



The many futures of gender
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The minute you strip away context, you have lost your ability to understand what is going on

A conversation with Anne Fausto-Sterling

Patricia Purtschert and Anelis Kaiser Trujillo

About the many futures of gender

The aim of the project is to tell and reflect the different histories of feminist theory. To this end, conversations are held with protagonists who had and have a formative influence on feminist theories. In engaging with these scholars, we wish to delve deeper not only into the ideas and concepts that form the key basis of these theories but also to explore the historical contexts, collective thinking, political practices, and historical controversies that enabled them at the time. The conversations bring forth exigent questions around power, inequality, and violence, intersectionality, the relation of sex, gender, and sexuality, or the critique of binary thinking. We discuss the contributions of feminism to analyzing and challenging significant differences other than gender, such as race, class, nationality, religion, and caste. The project is rooted in oral history and philosophical exchange. It has value for those of us interested in the history of feminist theory and in feminism as a resourceful way of challenging dominant knowledges and creating different ones.

Corresponding author

Patricia Purtschert, Interdisciplinary Center for Gender Studies, University of Bern
patricia.purtschert@unibe.ch

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The minute you strip away context, you have lost your ability to understand what is going on: A conversation with Anne Fausto-Sterling

Patricia Purtschert and Anelis Kaiser Trujillo

We meet Anne Fausto-Sterling in a hotel lobby in the old town of Bern. She has traveled to Switzerland for the ceremony at which she would receive her honorary doctorate at the University of Bern that evening. The honorary degree was granted to her in 2020 for “her groundbreaking contributions to Gender Studies, especially the biological and sociocultural constitution of gender” and for being a “public intellectual [who fearlessly stands up] against prejudice, reductionism, and fake news.”¹ Because of the COVID-19 pandemic, the ceremony did not take place until two years later. Before delivering her lecture on “Feminist approaches to science and medicine: What are they and why do they matter?,” Anne Fausto-Sterling sat down with the gender and brain researcher Anelis Kaiser Trujillo and me, and we had the following conversation.

Patricia Purtschert (PP): Anne, when did you get in touch with feminism for the first time?

Anne Fausto-Sterling: That was in the late 1960s, during the anti-war and civil rights movement, which I was active in. This was also when the women’s movement in the US began. I was part of it from the very start.

PP: Were you a student during that time?

I got my PhD in 1970, so I was a graduate student at the time.

PP: So that means that anti-war, anti-militarism, and feminism went together for you?

And the civil rights movement. Those were all part of that New Left eruption of action and activity, and they were all mixed together.

PP: Can you remember what resonated with you when you started to engage with feminist movements?

It is a long time ago. But in the 60s, Betty Friedan wrote her book *The feminine mystique*,² and certainly I was aware of that book. I read it and it made sense to me. And then various people in the civil rights movement started complaining about the role women were being

1 For the complete citation, see https://www.annefaustosterling.com/wp-content/uploads/2020/12/Laudatio-Vorlage-Fausto-Sterling_EN-1.pdf

2 Betty Friedan, *The feminine mystique* (1963).

forced to take. It was all part of a liberation ideology, and the minute anyone started talking about women, it just made perfect sense to me.

PP: You did a PhD in molecular biology on female sterile drosophila. Did feminism matter to you when you worked on your dissertation?

No, when I did that work I was still at a place where somehow the politics and the science were completely separate things, and I did not actually see how they worked together at that point. In my head, it was as if I did this thing and then I did this other thing. It really was not until I wrote *Myths of gender*³ that I began to see how they might fit together, which was not until the 1980s. The decade of the 70s, I was very involved in what was then women's studies rather than gender studies and involved in getting a course started on campus at Brown University. In fact, the Pembroke Center has that original syllabus that we designed; it was a group of us from different fields, people from history, anthropology, some names that you may know of people who were important in those early days of women's studies.

PP: Can you remember some of these names?

Louise Lamphere in anthropology, Mari Jo Buhle in history. Those are the names I am thinking of right now. And of course, when Joan Scott came to campus, that was a little later, she did a lot. The Pembroke Center was getting started at the time. Brown was originally a men's college, and it had a sister college called Pembroke. In 1971 those two were combined, and there were a lot of alumni from Pembroke who were very concerned about what would happen to women. Part of the merger agreement between the two colleges was to set up the Pembroke Center as a place for the study of women, as a way of compensating for the merger into a single institution. Eventually, Joan was hired to direct the center, and that center became an important intellectual focus for feminist theory over the years.

However, in the 1970s, I was doing my straight science as I thought of it, with the fruit flies. It was not until the late 70s that I began to think about what women's studies meant for the sciences. At first that just meant talking about women scientists. The transformation from the idea of women in science to the idea of gender and science took place during the 1980s, in my head and nationally also. I was not inventing this on my own, but there were groups of people I interacted with nationally, and we would be on panels together, we were like a traveling road show. It was myself, people in philosophy, Sandra Harding, Helen Longino, and Elizabeth Potter, and then in people in history, Londa Schiebinger. Who else?

Anelis Kaiser Trujillo (AKT): Ruth Bleier?

