

# RETHINKING GENDER AND INTER/TRANSDISCIPLINARITY IN RESEARCH AND SCIENCES

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## Introduction

It only takes a quick look at the informational materials from the Ministry of Education about graduate education in Colombia to see that more attention needs to be paid to the role of gender in the Colombian academy. Only in one table is gender even mentioned. Not only this, but the images that dominate the documents are heavily masculinized. All but one of the many images associated with educational attainment in Colombia are of Westernized men: their body language is stereotypically masculine, with crossed arms, assertive postures, and they wear business suits and ties and carry briefcases. This suggests a picture of university life in Colombia that is completely dominated by men (MinEducación, 2013, p. 11). On this basis we can conclude that women still have limited access to education and positions of power in the university. In the collective imagination of Colombia, scientists are still a male and secretaries are still a female: most of the time jobs are categorized along the line of sexual differences and follow common stereotypes regarding gender. Although sexism and gender discrimination are part of Colombian machista culture as a whole, there is an urgent need to interrogate gender dynamics in sciences and research.

Colombia is not an isolated case: men are overrepresented in the domains of research and science around the world, and more often than not white men represent the embodiment of the “scientist”. Hanson argues that even if girls and boys have the same interest in mathematics and natural sciences, the collective imaginary still presumes “that boys are “naturally” better” than girls in these domains (Hanson, 2012, p. 115). In addition to the masculine hegemonic postulates of science, we urgently need to rethink our ways of making knowledge. The sciences are going through a general crisis, mostly due to an outdated insistence on positivism and objectivity (Curiel, s.f., p. 3). This is directly correlated to the fact “that the foundations of modern science were forged in and through gendered imagery and language” (McNeil & Roberts, 2011, p. 32).

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In light of this situation, it is essential to interrogate how we can improve not only women's presence but also their agency for transforming how we produce knowledge in both the natural and social sciences. Toward this end, this article provides a reflection on the necessity of both attending to gender across the academy. Furthermore, in today's globalized world, it is essential that Colombian scholars open their disciplines to inter/transdisciplinarity. In this article we show how a focus on gender offers invaluable tools for accomplishing this task.

One of the most important feminist insights in epistemology is that knowledge must be situated. Our own positions as postgraduate students from North American living in Colombia shapes our vision of gender and inter/transdisciplinarity. We are convinced that adopting a focus on gender would lead Colombian universities to an inter/transdisciplinary approach to scientific investigation and research that would benefit both society and the academy. Interactions between the diverse branches and disciplines in sciences will favor a better comprehension of the world and foster equity.

In pursuit of this objective, in this article we argue that attention to gender can transform knowledge production across the academy. We first define the key terms of our discussion. Second, we offer a reflection on why gender matters in the academia. Then we insist on the necessary adoption of gender perspective in sciences, showing how gender studies can contribute to inter/transdisciplinarity. Fourth, we explore how disciplines and research methods can be transformed through the adoption of inter/transdisciplinary approach. Finally, we seek to initiate a dialogue on transversality in contemporary academia in Colombia.

## Conceptual Clarifications

In the field of social sciences, and more generally in our daily lives, we tend to think that we know the meaning of terms like "sex", "gender" or "interdisciplinarity and "transdisciplinarity". However, for the purpose of this article, it is important to clarify the definitions of each of these terms.

## Sex and Gender

Defining gender is an extremely difficult task; in fact, it is most likely impossible. However, it is also important to understand what is generally meant by the term gender, and particularly by the distinction between sex and gender, a distinction that has currency in the social sciences since around the 1950's.

When human beings come into this world, they are generally labelled according to their "sex", most often according to the binary categorization of man or woman, with few other possibilities. The term "sex" most often refers to biological sexual difference. Sex is therefore understood to be natural and innate. Most of the time, it is associated with sexuality or sexual acts. In that sense, the term "sex" is important that a lot of people identify themselves strongly with their sex: in that sense, it can also be a mode of subversiveness, on the same level than gender.

Gender, on the other hand, has come to be used to describe the social identities, roles, expectations, and norms that are often connected to biological sex. When we talk about gender, we are normally talking about a concept that sits somewhere in the meeting point between bodies, social norms, and identities. Gender is performed, chosen,

socially conditioned, and produced, depending on how you understand it, but the important point is that it is cultural, as opposed to natural. Most feminists argue that gender is “an intersubjective social construction that constantly evolves with changing social perceptions and intentional manipulation” (Sjoberg & Gentry, 2007, p. 5). Gender is thus intrinsically linked to power relations between sexes and it is also related to expected attitudes and behaviors that go along with the determined sexual identity of each individual. It is consequently an essential element of how people interact with each other, permeating all of our lived experiences. The fundamental aspect here is that gender has no precise body representation; it is not made in isolation but always in interaction with others.

