

# Anne Fausto-Sterling

## *Frameworks of desire*

Genes versus choice. A quick and dirty search of newspaper stories covering scientific research on homosexuality shows that the popular press has settled on this analytic framework to explain homosexuality: either genes cause homosexuality, or homosexuals choose their lifestyle.<sup>1</sup>

The mischief that follows such a formulation is broad-based and more than a little pernicious. Religious fundamentalists and gay activists alike use the genes-choice opposition to argue their case either for or against full citizenship for homosexuals. Biological research now arbitrates civil legal proceedings, and the idea that moral status depends on the state of our genes overrides the historical and well-argued view that we are “endowed by [our] Creator with cer-

tain unalienable Rights . . . .” Moreover, rather than framing research projects in terms of the whole of human desire, we neglect to examine one form, heterosexuality, in favor of uncovering the causes of the ‘deviant’ other, homosexuality.

Intellectually, this is just the tip of the iceberg. When we invoke formulae such as oppositional rather than developmental, innate versus learned, genetic versus chosen, early-onset versus adolescent experience, a gay gene versus a straight gene, hardwired versus flexible, nature versus nurture, normal versus deviant, the subtleties of human behavior disappear.

Linear though it is, even Kinsey’s scale has six gradations of sexual expression; and Kinsey understood the importance of the life cycle as a proper framework for analyzing human desire. Academics – be they biologists, social scientists,<sup>2</sup> or cultural theorists – have become locked into an oppositional framework. As a result, they are asking the wrong questions

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1 I used the keywords ‘genes’ and ‘homosexuality’ in the Lexis-Nexis academic database and searched general newspaper articles for the past two years. In well over one hundred articles, this is the framework for analysis.

2 I except some anthropologists from the broad-brush claim.

and offering intellectually impoverished accounts of the emergence and development of human desire.

A steady patter of research papers linking genes to homosexuality rains down on us, hitting first the scientific journals; then soaking through to the newspapers, blogs, and television news; and finally growing like mold, often wildly reshaped from the initial tiny spore into the mycelia of popular discourse. As intellectual efforts, each of these articles has technical strengths and weaknesses – one can always criticize the sample size, or the method of recruiting study subjects, or the statistical test employed. But most of them share a similar – and problematic – analytical framework.

We can expose this general framework by considering one recent and widely reported article, “A Genomewide Scan of Male Sexual Orientation,” authored by six scientists from five prestigious research institutions dotting the United States from California to Washington, D.C.<sup>3</sup> The article introduces the problem by citing scholarly research linking biological events or genetic structures to male-male sexual orientation. While the authors, Brian Mustanski and his colleagues, concede that the evidence is incomplete (they note the limited number of studies that attempt to locate specific genes related to homosexuality) and that nonbiological factors must also be involved (they mention, for example, two recent twin studies that “report moderate heritability estimates<sup>4</sup> with the re-

maining variability being explained by nonshared environmental influences”<sup>5</sup>), they ultimately argue that the linkages suggested by such studies are important. Since they believe that many genes are likely to be involved, they decided to scan the entire genome (X, Y, and all of the autosomes) in an attempt to fish out a set of genes related in some way to male sexual orientation.

The authors hoped to avoid false positives caused by “gay men who identify as heterosexual”<sup>6</sup> by only studying self-identified gay men. But the idea that there are gay men who identify as heterosexual suggests that there is some biological essence of gayness that can exist genetically and therefore be measured independently of identity and behavior. This begs the definitional question. The state of being gay (in adulthood) might, in fact, reasonably include identity, behavior, and/or desire.

Indeed, in their groundbreaking work, *The Social Organization of Sexuality*, E. O. Laumann and his colleagues studied the interrelation of these components of homosexuality in 143 men who reported any inkling of same-sex desire. Of the men surveyed, 44 percent expressed homosexual desire but not identity or behavior, while 24 percent reported having all three of these components. Another 6 percent expressed desire and behavior but not identity, 22 percent expressed behavior but not desire or identity, 2 percent had only the identity, and 1 percent had the identity and desire but not the behavior.