Yes, Ruth Bleier and Ruth Hubbard were essential. Alas, Bleier died early on, but she supported my work when I first started. I was less often on panels with Hubbard, but she was essential in all of this. First of all, she was very encouraging, she was very inclusive. She was a

3 Anne Fausto-Sterling, *Myths of gender: Biological theories about men and women* (1985).

bit older than me and more established in her own career. She was just very open to bringing other people into the enterprise of thinking about gender and science. There was a group that met in Cambridge on a regular basis to discuss gender and science and women in science. Ruth Hubbard was part of it and also Evelyn Hammonds. So there began a national discussion among women scholars that I was part of.

AKT: I have an add-on to that. Your very first paper, in molecular biology, is on the female-sterile mutant of drosophila,⁴ and at the same time, there were fights for abortion on the street by the women's movement. Was that a coincidence? Or in other words: Did you pick that topic because "reproduction" was a feminist subject or was it given to you by your PhD supervisor?

I picked that topic. I was always interested in things that were a little out of the ordinary, and I picked that topic because it seemed to me that this example of maternally contributed material was a counter-argument to a sort of profound genetic determinism. That topic appealed to me because it made the whole story of genetic essentialism more complicated.

PP: This means that somehow, the question of "gender" was already in there?

I do not know if it was gender or not. I mean, I think certainly because the story was about molecular information in the oocyte before fertilization, you had the sex differences in there. But in my head, I think it was probably much more about genetic essentialism at the time. This was the 1960s, so honestly, the word "gender," in the context we now use it, was not part of our lexicon.

AKT: Then, in an article from 1982 about the interactions between fused and engrailed phenotypes of drosophila, "sex" is used for the "secondary sex combs" in the flies ... so it still went by "sex" in the 80s?⁵ It would be interesting to know whether you already meant "gender" in your papers from the 1970s or 1980s or if you would use "gender" for the same objects of research today.

They were and are called sex combs, which are a dimorphism in flies—males have them and females do not—and that is the term I would still use.

PP: The 1970s were the time when the term "gender" started to appear in feminist theory. What is your recollection of how gender emerged, and when did you start working with the term?

Well, in my recollection, it began to emerge particularly in the fields of literature and history, where it became clear that scholars had moved beyond studying great women in history or great women writers. At the very beginning, there were questions like: Why does the canon not

4 Anne Fausto-Sterling, *Studies on the sterility phenotype of the mutant fused of Drosophila melanogaster* (1971).

5 Anne Fausto-Sterling and Heidi Smith-Schiess, *Interactions between FUSED and ENGRAILED: Two mutations affecting pattern formation in DROSOPHILA MELANOGASTER* (1982).

include Jane Austen, why does it only include Charles Dickens? At first it was about women writers, but that only lasted a short period of time because people in literature and history became interested in the question of gender as a power structure, as a sphere of influence, as a set of behaviors, and very quickly began to look at gender in history or literature.

That was a much harder argument to make in the sciences. In the sciences, it was clear that you could talk about women in science and talk about women scientists who had not been recognized and whose work had been neglected. There was a growing list of examples of that and people working on it, people like Margaret Rossiter's critique that turned out into a three-volume book on women scientists in America.⁶ It was ground-breaking, and it took her a long time to publish it. But we all knew she was working on it. We read bits of it and met her at history of science meetings.

However, what gender and science meant was less obvious. We all, not only the women scientists but the philosophers of science as well, were thinking about it. We were confronted by this ideology of objectivity and the ideology of science as a neutral objective space, where gender, sex, and race do not matter. So a lot of the early work really fell onto the philosophers, people like Sandra Harding, Helen Longino, and Donna Haraway. Their work certainly was essential to this process of beginning to think about what gender would mean in the production of scientific knowledge. *Myths of gender* was a contribution to that, but I was also very dependent on the theoretical work by the philosophers of science. Especially on opening up the notion of objectivity to include standpoint theory and all of those things that make possible a view of science that was more multiple.

PP: What made you write Myths of gender? And did you think at the time that you would be sticking with these questions for so long? Or was it rather supposed to be an intervention at the time?

It was more of an intervention and it really came out of the political movement for equal rights for women. The counteraction to this movement were arguments about women's biology making equality impossible. In the realm of politics, the famous one in the United States is the physician for US Vice-President Hubert Humphrey saying that women could not hold higher office effectively. It would be dangerous, because they would be menopausal and they would not be able to be stable under a crisis. One of his famous quotes was that if a woman had been in place during the Cuban missile crisis instead of John F. Kennedy, how dangerous that would have been because she would have been hysterical. Another argument that you often heard was that women could not advance in politics or in business because they were not aggressive enough since they did not have the testosterone. You heard all of these counter-arguments about equality that came straight out of biology. Most of my activist colleagues were from other fields, and so they would turn to me and say: "Is that true?" And I would say: "I don't know!" I finally decided that I had the skills to find out, and that was the impetus to write this book. The idea was to look at these things and see what was behind them.