The work of the philosopher Judith Butler has been extremely influential in shaping our contemporary conceptions of gender. To begin, she actually refuses the distinction between sex and gender, since “biology itself does not escape discursive formation” (Lennon, 2010). Butler contends that : “[i]n distinguishing sex from gender, feminist theorists have disputed causal explanations that assume that sex dictates or necessitates certain social meanings for women’s experience” (Butler, 1988, 520). According to her, “sex” is also “materialized through time” (Butler, 1993, 1), therefore influencing and influenced by norms.

For the purpose of our analysis, it is clearly important to consider both gender and sex, both biology and society, and especially the relation between nature and culture, which invokes and calls into question scientific inquiry. Butler’s work shows that the nature/culture division is not so strict, clear and simple: culture and nature influence and bound by each other. This mutual influence is also central to the analysis of sex and gender issues in social sciences: although some people might think that in social sciences

we should only be interested in the sociocultural aspects of identity, and therefore concern ourselves only with gender, these two concepts are deeply interconnected. For this reason, it is important to study both sex and gender, as well as how they interact, through the lenses of both the natural and the social sciences.

### Inter and transdisciplinarity

The last decade has been marked with rapid changes regarding knowledge sharing and global technologies in most part of the world. This has brought to the forefront the necessity of dialogue between disciplines, which we can frame as interdisciplinarity or even transdisciplinarity. These modes of knowing are difficult, but they provide indispensable tools for research and science.

What is the role of the disciplines in the production of knowledge? Hornscheidt and Baer characterize the academic disciplines as “fragile but long-living artefacts which, in turn, have a strong impact on how knowledge is organized and understood” (Hornscheidt & Baer, 2011, p. 166). Simply put, disciplines can be understood as “cognitive divisions in research and university communities” (Linason & Holm, 2006, p 117). These divisions are important, but they also limit our perspectives. In particular, they are also strongly tied to their cultural contexts, which justifies even more the gender perspective in science and investigation. For example, the distinction between sciences related to ‘nature’ and the others related to ‘culture’ has strongly been associated to gendered conception of the world (Hornscheidt & Baer, 2011, p. 166), as women have tended to be associated with care professions for example. It should be noted that the two concepts we want to explore here, interdisciplinarity and transdisciplinarity depend

on the existence of disciplines, and are consequently not seeking their elimination. Instead, they seek to challenge and call into question the ways that we allow our work to be defined by disciplinary concerns.

In this article, we understand interdisciplinarity as the action of coming and working together from different disciplinary methods and perspectives around mutual concerns. As Hornscheidt and Baer argue, interdisciplinarity is a “way to conduct collaborative research between two or more disciplines, combining their respective hypotheses, assumptions, methodologies and findings” (Hornscheidt & Baer, 2011, p. 169). Interdisciplinarity is a step beyond multidisciplinary; it insists on the relationships between the disciplines and not only the superposition of disciplines. Interdisciplinarity thus distinguishes itself from multidisciplinary in the construction of theoretical frameworks that traverse the disciplines and, in the end, can contribute to the creation of a “new synthetic fields of study” (Lykke, 2011, p. 139). It implies collaborative work on a common field with common goals, but incorporating different approaches to a problem. It is, in a sense, the action of “learning how to learn in alternative ways” (Hornscheidt & Baer, 2011, p. 170).

Tightly related to interdisciplinarity, transdisciplinarity is a more recent concept and can be understood as a “critical evaluation of terms, concepts, and methods that transgresses disciplinary boundaries” (Dölling & Hark, 2000, p. 1195). Transdisciplinarity goes beyond the mere relationship between disciplines as it considers that the latter are “less constituted around a core than organized like knots in a netlike structure” (Dölling & Hark, 2000, p. 1196). According to Pérez Matos and Quesada, transdisciplinarity is “inherent to disciplines”, “between disciplines, within disciplines and beyond disciplines” (2008, p. 2). Thus, contrary to interdisciplinarity,

transdisciplinarity pushes further the interaction and goes beyond the framework of a given discipline. Therefore, collaborative and constant work is indispensable to building transdisciplinary knowledge. Transdisciplinarity has been widely explored by gender and feminist studies, as gender is not a concept or reality that “fits” neatly into any predetermined discipline. On the contrary, gender transcends disciplines and builds bridges between them. This has monumental implications for how we study and produce knowledge. Gender is truly inter/transdisciplinary, because it requires constant collaborative work between and across disciplines. In this sense, attending to gender has the potential to revolutionize and transform what and how we know, promoting a university that is not only more just, but more far-reading, rigorous, and robust in the kinds of knowledge it produces.

