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Harnessing the creative power of sex and gender analysis for discovery and innovation

Londa Schiebinger meets Elisabeth Zemp and Elke Gramespacher

Zemp: *Given your long term presence in the field of gender research and of dealing with change, how do you perceive the current situation with regard to gender research?*

Schiebinger: I tend to be very optimist. The current situation is so much better than it was thirty years ago when I started. We have made great strides. We see governments and granting agencies requesting sex and gender analysis for research funding; we see peer-reviewed journals in the natural science, technology, and medicine asking for sex analysis when considering articles for publication (hopefully we can move them onto gender). These are important developments.

If I may, let me say some more about this. As a sign of how established sex and gender analysis have become, December 2013, the European Commission launched *Horizon2020* and identified 137 areas of science and technology where gender analysis could benefit research. These include computer hardware and architecture, nanotechnology, oceanography, geosciences, organic chemistry, aeronautics, space medicine, biodiversity, ecology, biophysics, among others. This is new and important.

This is happening outside Europe as well. Since 2010, all thirteen Canadian Institutes of Health Research (CIHR) have requested applicants to consider sex and gender in their research. CIHR is currently in the process of giving that policy teeth by including the sex and gender components as review criteria for funding. And in the US, the National Institutes of Health (NIH) announced in 2014 that it will be requiring sex analysis in preclinical research, i.e., in research in cells, tissues, and animals.[1] This is huge. And policy change leads to methodological innovation. Lots of fascinating new research on sex and gender analysis in human and non-human animals is coming out of Canada, where the policies have been in place the longest.

In addition to policy changes, we can chart change by understanding that many of us are now senior women in academia. Thirty years ago, you and I would not have been professors at universities. When I was a graduate student at Harvard, there were no tenured women in History. Now there are many. We in gender studies have created new knowledge, we are the experts, and we have been recognized by being hired into senior positions.

Zemp: *Has the way you are thinking about sex and gender changed over time?*

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Schiebinger: Of course!

Zemp: *In what regard? Can you describe how that changed?*

Schiebinger: I published my first book, *The Mind has No Sex? Women in the Origins of Science* in 1989, so I very much hope my ideas have changed! I think, well, I don't know, I don't actually study myself (laughs).

I have always been very interested in how *knowledge* is gendered. In the beginning it was hard for people to understand that knowledge itself is gendered. We understood that women are left out, and we understood that there is conscious and unconscious gender bias in the cultures of science, but we didn't understand knowledge. As an intellectual, social, and cultural historian, I strive to understand how ideas relate to society; that is, how ideas emerge from society and return to society to shape individuals, cultures, science, medicine, and technology. My basic goal has not changed a great deal; that's always been my problematic. I'll come back to this later.

But you want to know about how we understand sex. Sex is so difficult to really understand – and how it interacts with gender. These are things we need to constantly reconceptualise.

Zemp: *For quite a while gender research was structured from a gender perspective. In the last maybe one decade or two, gender research was taken up in the medical area where the so-called 'sex category' was addressed more explicitly, and where the thinking about the two categories, or how they interact, has possibly changed. Do you think that the medical field may reshape thinking about gender in the Humanities?*

Schiebinger: About gender!? In the Humanities?

Zemp: *Yes. Or about sex and gender.*

Schiebinger: Oh, or about sex and gender.

Zemp: *My impression is that sex had been left out for quite a while because gender allowed us to address issues that can be changed through negotiation and political processes. It was the separation of gender from sex that allowed us to address societal issues, such as the place of women in intellectual life, but the meanings of 'sex' remained unchallenged.*

Schiebinger: Yes, right, right.