3 B. S. Mustanski et al., “A Genomewide Scan of Male Sexual Orientation,” *Human Genetics* 116 (4) (2005): 272–278.

4 See Kaplan’s discussion of the use and misuse of the concept of heritability in Jonathan Kaplan, *The Limits and Lies of Human Genetic Research: Dangers for Social Policy* (New York:

Routledge, 2000). S. E. Lerman et al., “Sex Assignment in Cases of Ambiguous Genitalia and its Outcome,” *Urology* 55 (2000): 8–12.

5 Mustanski et al., “A Genomewide Scan,” 273.

6 Ibid.

So Mustanski and colleagues selected a subset of men who, judging from the Laumann survey, would comprise only 27 percent of men expressing some component of homosexuality. Thus, even if the authors were to find genetic linkages, genetic studies of this sort give insufficient theoretical attention to the possible meanings of such findings.

The study also compares the DNA of gay men with those of their heterosexual brothers. Since all siblings share 50 percent of their DNA, the DNA regions (genes) that are present in higher frequency in the genomes of the gay brothers then become regions of interest, as potentially related to male homosexuality. But to find the brothers for the study, the authors advertised in homophile publications, and the mean Kinsey score for their sample was 5.46.<sup>7</sup> Again, this sample would represent, according to the Laumann study, only about one-quarter of men expressing or feeling some aspect of homosexuality.

As Mustanski and his colleagues freely acknowledge, their findings are merely suggestive, providing trails to be followed rather than explanations to be had. In their own words, they identify “candidate genes for further exploration” and hope that any future molecular analysis of “genes involved in sexual orientation could greatly advance our understanding of human variation, evolution and brain development.”<sup>8</sup> But here, they reflect the point of view of most classical genetic studies. From Thomas Hunt Morgan’s first analysis of the white-eyed fruit-fly mutant to present-day dissection of genes involved in

embryo formation or disease, the geneticist’s method is to study the mutant in order to understand normal processes. Although Mustanski and his colleagues prefer to consider homosexuality as part of the natural variation of the human species, this fig leaf cannot hide the basic framework of ‘normal versus mutant,’ which emphasizes fixed typologies rather than biological processes and life-cycle analyses.

If some sociologists can frame homosexuality in ways that better appreciate its complexities, why can’t biologists? After all, the tools exist within their field: biologists know how to look at behavior or cellular states as processes or emergences rather than as static categories. In studying the role of gene networks in the process of embryonic development, for example, Eric Davidson and his colleagues have pinpointed ‘feed-forward’ genetic networks that define cell transitions as the fertilized egg divides and the resulting cells differentiate into specialized tissues. The process is self-generating, involves hundreds of genetic elements and their feedback loops, and progresses historically – each new cellular state provides the necessary conditions for the next one until a stable feedback loop is established.<sup>9</sup> Using a more complex version of a cybernetic thermostat regulation loop, the system maintains a stable differentiated state under a broad range of (though not all) conditions. Conceptually similar approaches have been employed to devise models of the emergence of perceptual competence in de-

7 0=exclusively heterosexual, and 6=exclusive-homosexual.

8 Mustanski et al., “A Genomewide Scan,” 277.

9 E. H. Davidson et al., “A Genomic Regulatory Network for Development,” *Science* 295 (5560) (2002): 1669 – 1678; E. H. Davidson, *The Regulatory Genome: Gene Regulatory Networks in Development and Evolution* (New York: Academic Press, 2006).

veloping human infants.<sup>10</sup> Such dynamic models have room for specific information about gene action during neural development – the sort of information Mustanski and his colleagues seek – but they provide a more productive framework for understanding human desire as a developmental process rather than a typological state.<sup>11</sup>