### Why Gender Matters

Gender does matter, and not only because the discussion regarding the topic is gaining attention. Gender is everywhere in our everyday lives. There is no escape; as Butler said, “we are undone by each other” (2003, 13). Although we don’t always realize it, we face gender power relations every day. Sex and gender are related not only to specific facts and situations, but more importantly to power relations and structures. Gender is one of the most important ways in which power relations are signified (Acker, 1992): relations between a father and a daughter, in a couple, between society and transgender, between two kids, between a government and its population or between a boss and an employee. These relations and structures of power are very multifaceted. They are culturally and historically specific. They have economic, political, social, religious, relational, and ideological/philosophical aspects.

Gender matters because it is linked with so many other social, political and economic factors. Feminist and gender studies use the term intersectionality to express the overlapping of “contexts and social forces such as race, age, gender, sexuality, income, nationality” (Ackerly & True, 2010, p. 30). Gender never function on its own; it always intersects with other categories or social meanings. Two of the most important of these are race and class: because they inevitably intersect with gender, attention to gender is absolutely essential to building an understanding of both of these categories (Crenshaw, 1989; Collins, 1986; Anzaldua, 1999; Anzaldua & Moraga, 1981). Furthermore, gender is a key factor in many social inequalities, including labor and wages, pay, health care and vulnerability to illness, and political access. If we want to study, understand, address, and change these inequalities, attention to gender is absolutely essential. The academy is no stranger to these inequalities: many of the power structures in the academy are deeply unequal. Gender is a relevant category for all knowledge production, since institutionally-recognized knowledge has been a privilege of white men. In this sense, together with other categories, gender allows us to critique and transform an unequal and unjust orientation that has plagued mainstream academia since its inception.

However, it is not only in pursuit of equality that gender should become a transversal issue in the Colombian academy. Equality is important, but the potential benefits of attending to gender go far beyond simple numerical equality. Adopting a perspective that takes gender into account also leads to more objective and robust research. It has been proven that adopting gender diverse groups in research and sciences in general has a positive impact on production and efficiency. Campbell, Mehtani, Dozier and Rinehart show that “[G]ender diverse groups tend to collaborate more effectively and exhibit higher collective intelligence” (2013, p. 1), increasing the quality of

researches produced. The transformative potential of gender as a category in the academy is inestimable, it “disrupts traditional ways of knowing to create rich new meanings” (Hesse-Biber, 2012, p. 3) and ways of living and studying within the academy.

It is important at this point to recognize that gender cannot be reduced to the category of women. Sexed and gendered bodies are numerous and varied. However, the struggle for gender equity has often been reduced to seeking equality for, overlooking the gender and sex related challenges faced by many other groups and individuals. This is highly problematic and we certainly do not wish to reinforce this tendency in this article. However, in this article we will begin by focusing on the way attention to gender, and in this case especially to women, has transformed the sciences. Women are proportionally a large population group that nonetheless face significant and widespread discrimination in the sciences. For this reason it is important to understand how and why women have been excluded, either deliberately or because of the social pressure exerted by research culture from disciplines traditionally “reserved” for men. The core idea is to draw attention to the ongoing discrimination women are experiencing because of their gender, with an eye to how this reflection can have an impact on Colombian universities.

Across the human and natural sciences, women occupy fewer positions of power and influence. Not only this, but in most disciplines women are not equitably represented, if at all, in the canonical literature. Why should this be the case? According to Jesse, the debate regarding women in science and engineering presents a lot of contradictions. Some experts assert that women are simply less capable than men, which would explain why they are rarely part of the top echelons. This is consistent with the historical

characterization of women as the “weaker sex”; most of the time, science has legitimized their “inferiority” compared to men (Hesse-Biber, 2012, p. 7). Others affirm that on the contrary, women are just as capable, as evidence by the fact that women are gaining territory in nearly every discipline (2006, 832). What is undeniable is that there is a clear underrepresentation of women in both the natural and social sciences. A recent study showed that little “more than a quarter (29%) of the world’s researchers are women, according to the latest UNESCO data covering 121 countries” (Hearn & Husu, 2011, p. 104). Recent research shows that women are generally excluded not because of their lack of interest in the sciences, but because of gender discrimination (Jesse, 2006, p. 831). We must ask crucial questions therefore, about who are the scientists, who produce knowledge, for which public they produce it and how gender studies can transform this through inter/transdisciplinarity.

