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Interview with Sandra Harding

By Stephanie Urso Spina, Mike Roberts, and Patricia Ticineto Clough

The following interview took place last October. Two members of the Found Object editorial collective and the Center for the Study of Culture, Technology, and Work, CUNY graduate students Mike Roberts (Sociology) and Stephanie Urso Spina (Psychology), with Professor Patricia Ticineto Clough (Sociology), spoke with Sandra Harding at the Center for Women's Studies at the CUNY Graduate Center. Dr. Harding is a Professor of Education and Women's Studies at UCLA, where she also directs the Center for the Study of Women. Her teaching and research interests include feminist and postcolonial theory, epistemology, research methodology and philosophy of science. She is the author of numerous books and articles, including *The Science Question in Feminism* (1986), *Whose Science, Whose Knowledge?* (1991), *Is Science Multicultural?* (1998), and *Decentering the Center* (ed.) (2000). This interview discusses Harding's philosophy and explores some of the controversies surrounding her work.

Harding's position has been critiqued as more postmodern than feminist, as viable without nasty entanglements in feminism, as too concerned with established Eurocentric, scientific discourses, and as appealing to foundational innocence by her concern with realism. But what seems to drive Harding's choices more than anything is a conscious attempt to be effective in intervening in existing systems of power, whether empiricist and postmodern. By taking this position, Harding undertakes a difficult task. Its difficulty, however, is compensated for by the conversations she generates. As a voice not restricted to one intellectual school, Harding demands attention from many with opposing views and provokes scholarly exchanges (arguments) that would not have happened otherwise. So even as we question what may be called Harding's postmodern spin on logical positivism, we respect her advocacy for change and admire her candor and integrity.

Stephanie: A crucial difference between feminist empiricism and feminist standpoint theory has to do with what is known as scientific method. This difference is frequently reduced to a question of objectivity vs. subjectivity, pitting arguments for truth claims against relativism. I know I've framed this debate with a broad and reductive brush, but my purpose is to paint a background against which you might further develop and articulate some of the questions of method you addressed eight years ago in *Whose Science? Whose Knowledge?* How have your ideas, if you'll forgive the expression, "evolved" since then.

Sandra: Let me save the question of what is feminist empiricism for now. When I wrote *The Science Question in Feminism*, I was thinking of empirical researchers in the sciences, particularly in biology, and the kinds of ways they were posing feminist questions. For them, the issue was that there was nothing wrong with scientific method. You're right, that's the way I was talking about it. It's just that there's good science and bad science and, alas, science that has been biased is bad science and so feminism is here to make good science by helping science to follow its own rules a little more carefully than it has done. Feminism raises new questions, such as questions about what is biology and so forth, and it helps science more rigorously follow its own procedures. So, what I meant by this, I named "feminist empiricism." I'm not bragging, I'm complaining because I had to name it because they didn't think there was any reason to name what they were doing. They were just doing good science. And I and other people wanted to talk about a different way of understanding epistemology and philosophy of science and approaches to science where knowledge and power are fundamentally linked. Politics is not in opposition to science or in opposition to epistemology, but it is always involved in epistemology. I just wanted to give a little history of feminist empiricism here, which may not be one that everybody would agree with, but it's the one that shaped the way I think about it. In *The Science Question in Feminism*, I distinguish between feminist empiricism and feminist standpoint theory. I'm really sorry that's gotten so rigidified and popular. I don't know if I'd call it postmodernism but I'd want to talk about it as poststructuralism. Some years later feminists within philosophy

took on empiricism as a particular philosophy dating back to Locke and Hume, with a particular history. People like Helen Longino, on the one hand, and Lorraine Code have all developed what they call feminist empiricism but they're not empirical scientists. They're philosophers who are trying to remake the philosophic tradition of empiricism in the way that I and others have tried to remake the philosophic tradition of standpoint epistemology. So there's this kind of history.