⁶ Margaret W. Rossiter, *Women scientists in America: Vol 1. Struggles and strategies to 1940 (1982); Women scientists in America: Vol. 2. Before affirmative action, 1940–1972 (1995); Women Scientists in America: Vol. 3. Forging a new world since 1972 (2012).*

In the process of doing that, of course, I ended up looking at how scientific knowledge was created in the first place. It was writing that book that got me deeper into the question of scientific theory and feminist theory. It also got me into a whole diversion, as it were, with science and technology studies. Because then, that field was just beginning and it was really the field, it still is the field, that works on understanding the production of scientific knowledge as a cultural product. So I did a lot of work in that field, and I founded the science and technology studies [STS] program at Brown University.⁷ I felt greater affinity with the STS people because they embrace science, whereas in the feminist movement, there were a lot of just blanket anti-science attitudes: no positive feelings about sciences as a form of inquiry, really profound ignorance about it. Science was not part of a requirement for most gender studies undergraduate majors. I was annoyed at that and found the STS people intellectually much more interesting, because they really wanted to think about what science was and how it worked instead of totally rejecting it as a form of inquiry. From 1985 till the present, I was very engaged with that field and have gone back to feminist theory more recently and from my own point of view.

PP: When you worked on Myths of gender, how important were the people around you: The Pembroke Center, the “Boston group,” did they play a role in it?

The group in Boston was very important. The people at Brown were not discouraging to me, and the Pembroke Center was just getting started. They were very attached to high literary theory and really did not want to know about the science until years later. Eventually, they became very encouraging and supportive with my work but that was two decades later. In the beginning, they were in their own world, and I participated in some of the seminars, but I could not even get them to think about the idea of the material body. We had these raging arguments at seminars where I would say, “We have to think about the body as having a material reality,” and they just did not want to do that, so they were not so much of a help to me. But the women in science studies people were different. In the mid-80s, Peggy McIntosh at Wellesley College organized a seminar on gender and science. We met regularly, read each other’s work, and discussed it. Peggy brought in people from all over, who were essential in gender and science in that period. That was enormously helpful because there we sat and we struggled with these big questions: What is objectivity, what does it mean? How can you have gender in something that is supposed to be objective? We discussed all of these basic questions. And every name that you can think of passed through that group: Ruth Hubbard, Evelyn Fox Keller, Evelyn Hammonds, Elizabeth Potter, Helen Longino, Sandra Harding, Donna Haraway. Everybody who was active in that period. And Peggy was behind it. She is a really extraordinary woman.

AKT: As far as I understood, everything you wrote on feminism and STS at the time was not really part of your paid work. You were a regular professor in the department of biology. This means that you had to teach students and do research on biology. How were you able

⁷ See <https://www.brown.edu/academics/science-and-technology-studies/>

to combine these two parts of your intellectuality, your academic duties and your emerging curiosity in science and sex/gender?

I did teach courses on gender and science and STS material, but I never got compensated for it. It was unpaid, extra work on top of my regular teaching, and that was pretty typical at Brown for anyone who wanted to start a new area. It is only recently that the STS group has been recognized and the teaching funded. That happened when I retired and the next generation took over. But sometime in the 1990s, I started integrating this material into the biology that I was teaching. I designed an introductory course called “The biology of gender” and managed to make that one of my official assigned courses. I taught that for a few years and then I integrated social material into the vertebrate embryology course that I taught for maybe the last decade before I retired.

AKT: And the people taking these classes were students from biology. So you infiltrated reflections on the biological construction of sex/gender into their curriculum?

I infiltrated it in the end, yes.

*PP: In the conclusion of *Myths of gender*, you use the term “dual tack” and you write, “I have asked of each claim about women and biology a very conventional, scientific question—what is the evidence? At the same time, I have scrutinized the data with an unconventional feminist eye” (p. 208). Would you describe this “dual tack” as something that characterizes the way you did feminist science?*

I do not think I look at the world the same way now that I did when I was doing *Myths of gender*. Those were really my early efforts to think these things through. The work that I am doing now in child development is not like that. It is in fact rejecting the basic operating theories in the cognitive sciences and instead saying that you have to look at development in a very different way, one that gets rid of that sort of binary way of thinking about nature and nurture. I was not at that point when I was writing *Myths of gender*. I was getting to that point at the end of *Sexing the body*⁸ because that is when I first discovered Esther Thelen’s work and gave a nod to it at the very end of the book. Then I wrote more on it in the new edition of *Sexing the body*,⁹ which came out in 2020, and in an article in a *Frontiers* edition on “Challenges of intersectionality research in the field of critical (sex/gender) neuroscience”¹⁰ that was published in 2021.

PP: Was it this systemic approach that enabled you to overcome the “dual tack” approach, which reflected the difficulty of combining a more conventional scientific and a feminist approach?

8 Anne Fausto-Sterling, *Sexing the body: Gender politics and the construction of sexuality* (2000).

9 Anne Fausto-Sterling, *Sexing the body: Gender politics and the construction of sexuality* (2nd ed., 2020).

10 Anne Fausto-Sterling, A dynamic systems framework for gender/sex development: From sensory input in infancy to subjective certainty in toddlerhood (2021).

Yes. The notion of systems and systems development was crucial for me. It offered me a critical theory. I sometimes use the metaphor of the M. C. Escher print where you see the multiple tessellations.¹¹ You look one way and you see only fish, and then you look at it later and they have turned into birds. It is that kind of a switch. Once you see the birds, you cannot go back and use the fish. So once I made that switch, I saw the old way of looking at things that dualistic way, it is just impossible and wrong. Esther Thelen was a developmental psychologist, and I first discovered her toward the end of writing *Sexing the body*. I have something in the last chapter about her work and then I just immersed myself in that approach and have not come out of it.

AKT: Coming back to the reason for writing Myths of gender ... so it means that Myths of gender was rather an attempt to give an answer to the questions people were asking you. You had not yet developed your own theories and way of posing your own questions?

