# Preface

Most books set out to answer questions. This book sets out to question answers. The answers I question have to do with the nature and causes of differences between men and women, and between straight people and gay people. Specifically, I question what we "know" about male and female brains, or gay and straight brains.

When Simon LeVay reported in 1991 that he had found a difference in brain structure between gay and heterosexual men, which was trumpeted as the discovery of "The Gay Brain," I found it interesting but also puzzling. How could gayness take a single identifiable form in the brain when it takes such varied forms in people's lives?

At the time, I had already been engaged for several years in large-scale sexuality research related to the AIDS epidemic. In an outreach storefront in Washington, DC, I ran a project that focused on injection drug users. It was there that I first met a lot of gay men. These men were not the poster children of the gay rights movement, but were poor, struggling with addiction and recovery, and trying to avoid or outlive AIDS. And so were their heterosexual brothers, with whom I also worked. In fact, these men were so similar in demeanor, dress, and daily struggles that without our detailed interviews, it was impossible to tell the difference between the gay and straight men. In LeVay's study, the homosexual men were a singular "type" unlike the (also homogeneous) heterosexual men, and they were also somehow similar to (presumably straight) women. Those are com-

mon enough ideas both inside and outside of science, but our research challenged these notions.

The reason for this was our research methods. Since our main questions didn't have to do with sexual orientation, our preconceptions about sexual orientation didn't shape the way we gathered our information. We asked people to join the study based on their drug use or their connection with drug users, not their sexuality—not their sexual practices or identities, not the gay or straight reputation of the bars or neighborhoods they hung out in, nor even how we perceived them as straight or gay. We asked everyone extremely detailed questions about their sexual practices with both same-sex and other-sex partners. Scientifically, this approach is a much more reliable way to get information about the nature of sexuality in a population than to go out looking for gay and straight people to compare. The number and variety of people who talked about same-sex relationships surprised all of us—including the gay and lesbian staff members who thought we had finely tuned "gaydar." The bias in epidemiology at the time was to see same-sex behavior among people outside of well-defined gay communities as being "instrumental"—meaning that it was due to drug use, incarceration, or sex work. But as we spent hours and weeks and eventually years with our participants, growing to know and love many of them, it was clear that they had same-sex relationships for the same reasons they had heterosexual relationships: desire, affection, and love. The thousand or so sexual histories we gathered fed into an enormous pool of research that eventually included information on the sexual and drug-using behavior of tens of thousands of people from more than fifty cities. And on the basis of this research, it would be very hard to suggest that either men who desire and have sex with men, or women who desire and have sex with women, are a distinct type of person, or are somehow "like" heterosexuals of the other sex (Young, Weissman, and Cohen 1992; Young et al. 2000; Young and Meyer 2005).

So how could I make sense of what LeVay had found? What functions might relate to the brain structures that he suggested were somehow connected to both sex and sexual orientation? Where did the brain differences come from? And are they the *cause* of differences in behavior, personality, or desires, or the result of them?

Some years later, when I was in graduate school, one particular semester had my brain stretching in almost too many directions to bear. I was studying psychometrics, observational epidemiology, and biostatistics, and I decided to add a class on "the gay brain." LeVay's 1991 study was on the syllabus, and by then, I knew enough to spot quite a few problems with it. But other studies seemed to point in the same direction as his: Dick Swaab

and Michel Hofman (1990) had reported another structural difference between the brains of heterosexual and gay men, and Laura Allen and Roger Gorski (1992) reported yet a third. Each of these research teams was also looking at male versus female differences in the brain. It turned out that none of the studies could answer my earlier questions about function, and none of them even entertained the idea that the structural differences might come from behavior and experience, rather than the other way around. Instead, through these studies, I learned about the largely unquestioned theory that was guiding the work of these research teams and many others. According to this theory, prenatal hormone exposures cause sexual differentiation of the brain—that is, early hormones create permanent masculine or feminine patterns of desire, personality, temperament, and cognition. Further, hormones later in life could "activate" behavioral predispositions, but the predispositions themselves result from the initial "organizing" effect of hormones very early in development, before birth. Intrigued, I began to look for other research related to this theory, which some scientists call the "organization-activation hypothesis," and some call the "neurohormonal theory." I was particularly interested in studies that explore the earlier, organizing role of hormones, the time when hormones presumably cause sex-typed predispositions. I think the clearest way to refer to that work is by the term *brain organization research,* so that is the term I use in this book.