Is it possible that the biological demands of motherhood simply do not coincide with academic careers? In other words, as Jesse asks, “Are women simply asking for too much? Are interest in healthy family life and the pursuit of science mutually exclusive?” (2006, p. 833) Setting aside the issue that not all women are mothers, as Jesse demonstrates, the real issue is that women have been historically excluded from sciences not because of objective needs created by their biologies (their sex), but because of the general stereotypes attributed to their gender or what society is expecting of a good women. Women have been excluded from the academy on the basis of assumptions that they are not able to do the work in science as well as men, while men are tagged with the stereotypes that they are ‘made for science’. Following these assumptions reason, women have been labelled as more capable for so-called “care professions” (ex.: education, childcare, nursing, etc.) and less competent in fields of study relating to sciences, technolo-

gy and engineering. These cultural norms and stereotypes about women and men are perpetuated to this day: men are associated with their control over nature (and by extend, over women) and women are seen as givers of life and care. Women are considered to be less rational, in contrast with the rationality and logic attributed to men. This dichotomy between rationality and emotions perpetuates a vision of women as unable to confront a ‘masculine world’ represented through the lenses of objectivity.

There may be some truth to the notion that there is not a great fit between women and the academy, but it is not because women are unfit. Instead, having been traditionally excluded, women who now enter the academy find themselves in institutions that have been male dominated for centuries. This historical trajectory has resulted in particular, androcentric cultures in nearly all of the disciplines, and especially those that most thoroughly exclude women. From this perspective, we can see that many aspects of the institutional functions of the disciplines are a product of being male-dominated. For example, disciplinary attitudes about what constitutes good or valid knowledge production often prioritize traditionally “male” values, such as autonomy, assertiveness, competition, individualism, and even arrogance. Women may find themselves uncomfortable in environments where they are penalized for collaborating or expressing their uncertainty. This is not because they are unable to cope with the “rigorous demands” of their discipline, but because the discipline is institutionally unable to cope with alternative and equally valid methods of working, many of which tend to be more productive. This is certainly the case with collaborative work, which has finally been recognized across the sciences and especially in the natural sciences as much more conducive to high quality research and results. Other institutional aspects of the academy that unnecessarily and unfairly disadvantage women include

labor and employment practices that are not helpful for parents, including sufficient maternity leave, childcare assistance, and flexible scheduling, as well as internal cultures of misogyny and sexual harassment (Bug, 2003; Haslanger, 2009).

### Women in the disciplines: agents of transformation

“Long before second-wave feminism, Simone de Beauvoir (1988) alerted many to the persistent alignment of women with nature and of men with culture and technology in Western societies”(Maureen McNeil and Celia Roberts 2011, p. 32).

In what follows, we will show how attention to gender, and specifically to the inclusion of women and their perspectives, has already transformed the content of numerous and varied academic disciplines. Unfortunately, just as women have traditionally been excluded from the academy as teachers, researchers, and students, so women have often not been considered valid objects of study. Women’s lives, bodies, perspectives, desires, and experiences are considered less pertinent to study than their male counterparts. As women have become more present in the academy, they have been to question why women and women’s lives and experience are not a more common and respected object of academic study. Over the last few decades female and feminist scholars have attempted to address this inequality. The remarkable result has consistently been not only an inclusion of women within the boundaries of disciplinary study, but also a transformation of disciplinary boundaries themselves.

One of the first to experience this transformation is been the discipline of history. Studying women’s lives throughout

history has dramatically changed the disciplinary boundaries of what constitutes the proper object of historical study. Much of human history preserves the actions and lives of men. This gives rise to the perception is that there are not a lot of famous women in history or that women have not really done much ‘worth remembering’. But, as we mentioned before, the historical condition of women has confined their spheres of influence to be more private and relational because they were excluded from the public sphere. Focusing on women’s lives, therefore, shifts the focus of historical study towards spheres of life that are more interpersonal and private, away from the traditional public and political spheres that defined, most of the time, androcentric history (Scott, 1986, 1996; Riley, 1989). This has impacted the entire discipline of history, as private and interpersonal actions and events have come to be considered legitimate and important objects of study across the discipline.

Philosophy, to this day a highly male-dominated discipline, has traditionally disregarded and dismissed women (Lombrozo, n.d.). The common cultural assumption that women are less rational is used to justify the historical exclusion of women from philosophy and from the philosophical canon. However, the notion that women are somehow less rational is a misogynistic stereotype that has been disproven and continues to be disproved every day, as more and more women join the ranks of the most accomplished researchers in every discipline. Furthermore, incorporating the wisdom and truth derived from women’s lives and experiences has also changed our understanding of the role of rationality in human life. Philosophical moral theory in particular has been transformed by including women’s perspectives. By attending to what women learn from parenting, for example, has led to the development of moral theories that justify morality not only through rationality and autonomy, as they have traditionally

been defined, but also through care, responsibility, and interdependence. Care ethics is one of the most important examples of this transformation (Ruddick, 1989; Kittay, 1999; Kittay & Feder, 2003; Held, 1993, 2006).

