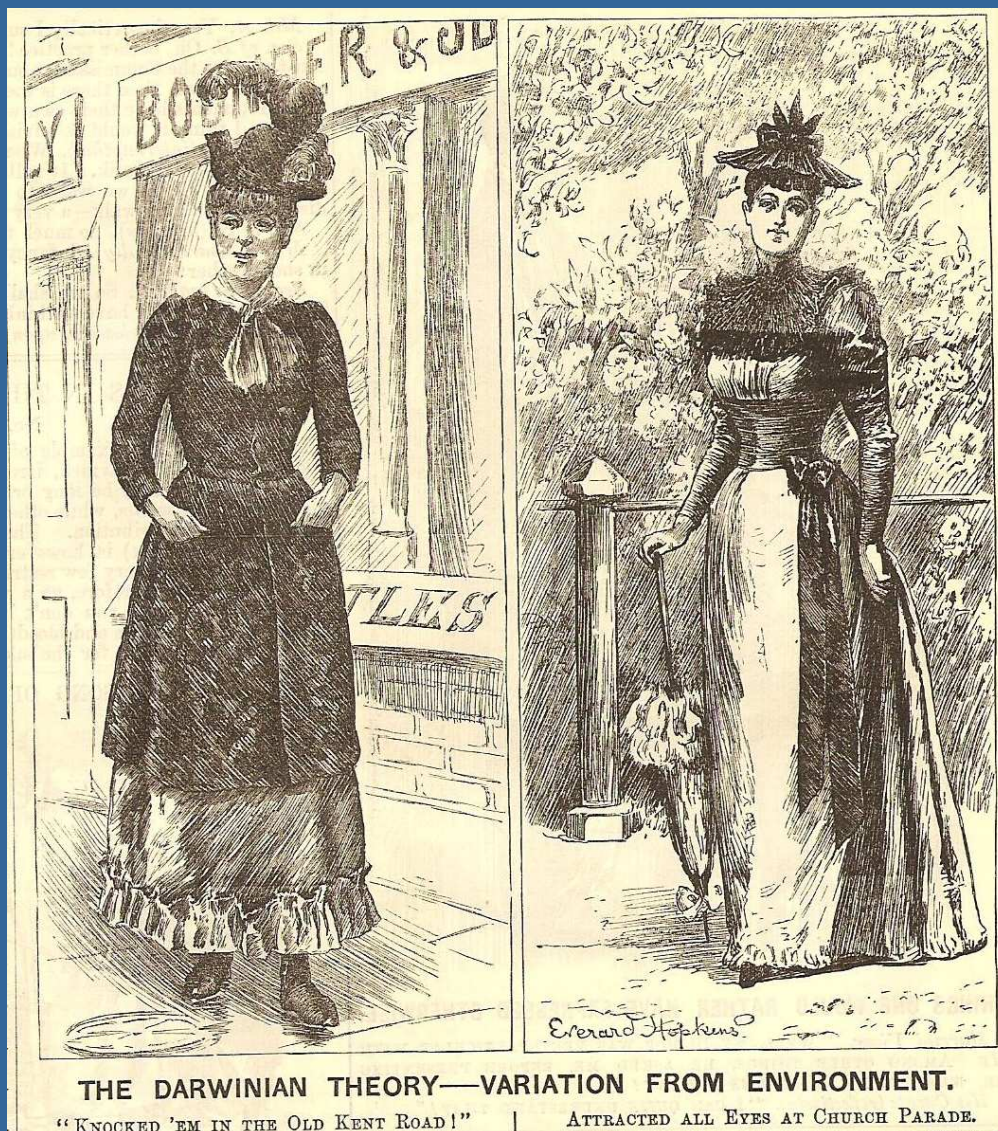


*Anthropological Presuppositions of the Darwinian View of Women: A Historical-Critical Analysis of the Debate between Feminism(s) and Darwinism(s)*

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**FACULTY OF ARTS AND PHILOSOPHY**

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(s)**

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DISSERTATION SUBMITTED IN FULFILMENT OF THE DEGREE OF DOCTOR OF  
PHILOSOPHY AT GHENT UNIVERSITY (December, 2006)

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## Table of Contents

<b><i>FACULTY OF ARTS AND PHILOSOPHY</i></b> .....	<b>2</b>
<b><i>ACKNOWLEDGEMENTS</i></b> .....	<b>7</b>
<b><i>0. INTRODUCTION</i></b> .....	<b>9</b>
0.1. The Problem.....	9
0.2. Why this Topic?.....	11
0.3. Research Objectives and Methodology .....	13
0.4. Outline of the Dissertation.....	15
<b><i>1. WHAT IS FEMINISM?</i></b> .....	<b>19</b>
1.1. Introduction.....	19
1.2. The First Wave.....	20
1.3. The Second Wave.....	22
1.4. An Interlude on Psychoanalysis.....	26
1.5. The Third Wave.....	31
1.6. Heterogeneity: Problem or Merit?.....	35
1.7. Sex and Gender.....	39
1.8. The Missing Link.....	41
<b><i>2. SCIENCE AND ITS PROBLEMS</i></b> .....	<b>44</b>
2.1. Introduction.....	44
2.2. Misogyny in Science: Facts about the Past.....	45
2.3. Fables about the Past.....	51
2.4. Facts and Fables about the Present.....	58
2.5. The Social Embeddedness of Science.....	62
2.6. Answers to Scientific Relativism.....	65
<b><i>3. FEMINIST VIEWS OF SCIENCE</i></b> .....	<b>71</b>
3.1. Introduction.....	71
3.2. Empiricism: The Belief in Gender-Free Science.....	72
3.3. Standpoint Theory: The Objectivity of Science Questioned.....	73
3.4. Scientific Contributions of Standpoint Theory .....	80
3.5. Postmodernism: The Whole Project of Science Questioned.....	85
3.6. Should Science Be Politically Progressive? .....	86
3.7. Does Feminist Science Exist?.....	88
<b><i>4. THE SEXES IN VICTORIAN TIMES</i></b> .....	<b>94</b>
4.1. Introduction.....	94
4.2. The World before Darwin.....	96
4.3. Evolution by Natural Selection.....	96
4.4. Social Darwinism.....	100
4.5. Evolution by Sexual Selection .....	102
4.6. Darwin and the ‘Coy’ Female.....	103
4.7. Antoinette Brown Blackwell: The Road not taken.....	107
4.8. Male Scientists on Female Inferiority.....	110
4.9. Victorian Women Reply.....	113
4.10. Women Rewriting Darwin.....	115
4.11. Darwin and Women’s Emancipation.....	119
<b><i>5. 1930s-1975</i></b> .....	<b>122</b>
5.1. Introduction.....	122