Once I began looking into this theory, I couldn't look away, and I have now spent thirteen years exploring brain organization research. I was not initially interested in using my analysis to reflect back on how well or how poorly brain organization theory was supported by the evidence from these studies. I was more interested in methods, particularly in how scientists resolved the problem of measuring something as complex as sexuality or gender in such a way that these in turn could be associated with brain structure or hormone exposures. I was also curious to see how scientists differed in their approaches, and what kinds of methods they used to translate research findings across different study designs. Focusing on original, peer-reviewed research in English-language scientific journals, I used a combination of strategies to identify studies, beginning with a small set of high-profile studies and searching for the research those works cited, as well as subsequent studies that cited my index cases. I identified the "founding paper" in the field (Phoenix et al. 1959), in which the theory of brain organization was first proposed, and systematically searched for research reports on humans that cited that paper. Using the ISI Web of Science, Medline, and PsychInfo databases, I combined keywords about hormonal "inputs" (such as prenatal, in utero, organizing effects, hormones,

testosterone, estrogen, progesterone) with psychosexual "outputs" (such as masculinity, femininity, eroticism, sexual behavior, psychosexuality, sexual orientation). Early on, I limited myself to analyzing studies that explored the connection between prenatal hormone exposures and human sexuality. I ultimately analyzed virtually every study on the ostensible prenatal hormone-sexuality connection published from 1967, when the theory was first applied to humans, up to the year 2000, when the increased flow of research in this area made it no longer possible to examine every published study in depth. I continued to examine all major studies (those published in the most important journals, those that garnered a lot of scientific attention, and those by well-established scientists) through 2008. Further, because brain organization research had always addressed broader questions of masculinity and femininity, I expanded my ongoing search strategy to identify studies that focus on those variables, too. I have now done a close analysis of over three hundred studies that span all of the many research designs used to explore the hypothetical connection between prenatal hormone exposures, on the one hand, and human sexuality or gender, on the other.

I also interviewed scientists. I did an influence analysis to identify the twenty-five most influential people doing brain organization research, based on how their studies were cited by other scientists. Twenty-one of them generously agreed to be interviewed; five spoke with me at least twice. They talked with me about the theory and about the nitty-gritty details of their studies: subject recruitment, questionnaires, statistical analysis, and so on. I enjoyed those conversations, and many of the scientists told me that they were happy for the chance to step back from their work and think about the field as a whole, or about conceptual issues that sometimes take a backseat to daily research practice. I am grateful for their time and their openness with me. The interviews were of immeasurable value to me in making sure I understood scientists' varied research approaches, as well as their disagreements with one another. I use quotations from the interviews somewhat sparingly, though, because I am less interested, in this particular book, in what scientists *say* than in what they *do* in their research practice. Several scientists were wary about controversies that had erupted shortly before I began my interviews, so I follow standard ethnographic practice, and treat the interviews as confidential. In a few places where I have used material that bears directly on a particular scientist's work, I have used their names with permission. Elsewhere, they are identified by simple pseudonyms (Dr. A, Dr. B, etc.).

The closer I looked at brain organization research, the less it made sense. My initial focus on methods gradually gave way to the realization

that the evidence simply does not support the theory. In this book, I ask readers to follow the same journey I have taken, looking closely at the measures and methods in order to understand gaps and fundamental contradictions in the data. Although I find much fault with research done in connection with brain organization theory, I hope that the researchers who generously shared their time with me, as well as others who read this book, will take it in the spirit of constructive criticism in which it is offered.

Brain organization research is important because it engages deep and enduring questions that practically everyone shares: how do we come to be the sort of people we are? How do our bodies matter to our personalities, skills, interests, and desires? These are great questions, but sometimes we treat them like rhetorical questions, and plug in answers that seem right just because they are familiar.

For instance, when I talk to people about the idea that people are born with a male brain or a female brain, I almost always end up hearing about their experiences with children. A few people relate tales of unexpected flexibility or gender-bending, but most relay their experiences with boys who practically radiate "boyness" from some deep space within (interestingly, I hear many fewer stories of girls who are sugar and spice and everything nice). Recently, my mother happened to be present for one of these conversations, and she very matter-of-factly presented what is considered these days to be a radical idea. Before relaying her idea, let me explain that my mother is a lovely southern lady who has raised an impressive number of children: four boys and four girls of her own, in addition to playing a major role in raising some half dozen of her more than two score grandchildren and great-grandchildren (I think she's drawing the line at the great-great-grandchildren). When my friend talked about her girl being so different from her younger brother, who is "all boy," my mother literally snorted. "That's because you only have two," she said. Mama went on to explain that with just a couple of children, gender looms large—it's the most obvious explanation for every difference you see between them, and unless your children are really unusual, it's going to be easiest to see their personalities as "boy" versus "girl." But when you have a lot of children, you begin to notice that they all come with personalities of their own, and they are all quite different from one another. Gender recedes in importance.

Of course, that doesn't mean that gender isn't real. One particular question about the "realness" of gender is at the heart of this book: how is gender connected to bodies, specifically, to the brain? And how does sexuality figure in that connection?

Brain organization theory offers a pretty tidy answer: it's all down to "sex hormones" that shape the brain before birth. Get enough "male hormones" and you'll be masculine in desires, interests, and personality. Maybe it's the Missouri in me, but I am never happy with an answer if it's too easy. I really do demand evidence: "show me." And I expect you want the same, so that's what I do in this book.