Yes.

AKT: You went into science, you compiled and collected scientific journal papers on gender or on homosexuality, and you realized, "Oh, wow, this is not all that clear. There is no real scientific evidence for these claims." But then later, systems theory became your theory as well as your method, because now you would try to look at things in a different way and would ask questions in a different way right from the start. Whereas in Myths of gender, you basically took the questions the way they were put to you and you answered them in the way you used to do as a scientist.

That is right.

AKT: And then, instead of looking at things from one side and another, you realized that one has to go back to the very beginning and pose the questions in a different way from the start. In Myths of gender, the question was quite clear: Is there a difference between women and men, between "homosexuals" and "heterosexuals"? And in your current work, the question of difference does not seem to be as important any more, because by overcoming a comparatist way of thinking, you also seem to have lost this immanent focus on sex differences. Or to put the question in another way: The development, the changes, the flexibility seem to be much more important now.

Yes, because what you have is a kind of grassroots explosion of the notion of binary development. So you have all of these different nonbinary categories. The classic way of explaining it just does not work. Hence, you have to have a different approach to understanding development than the one that generates from the original cognitive science development people from Lawrence

¹¹ "Sky and Water I," a woodcut print by M. C. Escher, illustrates birds and fish alternatively either in the background or in the foreground, based on the viewer's focus on the light or dark parts of the artwork. See an image and description at <https://mcescher.com/product/facsimile-sky-water/>

Kohlberg on. It has outlived its usefulness as an approach to understanding development because the world is expressing itself differently.

AKT: Maybe it has always expressed itself differently, but before we were more committed to the rules of science.

Maybe. One interesting thing that happened when I wrote *Myths of gender* was that my biology colleagues who read the book said: “Oh, this is just bad science.” They thought what I was doing was uncovering bad science. I would say, “But you know, Charles Darwin wrote it and we do not think of him as an inadequate scientist.” Hence, the only framework available to think about it was: Here was a question, it was poorly answered by bad methods or bad interpretation of data, but it was not that the theoretical approach that led to the question framing was wrong. My science colleagues interpreted the book as an exposé of badly done science without it shaking their faith in the notion of science as an objective process, in the old sense of objectivity, not in the multiple standpoint sense. That was interesting. They were not mad at me for doing the book, but they also could not go with me to where the book leads you, namely, to ask about the whole notion of how science is done. So they continued to maintain that there was no culture of science, there was just good science and bad science and I had found some bad science.

*PP: How would you describe the change in perspective that you have undergone between writing *Myths of gender* and *Sexing the body*, books that were published 15 years apart in 1985 and 2000 respectively?*

Feminist theory itself began to change during this time; the phrase “social construction” became very popular in the 1980s in history and literature. People who were resisting the notion that there was gender in science or culture in science would make fun of that phrase “social construction.” They would say: “Ha ha ha, how can you socially construct a bridge? It either works or it falls into the water. And it is real, it is material and solid.”

I began to gain a better understanding of the idea of social construction as it might apply to biology as I taught the basic embryology, particularly of the development of the sexual system, and started looking more at the development of intersex individuals. This was, really, at the heart of starting *Sexing the body*, namely the question of what it might mean to talk about the social construction of material objects. The whole book was aimed to show how various aspects of the sexed body had a social construction component to them. That did not mean we did not have real or solid bodies, but nevertheless how they function and how we conceptualize them were socially constructed. So in *Sexing the body* there were the chapters on intersex. There was a chapter on how we look at the corpus callosum. There was a chapter on the naming and the history of naming of hormones. Each of these chapters gave examples of how material objects were socially constructed and yet also material. That is why I always want people to read beyond the intersex chapters because those are the “sensational” chapters with the genital surgery and children. But I think the corpus callosum chapter, the hormone chapter, the chapters on rat behavior are equally important because they show various ways

in which scientists socially construct objects using theories of sex and gender, and that was the impetus. And as I did that, I began to gain a more theoretical understanding of where I needed to go, and of where the field needed to go. By the field, I mean people who are interested in how bodies develop and how you could begin to concretize a relationship between the material and the constructed. So, in a way, it moved me even further away from the literary feminist theory, which at times was anti-materialist. But I think that by the time *Sexing the body* came out, at least at the Pembroke Center, people who were doing feminist theory were more appreciative of the approach I was taking and began to support it more.

PP: And you also integrate poststructuralist theory into your analysis: Michel Foucault's history of sexuality, for example, plays an important role in the first chapter of Sexing the body.

Yes, but there was still skepticism from some people. I interviewed for a job at Harvard once in this period, and one of the historians of science there, who fancied himself a feminist, said, "Well, have you read Foucault?" and I said, "Yes, I have read Foucault." They were super-insulting, like: "How could a scientist have any kind of sophisticated understanding of this material?" There was resistance to it for sure from within the poststructuralist, feminist-theory world. I think that has mostly evaporated. And then I continued to work on it with articles like the one on bone development. I think that that was pretty effective, also because I got it published in the feminist journal *Signs*,¹² which spoke to a particular audience. That article still gets cited and used quite a lot. That integration of the culture and the body just makes sense to people.