Zemp: *I mean, thereby, sex was not really addressed by humanists. It was rather left out, 'separated away', in order to discuss another dimension of that complex concept. Do you think that sex/gender issues might be reshaped, that the understanding of sex/gender might be influenced by current developments in the medical field?*

Schiebinger: You asked me before how have my concepts of sex and gender changed. I think, if you look at the Humanities in general, we have changed our idea of sex. It is not that we didn't consider sex. If you take, for example, the problematic of my first book, I was looking at how biological determinism arose in the eighteenth century and why it was so important and how it determined women's place in democratic societies. And so I think that humanists, or at least myself, we tended to see sex differences as the enemy: We didn't want people to think that intellectual capacities, behaviours, and attitudes are based in sex. For example, we argued that women's mathematical ability was not based in sex. We argued further that it was social discrimination that kept women from becoming tenured professors in math at Harvard (for 300 years!), not inability anchored in sex.

That was our problematic in the 1980s. Humanists now seek to understand how sex itself is influenced by society. One of my students Sarah Richardson, now a professor at Harvard, has a wonderful book entitled *Sex Itself* (2013), which is a history of identifying, charactarizing, and defining the X and Y chromosomes. This is a very humanistic project that adds much to our collective unnderstanding of sex – both for humanists and for medical researchers.

I think we have all come to appreciate, problematize, and understand sex better. Anne Fausto-Sterling's work (1993, 2005, 2008, 2012) has been so important. Her article on the five sexes in 1993 was a bomb shell, right? That was so interesting. But then, we asked, *why five*? Why would you stop at five? And what does that tell us about sex? Also Suzanne Kessler's work (1990) on inter-sexed children and how they were fixed according to the discipline of the physicians seeing them: Urologists liked to make males, and endocrinologists liked to make females.

This raises interesting *cultural* questions about sex. I, as a humanist, got much more interested in sex, as something to analyse, over the years.

The 1990s saw the rise of body studies. I summarized some of those fascinating studies in a volume, *Feminism and the Body* (Schiebinger 2000). Nelly Oudshoorn's work (1994) on the birth of sex hormones is one example of how we take something to be natural until a social scientist documents how, in fact, sex hormones are as much cultural as natural artefacts. One measure of how mainstream rethinking sex has become might be that, in 2013, Germany became the first country I know of that established a third gender option – *indeterminate* (means: *unbestimmt*) on birth certificates.

Zemp: *Still, there is this, like – not a plethora – but an increasing number of sex/gender publications and of sex/gender research done in the health area. How do you perceive this body of research and what comes out of this body of research? How are sex and gender conceptionalised in this field of research? Do you think there is an impact, … even if sex has not been left out before...*

Schiebinger: Yes, I know – right!

Zemp: *… do you think there are some implications from this field on how sex/gender is viewed?*

Schiebinger: I do the history of medicine so, as a humanist, I have always been interested in how sex and gender are conceptualized in medicine. I am currently finishing a book on human experimentation (or drug trials) in the eighteenth century. What is so interesting is that women were a regular part of drug testing then. Physicians routinely considered *sex*, *age*, and what they called *temperament*.

The interesting question is when was the study of sex differences (apart from reproduction) defined out of medical research. Or, put another way, when were women excluded from clinical trials (because they were included in the eighteenth century). I don't know because that will be the subject of some of my future research, but I'm guessing it was in the nineteenth century when medical students and military recruits increasingly became subject for experiments (these populations were all men) and when prison populations became increasingly men (prisoners were also routinely used for experiments). Women of child-bearing years were legally defined out of trials in the US in 1977 by the Food and Drug Administration because of the thalidomide disaster.

Then in 1993 the US passed a federal law requiring that women and minorities be included in clinical research. These requirements applied to humans only, and we had the untenable situation that candidate drugs and devices were tested in humans but had not earlier been tested in animals. This can be extremely dangerous and may explain why so many drug candidates fail. As I mentioned earlier, NIH will now require sex inclusion in all preclinical research – with animals, cells, and tissues.