Economics has undergone a similar transformation. Traditionally, economics and other financially related fields are gender blind. This is ironic, since in many cultures women have been barred from property ownership, many kinds of employment, and in some cases even handling money. Thus it is no surprise that even today, most of the important money handling positions in the world, including stock brokers and C.F.O.'s of large corporations, are male. In recent decades, however, feminist sociologists and economics have begun to turn their attention to the ways that gender intersects with economics. Paying attention to women's labor brings to the fore all kinds of interesting new areas of study. These include the role of kinship relations in economies, pay inequality and parental and maternal leave, surrogacy and health care access, and patterns of women's labor migration in the context of north-south relations (Fraser, 1997; Okin, 1989; Sen, 1999). Feminism has also transformed Marxism, which despite its progressive agenda, in its original forms was blind to the special position of women. Feminist Marxists like Hartsock and Hennessy have attempted to critique and amplify Marxist analyses to include an explanation for the sexual division of labor (Hartsock, 1983; Hennessy, 1993, 2000, 2003).

In psychology, studying women has transformed how we understand process of knowing and decision-making. Models for human psychological and moral development were traditionally been predicated on the universal male model. By this standard, women's ways of knowing often seemed to fall short of true rationality. Feminist psychologists have emphasized that women have their

own ways of making moral decisions, ways that rely more on relational harmony and collaboration. Whereas models like those of Piaget and Kohlberg saw this as a lower level of development, scholarly attention to women and their "ways of knowing" framed these modes as alternative and equally important aspects of the human psyche (Gilligan, 1982). Contemporary feminist neuroscientist Elizabeth Wilson works on the assumed distinction that mind is active and matter is passive. Psychiatry and psychology to this day still separate the two, treating either mind, through cognitive or talk therapy, or body, mostly by the use of pharmaceuticals that change the chemical functioning of the body. By using insights from feminist theory to draw attention to the interactions between matter and mind, and the agency of matter in neuroscience, Elizabeth Wilson is opening up new clinical possibilities for treating disorders like hysteria, bulimia, and depression (Wilson, 1998).

Attention to the insights generated by feminist theory is also transforming the so-called "hard sciences" like physics and engineering. For example, Karen Barad is a feminist physicist at the University of California at Santa Cruz. She looks at how Niels Bohr's experiments proved the feminist idea that there is not really a strict separation between the scientist and what she is studying. The way the scientist chooses to set up the experiment influences what kind of reality can be known. She develops this into a theory called agential realism, in which both matter and humans co-create reality. This leads to a revised understanding of objectivity, as well as an understanding of the fact that our scientific practices are also ethical decisions that change the shape of the world (Barad, 2008). In the engineering fields, feminist engineers look for ways to pay attention to emotion and affect in their design and structures as to incorporate a less objective vision of reality (Durlach, 1990).



Sex and gender are hugely significant for medicine. This is unsurprising, since medicine fundamentally has to do with bodies. Ironically enough, however, medicine has often assumed equality and similarity between men and women when it should not. For example, male bodies have long been taken to be the medical universal. In the U.S. it wasn't until the 1980's that researchers started to question this and call for more women in clinical trials. Until that time drug tests were conducted almost exclusively on men, even though women consumed 80% of pharmaceuticals. This means that women have been given doses that were tested and approved for men's sizes and metabolisms. Research has shown, for example, that women's bodies eliminate acetaminophen at only 60% of the rate that men's bodies do. One reason that women have not been studied more in clinical trials is that researchers think men's bodies are easier to study, that women's hormonal cycles and the fact that they can get pregnant just make them more costly and difficult to study. For this reason, there have been almost no studies done on the effect of drugs on pregnant women, and women are twice as likely to have an adverse reaction to a drug than men. There are also equity issues, in that research dollars aren't equally allocated to men and women, even though they are both half the population. For these reasons, organizations like the World Health Organization have begun initiatives to pay more attention to specific challenges that arise in health and healthcare because of biological and sociocultural differences.

On the other hand, sometimes medicine problematically assumes difference when it should not. For example, for a long time it was assumed that heart disease was a men's problem. Women were often misdiagnosed or failed recognize the symptoms of heart attacks because it was assumed that they were not really vulnerable to heart problems. However, researchers now realize that heart disease is one of the main causes of death for women worldwide. Similarly, researchers

in the medical field are now realizing that gender and social identities play a huge role in health. This is particularly the case because of the ways that many economic realities end up disfavoring women. Women are more likely to be unemployed and thus to have limited access to health care and/or health insurance. For example, U.S. M.D., Paul Farmer, who worked on the aids crisis in Haiti, writes that women are especially at risk for AIDS because of their poverty, which is due to lack of access to employment (Schiebinger, 2003; Farmer, 2001).