5.2. The 1930s and the Rise of Ethology.....	123
5.3. Human Ethology.....	125
5.4. Women in Primatology.....	126
5.5. The 1960s and Inclusive Fitness Theory.....	129
5.6. The 1970s and Parental Investment Theory.....	130
5.7. Costly Eggs and Cheap Sperm: But Is It True?.....	132
<b>6. BIOPHOBIA WITHIN FEMINISM.....</b>	<b>140</b>
6.1. Introduction.....	140
6.2. Fear of Sex Differences.....	142
6.3. Intellectual Developments at the Turn of the Nineteenth Century.....	145
6.4. The Rise of Behaviorism.....	146
6.5. Cultural Anthropology: To Tropical Paradises and Back Again.....	147
6.6. Social Constructionism, Environmentalism, and the Left.....	149
6.7. The Nature-Nurture Controversy.....	153
6.8. The Myth of Genetic Determinism.....	156
6.9. The Naturalistic Fallacy.....	158
6.10. Current Socialization Theories.....	163
6.11. Evaluating Some Environmentalist Contentions.....	166
<b>7. SOCIOBIOLOGY AND EVOLUTIONARY PSYCHOLOGY.....</b>	<b>177</b>
7.1. Introduction.....	177
7.2. Proximate and Ultimate Levels of Explanation.....	179
7.3. Sociobiology: Of Genes and Men.....	182
7.4. Sarah Hrdy and the Lusty Female.....	184
7.5. Other Feminist Critiques of Sociobiology.....	186
7.6. Moral Reading.....	188
7.7. Cognitive Science Setting the Stage for Evolutionary Psychology.....	190
7.8. The Mind as a Swiss Army Knife.....	192
7.9. Neural Plasticity: A Challenge to the Modularity View?.....	197
7.10. Indications of a Panhuman Design.....	200
7.10. Characteristics of Adaptations.....	203
7.11. Is Evolutionary Psychology Scientifically Defensible?.....	204
<b>8. A METATHEORY FOR FEMINISM.....</b>	<b>212</b>
8.1. Introduction.....	212
8.2. Feminist Observations.....	215
8.3. The Seeds of Adulthood.....	218
8.4. Sexual Selection as an Origin Theory.....	222
8.5. An Evolved Male Psychology.....	227
8.6. An Evolved Female Psychology.....	238
8.7. Benefits of an Evolutionary Framework.....	250
8.8. The Essentialism-Constructionism Debate.....	256
8.9. The Evolutionary Origins of Patriarchy.....	259
8.10. Toward a Darwinian Left.....	265
<b>9. ENGINEERS HAVE MORE SONS, NURSES HAVE MORE DAUGHTERS: AN EVOLUTIONARY PSYCHOLOGICAL EXTENSION OF BARON-COHEN'S EXTREME MALE BRAIN THEORY OF AUTISM.....</b>	<b>271</b>
9.1. Introduction.....	272
9.2. The Anatomy of the Theory.....	273
9.3. An Evolutionary Psychological Extension of the Theory: Enter the Trivers-Willard Hypothesis.....	277
9.4. Empirical Analysis.....	279
9.5. Conclusions.....	287
9.6. Appendix.....	289
<b>10. CONCLUSION.....</b>	<b>295</b>
10.1. Summary.....	295
10.2. Discussion.....	298

10.3. Conclusion.....	302
<b><i>BIBLIOGRAPHY</i></b> .....	<b>305</b>

Illustration title page: Everard Hopkins, 'The Darwinian Theory – Variation from Environment'. *Punch*, June 18, 1892, p. 291.

Except when mentioned otherwise, the following chapters are adapted from:  
Griet Vandermassen, *Who's Afraid of Charles Darwin? Debating Feminism and Evolutionary Theory* (2005). Lanham: Rowman & Littlefield, 229 p.





## **ACKNOWLEDGEMENTS**

The past four years have been intensely stimulating to me, on an intellectual as well as a social level. Thanks to the financial support of the Flemish Fund for Scientific Research, I got the opportunity to thoroughly acquaint myself with new scientific ideas, to meet lots of interesting people from all over the world, and to explore academic life in a sun-drenched part of that world.

Writing this dissertation would, however, have been equally impossible without the help and support of my supervisor, Marysa Demoor, and my co-supervisor, Johan Braeckman. I want to thank Marysa for her enthusiastic support of my research topic, for her trust and advice, and for getting me going again when my spirits started sinking. Johan also had to tone me up more than once, but he remained as understanding as ever. I am greatly indebted to him for stimulating me to undertake this research, and for his many constructive comments on my preliminary writings. Marysa's and Johan's seemingly boundless energy levels never cease to amaze me. Without realizing it, they always succeeded in transferring some of that energy to me whenever I had an appointment with them.

I also want to acknowledge two other people who helped me devise the structure of my dissertation: Gita Deneckere and Hilde Vervaecke. My friends and colleagues at the University of Ghent were extremely supportive: Günter Bombaerts, Charlotte De Backer, Farah Focquaert, Koen Margodt, Frank Mertens, Karolien Poels, An Ravelingien, Tom Speelman, Liselotte Vandenbussche, and Thomas Vervisch. Thanks!

When starting this research project, I hardly knew where to begin. I want to thank Helena Cronin and Iver Mysterud for notifying me about indispensable literature, and Helena for the other troubles she has taken for me. During these four years I got to know many other magnificent people with whom I had insightful conversations. I cannot mention them all, but I specifically want to thank Jerome Barkow, David Buss, Dylan Evans, Maryanne Fisher, Sarah Hrdy, Elizabeth Meier, Craig Palmer, Janet Radcliffe Richards, Ullica Segerstråle, Margo Wilson, and Lisa Zunshine. Two people became dear friends, and I am grateful to them for the many animated discussions we had on feminism, evolutionary psychology, and so much more: Satoshi Kanazawa and Don Symons.

My thinking has greatly profited from my stay at the University of California, Santa Barbara. I want to thank Leda Cosmides and John Tooby for their support and enthusiasm, as well as Donald Brown, Daphne Bugenthal, Steven Gaulin, Michael

Gurven, Leila Rupp, and all the people at the Center for Evolutionary Psychology. I had a great time, folks!

Thanks also to Malte Andersson, David Barash, Simon Baron-Cohen, Milton Diamond, Terri Fisher, David Geary, Paul Gross, Nicola Koyama, Charlotta Kvarnemo, David Schmitt, Robert Wright, Ken Zucker, and all those I forget, for responding to my email questions.

Most of all, thanks to Tim, for his love, trust, and encouragement.

## **0. INTRODUCTION**

I am a feminist who does not like what feminism has become.

Christina Hoff Sommers

### **0.1. The Problem**

Darwinism and what was later to be called feminism developed during the nineteenth and the eighteenth century respectively. Feminism, a product of the Enlightenment, emerged in Europe and the United States as a social-political movement for equal rights for women (Wollstonecraft 1792; Stanton, Antony, and Gage 1881/1882). Darwinism, named after its founder, the British naturalist Charles Darwin (1859, 1871), is the scientific theory of the evolution of life through the process of variation and natural and sexual selection. Although Darwin did not assign any political implications to his theory of evolution, his contemporary Herbert Spencer modified his insights into social Darwinism, the political doctrine of the law of the jungle.

Darwin's views on the relationship between the sexes and the role of female organisms in evolution was already contested during the nineteenth century (Blackwell 1875; Gamble 1894). The overall trend of the criticisms was that in his interpretation of sex-typical behavioral differences within different species he let himself be guided by a typically Victorian view of the sexes. Similar criticisms are still being voiced today (Fausto-Sterling 1992; Hrdy 1999a, 1999b; Segal 1999).

In the twentieth century Darwin's theory of evolution underwent important additions and refinements. During the thirties and forties a synthesis with Mendelian genetics, known as 'the new Synthesis', was accomplished. Not all problems concerning Darwin's theory of evolution disappeared as a result. In particular the level at which natural selection operates remained unclear. The work of George Williams (1966) and William Hamilton resolved this problem. In 1972 Robert Trivers developed his theory of parental investment, which offers an evolutionary explanation of sex-typical behavioral differences within sexually reproducing species. The mechanism of sexual selection, discovered by Darwin and fallen into oblivion after his death, became a matter of

interest again. Nowadays it attracts a lot of scientific attention (Cronin 1991; Miller 2000b).

The evolutionary perspective on sex differences was square to the theories of socialization of second wave feminism, which developed during the seventies in Europe and the United States. An important source of inspiration for the movement was Simone de Beauvoir (1949), who postulated that one is not born a woman, but is made into one. Second wave feminism is characterized by a whole range of theoretical perspectives and views of human nature, a heterogeneity which survives in the feminism of the nineties (also called the 'third wave'). Liberalism (Friedan 1963), socialism (Hartmann 1979), psychoanalysis (Chodorow 1978), existentialism (de Beauvoir 1949), radical feminism (Millett 1970, French 1992), black feminism (hooks 1981), lesbian feminism, difference feminism (Gilligan 1982), ecofeminism, and - ever since the nineties - postmodernist feminism (Butler 1990; Haraway 1991) and queer theory (Butler 1990) are the main, often partially overlapping currents.