The Mustanski article illustrates one other – and quite central – component used in biological approaches to the study of homosexuality: the imposition of a sex/gender schematic. The formal analogies are (1) ‘male:female’ is as ‘heterosexual male:homosexual male’; (2) ‘male:female’ is as ‘lesbian:heterosexual female’; and (3) ‘masculinity:femininity’ is as ‘straight male or lesbian: gay male or straight woman.’ This is the logic that led Simon LeVay to study the hypothalamus in gay men, hoping to find the same differences in the brains of gay versus straight men that others had reported when comparing the brains of (presumably straight) men and women.<sup>12</sup> The Mustanski paper cites a number of studies based on this concept – a concept that is also often embraced by and acted out within the gay community. The stereotypes seen on *Will and*

*Grace*, or in discussions about butch and femme lesbians, may derive from particular, but certainly far from universal, practices within the gay community. But are they a reasonable basis for biological investigations of homosexuality?

Theo Sandfort recently reviewed academic accounts of the relationship between gender and sexual orientation.<sup>13</sup> He argues that we now understand homosexuality to have multiple and not always synchronous components (attraction, orientation, behavior, self-identification) and varied expression according to gender, ethnicity, social class, and culture. In other words, the concepts of masculinity and femininity are no longer seen as bipolar. Rather, “it has become good practice to discuss them as multidimensional phenomena ... [as] femininities and masculinities.”<sup>14</sup> He then places the origin, in American psychology, of the idea that homosexual men are feminine and lesbians masculine, in the work of Lewis M. Terman and Catherine C. Miles, published in 1936. Sandfort reminds us that Terman and Miles identified homosexual men who did not fit this pattern of opposites, but failed to theorize about masculine gay men. Subsequent citations of their work followed suit, and the unquestioned link of male homosexuality to femininity was born. More recent and more multifaceted attempts to correlate gender expression with sexual orientation have yielded correspondingly more complex results.

10 D. Mareschal and S. P. Johnson, “Learning to Perceive Object Unity: A Connectionist Account,” *Developmental Science* 5 (2) (2002): 151 – 172.

11 M. D. Lewis, “Self-Organizing Individual Differences in Brain Development,” *Developmental Review* 25 (2005): 252 – 277.

12 S. LeVay, “A Difference in Hypothalamic Structure Between Heterosexual and Homosexual Men,” *Science* 253 (1991): 1034 – 1037; W. Byne et al., “The Interstitial Nuclei of the Human Anterior Hypothalamus: An Investigation of Sexual Variation in Volume and Cell Size, Number and Density,” *Brain Research* 856 (1 – 2) (2000): 254 – 258.

13 T. G. M. Sandfort, “Sexual Orientation and Gender: Stereotypes and Beyond,” *Archives of Sexual Behavior* 34 (6) (2005): 595 – 611.

14 *Ibid.*, 599. For a longer discussion of some of the subtleties involved, see also J. H. Gagnon, *An Interpretation of Desire: Essays in the Study of Sexuality* (Chicago: University of Chicago Press, 2004).

Current changes in gay and lesbian subcultures also contribute to the discussion. Among gay men, there has been a move away from femininity, as evidenced by the new gay macho, leathermen, and web sites such as [www.straightacting.com](http://www.straightacting.com) (“your masculine gay guy hangout,” “a site for guys who like sports and change their own car oil”). An analogous site – <http://lesbiansclick.com/Butch-Femme/index.html> – offers, as the URL suggests, information and connections for feminine lesbians. At this point, we do not have clear answers to the question of the relationship between gender (masculinity and femininity) and homosexuality, making it difficult to interpret biological studies premised on the idea that gay men are more like (straight) women and gay women more like (straight) men.

Sandfort recommends three research areas that, if carefully investigated, might help us add gender intelligently to a framework for understanding the development of human desire. First, he suggests we learn more about how different groups (men, women, homosexual, heterosexual) understand the concepts of masculinity and femininity. Do self-perceptions correlate with external perceptions? Second, he asks how the social and cultural environment (including gay subcultures that value male femininity and female masculinity) influence individual perceptions of masculinity and femininity. Third, he wonders what the consequences of gender perception and identification are. How do they contribute to sexual practices and desires? And, I would add, do the behaviors train brain circuits or otherwise influence brain development rather than (or in addition to) vice versa?