Before I go back to your question, let me say that I appreciate where both of these groups of feminist empiricists are coming from and I think those are very important positions for a variety of reasons. I don't think one should make choices between, say, "who's got the best epistemology." I think they serve very different functions. Epistemologies are, when push comes to shove, justificatory strategies, and you need different justificatory strategies for different contexts. And so I always teach my students to be multilingual in epistemology -- to be able to understand there's no point if the people you're talking to don't understand how you are explaining something. I think feminist empiricism is extremely valuable and I use it myself. I talk feminist empiricism. Sometimes when I'm talking to scientists, they're not interested in the historical and political philosophy issues that standpoint theory is concerned with. They're interested in how to do their research in a way that produces less biased results, whether it's around issues of race or gender or class or whatever. So, if I only have 10 minutes to talk to them, I'm going to talk to them about their methods. Their methods are fine. They're just not following them carefully enough. So that's the first thing to be said,

Now, let me talk a little about the question of relativism. I have ways of thinking about that. But first let me go back a little and say something about positivism and post-positivism. My view is that most philosophers today and many sociologists and historians count themselves as post-positivist. It's a very lively debate, but in some ways it isn't lively in philosophy of science anymore. Since W.B.L. Quine, really, and certainly Thomas Kuhn, most people wouldn't hold the kinds of views that Carnap (OR Carnap?) and Popper had and that I was trained in as a

graduate student of the philosophy of science. So they count themselves as post-positivists, but my argument is that you can't just say no to positivism in the kind of rationalistic way that philosophers and frequently sociologists think they can do because positivism or empiricism — the kind of empiricism we are talking about here — is part of a larger social formation. I'm going to turn Feuerbach(sp?) on his head and say that philosophers who want to interpret the world have to help change it first. Out of new social formations, particularly the ones created by postmodernism and feminism, new possibilities for interpreting the world appear.

Returning to your earlier question, the issue of relativism persistently comes up. It's just so bothersome. And there are a lot of reasons for that, but one way I've adopted to try to get around it is to try to make the question disappear. I don't think it can be confronted and defeated. I think new ways of thinking have to arise that make the relativist question disappear. After all, it hasn't always been a question. It only emerged as a question within epistemology and philosophy of science with Kuhn. It had been a question in ethics since Herodotus(sp) but it's really Kuhn that made it an issue in, if I can put it this way, European diaspora science. Technology studies put relativism on the map, but it was already getting there via post-colonial studies, which were invisible, at that point, to European and European diaspora science studies. One way I get around it is by talking about science not as fundamentally a set of sentences but a set of interventions, a set of practices. Ian Hacking has an early 1980s book called *Representing and Intervening* where he talks about scientists, fundamentally, as intervening in the world. And that makes sense. I think even Kuhn is arguing that when he talks about a paradigm preceding theorizations. You then can't talk about truth in other than a very colloquial way. Truth claims are fundamentally not what science is about. It's about active interactions with the world and, indeed, any scientist would say that the test is whether it works to do what we thought it would do in the world. It's very hard, then, for the issue of relativism to arise because if one is talking about a particular scientific project it is designed for this particular set of interactions. Do they do it or not? You can ask if another set of interactions, guided by another set of beliefs and so

forth, do it more effectively. Take an example such as management of chronic pain. You could ask whether acupuncture practices do it more effectively than western biomedicine and there are other kinds of medical concerns where you give a different answer about which system is effective. Those systems have conflicting notions of the body. The very notion of health, of a body in health or in ill health, is a western notion as opposed to an eastern notion of the body in balance and so forth.

I think standpoint theory, and feminist epistemology more generally, has always been problematic. People haven't been able to understand it because if you reject absolutism you must have fallen into relativism, and yet we've always, from the beginning, rejected relativism too. We reject both and in our view it is entirely possible to make well-founded claims of better and worse beliefs on the basis of how well they work to guide the kinds of practices they claim they can guide. It's kind of an end-play around the whole set of problematics that produce the absolutism versus relativism argument.

Mike: How do you situate your work, beginning with *The Science Question in Feminism* to your most recent work on philosophy for a multicultural, postcolonialist and feminist world, in what has become known as the science wars? How would you explain the conditions that created the science wars, and in your view how have the issues changed since *The Science Question* was first published?

Sandra: I think that the science wars have not been as visible in California as they have been on the east coast. Nevertheless I have a kind of double vision about them. On one hand, they have been a serious pain and created a lot of difficulty for a lot of people and that's unfortunate. They made scandalous some of our work in kinds of ways that's reflected on us. It's hard for some young people to get jobs now. I was to work with the CNRS, the French equivalent to NSF (National Science Foundation), but the appointment was canceled. It was a research position working with people there who are historians of post-colonial science. The duration was only a couple of weeks, but it was just too controversial for the French government to fund me. But on