In spite of this heterogeneity most feminist theorists and scientists share a distaste for the evolutionary view of human behavior that in the seventies was termed sociobiology (Wilson 1975; Dawkins 1976). This discipline tried to analyze animal and human behavior from a Darwinian perspective. At first it emphasized the importance of the genetic foundation of behavior. In the nineties sociobiology evolved toward a perspective that stresses the human mind as the mediating organism of behavior. It was termed evolutionary psychology. Being a product of millions of years of evolution, the mind is supposed to consist of a large amount of mental modules which, depending on the environmental input, rule human behavior. Today those modules and the kinds of behavior they generate do not necessarily have any adaptive value, because the environmental context in which they arose has changed (Barkow, Cosmides, and Tooby 1992; Dennett 1995; Pinker 1997, 2002).

The propositions of evolutionary psychology get support from data from genetics, anthropology, brain research, evolutionary biology, cognitive psychology, neurophysiology, linguistics, and other scientific disciplines. Sociobiology and evolutionary psychology are, however, being strongly criticized by feminists, social scientists, and (to a lesser extent) natural scientists (Fausto-Sterling 1992; Rose and Rose 2000). This criticism ranges from genetic determinism, legitimation of existing standards of behavior to ultra-adaptationism. Feminist critics mainly object to the proposition that psychosexual differences between men and women have a biological foundation. Those criticisms cannot be discarded by the suggestion that science is value-free, as the well-documented corrective effect of the growing number of women

in a number of scientific disciplines demonstrates. Within anthropology and primatology, for instance, women scientists have tried to broaden the prevailing interpretative context of behavior, which according to them was too male biased (Hrdy 1999a; Smuts 1996; Zihlman 1997). Simultaneously, a feminist critique of science was developed (e.g., Bleier 1985; Harding 1986; Haraway 1991; Schiebinger 1999). Women were also influential within sociobiology and evolutionary psychology, disciplines which now contain a relatively large number of self-declared feminist scientists (e.g., Cronin 1991; Fisher 1999; Gowaty 1992; Smuts 1995, 1996; Hrdy 1997, 1999a; Low 2000). During the past decade the number of international endeavors to unite feminist and evolutionary perspectives has grown (Buss and Malamuth 1996; Gowaty 1997a). Yet the gap between mainstream feminism and the Darwinian research project remains large.

## **0.2. Why this Topic?**

A number of studies by psychologist Rhoda Unger have demonstrated that most self-identified feminists reject traditional views of science (the belief in some form of universal truth, in the existence and value of objectivity, in the validity of criteria such as replicability and generalizability, and in the possibility of determining causal relationships). In a sample of American psychology students, Unger found that women enrolled in feminist courses and women who considered themselves actively involved in feminism had significantly higher scores on epistemological constructionism (the belief in the relative nature of truths, a concern for the subjectivity of researchers, a focus on the individual as a source of authority, and an acknowledgement of the role played by chance in the determination of events). Feminist psychologists who were leaders of the Psychology of Women Division of the American Psychological Association had the most constructionist epistemology Unger had ever measured. They were particularly high on items that involved rejection of biological causality, such as the potential role played by genes in human behavior, and rejection of the value of science for solving human problems (Unger 1996).

These findings are not surprising to me. I, too, held social constructionist views of science once. Having considered myself a feminist since my coming of age, and having been involved in feminist discussion groups for some years, I know from first-hand experience that being a feminist and being distrustful of traditional science often go hand in hand. The conception of science as a white, male enterprise, as an androcentric approach to the world that serves to dominate both women and nature,

was an unquestioned premise within this circle. So was the view of sexual and gender identity as social constructs. Newborns, we knew, were blank slates, and our capitalist society guided them into certain pathways in order to keep control of things. That we had the ineluctible feeling of being a man or a woman - some discussion groups were mixed - only testified to the deep ways in which we had all been indoctrinated. We read and talked a lot, but we did not consult any dissenting literature. Why should we? We knew that we were right and that all the others were just defending their vested interests or were not enlightened enough to see the truth.

Looking back upon those years fills me mainly with amazement. It is hard to conceive for me now that I was once so dogmatic, so blind to everything that might shake my deepest convictions. When unwelcome information about the role of biology in human behavior came my way, I shrugged it off. I remember the peculiar feeling of cognitive dissonance very well, but I managed to crush it every time it cropped up. The consequences of being wrong seemed, after all, so grave: It meant, or so I thought, that nothing would ever change, that men and women were doomed to keep repeating their age-old battle, that women would forever be considered the lesser sex, and that people would forever be forming dominance hierarchies. Our anarchist, gender-free utopia would never materialize. The thought was too hard to bear.

I eventually succeeded in leaving my biological ignorance behind. The year was 2000, and I was working freelance as a journalist. I paid Johan Braeckman a visit in order to get some more information on the cognitive archaeologist he had invited for a lecture and who I was going to interview. About an hour later I was standing outside again, holding a hefty book: *The Adapted Mind* (1992), edited by Jerome Barkow, Leda Cosmides, and John Tooby, and feeling slightly ridiculous. Having a discussion with someone who knew the subtleties of the Darwinian view of human nature, rather than just trusting what feminist and other critics wrote about that view, had made me realize that I had been thoroughly misinformed by these critiques. I thought I knew what evolutionary psychology – for that is the discipline we had been talking about – entailed, but actually I knew next to nothing about it. That evening I started reading *The Adapted Mind* and promptly ordered it on Amazon. It marked the beginning of a new intellectual passion.

Reading evolutionary psychological works made me realize that my antibiological stance of the past had been based largely on prejudice and ignorance. Moreover, I felt that evolutionary psychology could contribute to a better understanding of all the topics our gender groups had been discussing so elaborately (and so fruitlessly): patriarchy, gender identity and gender roles, mating preferences, and sexuality,

without being in the least a defense of the status quo. This was a confusing experience. Why had I been misled into believing that evolutionary psychology was sexist, reactionary, and genetic determinist? Why had I not been open-minded enough to at least consult some of this literature? Why did feminists present a science that could back their claims in such an unfavorable light? Or was evolutionary psychology not so scientific after all and had I been convinced of its value too easily? What role did ideology play in evolutionary psychological propositions and in the feminist dismissals of them? Could it be that sexual selection theory was a reflection of androcentrist assumptions after all? I was not an expert, so I could not tell. Studying the arguments on both sides of the debate thoroughly seemed the only option if I wanted an answer to my questions. I got the chance to do so, and so I did. This dissertation is the reflection of four years of acquainting myself with the most relevant publications within the fields of evolutionary biology and evolutionary psychology, feminism, and feminist critiques of (Darwinian) science.

### **0.3. Research Objectives and Methodology**

Feminist literature is characterized overall by a social constructionist view of human nature, often implicitly or explicitly linked to the assumption that such a perspective is necessary for the granting of equal rights to women. It is suspected that the evolutionary approach has hidden ideological motives or that it implies the impossibility of social change (Bleier 1985; Fausto-Sterling 1992, 1997, 2000a; French 1992; Hubbard 1988, 1990; Segal 1999). As is indicated above, science is not always value-free and women scientists can introduce a valuable new point of view in traditionally male dominated disciplines. Also, the very existence of feminist Darwinian scientists demonstrates the possibility of bridging the gap between feminist and Darwinian research strategies (e.g., Buss and Malamuth 1996; Cronin 1991; Fisher 1999; Gowaty 1992; Hrdy 1997, 1999a, 1999b; Low 2000; Smuts 1995, 1996). In this dissertation I want to investigate the common ground between the two research strategies. My objectives are threefold.

First, I want to analyze whether and to what extent the criticisms uttered by feminist scholars are sound. Is the evolutionary research program biased? In that case, just as primatology has benefited a lot from the critical work of women scientists, those criticisms might contribute to the scientific nature of the Darwinian research program.