The field of law studies is also important to analyze here as an inter/transdisciplinary approach coupled with gender studies would give a special significance to issues that affect women, young girls or LGBTBI collectives. A few examples are sexual and reproductive rights, domestic and gender-based violence or gay marriage. In fact, attention to gender brings forth existing social inequalities and an integrated inter/transdisciplinary approach would foster the representation of women in courts and more generally, in politics.

At any rate, gender studies and law studies cannot be separated: the increasing participation of women in gender degrees at university is demonstrating the need of an inter/transdisciplinary approach to law and human rights. In this sense, authors like Alda Facio have been criticizing the constitutive sexism of law studies and practices. Facio also pointed out that generally, critiques to law have been focused on being sure that women could do the same thing that men lawyers are doing, the way they are doing it, while not changing the structural problem of patriarchy within the discipline (2000, p. 17).

In fact, Facio argues that all the objectives that women try to obtain with regards to gender equality are also governed by the legal construction of patriarchal frameworks. These frameworks are subordinated to the objective vision of reality that constitutive of law studies. Even the intrinsic

language that supposedly defends women's rights is paved with machismo as historically, the subjects and objects of human rights have been men as the widespread use of *hombre* and *homme* in Spanish and French to represent human beings in general. Therefore, what is really needed is a complete change in the frameworks and this can be made possible thanks to a transversal, inter/transdisciplinary focus on gender.

On the basis of all of the above examples, we affirm that scholars and universities need to pay attention to gender to transform our respective disciplines. Not only does this address longstanding inequalities in the academy that fall along gender lines, but it also opens up disciplinary boundaries to transformation and renewal. However, it has another significant benefit as well. Studying women has also transforms how we understand women, including how we construct the very categories and conceptions we use to think about sex and gender. For example, in the field of literature, as more women writers have entered the canon, it has become clear through their writings that there is no universal woman. Authors such as Gloria Anzaldúa have unmasked the Anglo bias of traditional feminism and been the driving force behind the emergence of both women of color feminism and transnational feminism, which tie questions of gender and sexual oppression to issues of racial oppression, the construction of identity, and global politics and economics. Gender relations cannot be understood apart from their relationship to issues of race and class, since these often interlock and cause distinct forms of oppression, for example, for poor women of color, whose challenges might be different than those of white rich women (Anzaldúa & Moraga, 1981; Lorde, 1984; Davis, 1981; Hull, Scott & Smith, 1982; Collins, 1990).

Some of the most important work in reconfiguring how we understand sex and gender is being done in

biology and psychology. As feminists have challenged the "construction of women as passive", they have opened up conceptions of the body, how it is "made, performed or enacted", insisting on "transsexual and intersexed bodies for example" (McNeil & Roberts, 2011, p. 32-33). For example, they question reductionistic assumptions about the link between genes, hormones, and sexual traits with behavior and roles, and question assumptions about the evolutionary roots of human sexual behavior. In her article "Sexual Natures: How Feminism Changed Evolutionary Biology," Patricia Gowaty describes how "parental investment theory" from the 1970's defends the idea that in most species it is biologically preferable for mothers to be more invested in parenting than fathers. This supposedly favors aggressive, competitive males with many sexual partners and passive, discriminating females who prefer monogamous relationships. Although many scientists have offered suggestions for why this is the case, feminist biologists show that these results simply support existing gender stereotypes and most experiments and species do not clearly show this tendency, and that other explanations about behavior and evolutionary history, such as that these variations are due either to chance, or to the situational context of the experiment, might be actually more accurately explain the data (Gowaty, 2003). Neuroscientists have undertaken similar questioning of deterministic assumptions about the relationship between biological sex and gendered behavioral norms. Cordelia Fine, a Canadian neuroscientist and psychologist, for example, has written a fascinating book called *Delusions of Gender: How Our Minds, Society, and Neuroscience Create Sex Difference*. In it she shows how many studies that seem to "prove" the relationship of sex to gender norms are actually deeply flawed in their methods (Fine, 2011).