the other hand, I have to say, these disputes have helped scientists and the general public and people working in other disciplines to catch up with the past 40 years of science studies. Most of these arguments could have been made about Thomas Kuhn, and that's 40 years ago. Thomas Kuhn is taught in freshmen lit courses now, but these folks took their lit courses before that. So, in a way it's been a terrific educational project and I think that's a good thing. I know a lot of scientists who have thought of this as the other side and they're not on it. I think they need to take a closer look at what's being argued by the feminists and post-colonialists. I think that what the science wars did was displace an argument over to post-modernism that actually is targeted elsewhere. For example, most people don't think my work is postmodern. I do in some ways, but it's certainly not postmodern in the way that literary critics are. My work is much more guided by conservative influences like Quine and Kuhn. Even though I may take the philosophy of science into places that others who I share that tradition with wouldn't, it is, in fact, part of post-positivist philosophy. So I think the science wars made it possible to have public discussions about what's been going on in the history of sociology and philosophy of science. In the book that I published two years ago, *Is Science Multi-Cultural: Post-colonialisms, Feminisms, and Epistemologies*, I argue that some of the important themes in the last 40 years of post-Kuhnian European diaspora science and technology studies converge with some very powerful work coming out of the developing world, coming out of post-colonial science and technology studies. I would include somebody like Donna Haraway, for example, in that world. It's a burgeoning literature. Many of its themes are in opposition to European-American science studies, but many of the themes do converge. I think, in a way, the science wars helped make it possible to make post-colonial arguments more easily because everybody had to go back and, without actually cracking the cover of *Kuhn's Structure of Scientific Revolutions*, catch up to 1962, at least.

I think the science wars have died rather completely and I think the conditions that created them have to do more with the inevitable decline of funding for science in the west.

Derek De Solla Price made a prediction back in the sixties that if the number of scientists kept increasing at the rate that it was growing then by something like 2005 everybody in the world would be a scientist. I mean it was just such a *huge* influx of money into the sciences, particularly in the U.S., but also in Europe and the former Soviet Union and that had to end. The spending, of course, couldn't last, but it's sad when it disappears. And now when you look around for who's making trouble about the practices of science, who do they see but us folks.

The other thing I would say is that there's very high right wing funding for the science wars and that's been documented in FAIR (Fairness and Accuracy in Reporting), the Washington-based media watch agency. The National Association of Scholars (NAS), for example, is a huge right-wing funded group of largely scientists, though there are other people in it, that was formed about a decade ago and funded by the Olin Foundation and a whole bunch of other right-wing foundations. What the National Association of Scholars did in about its third or fourth year of existence, which is now about 8 or 9 years ago, was make a concerted effort to recruit scientists for the organization. They ended up with about 20% of the membership of NAS being scientists. It's hard to think through the issues that Kuhn raises. Those of us who spend our time thinking about it still haven't really thought our way through it. It's hard to give up, what should I call it, Liberal philosophy of science, with a capital L, which has, in my view, a lot of strengths to it as well as very serious limitations. But a basic strength is that it seems to explain a lot to people who live in democratic societies and benefit from science and technology. So, I think the science wars have passed their peak and the issues about science, technology and development are getting very hot for a variety of reasons.

Mike: In your essay, *Gender, Development, and Post-Enlightenment Philosophies of Science*, you criticize the Enlightenment for, among other things, a kind of "economistic" thinking, and that because of this, "development" policies designed for the Third World "failed to perceive women's work in the household as real work or, therefore, as activity that contained elements of a history of progress." You add that Marxism also suffers from the economism of the

Enlightenment. To make that point, you refer to the work of Maria Meis, which I find interesting because I think she misses the point about development, and “progress” especially regarding labor saving devices. I have in mind Marxist Feminists like Mariasoa Dalla Costa, who argues that technology develops as a result of workers refusing work, including the refusal of household work. This kind of refusal of work can translate into “progress” because who wants to perform back-breaking labor all their lives? The issue is how workers can find ways to control the supply of labor so they can push the work back up onto the shoulders of capitalists. Mies, at the end of her book, takes the opposite stand, that women in the so-called third world need to re-appropriate work rather than refuse it. It seems to me that Marxist Feminists like Dalla Costa make a persuasive point in that to refuse work is a necessary strategy in any effort to resist the repressive “economistic” nature of the Enlightenment, which is, as Weber points out, bound up with the work ethic. Do you find refusing work to be a viable feminist strategy for a program that seeks to “decenter the center?”