Second, I want to address the issue of the deep-rooted causes of the discrepancy between the respective views of human nature and of gender difference provided by feminism and Darwinism. How did these accounts come to differ so much? What other developments helped to pave the way? A naive spectator might expect people who are studying and trying to ameliorate women's position in society to want to use every tool at hand to understand how this position came to be. The more comprehensive our understanding, the better we can remedy the situation. This is, however, not what we have seen happening. Whereas many evolutionary psychologists sympathize with feminist aims and study topics of interest to feminists, the majority of the latter refuse to take a Darwinian framework seriously. In order to find the historical roots of this gap, I have to go back in time. I also have to take a look at feminist conceptions of science in general. Both feminism and the scientific enterprise emerged centuries ago. That leaves a large time span for potential scientific sloppiness or misconduct and for feminist scrutiny of it, resulting in alternative feminist conceptions of science. These conceptions, in turn, influenced the kind of scientific theories feminists are willing to accept.

Third, I want to analyze the extent to which ideological motives play a role in the discussion, apart from the scientific nature of the Darwinian research program. Does ideology lead feminists to impose higher standards of evidence on biological theories of gender difference than on social constructionist ones? How does a social constructionist view of human nature hold up when confronted with well-validated scientific theories and findings from relevant disciplines?

Human nature is a sensitive topic to study, as people are quick to draw political conclusions on the basis of what has been found. In addition, because we are essentially studying ourselves, it is difficult to keep one's own bias out. In my comparative study of feminist and Darwinian literature I have tried to be as neutral as possible by trying to adhere to a few elementary rules of scientific reasoning and by holding my authors to these same rules. They comprise, among others, that reasoning should be logical and coherent, and that the premises should justify the conclusion. Claims should not be just postulated, but have a solid scientific (if it concerns a verifiable claim) or argumentative underpinning. If a new or implausible-sounding explanation is offered, it should be made clear how this fits with the rest of what we know about the world and how it works, and whether it accounts for as many phenomena as existing or rival explanations. Citations and descriptions of the work of others should be accurate. Arguments from authority, ad hominem attacks, political insinuations, and other specious arguments are forbidden. One should aim at



presenting the whole picture, not just select those bits and pieces that fit one's preconceptions. Alternative interpretations of the findings should be considered, together with a rational evaluation of which explanation is best supported by the evidence. This is what I mean by 'a critical comparative study', which is what I have tried to do in this dissertation. It is a methodology that, in my view, should be self-evident to all science students and science critics, but, as I found, it is not.

In addition to this comparative study of the relevant literature, one empirical study was carried out, together with evolutionary psychologist Satoshi Kanazawa of the London School of Economics.

#### **0.4. Outline of the Dissertation**

Feminism is a movement that is hard to describe. Not only are its branches multifarious, but they comprise activism as well as an academic mode. In order to shed light on this movement, the first chapter starts with the search for a definition of feminism, followed by a brief historical overview of its history. I will sketch the first wave of feminism in the nineteenth century, the 'second wave' in the 1960s and 1970s, and the 'third wave' in the 1990s. I will also address the problems confronting the various strands of feminism.

If we want to understand the distrust that many feminists have of the biological sciences, we should start by having a look at the history of science. The focus of the second chapter is on past and present instances of bias and misogyny in science, but on the ways in which this bias is sometimes read into scientific theories and the scientific enterprise by feminist beholders as well. The finding that science is not always value-neutral raises the question of its social embeddedness. I also address scientific relativism.

Chapter 3 dwells on the merits of and problems with feminist views of science, which can broadly be divided into empiricism, standpoint theory, and postmodernism. It asks whether science should be politically progressive, as some feminists suggest, and finally contends that feminist science as such does not exist.

Feminist critiques of Darwinian theory date back to the nineteenth century. These critiques, however, were not heard. Chapter 4 focuses on Victorian times, starting with Darwin's theories of natural and sexual selection. I describe how these and other evolutionary theories were appropriated by his contemporaries, among whom some women, to serve their own sociopolitical ends. Current critiques of the theory of evolution by natural selection are also dealt with.

The fifth chapter describes the foremost theoretical developments within evolutionary biology in the period from the 1930s, when the 'New Synthesis' was forged, until the dawn of sociobiology in 1975. The impact of female scientists within primatology, often singled out as a 'feminist science', is analyzed. I also describe the roots of gender difference as explained from an evolutionary perspective and evaluate the evidence.

Feminist biophobia, the prevailing conception in gender studies departments that the psychosexual differences between men and women are almost solely the result of socialization practices, shows no sign of abating. What are its sociological roots? What is the scientific evidence? Chapter 6 addresses these questions. I highlight the main erroneous reasonings of biophobic theorists: the nature-nurture dichotomy, the myth of genetic determinism, and the naturalistic fallacy, the idea that what *is* also *ought* to be. I show how current socialization theories are deficient at explaining pervasive gender differences.

In the seventh chapter I describe the rise of sociobiology, evaluating the feminist reactions to it. I set out the subsequent scientific developments leading to evolutionary psychology and explain the central premises of this discipline. The question of whether evolutionary psychology is scientifically defensible is tackled.

Feminist and evolutionist observations often coincide, but the explanations offered diverge. Chapter 8 offers examples of some of these observations. I describe sexual selection theory as an origin theory of gender difference. This theory shows how evolution has given rise to a distinctly male and distinctly female mind and provides a framework from which to interpret the afore-mentioned observations. I investigate to what extent feminist and Darwinian accounts may be complementary. I explain why the integration of a Darwinian perspective into feminist theory is necessary and what, specifically, evolutionary psychology has to offer feminists. I thereby dwell on the essentialism-constructionism debate and on the evolutionary origins of patriarchy. Finally I try to explain why Darwinism does not have the reactionary political implications that feminists fear it has. For as cognitive psychologist Steven Pinker says: "We should expose whatever ends are harmful and whatever ideas are false, and not confuse the two" (1997:48).

The last chapter is an empirical study. Evolutionary psychologist Satoshi Kanazawa and I derived a new hypothesis from the combination of two evolutionary psychological theories: the Trivers-Willard hypothesis regarding parental ability to vary offspring sex ratio and Simon Baron-Cohen's extreme male brain theory of autism. Our analysis of the 1994 U.S. General Survey data provides support for our prediction. The study is

another indication of the importance of a Darwinian framework if we want to understand the phenomenon of gender (in this specific case, gender ideologies favoring one particular sex) in our species.



## 1. WHAT IS FEMINISM?

Feminist analytical categories *should* be unstable – consistent and coherent theories in an unstable and incoherent world are obstacles to both our understanding and our social practices.

Sandra Harding

### 1.1. Introduction

The question "What is feminism?" has a staggering number of possible answers to it. To some, feminism is about equal rights and opportunities for both sexes. To others, it is about affirming women's difference. Some reject this notion of a female subject as essentialist and look for the ways in which the fragile construct of personal identity is supposedly constituted through discourse. Still others reject the 'male' notions of logic, rationality, and ambition and embrace an intuitive, 'holistic' worldview. The list of possibilities goes on and on. Theoretical inconsistency reigns to the extent that as a feminist, one can interpret this incoherence of theories as a deficiency or as a merit, depending on one's theoretical framework.

Since feminist theory is not, and has never been, a united body of thought, any attempt to define it will have to be so general as to tell us practically nothing, or it will have to encompass, in a nutshell, the main strands of feminism and their central premises. As feminist theorist Joan Scott says, whenever one tries to define feminism one runs into the problem that it has "only paradoxes to offer."<sup>1</sup>

To a newcomer in the field, this labyrinth of feminisms will probably seem bewildering at first. It may continue to do so for some time, until she has acquired enough background information to consider herself able to make a selection of the theories that seem to fit in with her knowledge and experience of the world.

That, at least, is the ideal situation. In practice still other motives often help to determine what strand of feminism she will choose to adhere to. Each feminism works with implicit assumptions of human nature, assumptions that more often than not are partially guided by political motives. On the one hand this should not surprise us, since feminism is in essence a political movement. On the other hand one would expect

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<sup>1</sup> As cited in Segal 1999:200.

people who want to change the treatment and position of women to desire reliable information about human nature, in order to act upon it as efficiently as possible. The variety of reasons for this frequently politicized stance toward what counts as reliable knowledge is one of the topics of this dissertation.