## Transforming Science and Knowledge

Looking at the disciplines in science through gender lens exerts a transformative influence on both disciplinary boundaries and to our conceptions of gender. Gender itself as a category has changed immensely. It has become a category of historical, anthropological, and sociological analysis. Research has shown how gender norms, gendered institutions, gender representations, and gender identities change over time and in various cultural contexts. These changes have de-essentialized gender, and also destabilized many essentialist, reductionist, and deterministic arguments and understandings of why gendered inequalities exist. Gender now encompasses a large variety of other sexual identities, including homosexuality, transsexuality, androgyny, intersexuality, etc. Heteronormativity, masculinity, and alternative family and kinship structures are all being studied as part of a broad interest in gender.

Yet this is not all! Attending to gender in the academy brings about a radical revolution in the very categories of knowledge we use to frame our research and our ideas. Feminist studies and perspectives are having an increasingly important impact on how we do research and how we create knowledge, transforming the traditional way of seeing reality for a highly intersubjective vision of reality. These changes in turn transform our foundational categories and methods of research. And contrary to what we may think, these changes are not only occurring in social sciences, “but increasingly also in the natural, medical and technological sciences” (Hearn & Husu, 2011, p. 106).

Let’s begin with the human sciences. In the disciplines of sociology and history, studying the particularities of women’s experiences has led to the insight that the notion of experience cannot be a foundational category for historical or sociological analysis, because experiences

themselves need explanation. Experience, like subjectivity and knowledge, is at least in part produced by structures of power and inequality. It is not possible just to report what people experience; we must also analyze why their experiences take the form that they do, and we can never do this with full and complete separation from our own experiences and perspectives (Scott, 1991). Similarly, Marxist feminism, with its attention to the epistemological effects of gender, has deeply undermined the possibility of a universal knowledge or knower. Attending to the difference of women’s positions, perspectives, and experiences has demonstrated beyond a doubt that a person’s interest and social situation influence what and how he or she knows. Therefore, to get anywhere close to full and/or objective knowledge, we must recognize and include a variety of situated perspectives (Haraway, 1991).

This is true, not only in the human sciences, where interpersonal knowledge plays an important role, but also in the hard sciences. This insight has also been significantly developed by feminist scientists and feminist scholars in science studies. Feminism has therefore revolutionized our conceptions of what constitutes knowledge, as well as the nature of the conditions of objectivity and truth (Harding, 2006). By showing the impartial and situated nature of human knowledge, feminists have demonstrated a need for a diverse community of knowers. This framework integrates knowledge and justice at the deepest possible level, by convincing us that we cannot know fully if we do not take into account the widest possible variety of perspectives, including those voices that have traditionally been marginalized and excluded (Harding, 1991, 1998; Longino, 1989, 2001). This means that feminism is not just about gender discrimination; the feminist lens helps us to attend to the truth and knowledge of minorities that have been historically marginalized, including for example, indigenous communities, largely prejudiced for their way

of acquiring knowledge as it was not aligned with the Cartesian and European vision of the world.

The notion of situated knowledge is essential to any form of investigation: the researcher is never fully separate from the object of its study. Researchers need to acknowledge their own positions in relation to what they are studying. This leads to all kinds of interesting methodological challenge, since we can no longer assume that the outside observer is either objective or has a privileged view on the truth of the situation. Instead, the relationality between knower and known plays an irreducible role in knowledge (Haraway, 1991; Haslanger, 1993, 1995). This means that knowing is actually an ethical endeavor. Who knows, and in what way they know are aspects that must come to the fore in every investigation. Knowing therefore has a justice component. We need knowledge practices that keep issues of justice in mind, that are not only rigorous but also inclusive. If every perspective is situated and partial, knowing also means realizing our limits. We need to create knowledge-making practices that are responsible to these limits. This means that the conditions of proper academic knowledge need to account not only for objectivity, but also for humility (Code, 1995, 2006).

Overall, feminist insights have shown that it knowledge is never objective and neutral. Instead, it is a value-laden practice. Looking at science through the lens of gender can help us be aware of how to make the academy more inclusive and diverse. This in turn encourages us to pay attention to how science is communicated, including responsibility for language and metaphor. Feminist scientists point out that gendered metaphors have traditionally played a key role in science, and gendered assumptions are often imported into their descriptions and methods. For example, anthropologist Emily Martin shows how science textbooks on reproduction describe eggs, the female contribution, as passive, while

sperm, the male contribution, as active (Martin, 1996). For many years the active role of the egg in fertilization was not recognized, because it was not studied, because of the assumption that all things female are passive. Science that takes gender into account also pays attention to equity and ethics in the conditions of knowledge production. This is not simply a question of how many women scientists or scholars are in the department. It is also a matter of questioning the attitudes and values that guide our investigation. We need to pay attention to the ethics of research, the values that guide our interactions with nature and with people. In the hard sciences, for example, science has traditionally been guided by an attitude of exploitation or domination, which are androcentric, Western values that feminism questions. Scientists who are attending to more traditionally female ways of knowing seek to acknowledge the emotional, relational, and affective aspects of scientific study. They thus reorient scientific inquiry to promote values harmony with and care for Nature