The ‘genes versus choice’ opposition is also wanting on the ‘choice’ side. Most

people can understand why the word ‘choice’ is bad in this context. First, it is easily used – especially in the popular and political arena – to deny rights. This usage implies that just as a person can ‘choose’ not to commit a crime and thus avoid prosecution, so, too, a person can choose not to be gay and thus avoid homophobic violence or losing out on social benefits afforded to straight people. ‘Choice’ also carries with it the connotation of conscious control and easy changeability; yet few homosexuals believe that they chose their state of desire. Indeed, the history of homosexuality is filled with stories of people who tried for years to become straight before accepting that, for whatever reasons, they felt how they felt.<sup>15</sup> Nor can heterosexuals choose to change their states of desire. Even those who argue that being gay is a choice would vehemently deny that they could make such a choice.

Rather than defend this oversimplification of choice, academics prefer to frame the opposition to biology in terms of social construction. They point out that regardless of where our sexual desires and our gender senses originate, they are not easily changed. Just as biology does not really imply permanence or determinism, social construction does not necessarily imply flexibility or impermanence. But as with the biologist, the social constructionist has yet to offer a coherent account of the development of individual desire. The conventional constructionists do not explain how the body comes to feel desire, to respond to touch, or to quiver when a person to whom it is attracted walks through the door. Indeed, to date, attempts to offer such accounts have found little empirical support.

15 M. Duberman, *Cures: A Gay Man's Odyssey* (New York: Dutton, 1991).

In *The Mismeasure of Desire*, philosopher Edward Stein reviews a number of constructionist approaches to understanding the origins of sexual desire. Theories based on experience (rather than genes) fall into three major categories: early sexual experience, family dynamics, and childhood gender roles. Early sexual experiences might be either pleasant or unpleasant, and thus might provide positive or negative feedback for either heterosexuality or homosexuality. Such experiences might include seduction or (in this modern era of priestly scandal) sexual aggression – or a chance encounter involving mutual desire. This latter scenario suggests that even young or preadolescent children may have unformed or partly formed sexual desires, and that the chance acting-out of these desires (i.e., the innocent childhood games of ‘playing doctor’ or kissing under the table) might carve a psychic groove that entrains future encounters.

Stein then analyzes two forms of the second category of explanation, family dynamics. The best known of these are theories stemming from Freud’s Oedipal triangle. In Freud’s view, male homosexuality appears in families with a strong mother and a distant father, while (male) heterosexuality results from strong paternal identification and, in adulthood, the replacement by other women of the mother as love object. This theory, it should be noted, is unusual in that it attempts to explain heterosexuality as well as homosexuality, although, as many have commented, Freud’s theories of female sexuality are more inchoate. Less well known are a variety of sociobiological theories that employ the concept of parental manipulation. According to such theories, parents subconsciously realize that it would be advantageous (evolutionarily speak-

ing) to focus on the reproductive success of some offspring over others. If parents could manipulate the development of homosexuality in some children, so that they forgo reproduction in favor of supporting their siblings, parents could continue their genetic line by increasing the survival chances and reproductive possibilities of selected grandchildren.

Stein considers a third category of experiential theories: childhood gender roles. This approach examines the extent to which children engage in gender-typical behaviors – understood to be culturally specific. Those who are gender typical are thought to become trained in some way by this typicality; such training in turn leads to the development of heterosexual identity and desire. Gender-atypical behavior, on the other hand, is thought to shape adult sexual desire in atypical directions. It is for this reason that many parents who spot early gender-atypical play in a child try hard to change such behavior in hopes of staving off future homosexuality. Some cite early gender atypicality as proof of a biological cause, the logic being that behaviors in the very young must be caused by something genetic, since a two- or three-year-old would be too little to have been influenced by experience. There are other evidential categories – e.g., twin studies, comparative anthropology, and the study of the history of sexuality – that are used by both sides of the genes versus experience, nature versus nurture debate. That the same considerable scholarship supports both sides of supposedly incompatible theories provides more evidence that the analytical framework needs revision.