But before starting to explore the field of tension between feminism, science in general, and evolutionary theory in particular, some description of the feminist movement is in order. Feminism, one might say, is the multiplicity of political and philosophical programs designed to explain and end sexist oppression. On the question of what constitutes sexism opinions are, however, expected to differ among these programs. Therefore an even more simple definition might be in order. I prefer the one provided by evolutionary psychologist Anne Campbell: "Feminism is a social movement and political program aimed at ameliorating the position of women in society" (Campbell 2006:63). The history of feminism is rich, dramatic, and marked by rapid developments.

## **1.2. The First Wave**

The eldest and most influential feminist strand, liberal feminism, emerged in the eighteenth century as a product of the Enlightenment. As such the liberal feminist focus was and still is on women as free and rational agents, who are entitled to the same basic rights as men (e.g., de Beauvoir 1949; Friedan 1963; Stanton, Anthony, and Gage 1881/1882; Wollstonecraft 1792; Young 1999). Consequently, liberal feminism is also called equity feminism. Its defenders tend to assume that the differences between the sexes are small and are mostly the result of socialization.

At that time, the assumption that women belonged at home as wives and mothers was omnipotent. They were seen as "naturally" lacking in rationality and so unfit to participate in public life. They were barred from various professions, such as medicine, scholarship, and business. Married women had no property rights, no control over inheritance, no control over custody, and no right to bring civil suit (Donovan 2000). Women had been barred from the university from the very beginning, and ever since in 1662 the Royal Society had been founded in London, they were also disqualified from all European scientific academies - a move that formalized their exclusion from the world of institutional science (van Muijlwijk 1998).

In 1791, during the early phases of the French Revolution, Olympe de Gouges issued a street pamphlet entitled *Les Droits de la Femme* (The Rights of Woman). She had to pay a high price for her ideas: Two years later, she was guillotined. In 1792

Mary Wollstonecraft completed the first major work of feminist theory in history: *A Vindication of the Rights of Woman*. The book is a defense of the importance of education for women. Wollstonecraft argued that women are what society and men have made of them: dependent children, instead of the confident equals of men that they could be, if only they were not raised just for marriage and for pleasing men. *Vindication* was an instant success, much read and much discussed. In 1848 in New York, Elizabeth Cady Stanton and three other women organized the Seneca Falls convention. More than three hundred women came to Seneca Falls and adopted the "Declaration of Sentiments." This document, written by Stanton, was modeled nearly word for word on Jefferson's 1776 Declaration of Independence, but specified that the liberties demanded were for women as well as men (Donovan 2000). It declared:

We hold these truths to be self-evident: that all men and women are created equal; that they are endowed by their Creator with certain inalienable rights; that among these are life, liberty, and the pursuit of happiness; that to secure these rights governments are instituted, deriving their just powers from the consent of the governed. (Stanton, Anthony and Gage 1881/1882)

In the first sentence, the words "and women" are added to Jefferson's original, whereas the governments are no longer "instituted among men" as they were in the 1776 text; they are plainly "instituted."

Women in England would have to wait until 1880 to obtain property rights when married, and they didn't obtain the right to vote until 1919. American women, white as well as black, succeeded in obtaining the right to vote in 1920. In Belgium this would take until 1948.

The nineteenth century women's rights movement had other successes. It obtained the right for women to divorce without losing property and children. By the 1880s its liberal emphasis on the equal rights of the sexes led the doors to higher education and many professions to open for women, in America as well as in Europe (Donovan 2000). In the Netherlands, Aletta Jacobs was the first woman to be allowed to university in 1872. Education for women, however, kept being seen as unnatural, and as giving rise to health and fertility problems. Because of those societal constraints and uninformed stereotypes of women, it would take until the 1960s and the 1970s for the number of female university students to rise dramatically (Brouns 1995a).

The nineteenth century also witnessed the birth of a feminist strand taking issue with the prioritizing of rationality that was typical of Enlightenment liberal theory. These 'difference feminists' highlight the differences between male and female qualities, arguing that the strengths of women, such as pacifism, intuition, and cooperation, may be a source of pride. They strive for a society that is more guided by female concerns and values than the kind of society we have now (e.g., Blackwell 1875; Fuller 1845; Gamble 1894; Gilligan 1982). The initiator of difference feminism was the American journalist and social reformer Margaret Fuller. In *Woman in the Nineteenth Century* (1845), the first major feminist document to appear in America, she celebrated the more spiritual and intuitive side of women, arguing that their intellect should be developed in proportion to their other powers. If women were free to develop all their capacities, as they should be, they would not wish to be like men, Fuller thought.

The opposition between liberal or equity feminism and difference feminism would be magnified during second wave feminism.

### **1.3. The Second Wave**

The first wave of feminism, the end of which is usually dated at about 1920, was followed by a second wave in the 1970s. The French existentialist philosopher Simone de Beauvoir started it with her famous book *The Second Sex* (1949), but the real explosion of feminist viewpoints came two decades later. May 1968, the burgeoning rise of civil rights and student movements, and the New Left: Women were active participants in them. Liberal feminism had been rearing its head again since the publication of Betty Friedan's *The Feminine Mystique* (1963), but now it was joined by a multiplicity of budding new strands, each starting from different theoretical premises.

A controversial new perspective was offered by radical feminism, which may be considered a radicalization of difference feminism. Some of the young women involved in radical politics in the 1960s became disillusioned by the sexist attitudes still prevalent in these movements. The liberation that was being fought for, they realized, was not meant to apply to the female sex: Males did not want to renounce their privileges. The condemnation of masculinity as essentially dominating and destructive and the celebration of femininity as essentially nurturing and egalitarian became the hallmark of the ensuing strand of radical feminism. So did the slogan "The personal is political": Politics had to be redefined to include personal relationships, since women's



oppression not only was a case of unjust laws and unequal political representation, but also was deeply rooted in personal life. This implied new forms of political action and produced a wide range of collective activities, including campaigns for stricter controls over pornography, for adequate funding for women's refuges, for free access to abortion, for changes in the law on rape and domestic violence, and for an end to discrimination against lesbians. Kate Millet's *Sexual Politics* (1970) was critical in moving feminism in this radical direction (Bryson 1999).

Radical feminists point to men's control over women's sexuality as the basis of women's oppression. They reject many of the values held in high esteem by liberal feminists, such as rationality, self-determination, and equal competition, because they deem them essentially male (e.g., Brownmiller 1975, 1984; Dworkin 1997; French 1992; Millett 1970). In this they deviate from difference feminists, who propose differences between the male and the female mind without valuing one above the other.

Most radical and difference feminists remain in the dark about the underlying causes of these differences. A few second-wave feminists thought difference lies in the genes, or in the hormones, or in women's 'right-brainedness' (Donovan 2000), but most seem to implicitly assume that a gender-typical psychology results from socialization pressures and learning experiences. This idea of difference is, however, met with suspicion by many other feminists, because it is a proposition that has long been used to keep women subordinate (e.g., Bleier 1985; Butler 1990, 2000; Connell 1995; Fausto-Sterling 1992; Harding 1986; Hubbard 1988, 1990; Tang-Martinez 1997; ten Dam and Volman 1995). When feminists of whatever strand tackle the issue of inherent gender difference, however - whether to endorse it or to criticize it - they tend to embrace a false nature-nurture dichotomy - a problem that misinforms a lot of feminist discussions and that will be analyzed in this dissertation.

The less radical kind of difference feminism, plainly called 'difference feminism', also flourished during the second wave. Here the work of psychologist Carol Gilligan has been particularly influential. In *In a Different Voice* (1982) she described women's ways of moral reasoning as contextual, centering around care rather than around abstract rules of justice - the male way. She asserted that a genuinely mature ethic of justice would incorporate both male and female perspectives, and argued that it is women's typical experiences rather than innate factors that cause this difference between the sexes.