PP: In Sexing the body you keep saying that we need to include race into the way we think about the social construction of materiality. In the introduction you mention Oyeronke Oyewumi, who asks us to be cautious about universalizing ideas of sex and gender on the background of the colonial history of these terms and the colonial knowledge that they entail. How do you deal with race in your work and how has that changed in the past decades?

I have been working harder on integrating it. Race itself, as a political issue, dates back to my childhood. My parents were activists; we were picketing for civil rights in the 1950s in New York State where I grew up. So as a child growing up, that was just part of my part of my environment. The first March on Washington that I went to was in 1958, and it was a March on Washington for civil rights. Women, and equal rights for women, were not on the horizon at that point. It was before the outbreak of the mass civil rights movement, although there were 10,000 people on that march.¹³ I was still in high school then. So race as an issue has been part of my world.

I think in the new edition of *Sexing the body*, I address race quite explicitly and talk about intersectionality in the places where I did not do a good enough job in the original book of talking about race. I also think that the developmental system theory works for race as well.

12 Anne Fausto-Sterling, *The bare bones of sex: Part I—sex and gender* (2005).

13 See Zinn Education Project, Oct. 25, 1958: Youth March for Integrated Schools (2020, October 25), <https://www.zinnedproject.org/news/tdih/march-for-integrated-schools/>

More and more, I am trying to be cautious about making sure that I am never just talking about women as if they were a unitary category. In the book I am writing now I devote a long chapter to race at a more theoretical level and in terms of the history of child psychology, and I integrate discussions of race throughout the book.

PP: Is there a collective of people who help you think through these questions? Are there other scholars working with you on intersectional approaches to science?

There are a couple of groups. There is a group I work with at Brown that works on race in medicine, and I still go to their seminars and discussions. They are mostly physicians who are trying to figure out what to do with racialized algorithms in treatment of clients that walk in off the street. The standard method is to apply an algorithm that sets a higher threshold of disease for people who are of color compared to white people.¹⁴ Thus people of color have to be sicker before a doctor prescribes treatment. Examples include kidney and lung disease. This is very much under critique now. The other group is a listserv of people who work on genomics and race that includes some of the colleagues from Brown. The group includes probably 50 or 70 scientists and is one of my main resources. And if I ever got stuck on a topic, I would just put it out there or write some of them individually.

Evelynn Hammonds is also part of the group, and we are close personal friends. If some big issue comes up I will write her and say, “Well, what do you think about X?” The people on this listserv are in all sorts of fields, they are molecular biologists or sociologists, historians and anthropologists. So that those issues having to do with race and genes and biology are in my mailbox, if not every day, several times a week. The group includes a woman that several members mentored, she is quite a bit younger than I am, who became Biden’s science adviser for several years: Alondra Nelson, a sociologist.

So there is a whole group of people that I interact with who are focused on race. They will occasionally write something about gender, but I have the gender side. They do more of the work on race, but I am up to date on what people are thinking about and worrying about. And it was given an extra impetus with the Black Lives Matter movement, it just exploded questions of race and science: The question of scientists of color, for example, who do work in the field, and how it can be dangerous to them to go bird-watching in the woods in certain parts of the country.

PP: This example shows impressively how racism structures different areas of research and how we need to keep understanding and changing this. I would like to turn to one of your most famous articles, “The five sexes,”¹⁵ a paper with an intriguing title that you had published in 1993 and which stirred quite a lot of debates.

It still gets responses. People still argue about it on Twitter, either positively or negatively.

14 See Ziad Obermeyer et al., *Dissecting racial bias in an algorithm used to manage the health of populations* (2019).

15 Anne Fausto-Sterling, *The five sexes: Why male and female are not enough* (1993); see also Anne Fausto-Sterling, *The five sexes, revisited* (2000).

PP: The five sexes you suggested in this paper were men, herms, merms, ferms, and women—and that drove people nuts.

I put it out there, the herms, merms, and ferms seemed so obviously to me a joke and yet people took it way too seriously. But it upset people in a good kind of way, and it continues to speak positively to some people, while other people think it is stupid. It has been particularly taken to task in the debate in England about trans rights right now. On Twitter, some people keep bringing it back as an example of really terrible science, and then there is the claim that it has ruined people's lives by saying these wrong things. I do not try to get into it much actually, because you know how Twitter is. So I just let them rage and I kind of laugh because the more it gets discussed, the more followers I get.

PP: Were you asked to write something critical about sex and gender at the time?

No, I wrote it because I was teaching this material on the development of the urogenital system, John Money, and his approach to it. In 1970 it was pretty progressive, and then someone pointed out to me that the treatment method really involved some pretty horrendous surgery, specifically clitoridectomy in infants. And I was like, "Oh my God!" This was my first concrete example of the social construction of sex—by shaping bodies to fit what the scientists believed, as they say, "what nature intended." From there, I got into it and I started critiquing it, and that was really the background to starting *Sexing the body*. I wrote this piece, "The five sexes," and then I found an outlet for it at this magazine, *The Sciences*, that had a really good editor. He helped to shape the rhetoric so that it had some zing to it. The rest is history. It just hit a nerve when it came out, and the *New York Times* asked me to write an editorial for an op-ed version of it, which was much shorter.¹⁶ At the same time I was contacted by Cheryl Chase, who is an intersex rights activist. We collaborated for really over a decade. We corresponded and collaborated and discussed these issues. I reconnected with her when I wrote the afterword to *Sexing the body*. I showed her what I had written and got her comments on it to see if she agreed with my assessment of what has happened since.