### **Gender, Interdisciplinarity and Transdisciplinarity: A Tentative Assessment**

We sustain that, contrary to what the collective imaginary assumes, “Science has advanced with the entry of women” (Hanson, 2012, p. 114) acting upon new methodologies, theories and life conceptions. Feminist views on science have benefitted numerous disciplines. As Jesse argues:

By challenging how science is done and how it is taught, women have often opened up new areas for examination and found new ways to make sense of the world. These new pathways to scientific discovery may move science and engineering forward in unanticipated ways as well as open fields to new participants (2006, p. 836).

What becomes clear when we have a look at the input of feminist and gender studies is that there is an urgent need to implement deep changes while “rethinking teaching, research, institutional structures, and interpersonal relationships” (2006, p. 837). As we have seen, gender is relevant in every discipline, because it is an important aspect of how our social, political, personal, and economic lives are constructed. To study sex and gender requires interdisciplinary collaboration, but this study also transcends our disciplinary assumptions and challenges our methods. In this sense, feminist and gender studies raises the need to deconstructing boundaries between disciplines. When we respond to the demands of justice and incorporate gender into our thinking and our methods of investigation, we will find that this will be a force for transformation and growth. For this reason, gender is also a category that requires inter/transdisciplinary analysis, if we are really to understand how it works: it is “not just an optional choice for gender studies” (Hornscheidt & Baer, 2011, p. 171) it is a necessity. The field of gender and women’s studies has thus been a pioneer in inter/transdisciplinary work and it “stands out as advanced when it comes to innovative experiments with cross-disciplinarity” (Lykke, 2011, p. 138).

We **argue are** that a transversal focus on gender is a crucial element and tool for revolutionizing inter and transdisciplinary study within the academy. Why is this the case? First, attending to gender teaches to pay attention to difference and diversity in general, which are underlying and indispensable to inter/transdisciplinary work. Second, attending to gender reminds us that robust study of the world requires a complex understanding of all the factors that shape and determine human relationships. Gender is one of these, and is the way that gender intersects with other factors. Third, the cross-disciplinary frameworks required to study gender permit a complex analysis of

other research problems, such as discrimination (Lykke, 2011). Like gender, discrimination must also be studied in the various disciplines as medicine, engineering, or law studies. No one disciplinary approach can do justice to the phenomenon of discrimination: instead, we need to study how and why discrimination has been a historical part of all the modern sciences. Fourth, this interdisciplinary approach opens the path to consider a critical reflexion on our practices as scientists with regards to the systemic and structural organization of our disciplines and the categories and values that guide our knowledge production.

Interdisciplinarity and transdisciplinarity are becoming necessary epistemic and methodological strategies in a globalized world. Feminist theory and gender studies have been introducing innovative views with this regard, focusing on a virulent critique of objectivity in science and insisting on situated knowledge. As Liinason argues, “[a]s an interdisciplinary subject field, women’s/gender studies challenges the predominant knowledge-structure by advocating a mixture of alternative methods and research strategies” (Hornscheidt & Baer, 2011, p. 162). As this article has shown, however, gender studies are not something that can exist independently of the other disciplines. Gender is already within all the disciplines, undoing them, acting upon them. For this reason, attention to gender needs to be transversal, across the disciplines and throughout the academy. This is particularly so in Colombia, where gender inequalities still dominate the academy. However, we do not say that incorporating a transversal focus on gender into the Colombian academy will be easy. Often, even those scholars who study gender are not as visible in the academy as they need to be. They tend to suffer from marginalisation not only within their ‘home’ disciplines” but also in mainstream academic debates on inter- and transdisciplinarity (Hornscheidt & Baer, 2011, p. 174).

As a first step toward transversality in social and natural sciences, therefore, “Gender as a category and/or object can be integrated into different disciplines and therefore into a mainstream, institutionally established structure of an academic field” (Hornscheidt & Baer, 2011, p. 167). Each discipline can begin by looking to include more women, both as scholars and as objects of study. Actively mentor and hire women. Review your hiring and employment practices. Ask the women in your department if they feel that the culture of the department is friendly and supportive to them. Try to include readings from women thinkers in every course. Invite women scholars to give talks at your university. As a focus on gender becomes an established part of the various academic fields within the university, the gaze, values, and perspectives that guide research will begin to shift. This transversal focus will give rise to new possibilities and conversations that will promote a renaissance of inter and transdisciplinary research.

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