarly obstruct the scientist's efforts to know the "real" nature.

Fortunately, however, the practice of science is in fact quite different from its ideological prescriptions. Scientists differ greatly in their approaches to their subjects and in their styles of work. These differences reflect the different ways they think about nature and themselves; individual scientists give widely varying meanings to the pursuit of objectivity, paralleling the wide range of meanings attributable to autonomy. Indeed such differences are essential to the vitality of the scientific enterprise. They are also responsible for a basic thesis of this book: actual science is more faithfully described by the multiplicity of styles and approaches that constitute its practice than by its dominant rhetoric or ideology.

While some scientists see their endeavor in predominantly adversarial terms, as contests, battles, exercises in domination, others see it as a primarily erotic activity. Michael Polanyi, for example, emphasizes, instead of distance, the need to "extend our body to include [the object]—so that we come to dwell in it" (1967, p. 16). Another contemporary scientist suggests that, for the practice of scientific research, "the best analogy is always love." The reward of discovery is the feeling that "one has touched something central to another person, or to a subject, and one feels silent and grateful . . . because one was allowed to penetrate a layer of understanding which remained impenetrable to others" (Goodfield 1981, pp. 63, 69). For this scientist, understanding is not a product of cool detachment. Rather, she says, "If you really want to understand about a tumor, you've got to *be* a tumor" (p. 213). And she rejects with passion the metaphor of "putting nature on the rack and torturing the answers out of her": "I think that analogy is horrible. . . . It is like rape. Whereas in science . . . it is like the difference between rape and making love." She goes on to explain, "We are all part of nature, and if you externalize man—which is to say yourself—you are still the victim of the Inquisition, although in a different way" (p. 231).

Other such examples abound. They have been part of the tradition of modern science from the Renaissance alchemists on. But they persist throughout history only sotto voce, as minor themes made inaudible by a dominant rhetoric. Through the dynamics of simple selection, this rhetoric has had a decisive impact on the par-

ticular course that Western science has taken. In this section, I have argued that the rhetoric of domination, coercion, and mastery serves to select for a scientific community that tends toward particular emotional—and cognitive—styles. In the next section I argue for a secondary selection process in which the same rhetoric, internalized by that community, in turn selects for compatible scientific styles of work, methodologies, and even theories. Close examination of individual cases shows (Popperian claims to the contrary notwithstanding) that a recurrent and striking continuity can be seen in the way scientists work, the relation they assume to their object of study, and the theoretical orientation they favor (see Keller 1983 and chap. 9). Ideology makes itself felt principally in the process by which particular styles, methodologies, and theories come to be legitimated as “good” science. Certain theories and methods are selected as “best” by a process in which scientists collectively choose among competing methodological and theoretical candidates. The criteria for such choices are complex. Inevitably, the question is not simply which theory offers the fullest explanation, the best prediction, but also which theory best satisfies that host of unspecifiable “aesthetic” criteria (see, for example, Kuhn 1962; Hanson 1958)—including which theory is most consonant with one’s implicit ideological and emotional expectations. If erotic themes have tended to be submerged in the history of science, they have been submerged by a rhetoric and ideology of aggression, which, though never binding, has been critically formative in the development of both scientists and science.

In order to get a clearer picture of the implications for science of a discourse predicated on different norms—on an ideal of dynamic rather than static objectivity—we need to examine and learn from those (generally unincorporated) traditions, which in fact can readily be found in the practice of science, even if not in its ideology. We need to pay particularly close attention to the science (both in style and substance) produced by those individuals who have seen their relation to their material in erotic rather than adversarial terms. It is to this end that, in the last chapter of this book, I return to the model provided by Barbara McClintock—perhaps the most striking exemplar of dynamic objectivity in present-day science—and attempt to identify the key elements that distinguish her vision and practice of science.

PART THREE

Theory, Practice, and Ideology in the Making of Science