All this means that there is currently a robust back and forth between medical researchers and humanists. While NIH requires that *sex* be considered in research, they don't require that *gender* be included. Canada's Institute of Health Research requests that *both* be included. Humanists and medical researchers will – together, I hope – respond to these needs. But, back to your question… – I don't really recognise disciplines.

Gramespacher: *Why?*

Schiebinger: Because the most interesting questions lay between them. I am a specialist in eighteenth century history before the advent of disciplines. We as humans, no matter what our research focus, learn most from what we now call inter-disciplinary work. Disciplines are arbitrary, and historical, ways of slicing and dicing reality. We need views from all sides. Much creativity emerges from the collision of disciplinary worldviews.

Zemp: *I agree a lot about this too. But it's not the history, as you certainly know.*

Schiebinger: Yes, I know.

Zemp: *And research conceptionalised by different disciplines differs a lot; the questions addressed, the answers given, or the interpretations made vary a lot across disciplines.*

Schiebinger: Let me discuss our Gendered Innovation[2] project because it is robustly interdisciplinary. And let me return to my interest in gender and knowledge that we started with. In science and culture, we have made much progress (if you want to call it that) from the 1970s. People – in science and society at large – generally agree that we need more women in science, medicine, and engineering. People also understand unconscious gender bias in medical and scientific institutions. What people don't understand is how knowledge is gendered. This is the problem Gendered Innovations tries to solve.

I was impressed how social scientists in the 2000s developed specific examples of unconscious gender bias in scientific culture. People *get it*. They understand. These examples traveled through culture. We learned, for example, that scientists – both women and men tend to hire a man applicant versus a woman applicant with the same academic record (Moss-Rascusin et al. 2012). Researchers in the study sent applicant dossiers for a laboratory manager position to 127 professors from biology, chemistry, and physics (the dossiers were identical, only the names differed). Both women and men professors scored *John* higher on competence (4 points out of 7); 3.3 points for *Jennifer*. They also offered *John* a higher starting salary. So this is a quick story that people can convey to each other.

I wanted to create the same kind of easily understood stories for knowledge. I wanted to develop quick examples of how doing sex or gender analysis leads to something better – and new. I wanted to show how gender analysis enhances creativity and innovation. For this, I needed an interdisciplinary team. I was convinced that only an interdisciplinary team could tackle our ultimate goal: to develop state-of-the-art methods of sex and gender analysis, and to provide case studies to illustrate concretely how sex and gender analysis leads to innovation.

Our workshops brought together experts from each specific research field we treated with gender experts (sometimes, of course, that technical expert and gender expert was the same person). Our four main gender experts represent different disciplines: Ineke Klinge in the public health, Martina Schraudner in engineering (she is a biologist by training and so brought also that perspective), Inés Sánchez de Madariaga in architect and urban planner, and Marcia Stefanick in preventive medicine in the Medical School at Stanford. We had many gender experts throughout the project) but these are the four project co-directors.[3]

Gramespacher: *What would you say was the indicator to find out that an interdisciplinary group now can work together? When do they find the same language? When do they have the basics to go on?*

Schiebinger: First of all, the workshops were small, only fifteen people at a time, so it's an intimate kind of situation. We balanced men and women; we balanced for the European Union countries, that sort of thing. That helped already. We might, then, have three roboticists, and three neuroscientists, or three people working in public transportation who worked with our gender experts. The people who were willing to come understood that it was international and inter-disciplinary.

My Stanford team prepared and sent out drafts of case studies and methods ahead of time so experts could prepare. People's creativity is heightened if you give them something concrete to respond to. You may not be able to sit people down and ask them to be creative, but you can ask them to criticise and give you feedback. That often leads to creativity.