What evidence exists for the varieties of experiential theories of desire? In the now classical study *Sexual Preference: Its Development in Men and Women*, Alan Bell, Martin Weinberg, and Sue Hammer-

smith interviewed hundreds of gay, lesbian, and straight men and women living in San Francisco. The bulk of interviewees said that childhood and adolescent sexual expression reflected their felt desires but did not determine them. The results also did not find evidence for the Freudian family dynamic or the parental manipulation theories of sexual formation. Subsequent studies have confirmed these findings.

The San Francisco project found what they claimed was a “powerful link between [childhood] gender nonconformity and the development of homosexuality.”<sup>16</sup> Men and women who reported childhood gender atypical behaviors were more likely to become homosexual than those who did not. While the study was quick to note that a significant minority of the homosexual study participants was not gender atypical growing up and some of the heterosexual participants were gender atypical in childhood, it nonetheless rested its conclusions on aggregate statistics. Its conclusions, however, cannot be taken at face value.

The Bell, Weinberg, and Hammer-smith study, like Kinsey before them and a number since, depends on memory, on retrospection. This approach to understanding the origins of human behaviors deserves some commentary. A retrospective study asks its participants to review, reconsider, reexamine the past. Anyone who engages in such an exercise does so in the light of present knowledge and experience. Current events may provoke new memories; old memories may take on new meanings; and old memories, when reevoked and

reconsidered, may get re-stored in the brain in new form. Thus, the very act of asking a person to remember past experiences begins a process of reformulating the present.

Two anecdotes, one personal and one from a recent longitudinal study of coming-out stories, illustrate the ‘memory as evidence’ problem. When I was a little girl I went off to camp in the country. I was interested in natural history and also navigated socially by developing a niche and staying in it. One summer, I combined niche development with a crush on the (male) camp counselor in charge of the nature ‘museum’ (a little cabin with found natural objects), and I devoted myself to catching snakes and insects and collecting mushrooms and the like. At the end of the summer, some of the group of girls I had met made little wooden gravestones for each of us. Mine read: “In memory of Anne who liked bugs better than boys.” I was twelve at the time. I understood the comment to be about my interest in nature (nobody knew about my crush on the counselor) and remembered it in that way as I made my way through graduate school in biology, met and married my biologist husband, and became a professor of genetics. But fast forward thirty-odd years from the day my little girl friends wrote my epitaph, and I could be found separated from my husband, living on my own, and courting women (one of whom I eventually married). During that transitional courting period, I came upon my miniature grave marker lying in a box of childhood treasures and read it with new insight. Of course it meant that I had been pegged as gay all along. My little friends knew it, but it took me all that time to understand their message. (Or could they have just been writing about bugs after all?) Memories get rewritten; new narratives are scripted.

16 Alan P. Bell, Martin S. Weinberg, and Sue Kiefer Hammersmith, *Sexual Preference: Its Development in Men and Women* (Bloomington: Indiana University Press, 1981), 188.

Lisa M. Diamond offers a more theoretical and formal version of my story as she reflects on her own research on sexual identity formation.<sup>17</sup> Consider three interviews over five years with the same lesbian woman. In the first interview the woman remembers being different as a child, a tomboy, uninterested in dating men. But she only began to think of difference in terms of sexuality in college, after meeting a lot of gay people. Two years later, in the second interview, she remembers being scared by her childhood crushes on female camp counselors. This time around she remembers linking her difference to sexual feelings even as a child. In the five-year follow-up interview her memories are quite explicitly sexual. Diamond asks if one of the versions is the “true” one, and concludes that “the very process of telling self-stories . . . engages multiple psychological mechanisms that promote later consistency by organizing and consolidating preferred versions of events.”<sup>18</sup>