Sandra: I think I understand what you mean. That’s very interesting. There’s a kind of tension in your question, I think, because the marxist account that it comes out of also values work and thinks that labor is fundamental to who we are as humans and how we interact with the world. Getting a long-handled hoe instead of a short-handled hoe is a way to refuse a sort of back-breaking work. I guess it would be refusing physically hard and exploitative work. That may be a little too restrictive a notion of how technologies operate and why they develop. Technologies also developed to make possible kinds of social relations that hadn’t existed before. Think about the information revolution. Those who invented the technology didn’t know exactly what would happen. You can’t control technologies in those ways. Their uses get established through existing social relations and so forth. The telephone, for example, created sets of social relations that were not possible with morse code. Then these were co-opted, in part, by women to maintain kinship relations, which I do all the time on the phone and email. So, technologies are invented

for very diverse reasons in the first place and they then develop in ways that their inventors wouldn't have imagined.

Patricia: What is your take on technology in terms of the rest of the west? Do you think it's helpful?

Sandra: I'm reading Manuel Castell on the Net Society. I'm finding it very useful for thinking about these new forms and societies that exist entirely within capitalism, but it's a different kind of capitalism than the older forms and there are different forms of resistance possible within this than were possible within the older forms. What I like about his work is that he responds to your question without being a futurologist. I mean, I'm interested in looking at the science and technology strain through all that and sometimes he's aware of that and sometimes he isn't. So as soon as I get nourished by his work, I want to go have some conversations with him about it because science and technology are fundamentally the basis of the global political economy in ways that were not the case before the information revolution. I think philosophy of sciences and sociology of knowledge are nowhere near up to it and who knows how to get a hold of it unless you have someone like Castell who's going to put an analysis of science and technology into a political economy analysis that's backed up by that *huge* amount of detail that he got his graduate students to generate in all these cities around the world over the last 30 or 40 years.

Patricia: But that's what's so wonderful about it . . .

Sandra: It's wonderful work and his focus is also on social relations, the relationship of what happens to the state. When I had dinner with him a couple of months ago I asked him who was doing feminist work in this context and I'm starting to track down some of these people, Saskia Sassen, (sp?) who are doing some of this work . . . But somebody like Mies is more in that tradition than she is in any other. She, too, is capable of this global vision of what's happening around women and work. One think I liked about Mies is that she was focused on labor, deeply marxist at the same time she's challenging the foundations of marxism in some important ways, particularly around the accumulation of primitive capital. That still goes on. The arguments

about feminization of labor I think are very interesting. The way that she integrates the feminist analysis of violence against women right into the labor discussions I think is useful.

Stephanie: I'm going to circle back to an earlier topic a bit. Feminist postmodernism challenges the notion that there is a feminist standpoint that can be simply privileged in epistemological questions. There is no one "female" standpoint but rather multiplicities of women's lives and experiences. It also question whether voices from the margins necessarily have an epistemological advantage. I know you have confronted these issues in the past, but would you respond to these challenges in the same way today? Why or why not?

Sandra: The argument was never that there's one feminist standpoint that all women share. Feminist standpoint theory was invented by social scientists, social theorists like Dorothy Smith, who starts from everyday life to ask questions about dominant institutions. So, depending on whether you're starting with the maintenance workers in this building or the nurses in the hospital, you'll be starting from a different standpoint but you will be starting from the standpoint of everyday experience in that sense. However, to start from everyday experience in some particular context, for standpoint theory, is not to have the answers to questions, but simply to pose new questions. It's to get a small degree of freedom from the dominant conceptual framework of, let us say, sociology or history or philosophy of science for that matter. Let me take my own work. In *Is Science Multi-Cultural*, I'm starting from outside the conceptual framework of western philosophy of science, not from outside of all conceptual frameworks, just a tiny degree of freedom to get a critical perspective on it. So, standpoint theory is part of critical theory. It's one of many post-marxian critical theories. It is very much an epistemology, but to start thinking of it from the abstract epistemological position ends up precisely with the kinds of questions that fail to grasp what is actually happening. So, from the beginning I have argued and would continue to argue that, yes, if you want to put it this way, feminist standpoint theory is a feminist postmodernism in that respect. It's always positioned against the god trick. Donna Harraway is a standpoint theorist. It's her language of the god trick I'm using. It's