One of the first things we did at each workshop was what we might call conceptual translation. I am very committed to knowledge that travels easily across disciplines, meaning that you aren't allowed any jargon. If you use complex concepts – which we all do – you must be able to explain them easily to smart people in other disciplines. So, first we *synced up* our language and concepts (this was done through general discussion and emerged easily from those discussions). A lot of the technical experts had no idea what gender was or what we were talking about. It was as though we were from Mars! But after a bit you saw light bulbs going off. It was an 'oh really' moment. Very transformative – for me and for them. What was so interesting is that we *got it*; we all began to understand each other as we focused on completing our discrete task. It was exciting and vibrant. Altogether, we have over seventy collaborators across Europe and the US, and now we've moved into Asia. This may be the most exciting thing I've ever done. It puts gender analysis into action!

Zemp: *So actually, in the procedure you used, you were relying a lot on 'making understandable', in a reasonable way?*

Schiebinger: Yes. We also did a lot of focus groups. One of our methods is *participatory research*. For the Gendered Innovation project, we employed this method by getting user feedback. That feedback shaped the way we presented our materials. We wanted to understand how engineers *read*, for example. How do they like their information packaged?

People like Gendered Innovations because it's positive. We provide very concrete examples of how gender analysis gives you something new. About 2005 or 2006, I decided we gender theorists needed *elevator speeches* to communicate efficiently how knowledge is gendered. An *elevator speech* is a quick pitch of about three minutes, presumably, the time it takes you to go from the ground floor to whatever floor you are going to, …

Zemp: *…of skyscrapers…*

Schiebinger: …yes. I knew that to get gender accepted by policy makers, government funders, and the general public, we needed to provide specific, eye-

catching examples. The public is not captured by theoretical debates. Policy makers don't care. But you can say: "Look, look at *osteoporosis* research in men, we had a breakthrough, here is a new finding". Or you can quickly give the example of how developing pregnant crash test dummies enhanced automobile safety for foetuses; you can give examples from stem cell research – how including both sexes of cells leads to discovery, or examples of designing assistive technology for the elderly that take into consideration both sex and gender aspects. Or, for industry, you can point out how Google Translate (or Systran, for that matter) defaults to the masculine pronoun. This was completely unconscious gender bias on Google's part. We took the problem to Google. They were shocked and appalled to learn this and are now trying to fix it! This examples helps industry leaders consider how they might design products that benefit their entire market. They might even increase their market share.

One day, I got my chance with a top-level European Commission official, and I had my examples ready. He was amazed. I think the example that got him the most was an EC-funded project to study how the human thorax performs during car crashes (that's our case study *Human Thorax Model*). Every aspect of the human (between the neck and waist) is carefully studied, except breast tissue, which is completely ignored! Breast tissue determines how a seatbelt sits over the body; it can also be dramatically damaged by a seatbelt in a tragedy. The EC official listened carefully, and exclaimed: "Who are these people" making such assumptions? The EC is in the business of creating excellent science. He understood that these types of blind spots impeded excellence.

Zemp: *So, by communicating efficiently findings and benefits of them? I would like to go on into the field of sex and gender analysis. We heard today,[4] from Anne Hammerström's presentation, that there is a line going from gender blindness to analysing sex/gender differences and then on to gender analysis, – do you think it was so linear?*

Schiebinger: No.

Zemp: *Can you comment on this?*

Schiebinger: So, what you're asking is about the development of gender analysis?

Zemp: *Yes.*

Schiebinger: Okay, let me answer in broad strokes. First, we started during the democratic revolutions of the late eighteenth century with the *sameness* argument – think Mary Wollstonecraft. And still, in the 1970s and 1980s, feminism was largely about sameness. For women to be equal, we had to be the same – physically, intellectually, and behaviorally.

Zemp: *…as described by the Yentl syndrome (see Healy 1991; Zemp 2003)…*

Schiebinger: …we argued about intelligence, is it the same? Then came the 1990s and *difference* feminism. We started emphasising gender differences. These differences were generally built on stereotypes, that is, conventional notions such as men are aggressive and women are nurturing. There were lots of problems with difference feminism: It tended to romanticize and reinforce traditional masculinities and femininities. It failed to take into account that women and men across classes and cultures hold many different perspectives and values. Nonetheless, the theoretical move of revaluing traditionally undervalued feminine qualities was extremely important. This argument is still very much alive today. We often hear that diversity breeds creativity. That's based on difference feminism and appreciating difference across ethnicities.