Retrospective accounts, be they in formal academic studies or stories swapped with friends or collections of coming-out tales, present a dilemma. On the one hand how better to find out about experiences and emotions than from the very people who are doing and feeling. If feminists did nothing else for academia, they successfully and rightly insisted that science cannot figure out why people do what they do, or how they feel what they feel, without taking into account what the feeling and experiencing individuals themselves have to say. This is the fun-

damental lesson about women’s health care that the many successful editions of *Our Bodies, Ourselves* taught. It is no more acceptable to develop theories of homosexuality without considering what homosexuals themselves have to say. And yet, memory is unreliable. It is not an objective arbiter of past truths but rather a reconciler of past and present. Reconciliation is a lifelong process, and it matters both when in the life cycle a memory is elicited as well as in what culture and historical period.

If we have not figured out how to make proper use of retrospective studies, perhaps prospective studies offer a better approach. As it turns out, there are not many prospective studies to draw on, and the most oft-cited ones, especially by Richard Green and his colleagues, have been roundly criticized. Green studied so-called sissy boys, brought to his psychiatric practice by parents concerned that their sons’ gender nonconformity heralded future homosexuality. He was able to follow up on no more than two-thirds of his original sample of sixty feminine boys and found that, compared to controls, a significant number became either homosexual or transsexual as adults. Psychiatrist Ken Zucker confirms these general trends. But questions remain: What happened to the one-third or so children he lost track of? Perhaps they resolved their early gender issues and grew up heterosexual. And how are we to understand the fact that these children were brought to researchers’ attention by parents worried about their children’s gender nonconformity?

In theory we should be able to design prospective studies that better examine the relationship between early gender nonconformity and later sexuality. The results would be important, but we would be left, still, with the twin prob-

17 L. M. Diamond, “Careful What You Ask For: Reconsidering Feminist Epistemology and Autobiographical Narrative in Research on Sexual Identity Formation,” *Signs* 31 (2) (2006): 471–489.

18 *Ibid.*, 478.



lems of process and bodies. What leads to gender nonconformity in young children, and how do these early behaviors relate to the emergence at later ages of particular desires? In other words, what are the processes by which desire becomes inherent to the body? And, of course, we would still need to consider how homosexual desire emerges in individuals who were gender conformists as young children as well as how heterosexual desire forms in both gender typical and gender atypical children.

Our current theories are too narrowly framed. They are shaped by the demands of empirical science and by the politics of sexuality. Geneticists simplify their study population to improve their chances of finding important genes while social scientists hone the quality of their survey instruments to improve statistical power. Psychiatrists study the children who land on their doorsteps because it is reasonable to do so and some information seems better than none. Gay activists tell coming-out stories and welcome the scientific approaches that affirm personal memories and feelings. Anti-rights groups write their own narratives and embrace supporting scientific results. It is, quite frankly, a mess.

But it needn't be. Instead of using a dead-end framework to churn out more data, we should debate what it is we want to understand about human sexuality, argue about the forms of knowledge we seek, and consider what the best ways of pursuing such knowledge might be. At the very least, geneticists, neuroscientists, psychologists, sociologists, anthropologists, and humanists of a variety of stripes need to collaborate to move forward. If this does not become an interdisciplinary conversation, then we will be having the same debate fifty years from now.

So what do we want to know and how do we find it out? First, I suggest that we take a page from contemporary dynamic-systems theories. Dynamic systems are complex and interactive. They are also self-organizing and self-maintaining. In some periods of their development they are unstable in that each current state produces the conditions for the next developmental moment<sup>19</sup> – the so-called feed-forward networks. But dynamic systems can also be self-stabilizing. And stability is one feature of human desire that requires explanation. Sexual preference, while not necessarily a permanent feature of a person's psyche, is very stable, as the failure of many decades of efforts to 'cure' people of same-sex desire shows.