Another important feminist paradigm that took shape during the second wave is socialist feminism. Although today socialism in general is on the defensive, it has been

very influential in feminist thought in Europe, but less so in the United States. Socialist feminists use traditional Marxist analysis to uncover the nature of women's subordination. They argue that gender disadvantages are, like those of class, structural and built into the very fabric of society. It is the patriarchal organization of labor, particularly under capitalism, that institutionalizes sexual inequality. Any analysis of the causes of women's subordination has therefore to be related to its socioeconomic context. Men are seen as allies, since socialism allows women to recognize the ways in which many men are also oppressed. There is a general consensus that women's domestic labor is of critical importance to the capitalist economy (e.g., Hartmann 1979).

Neither liberal feminism, nor radical or difference feminism, nor socialist feminism, however, have been able to explain just *why* men have always been in a privileged position, and exactly how the relationship between the sexes is historically reproduced. To some, psychoanalysis provides the answer. Derived from Freudian theory, the psychoanalytic view posits that girls and boys develop contrasting gender identities because they deal in a different way with the 'Oedipus and castration complexes' that arise in the early stages of normal psychosexual development. Freud disparaged feminism, and feminists have, in turn, long condemned Freud for devaluing women as morally inferior and for attributing women's misery to their unconscious desires. His description of infant development, however, provided a base upon which an important branch of contemporary feminist theory is built. Although a central component of second-wave feminist theory has been its rejection of what was called Freudian biological determinism, together with the obvious male bias inherent in Freudian ideas about female sexuality, a number of feminists have tried to revise these ideas from a feminist perspective. Simone de Beauvoir (1949) was the first to develop a feminist critique of psychoanalysis. The first feminist to specifically defend psychoanalysis was Juliet Mitchell in her 1974 book *Psychoanalysis and Feminism*, in which she revised Freudian ideas. The French philosophers Luce Irigaray, Julia Kristeva, and Hélène Cixous and the American psychoanalyst Nancy Chodorow have provided further influential feminist interpretations of Freudian and Lacanian theory (Gardiner 2002).<sup>2</sup>

In her 1978 book *The Reproduction of Mothering*, Chodorow argues that gender personality is shaped within the psychodynamics of the family, with mothers being closer to their daughters than to their sons, because of their being of the same sex. As a result, girls develop to be more dedicated to their mothers and to have a weak sense of ego, which enables them to be emotionally focused at other people. Boys, on the

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<sup>2</sup> For examples in the Dutch language area, see, for instance, Daniëlla Provost (1999).

other hand, are stimulated to distinguish themselves from the mother. They learn to equate maleness with 'not-femaleness' and to develop an independent attitude.

Chodorow's theory has been met with enthusiastic feminist approval and is still very influential, because it seems to succeed in providing some explanations for age-old phenomena such as motherhood and gender personality. During the past few decades, however, psychoanalysis has been established as missing every scientific basis (see next section).

In the early 1980s, black feminism (e.g., hooks 1981), as well as other particularizing feminist voices such as lesbian feminism, started protesting against what they perceived as the false universality of the predominant feminist accounts of the plight of women. It was argued that those merely represented the experiences of white, middle-class, Western women, and that there could not be a universal category such as 'women'. There existed too many differences among women for that. It was because of this kind of binary thinking that phenomena such as sexism and racism could emerge, it was thought. By falsely universalizing the experiences of one's own group, the lives and needs of other people were overlooked. Surely there were as many differences among women as there were between men and women. Feminists had to stop searching for universal causes of women's oppression, since these causes would differ from context to context.

A useful refinement of feminist theorizing, this focus on interpersonal difference risked running into a paradox: If nothing distinguishes women as a group from men as a group, then how was their oppression to be explained, and why should they have to unite?

These various strands of feminism paved the way for a third wave in the 1990s, a wave which would prove to consist of an even more confusing multiplicity of feminisms.

A caveat is needed at these categorizations. As Valerie Bryson (1999) points out, people frequently draw their ideas from more than one theoretical starting point, and these ideas often reinforce each other. At times they come into conflict, so that two contradictory sets of beliefs are often held simultaneously by one institution, group, or individual. The heterogeneousness of second wave (and third wave) feminism cannot be neatly classified. In a similar vein, in *Why Feminism?* (1999) Lynne Segal complains of the tendency of poststructural feminists to depict the first wave as 'equality feminism', with women using a logic of identification, and the second wave as its militant opposite: as 'difference feminism', with women rejecting all patriarchal

thought and practice and trying to exclude themselves from the masculine order. These descriptions miss the point, she argues:

Women's Liberation in its heyday was a theory and practice of social transformation: full of all the embroiled and messy actions, hostilities and compromises of collective political engagement. For the most part, it manoeuvred within a broader culture of the left: refusing to separate women off from wider struggles against equality and subordination, but fighting the perpetual marginalization or neglect of what were often women's most specific interests and concerns. (Segal 1999:15, emphasis in original)

The problem as she sees it is that, since feminism has moved from a decisively activist mode in the 1970s to a mode of academic theory and debate in the 1990s, contemporary feminist theorizing rarely acknowledges the time and the place of political ideas. It addresses only abstract *theories* and their refutation. It operates with an idea of feminism as the evolution of academic theory, whereas the major objective of women in the 1970s was the struggle to improve the lives and status of the majority of them. Two decades later, the focus is no longer on political activism, but, as Segal describes it, on the academic endeavor to reinvent the meanings of womanhood, to imagine the feminine in ways that radically subvert existing symbolic binaries of sex, gender, and sexuality.

Before moving on to a description of third wave feminism, I insert an interlude on psychoanalysis, as this paradigm has proven to be highly influential on the two newcomers in the third wave: postmodernist feminism and queer theory. Lacanian theory, in particular, underlies much theorizing in these two strands.

#### **1.4. An Interlude on Psychoanalysis**

That Freud was a pseudoscientist has been convincingly demonstrated by many researchers (e.g., Crews 1996, 1998; Grünbaum 2002; Israëls 1999; Torrey 1992). Yet psychoanalytic theories, whether based on Freud, on some of his (sometimes feminist) interpreters, or on Lacan, continue to exert an enormous appeal to many scholars, especially within the humanities and cultural studies, and among feminists. Some of these theorists might, admittedly, be only vaguely aware of the devastating findings about Freud's lies, his manipulation of his material, his inability to cure people, and the many falsifications of his propositions. They might not know that many of Freud's concepts, such as the unconscious, were not at all original, but that he

borrowed liberally from others, such as Schopenhauer and Nietzsche (Crews 1996). Yet even without this knowledge one can hardly fail to see that psychoanalysis cannot be called scientific in any sense of the word, in spite of Freud's insistence to the contrary (Storr 1989). This is due to, among others, his very limited sample of people (he mentions 133 cases, but offers only six extended accounts of individual patients, two of whom he never met in person)<sup>3</sup> and his lack of the use of controls. It is not because a theory is, to some extent, testable that it is a science. If this were the case, astrology and graphology would also be sciences. The reason why they are not is not just that their methodology is unsound and that their claims have been falsified, but also that their defenders continue to ignore all the contradictory evidence. The same goes for psychoanalysis.