What I'm trying to do is move people away from various brands of feminism to analysis. This is what is at the core of Gendered Innovations. The question is: What are the analytical tools you need to understand sex and gender in research and society. I want to promote *gender analysis*. These are flexible tools people can employ to understand different problems. It's what we humanists call critical thinking.

Zemp: *How do you see the aspect that – although there was this androcentric view in research, this all-male-model – that, let's say, the particular issues regarding men were also left out in research, remained unaddressed*

Schiebinger: ...well, no-normative men...

Zemp: *…ok, non-hegemonic models…*

Schiebinger: …right. Normative models were typically based on middle-class white males in Western cultures. Anyone who isn't that tended to be left out. Also, in the early days, masculinities weren't analysed.

You would be interested to know that in the eighteenth century there was a move to try gender medicine. There were some really interesting publications in the 1780s about health and sex differences. And somehow this never moved forward. We historians find it important to identify potential historical pathways that were not taken.

In my first book, *The Mind has no Sex?* (Schiebinger 1989), I wrote about the search in the eighteenth century for sex differences – beyond genitalia. In the US we are still trying to free ourselves from *bikini medicine* – the notion that men and women are the same physiologically except for genitalia. This way of thinking allows researchers to use male mice and humans as research models, and then to generalize the results to females (often a lethal error).

In 1788, Jakob Ackermann published an interesting book entitled *Über die körperliche Verschiedenheit des Mannes vom Weibe ausser Geschlechtstheilen,* where he catalogued sex differences throughout male and female bodies. In some instances he supported essentialism, i.e., limiting women's role in society based on the delicacies of female bodies. But he also appended a chapter on women's health, arguing that doctors should consider differences in body-build

that might influence the course of a disease. I intend to come back to this in some future work.

Joseph Wenzel, Ackermann's translator, was extremely interesting. He wrote that a sharp physiological delineation between the sexes was impossible, given the great variation among individual men and women. He stressed that one could find male bodies with a feminine build, and vice versa. These are topics worth returning to.

Gramespacher: *What are the main points they made at that time?*

Schiebinger: They were interested in sex differences in order to keep women healthy. This perspective was lost, and we did not return to that question until the women's health movement beginning in the 1970s.

Zemp: *On the Gendered Innovation website, sex and gender appear as distinct concepts.*

Schiebinger: As what?

Zemp: *Distinct concepts*

Schiebinger: I don't…

Zemp: *…not as inter-twined or...*

Schiebinger: Oh inter-acting? Or as twin concepts?

Zemp: *Distinct!*

Schiebinger: Oh distinct! Oh! Yes, I say they are distinct and then I do the opposite, right... They are distinct… and then you have…

Zemp: *…and then you deconstruct them...*

Schiebinger: …you have to see how they work together, ...

Zemp: *…so it is a strategy to put it...*

Schiebinger: …that's a strategy, yeah...

Zemp: *…to put it in such a clear way…*

Schiebinger: At one point, I studied Google analytics to understand how people use our website. Some people only stay for ten seconds. Even if they are there for only ten seconds, I want them to learn something! I tried to make even the titles

a *teaching moment*. So, yes, we distinguish sex and gender, and then we discuss how they interact. Hopefully people come for a couple of hours, and learn a lot.

A major problem is that many researchers use sex and gender interchangeably – that is to say incorrectly. They will be talking about *sex* but write *gender*. High-level researchers today often make the important point that it's impossible to tease apart sex/gender. That is true, but in many instances, people are simply talking about *sex* (biological qualities) and not *gender* (cultural processes). I think that *sex* and *gender* are still useful analytical categories even if we know that they shape one another in ways that often cannot be separated.