On the other hand, dynamic systems can destabilize. If enough of the inter-supporting subunits are disrupted, the entire system can become chaotic; eventually it restabilizes. The new stable state can produce the same types of desire, or a new set of desires may emerge. This, I would argue, is what happens when someone 'changes' sexual preference. The current way of explaining a change in desire appeals to a hidden essence that finally works its way to the surface. Hence people 'discover' that they were always gay but did not know it, and announce that their true nature has finally been revealed. The revelation model is at the heart of endless hours of friendly gossip within the gay community about so-and-so who is surely gay but doesn't know it. It's fun, but offers little sub-

19 For general reading on dynamic systems, consult E. Thelen and L. B. Smith, *A Dynamic Systems Approach to the Development of Cognition and Action* (Cambridge, Mass.: MIT Press, 1994); S. Camazine et al., *Self-Organization in Biological Systems* (Princeton, N.J.: Princeton University Press, 2001).

stance with which to understand human development – both its stability and its mutability.

If we are to understand desire as a dynamic system, we must learn more about the underlying components that produce a stable state (or become destabilized). There are many levels of organization to consider, from the subcellular to the sociocultural. Here I want to displace genes. They don't belong at the bottom of the pyramid or as the first arrow in a linear array of causes. Rather, they belong in the middle. Genes don't cause; they respond. It is important to understand gene activity as a reaction to a particular environment or experience. I use environment very broadly here to include both a cellular environment, say, in the developing embryo, and behaviors and experiences that stimulate gene activity.

The enormous and growing literature on neural plasticity is exemplary. From birth through adolescence, the density of synapses in the human brain – a measure of increasing complexity, connectivity, and specificity – more than doubles. Recent work in the neurosciences shows that central nervous system development is dynamic and activity-dependent. In other words, throughout childhood, the brain grows, and nerve cells make and lose and remake and stabilize multiple connections in response to experiences and behaviors. Gene activity mediates these events but does not cause them in a directional sense.

A dynamic approach, potentially, can give us purchase on the question of how we come to embody desire. While the early and mid-twentieth-century work of philosophers, physiologists, psychiatrists, and psychologists such as Paul Schilder, Douwe Tiersma, and M. Merleau-Ponty should be revisited in this context, I want in this shorter piece to

consider the idea of incorporating practices. N. Katherine Hayles<sup>20</sup> distinguishes between inscription, which she likens to Foucauldian discourse, and incorporation. Incorporating practices are repeated actions that become part of bodily memory. Learning to ride a bike is an archetypal example. We start out unable to balance on two wheels, but by trying and trying again, we eventually learn to balance without conscious thought. Our body has memorized the feeling; our muscles and nerves know what to do. Let me articulate the concept in the language of contemporary neuroscience: We form new neural networks, and we expand and train neuromuscular connections. Sometimes the memory is maintained primarily in the peripheral nervous system; other times the neural network involves the brain.

Several features of incorporated knowledge are conceptually interesting for an understanding of the development of human desire. First, there are improvisational elements: incorporation is contextual rather than abstract. Second, incorporated knowledge is, literally, sedimented in the body and thus resists change. Third, because it is habitual, it is not part of conscious memory. But – and this is the fourth point – because it is contextual, sedimented, and nonconscious, it is possible, through the human capacity to narrate our own lives, for it to become a part of our conscious thought as well. In proper cybernetic thinking our narrations of desire can in turn modify incorporated knowledge.

All of which places us at the beginning of a new effort to understand human sexuality. The information already gathered using previous methods and con-

20 N. K. Hayles, "The Materiality of Informatics," *Configurations: A Journal of Literature Science and Technology* 1 (Winter 1993): 147–170.

cepts may be of some use in helping to shape new research frameworks, even though I argue that we must radically shift gears, abandoning the old ways and forging new approaches. I urge scholars from the sciences, social sciences, and humanities to devote their energies to developing newly framed analytical projects in discussion with one another. I believe we can recoup the energy lost by continued devotion to the old nature versus nurture, genes versus choice debate and charge our batteries with ideas that promise an understanding of human sexuality as something complex, ever changing, and more delectable for its very dynamism.

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