PP: Were you taken by surprise by the reaction to this article?

Totally taken by surprise—it was just one of those things that was the right thing at the right time. And this is the other thing that is hard for people to remember: It was just the beginning of email and online contact. In those first years after "The five sexes" was published and the op-ed piece in the *Times*, which then got reprinted by other papers that the *Times* owned, people were contacting me by handwritten letters. They were saying: "I think I am one of these people—help! How can I get help?" I was finding physicians to connect them to. Google did not exist yet, we were still using much more primitive search engines.

PP: The reactions were mostly positive?

¹⁶ Anne Fausto-Sterling, *How many sexes are there?* (1993).

They were mostly enthusiastic. There were obviously others, like John Money. He wrote a letter to the editor of *The Sciences* saying I was wrong about his estimate of frequency. There were other letters to the editor that said I had it wrong. But mostly it helped people who wanted to learn about themselves. I would give talks on this material, and people who were, or thought they might be, intersex would wait for me afterwards to talk to me either to thank me or to ask for help or get further information, but it was people who would sit and realize that I was talking about them and they had never understood that before. Combined with Cheryl Chase's work and the intersex rights movement, which was the more public arm, it opened up a conversation for a whole group of people that really had not existed before.

PP: Some years before that, Judith Butler's Gender trouble¹⁷ had been released, which opened up a debate about overcoming the gender binary as an unquestioned premise of most feminist theory. Would you say that this discussion and the developments that you mentioned above fed into each other?

Well, they did for people in the academy, but I do not know that the intersex patients who contacted me knew anything about Judith Butler. But yes, it was a moment.

AKT: I have another question that ties in with your earlier studies. Why did you not include your early biological research interest in the fruit fly in your later works? You knew so much about the topic and thus probably about the social construction of "the female" in the fruit fly—why did you not include it into the book? Cynthia Kraus wrote in 2000 in "Naked sex in exile"¹⁸ about the experimental history of the drosophila's sex-determining gene, unearthing some intriguing "sexing" and "unsexing" research practices. I would have been interested in hearing from you about similar constructions of "sex" in the drosophila and about how sex determination is constructed here in comparison with humans.

Well, the book is really about human development. I talked about non-human models, which were the rats, which were used as the model for human development. And I think there is a long footnote about a default pathway for sex germination somewhere in there. I did not move beyond mammals in this book. Because in fact the whole sex determination system in flies is completely different. I did talk about different forms of sex determination. This was really about human development.

AKT: Looking back to the topics in your career, you moved from the fly and flatworm to hormones in the body, to intersex in humans, to development in humans, to, lately, embodying human language while acquiring gender identity. I see how you moved from the "real biological and concrete object in the lab" through the individuals to the abstract, the language. In other words, from the smallest thing under the microscope to the complexity of the human minds. Could you elaborate on this development?

17 Judith Butler, *Gender trouble* (1990).

18 Cynthia Kraus, *Naked sex in exile: On the paradox of the "sex question" in feminism and in science* (2000).

The view of most scientists is that you want to strip away the complicated and just narrow the problem down to something that is very simple and tractable. And I just no longer think that this is a great approach for the questions we want to ask about identity and human development, because the minute you strip away context, you have lost your ability to understand what is going on. That may work for understanding how one enzyme binds to another in a test tube. But that same answer may not work once you are talking about the enzyme in the body. So if you strip down to make a simple answer you lose essential information. And it is boring.

AKT: I observe that in research, people jump from one interesting subject to the other. You are one of the few people who are so brave and courageous as to stick to your main question. As a developmental biologist, you are attracted to origins and how things unfold. Late in your career you were brought to the origins of development in humans, i.e., infants of one year and below, babies. When you did the empirical research on humans, at the end of your career in 2012, you were almost retired and you started this new research on small children and language development. Research on babies is tricky because there are many ethical questions and nobody wants to dirty their hands with them. And what did you do? You just did it!

I did not expect to be back collecting data and making arguments with peer reviewers about statistics. It sort of surprised me when that happened, but there was the data set in front of me and an opportunity to get some funding, so I said, “Let’s do it!” Now I see what I would do if I were 25 years old and starting a whole career, I would have a research plan, but I will not do it. So all I can do is to ...

AKT: ... give it to others ...

... give it to others. I am in touch now with a couple of younger colleagues who have all the methods to do what I would like to do. And I tell them: “Gender, do gender.” I may get a couple of them in developmental psychology to start doing this work.

PP: How did that data end up on your desk?

The Pembroke Center played an important role in this. After I started thinking about the notion of embodiment, they invited me to run one of their year-long seminars on embodiment and we got to bring in postdocs and some colleagues from Brown. Esther Thelen came in and gave a talk before she passed away, and some other critical people gave talks. We wrestled with this question of identity development as an embodied phenomenon. One of my colleagues at Brown, in the psychology department, a woman named Cynthia García Coll who I have published with since, said, “You know, there is this data set, these tapes of babies that my colleague over at the hospital has. It is hundreds of tapes—it is just what you want.” And I said, “Well, let’s get them.” I had no idea how to do this work. We contacted the colleague, we got permission to use them for this purpose. Cynthia helped me to learn about methods of tape analysis that were the proper methods within the field of psychology. I had no idea, but I had Cynthia’s collaboration. And the Pembroke Center helped me to get a grant from the Ford Foundation to get started on it.