One of my major points on website that I don't think I communicate well, or that people don't get, is that gender analysis goes through the whole research process. It's not one question you ask; it has to do with the whole research process. Gender analysis is needed in all phases of research – from funding decisions, project conceptualization and objective setting, to methodologies and ethics, to data collection and analysis, and to making recommendations based on results.

Our methods are designed to assist researchers to integrate *sex or gender* considerations into every step of the research process.

Zemp: *I see the point that people spending little time on the Gendered Innovations website should also take away something. And if a person is doing for example a PhD on gender and asthma, goes to the website: How should this person use the website? Should this person do it the other way round, going to specific topics, guided by in depth interest?*

Schiebinger: Right, a PhD student should go to the case study closest to his/her question. If I were the PhD student you describe, I would read all the health and medicine case studies and then study the methods used. Each method is applied in several case studies so a researcher can toggle between the case study (where it is applied) and method (where it is discussed more generally) for deeper understanding. We cite the literature used. If I were a PhD student, I would read all the literature that is cited to see what more I could learn. And especially in the methods, we cite feminist scholarship that people might find helpful. The website is designed to teach people quickly or to expand almost infinitely for the serious scholar.

Gramespacher: *So would you say your website is not only interesting for PhD researchers but also for politicians, journalists, the whole society as well?*

Schiebinger: Our ideal audience is researchers. However, I later realized that the general public was interested. After receiving calls from a number of journalists, I added a version of each case study called *In a Nutshell*. This is a popular version for everyone. Teachers are welcome to use any of our materials in lectures. They are welcome to simply cut and paste to make the information travel to a new audience.

Gendered Innovations is based on forty years of gender studies of science, medicine, and technology. We are trying to bring this work to a broader audience.

Zemp: *Some people argue for not making gender anymore visible in reporting, whereas others attempt, as you mentioned, to work with Nature or Science, so that these would report the categories of sex. Can you comment on these discrepant tendencies?*

Schiebinger: Well, I think you were saying we went from gender blind, right? So we certainly have gone from gender blind in the 1970s, 1980s. We were really gender blind, and now we know something, but we don't know nearly enough, and we don't know exactly where sex or gender will be important categories to analyse. We just are not sure. So I think we should ask the question. We may find that sex or gender is not important, – but how would we know if we don't ask the question?

Earlier I discussed the important work granting agencies are doing to encourage researchers to integrate sex and gender into research design. A second policy area concerns editorial boards of peer-reviewed journals. Journal editors can require sophisticated sex and gender analysis when selecting papers for publication. Both *Science* and *Nature* have rudimentary guidelines requiring that the sex of the animals be reported. These should be elaborated and strengthened in light of the new NIH and European Commission requirements. On our website we have Policy Portal where we summarize the best journal editorial policies to date that we are aware of.

Finally, we need to integrate knowledge of sex and gender into the curriculum in medicine, the natural sciences, and engineering. It's important to educate the next generation. Some interesting things are going on in this respect, but we need to do more!

Zemp: *Thank you very much!*

Anmerkungen

1 This has occurred in the meantime: see National Institute of Health release of June 9th 2015: Consideration of sex as a biological variable in NIH-funded research. Available at <http://orwh.od.nih.gov/sexinscience/overview/pdf/NOT-OD-15-102_Guidance.pdf> (accessed 2 August 2015).

2 See <www.genderedinnovations.stanford.edu> (accessed 28 Mai 2015).

3 We have subsequently expanded to Asia and welcomed Hee Young Paik, an expert in nutrition, as a co-director.

4 The 11th National Symposium of the Swiss Gender Health Research Network on Developments, Innovations and Benefits of Gender Health Research, 20th of August 2014, at the School of Social Work, University of Applied Sciences and Arts Northwestern Switzerland, Olten, Switzerland.

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