always positioned against that one transcultural position and arguing that there are many different other positions from which to understand the conceptual frameworks and the discourses of the institutions of society. So, yes, there are a multiplicity of positions. And about voices — I would say that no voices have the “truth.” But I think voices from the margins frequently, but not invariably, ask the kinds of questions that are not even askable from the center. Those questions start off research projects in different directions. So, when women complain how tired they are, for example, if we ask why women have a double day of labor instead of asking the kinds of questions that sociologists traditionally ask, framing it as a “labor of love” in the household, you get a whole different set of issues about how the economy runs, how the boss gets two workers for the price of one. You get a whole different set of questions. I think maybe part of the problem comes from marxism, actually, and standpoint theory is a post-marxism. Of course Marx knew that you needed wine to make French workers and beer to make German workers; that workers were culturally distinct and there is not one proletariat, he understood there was no one proletariat standpoint, yet the talk is about *the* proletarian standpoint. There’s a kind of assumed homogeneity and I think that is part of Marx’s Enlightenment legacy, that Marx is still part of the Enlightenment in some ways. Instead of rational man there’s proletarian man. It’s a homogeneous subject of knowledge and of historical agency. I think Marx is conflicted here. He does understand that workers are different, but a lot of the real difference got defined out of the proletariat, such as women were not central subjects in the proletariat. Housework was not a central kind of labor, slave labor was defined often in other kinds of ways. The lumpenproletariat was not part of the proletariat. That’s his Enlightenment hangover. Now we’ve woken up from that hangover and standpoint theory doesn’t need to, and in fact never did, adopt that kind of position of a homogeneity. Some of the things we say may sometimes sound like they are homogenous, but they’re not. They’re multiple. So it’s difficult to get the voices from the margin. I know you’re talking about can the subaltern speak and should the subaltern be able to speak, and should they, is it still subaltern? Those are very complex and valuable

discussions, but to devalue voices from the margin is a far worse sin than to value them and look at the ways in which they raise new issues for analysis.

Stephanie: Forgive the oversimplification in the interest of time....but another critical difference between feminist empiricism and feminist standpoint theory, as I understand it, is that feminist empiricism sees the problem in terms of discrimination against women and other excluded social groups and the under-representation of these groups in the scientific discipline. They argue that the methodology of science should be maintained, while gender biases should be examined and removed in science education and institutions, as well as in the definition, selection, and funding of research. Standpoint theory claims this is inadequate. In fact, in 1986, in *The Science Question in Feminism*, you characterized empiricism as an incoherent epistemological option for feminists, noting that objectivity is at odds with politicized feminist criticisms of science. Yet, five years later, in *Whose Science? Whose Knowledge?*, you proffer an alternative epistemological option for feminists which you call “strong objectivity.” How is this different from “a kind of theoretical mimicking” of the dominant epistemological tradition of modern science?

Sandra: Oh, my goodness! That’s a very good question. Let me go back first to feminist empiricism. I think that not just feminist empiricism, but all feminists inveigh against discrimination against women in the sciences. And all of us think that if there were more women scientists it would be a good thing for the content of science as well as for the justice issues, but we think so for different reasons and those are the differences between feminist empiricism and feminist standpoint theory. I’ll point out also that feminist empiricism always thinks that men, too, should be able to learn to do unbiased research. Liberalism, philosophy of science, empiricism was always for men as well as women. The National Organization for Women was always for men as well. The problem was not women. The problem was men. So, men, too, as liberalism’s John Stuart Mills says, can learn to be rational, can get rid of entrenched false beliefs and bad attitudes. Let me summarize with two points: First, discrimination against women is a

bad thing wherever it occurs, for epistemological and scientific reasons as well as for political reasons; and second, men, too, should be able to be subjects of feminist thought.

But let me come to this issue of objectivity very briefly. I think that feminist empiricism is incoherent, but, hey, coherence isn't always a virtue. Coherence in a set of false beliefs is not a virtue. I think feminist empiricism has some really interesting arguments and I pointed out the incoherence in it because I think incoherences in a belief system show something that can't be said or that's unable to be articulated. It's putting scotch tape over some kind of problem. If you could articulate the problem you would see the incoherence and then we could try to do something about it. Those incoherences in feminist empiricism and in liberalism more generally are really interesting because they show the kind of semi-awareness of problems that can't be fully articulated within the conceptual framework available, the framework that liberalism provides. This is an ongoing problem. And it's not just a feminist problem. It's just as bad with those who aren't feminists, to put it mildly. I think pursuing those incoherences is very interesting. One of those incoherences is around how they think about objectivity. In *Whose Science, Whose Knowledge?* and a whole bunch of papers I published around the same time, I argue that feminists have noticed that what counts as a problem in the first place, the whole context of discovery, if we can use these philosophers' language—but wait, let me say this more clearly. How was objectivity to be maximized in scientific research? The answer to that is through scientific method. Scientific method comes into play in what philosophers refer to as the context of justification. Scientific method works, and I'm simplifying radically here, by repeating observations across a single observer or group of observers. So, suppose I come up with one set of conclusions and you come up with another after reportedly making the same observations. We can look at assumptions, the way that evidence is being weighed, data collected, and so forth. And oh, say, one of us comes up with this conclusion because we are making racist assumptions and the other is not. So, by looking at the differences between observations and assumptions and techniques used, we can identify and eliminate distorting