When reading feminist psychoanalytic interpretations and feminist accounts of psychoanalytic theories, however, it becomes clear that many scholars do not care whether psychoanalysis is scientifically sound or not. What counts is whether it "has been reformed into a theory of the genesis of women's psychosexuality that is acceptable to women" (Hermsen 1995:61, my translation). What feminists do is to intuitively modify psychoanalytic propositions such that they suit women better, as if truth were just a matter of personal taste. The criterion is not empirical validity. Chodorow's 1978 *The Reproduction of Mothering*, for instance, described by feminist philosopher Susan Bordo as "[t]he book that created a Copernican Revolution in gender theory,"<sup>4</sup> provides nothing but an ideological opinion without any empirical basis. Chodorow does not supply any evidence for her assertions, except for telling us that "[t]he evidential basis of psychoanalysis is clinical. It is drawn mainly from the psychoanalysis of adults and children, and consists in interpretations made by analysts of what is said in the analytic situation" (1978/1999:52) and that "the resurfacing and prevalence of preoedipal mother-daughter issues in adolescence (anxiety, intense and exclusive attachment, orality and food, maternal control of a daughter's body, primary identification) provide *clinical verification* of the claim that elements of the preoedipal mother-daughter relationship are maintained and prolonged in both maternal and filial psyche" (1978/1999:109-10, emphasis added). Thus we ought to believe Chodorow's account of the reproduction of gender difference merely on the basis of unverifiable and highly idiosyncratic interpretations of what people are purportedly saying during a

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<sup>3</sup> This leaves four cases personally analyzed by Freud: 'Dora', who was treated for eleven weeks, the 'Rat Man', treated for eleven months, an unnamed female homosexual whose treatment was discontinued by Freud after 'a short time', and the 'Wolf Man', intermittently followed up for years, who died only in 1979, still an obsessional neurotic (Storr 1989).

<sup>4</sup> Blurb text for the 1999 second edition.

psychoanalytic session. The fact that Chodorow does not even consider other possible explanations of the conflicts between a mother and her adolescent daughter, testifies to her bias.

Chodorow is, however, only following in the decidedly unscientific footsteps of illustrious predecessors such as Freud and Lacan. As this dissertation is not about psychoanalysis, I can offer only a few illustrations of how these theorists have been scientifically discredited.

The book that was at the cradle of psychoanalysis, Josef Breuer and Sigmund Freud's *Studien über Hysterie* (1895), is an omen of the shaky foundations upon which psychoanalysis, as a theory and as therapy, rests. *Studien* has turned out to be a case of scientific fraude. It figures the treatment of Anna O., which is very different from the success story that Breuer and Freud have made it into. For one, Anna O. was never cured. The details of what really happened will probably only be known in the year 2102, when Breuer's archive will finally be disclosed. Much of the Freud archive, in the Library of Congress in Washington, for that matter, will only be disclosed some time into the 21<sup>st</sup> century (Israels 1999). This is a strange way of proceeding for a purportedly scientific discipline.

Psychoanalysis is not based on experiments or hypothesis testing, and it is refuted by modern neurobiological research. Freud, for instance, conceived of the mind as a hydraulic system, consisting of drives that needed to be released and of channels that could become blocked. If pressure built up too much, the channel overflowed (Evans 2005). We now know that this model is wrong. The function of the mind is to process information. The cognitive revolution of the 1970s showed that the mind is better thought of as a computer (see section 7.7). Another example: There are major differences between the (cognitive) unconscious processes inferred by cognitive psychology and the psychoanalytic unconscious that is the supposed hiding place of repressed sexual or aggressive desires. The psychoanalytic unconscious supposedly operates in a highly illogical way, and its contents can be brought to the surface by the method of free association. What cognitive psychology shows us is that there is great rationality in the computational problem-solving processes that go on in our unconscious. Furthermore we typically cannot bring these processes (e.g., the searching process by which we recall a name) to consciousness (Grünbaum 2002).

Freud's major thesis that repressions, sexual repressions in particular, are the source of all neuroses, is the cornerstone on which the whole edifice of psychoanalysis rests. Freud assumed that distressing mental states, such as hate, anxiety, and forbidden sexual desires, fueled repression of these states (Grünbaum 2002). While

already being undermined by the finding that painful experiences tend to be remembered rather than forgotten, the thesis has been definitely refuted by research indicating that repression simply does not exist (Loftus and Ketcham 1994).

Freud's well-known imperviousness to criticism is, again, hardly compatible with the attitude of an honest scholar. Kevin MacDonald (1996) compares psychoanalysis to a religious movement, for it has been essentially immune to critiques from inside or outside. Insiders who dissented from central doctrines were simply expelled and often went on to found their own strand of psychoanalysis. Disputes are not resolved in a scientific manner; opposition is explained away as 'resistance' to central psychoanalytic insights. In this way psychoanalysis makes itself unfalsifiable.

Neurobiologist Eric Kandel (1999), firmly believing in the value of psychoanalysis, argues for an integration of neurobiology and psychoanalysis in order to provide the latter with a much-needed scientific foundation. "[T]he psychoanalytic institutes ... must change from being vocational schools – guilds, as it were – to being centers of research and scholarship" (1999:521). Ironically, though, every neurobiological study that he refers to either refutes central psychoanalytic premises – regarding repression, gender identity, and sexual orientation – or is in perfect agreement with standard psychological science. Nowhere does Kandel succeed in proving the usefulness of the psychoanalytic paradigm. He even admits to "[t]he failure of psychoanalysis to provide objective evidence that it is effective as a therapy" (1999:521).

Virtually everything about psychoanalysis that does lend itself to falsification has been falsified. Dreams are not wish fulfilment. Freud's studies of historical persons, such as Leonardo da Vinci, turn out to be manipulative and defective (Israels 1999). Paranoia is not caused by repressed homosexuality (Storr 1989). Women are not envious of men's penises. Various longitudinal studies have been carried out to ascertain whether there is a relationship between childhood events and adult personality characteristics. None was found. Neither are there differences in the sexual events of childhood between adults with neuroses and adults without neuroses (Torrey 1992). In fact, the only relationship that has been found is similarity between personality traits in children and their parents – a finding that can almost completely be explained by genetic similarity (Harris 2006). So, more than 100 years after its inception, psychoanalysis remains without any corroborative evidence. Our current understanding of the workings of the brain indicates that looking through a psychoanalytic lense – in whichever updated version, such as (Chodorow's) object relations theory, focusing on the child's tie with the mother – is like studying the body

using the ancient theory of the four bodily humors.<sup>5</sup> It is a nice theory, but it just isn't correct.

"[M]any educated nonscientists have in common an uneasy attitude toward mainstream science, leaving them with a susceptibility to irrational persuasion that Freud exploited with formidable brilliance", Frederick Crews (1996:478) writes. Someone else who has exploited this susceptibility even more brilliantly was the French psychoanalyst Jacques Lacan, hailed as the most important psychoanalytic theorist since Freud and enormously influential on, among others, feminists, literary theorists, and postmodernists. Like Freud, Lacan aspired to a science of psychoanalysis, yet his methods were anything but scientific. He reworked Freud's theory of instincts in an increasingly metaphysical way, interpreting every biological term in Freud's work metaphorically. Thus he removed psychoanalysis completely from the realm of testable biological claims (Evans 2005).

Filip Buekens (2006) is one of the critics to have demonstrated how Lacan's work suffers from ambiguities, incoherence, internal contradictions, inaccuracies, sophistry, a lack of argumentation and empirical verification, and irrationality. Take a cornerstone of Lacan's psychoanalytic theory: that the unconscious is structured like a language. As so often, Lacan does not provide a single argument for his claim. His reasoning seems to be that, as the unconscious manifests itself through language (during a psychoanalytic session), this shows that it is structured like a language. The conclusion, however, does not follow from the premises. By carefully taking apart Lacan's claims, Buekens shows that this work indeed amounts to "conceptual surrealism" (2006:16). Lacan's notoriously obscure, impenetrable writing, and his use of technical jargon may strike the reader as an indication of philosophical or scientific subtlety and depth, but this is deceptive. There is no substance, no coherent theory lurking within the idiosyncratic Lacanian discourse. As his concepts and neologisms shift meaning throughout his work, it is nearly impossible to nail them down (Buekens 2006).