AKT: So did I get you right that these recordings were there and they were not meant to have anything to do with gender?

Yes, they were part of the study of temperament. Ronald Seifer had done this longitudinal data collection to study temperament and he was not interested in gender. He had very open-ended permissions for using the recordings for other research purposes. We were able to convince the institutional ethics review board that it was okay to use this data set for this other purpose. So it was not collected with anything about gender in mind, but he had collected more or less equal numbers of boy and girl children. It was what we call a “found data set.”

AKT: That makes it even stronger—your conclusion, or your thesis, that gender is a background story and infiltrates everything. Because originally the researchers did not even plan for gender to be in it. Usually, when you set up an experiment, you will try to trigger situations where the topic comes in. But the tapes were not even set up that way.

Yes, I did not make these tapes—I just used them. And really the interaction with the Pembroke Center at that point was helpful—they continued to give me some funding for that work for several years, enough for me to hire students to continue to analyze the tapes. It is very time-intensive work. Earlier they had not been very impressed by what I was doing. But I guess the feminist theory was far enough along then that the light switch turned on about bodies and materiality, and they were super-supportive at that point.

PP: Can we please talk about terminology for a moment? You have been using the term “gender/sex” for quite a while, pointing out the inseparability of these terms. What is the history of this concept? It reminds me also, by the way, of Gayle Rubin’s “sex/gender-system,” which was a key concept that very early on amalgamated the two terms.

One person who really has brought gender and sex together, besides your paper, Anelis,¹⁹ is Sari van Anders.²⁰ I am following her work on this primarily because I think she has articulated the strongest set of arguments about doing it. The thing about Gayle Rubin is that she is really talking about systems of power. What Sari, and you, Anelis, and I are talking about are interactive systems *within* the body.

PP: I agree. I just find it interesting that the terms were together in Rubin’s text, it was the “sex/gender system” (p. 159),²¹ not sex versus gender, as we used to define their relationship later on.

I think the separation was an important rhetorical move at a certain point. But it became problematic also because people in the field of medicine, for example, just confused the two.

19 Anelis Kaiser, Re-conceptualizing “sex” and “gender” in the human brain (2012).

20 Sari M. van Anders, Beyond sexual orientation: Integrating gender/sex and diverse sexualities via sexual configurations theory (2015); Sari M. van Anders, Gender/sexual diversity and biobehavioral research (2022).

21 Gayle Rubin, The traffic in women: Notes on the “political economy” of sex (1975).

There was the careful distinction that feminists made between sex and gender, and yet you get into the medical field, and there it is all gender!

PP: Gender became a replacement for sex.

I am reviewing an article right now, and the author says that maybe one of the reasons people just started using gender is that it felt more polite not to use the word “sex,” which in English has all these scary ...

AKT: ... sexual connotations!

Yes. So in the scientific world and in polite discourse, people tend to use gender, instead of sex, even though they mean sex. It became way too confusing. I became pretty convinced that there is almost nothing in the body that is “pure sex,” maybe sperm and egg.

AKT: We can say sperm and egg then. Why do we need the term “sex”?

Yes, exactly. In these Twitter debates, people say things like, “Of course, sex is real; what about sperm?” People do not want to worry about the complexities and just revert back to sex cells. But of course, even those are affected by power structures. Sperm development can be affected. For years, people studied the effects of industrial chemicals on ovarian development but nobody thought about sperm development. That was part of a sexist view of the body, that sperm were protected and it was the egg that was vulnerable. But it turns out that sperm are vulnerable too.

PP: And why do you prefer the term “gender/sex” and not “sex/gender”?

One of my answers is that I just that it sounds better in English. But Sari van Anders is now making a much more detailed answer that if you put sex first, you are still prioritizing the body as if it were something apart. By putting gender first, you are making clear that you think the primary effect is a cultural one on the body. So it is a question of what you think of coming first if you put it gender/sex instead of sex/gender. Both are still being used but I do not know which will predominate in the long run.

AKT: Can I ask a personal question at this point? I find it very difficult to stand the pressure of having two worlds in one mind, the scientific and the STS worlds. And I remember reading Banu Subramaniam, who said, paraphrased, “I went to the lab and when I left the lab I took down my identity as a scientist. And I was very happy to have this long way on campus, during which I could transform into the gender or feminist theory person and go to the next class.”²² That works if you jump from one field to the other. But if you try to do both together, it sucks a lot of energy because we have to combine what has been divided, the mind and the body, and

²² Banu Subramaniam, *Ghost stories for Darwin: The science of variation and the politics of diversity* (2014).

has been so clearly separated into sciences and in social sciences, for so long. Does it also take you so much psychological energy to bridge these two worlds?

Not any more. It was when I was starting out in the 70s and 80s and 90s. It felt difficult because I did not understand myself how they fit together. But as I came to a point where I fit them together then it stopped being a problem. But doing both together does slow down the work because I have to read twice as widely and do harder work to put the two worlds together.

AKT: Can you put the natural sciences and the social sciences together in such a way that they complement each other?

Yes, I mean I am at peace with that, but I was not always. It took probably a couple of decades of intellectual work to get to that point. Also, now I am retired, I do not owe anything to anybody. So who cares? Being retired is incredibly freeing.