assumptions. However, if everybody in a community shares, let us say, eurocentric assumptions, there's nothing in that process that's going to enable them to be identified and that's been the case with eurocentrism and sexism, with racism, with ethnocentrism, with class biases, sexuality, heterosexism. And so feminists and people in these other emancipatory movements have argued that you have to look at the way the question is asked. What counts is the problem in the first place. How is the problem conceptualized? Which hypotheses are favored? What is the design of the research? All of these occur before method even has a chance to get in there. Some of the biased assumptions that sneak in here will get detected, but ones that are shared by the entire research community will not. Therefore, what was referred to as objectivity is, on our account, only weak objectivity because it fails to get any methodological controls over this earlier part of the process and therefore, standpoint theory is one response to that. It says, okay, go start from perspectives that are not part of the scientific community, such as women's tiredness after a double day of work or the effects of third world development on people in the third world. People then can look back and see that development in the third world has been maldevelopment. Something that for decades couldn't be seen by the IMF and World Bank but now can be seen by them. So strong objectivity expands the methodological controls. You're right that, in some ways, it continues using some of the conceptual apparatus and techniques of modern science, but the goal was never to go off to an island and start over, but rather to sort through our own traditions, our own cultural traditions, which include empiricism and positivism, and so forth, and take what's valuable there and update it and reject the parts that aren't valuable. So the idea is not to go native in somebody else's epistemology, but rather to come to a more measured appreciation of strengths and limitations of our cultural inheritance.

Stephanie: Do you think that it's not possible in principle to detect the biases from within? That it always takes someone from without?

Sandra: I don't know the answer to that. But I think that it's less likely. In my more recent writings I refer to it in terms of cognitive diversity for some of the same reasons as biodiversity. Science has this value system, a whole history of understanding...I mean the lowest graduate

student's, and maybe even the lowest undergraduate student's observations are valued just as much as Nobel prize winners', and so forth. The epistemologies do not articulate this point enough, at least to respond to feminist, post-colonial, and similar concerns.

Mike: What are post-colonial science and technology studies?

Sandra: After WWII and after the end of formal colonial rule, as I do not need to tell *Found Object* and its readers, there was a great deal of activism by people in the developing world to rethink their lives and the worlds in which they lived and particularly, to my interest here, their own cultural traditions, their own scientific and technological traditions and what they wanted from the west and what they didn't want from the west. And this project was helped along by their having to critically think about what they were getting in third world development. Third world development was from the very beginning conceptualized as science and technology transferring north to south. You can see it in C.P. Snow's *The Two Cultures* very clearly. The reason why humanists need to understand scientists better is so they can vote right around science and technology issues and, thus, the quality of life in the developing world can rise to that of the rest of the west. So, first of all, there was the problem that development didn't fulfill that promise and, in fact, was increasing inequality for the most part, and science and technology were a central part of that. Secondly, beginning in the mid-eighties, there were a whole bunch of national and international conferences on these kinds of topics, several of them supported by UNESCO, by the Indian History of Science Group, and so forth. I went to some of these and among the publications that came out of these conferences were the new post-colonial global histories that our children now get in elementary school. These replace the old world history books that looked at history as a history of encounters between cultures that were borrowing from each other in different ways through various relations, frequently not friendly. There's a science and technology theme running through all of this literature and the historians have been pulling it out. A major question that has been asked is, are there causal relations between the two great marks of modernity, that are the voyages of discovery, as we were taught to call them, and the development of modern sciences in Europe. The great historian of Chinese science, Joseph

Needham, asked that question in his 18 volumes, or whatever it was, on science and civilization in China. He asked “Why didn’t modern science start in China, which in the 15th century already had a 1400 year old tradition of science and technology that was a lot more sophisticated than what existed in Europe?” And out of these new post-colonial global histories has come a positive answer to that question, namely yes, there are causal relations between the development and flourishing of modern sciences in Europe and the so-called voyages of discovery, which in this literature was referred to as European expansion. Each needed the other for the success of its own projects. So the challenge, I think, for philosophy of science is to update the way we revise and transform the way we think about science and technology and take account of these post-colonial science and technology studies.

Sandra: Thank you for the interview.

Stephanie: Thank you so much