AKT: I think the inability to bring these two worlds together is one of the biggest reasons for interdisciplinary groups to break up. Which happens all the time, in my experience. It is so difficult to really open yourself up to another way of thinking. I am glad that you said it took you decades but you managed to find your way.

I have to say again, back to the Pembroke Center, it became very expert at conducting interdisciplinary conversations. By the time of the second seminar that I led there, which was the embodiment of what was going on, the director Elizabeth Weed and people associated with it really knew how to handle an interdisciplinary conversation in a way that encouraged discourse and avoided crazy argument. So that center again became really instrumental in fostering interdisciplinary work. And a lot of well-known scholars now have passed through it at one point or another.

AKT: Is the US system more flexible than the Western European one toward those interdisciplinary encounters, and is this reflected in the different academic cultures and structures—what would you say?

That is probably true, particularly at a school like Brown, where students are allowed to construct interdisciplinary majors. If they do not like any of the 30 or so majors offered to them, they can do their own. There was not a gender studies major for many years, but students made one. And after you suddenly had 20 students a year doing an independent women's studies major, we said to each other: "Okay, it is time to make an official one." Similar things happened with the STS, which we now have as a standard major, which is in itself pretty interdisciplinary. Brown encourages students to be interdisciplinary, although they still really favour departments over interdisciplinary programs. But there are interdisciplinary programs that ended up becoming departments. Usually it takes years and years, but at least there is a pathway.

It always starts with extra work from the faculty who are interested. And eventually if they do the work consistently and there is a lot of student interest, they can get small funding from

the university and then a little more funding. This is how I started STS. I got funding for a group of faculty to read things together, and the funding was to buy pizza, you know? And as it got bigger, we got funding to set up a website, and then finally this year we have got funding to actually hire a faculty member. That was 15 to 20 years of work to get to this point where it is pretty well established as a program that has a certain funding level.

AKT: At least it is possible. I remember PhD students from the US saying, "I have a major in philosophy and a minor in physics," and people in Germany were laughing at them because they assumed if you can put two disciplines into one degree, it cannot be a serious academic outcome. You will learn only a little about physics and only a little about philosophy, they thought.

My experience with European colleagues who work on gender and MINT [mathematics, computer science, natural sciences, and technology] is often meeting people who cannot break out of that rigid system. Particularly in the gender studies area, I have been meeting people who have a terrible time finding work and finding a permanent position.

AKT: Oh yes, this is for instance the case in Germany, where permanent professorship positions in gender in MINT are virtually nonexistent. It seems progress and changes are slow in the US—but at least they are happening.

Yes.

PP: This leads me to my last question: What is the future of feminist research and gender studies? Where do you think we should be going?

Well, I do not know that I can speak about gender studies in general. I have to only think about it in terms of biology and psychology. I think the future is doing research work that has to be developmental. It has to be systems-oriented. I think the methodology needs to turn less toward the quantitative and more toward qualitative work. There is really interesting work going on right now, in which identity development is explored by first asking the subjects using qualitative analysis about their experience in order to form the research categories rather than coming in with pre-existing categories in your head. An opening up of methodologies is needed, away from just the purely quantitative statistical analysis, which dominates psychology in a way that I think is a little crazy. The good feminist research in these fields will start making better use of these other methods.

AKT: That is interesting because the actual trend and the methodological approaches today are based on big data and the quantification of probabilities. This dominates not only sciences but also the social sciences. Against this background, it is interesting that you suggest going in the qualitative direction.

Well, I am looking at newer journals that are focused on the experiences of transgender and nonbinary people.²³ For instance the question of “gender dysphoria,” which is now the only definition in the DSM-5 [the diagnostic and statistical manual of mental disorders, fifth edition] for trans. It is defined very abstractly by psychiatrists as being a feeling of not belonging in your body. But these new journals publish articles in which researchers are actually gathering interviews with trans and nonbinary teenagers. And their descriptions of gender dysphoria involve actual physical symptoms, pain, headaches, feeling allergic to body parts. So there is a whole other dimension of what might be meant by gender dysphoria that they are obtaining by asking the people who experience it. Londa Schiebinger recently was part of a group who published a longer paper on trying to specify what gender and gender effects are in the medical sciences and how you would actually measure them.²⁴ Instead of using a multivariate where you control for it and parcel it out, you ask what is it and what are the things you could measure that would be a gender effect. It involves actually going in and asking people things about themselves.

I think there is a whole move in these newer areas by younger trans researchers, nonbinary researchers, and people who are sympathetic to them to actually ask the people who are affected by the research, what it is they think, and how they feel, how they would make categories rather than coming in with these predetermined ideas. I think this is very exciting.

PP: This brings us back to a long feminist tradition of showing that the split between people’s experiences and the creation of scientific knowledge is wrong and leads to problematic results, and that it is crucial to come up with ideas of how to bridge that gap. Thank you so much for taking the time to discuss with us.

You are welcome!

23 See e.g. M. Paz Galupo, “There is nothing to do about it”: Nonbinary individuals’ experience of gender dysphoria (2021); Marijn Arnoldussen et al., Self-perception of transgender adolescents after gender-affirming treatment: A follow-up study into young adulthood (2022).

24 Mathias W. Nielsen et al., Gender-related variables for health research (2021).

The conversation took place in Bern, Switzerland, on May 19, 2022.

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