Small wonder, then, that Lacanians have arrived at very different interpretations of Lacan. For this is part of what they do: trying to understand what the master meant exactly. As Dylan Evans, a former Lacanian psychoanalyst, describes it, debate in Lacanian seminars is purely a matter of exegesis. No critique is offered; Lacan's words are accepted as if they were holy writ. Nobody asks what the evidence is - the question is even considered vulgar. Another problem is the way his theory is put to use by, for

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<sup>5</sup> Black bile, blood, phlegm, and yellow bile. According to Galen, who developed this theory, these four fluids need to be present in equal quantity to be a healthy person.



instance, literary theorists. Lacan only meant his work to be a method for treating patients, and a theory of how that method worked. He was a practicing psychoanalyst, not a cultural theorist, and he was horrified by the way others applied his theory to domains that had nothing whatsoever to do with the clinical practice of psychoanalysis (Evans 2005).

Lacan's views are hopelessly inadequate because they are predicated on a false theory of human nature, Evans writes. Indeed, Lacanian ideas are completely absent from developmental psychology and from all other psychological sciences. They exerted an enormous influence on postmodernism, however, particularly the idea that the human subject is constituted through discourse.

### **1.5. The Third Wave**

The conundrum of women's oppression in the face of the claim that there is nothing unifying women, is especially pregnant in postmodernist feminism. As an exponent of the third wave of feminism that emerged in the late 1980s, postmodernist feminism has moved away from an activist mode to a mode of academic theory and debate. It is exemplified by historian of science Donna Haraway's deeply influential essay *A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century* (1985 [1991d]). Haraway propagates the cyborg as a creature in a postgender world, revelling in the confusion of the boundaries between human and animal, between man and machine, and between physical and nonphysical. Her focus is on fractured identities and on the rejection of all claims of universality:

Consciousness of exclusion through naming is acute. Identities seem contradictory, partial, and strategic. With the hard-won recognition of their social and historical constitution, gender, race, and class cannot provide the basis for belief in "essential" unity. There is nothing about being "female" that naturally binds women. There is not even such a state as "being" female, itself a highly complex category constructed in contested sexual scientific discourses and other social practices. Gender, race, or class consciousness is an achievement forced on us by the terrible historical experience of the contradictory social realities of patriarchy, colonialism, and capitalism. And who counts as "us" in my own rhetoric? (Haraway 1991d:155)

With this last question Haraway recognizes the contradiction at the heart of postmodernism: If the use of unified categories is to be condemned as essentialist and

totalizing, then how can one speak meaningfully about the world and, indeed, how is a universalizing theory like postmodernism to be justified? What is the basis for developing political reform programs if there is only difference and if identities can only be unstable sites of shifting meanings? Haraway warns for the risk of "lapsing into boundless difference and giving up on the confusing task of making partial, real connection" (1991d:161), but she does not explain how this connection should be made, nor how it is even possible. Since in the postmodernist view objective knowledge is impossible and knowledge and power are always intimately connected, postmodernists seem to forsake any ideals of justice or equality as universal human goals.

Nancy Fraser and Linda Nicholson tackle this problem in their 1988 article "Social Criticism without Philosophy: An Encounter between Feminism and Postmodernism." As true postmodernists, they criticize theories "which claim, for example, to identify causes and constitutive features of sexism that operate cross-culturally." Such theories, they argue, "falsely universalize features of the theorist's own era, society, culture, class, sexual orientation, and ethnic, or racial, group" (1988:27). They consider feminist theories such as Nancy Chodorow's analysis of mothering<sup>6</sup>, purportedly producing women whose deep sense of self is relational and men whose deep sense of self is not, essentialist and ill-conceived. For a theorist to use "categories (like sexuality, mothering, reproduction, and sex-affective production) to construct a universalistic social theory is to risk projecting the socially dominant conjunctions and dispersions of her own society onto others," according to them (1988:31).

Consequently Fraser and Nicholson consider the question how to combine a postmodernist incredulity toward metanarratives with the social-critical power of feminism. The answer, according to them, lies in theory that is explicitly historical, attuned to the cultural specificity of different societies and periods and to that of different groups within societies and periods. Its mode of attention would be comparativist rather than universalizing, and it would dispense with the idea of a subject of history. In general, it would be pragmatic.

This answer, however, does not seem to solve anything. The same problem remains: If we are all just the products of societal and discursive practices, then there can be no objective standards for measuring human needs and human well-being, or for condemning sexist practices. Without some kind of universal ethical standard, based on scientific knowledge of human nature, cultural relativism is rampant. Without

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<sup>6</sup> Chodorow 1978.

the existence of a subject who is the author of her own acts and without the reality of gender, feminism not only loses its critical edge, it loses its reasons for being.

The disappearance of the subject and the accompanying celebration of difference within postmodernism is a case of concern for many feminists. Feminist philosopher Susan Bordo (1990), for instance, criticizes postmodernist feminists for erasing gender and for flattening identities to mere performance. Nothing in the early critiques voiced by particularizing feminisms declared the impossibility of finding common ground among women, she notes. The affirmation of difference as the only "correct" perspective on race, class, and gender has become dogma among feminist academics. Attending to difference is important, but attending too vigilantly to it can problematically construct an Other who is an exotic alien. Stimulating general hypotheses can be dialogically invaluable, Bordo stresses. She further points out a perverse effect of this dogmatic focus on difference:

Indeed, it is possible, as we all know, to advance the most vociferously anti-totalizing theories, and yet to do so in the context of an intellectual discourse and professional practice (governing hiring, tenure, promotion, publications, etc.) whose very language requires membership to understand, and that remains fundamentally closed to difference (regarding it as "politically incorrect," "theoretically unsophisticated," "unrigorous" and so forth). We deceive ourselves if we believe that postmodern theory is attending to the "problem of difference" so long as so many concrete others are excluded from the conversation. (Bordo 1990:140)

Bordo's own theoretical position is, however, not far removed from postmodernism. She does not doubt that gender is a social construct, but she acknowledges that it may be based on the difference between male and female bodily realities. In order to struggle effectively, we need to be pragmatic, not theoretically pure, she says. Gender, to her, remains an important tool for theoretical analysis: "[L]ike it or not, in our present culture, our activities *are* coded as 'male' or 'female'" (1990:152, emphasis in original) – she is wrongly implying here that in other cultures the case might be different (see Brown 1991).

In the quote Bordo alludes to another problem accompanying postmodernism: its esotericism. According to feminist philosopher Jane Roland Martin, "the postmodern languages many feminist scholars in the academy speak today function, even if unintentionally, as a password or a secret handshake does" (Martin 1996:597). The trouble with secret handshakes, however, is that they drive a wedge between initiates

and the uninitiated. It is not just the use of jargon that creates problems; it is mainly the fact that postmodernist theorists seem to revel in writing as obscurely as possible, making no effort whatsoever to make themselves intelligible. For people who want to have impact upon the world – as I assume they do – this appears to be the worst possible way of proceeding. One might suspect that gaining prestige is a stronger motivation for these writers than the dissemination of theories and analyses is. Moreover, for all its verbal brilliance and sophistication, postmodernist prose sometimes resembles the emperor's new clothes: If one tries to translate it into accessible, coherent language, its message often turns out to be disappointingly trivial.

The fundamental problems accompanying a radical social constructionism also trouble a variant of postmodernist feminism: queer theory. With Judith Butler, an American professor in rhetorics and comparative literature, as its most outspoken exponent, queer theory regards not only identities as discursively produced, but also bodies. It criticizes what it considers the normative heterosexuality of our society and of most feminist theorizing:

The notion that there might be a "truth" of sex, as Foucault ironically terms it, is produced precisely through the regulatory practices that generate coherent identities through the matrix of coherent gender norms. The heterosexualization of desire requires and institutes the production of discrete and asymmetrical oppositions between "feminine" and "masculine," where these are understood as expressive attributes of "male" and "female." (Butler 1990:23)

Butler (1990, 2000), who "is without a doubt one of the most influential theorists in the domain of contemporary gender studies" (Buelens 2002, my translation) describes the body as constituted by the structures of language and politics. According to her, one cannot position oneself outside of those normative structures. Her philosophy is a combination of psychoanalytic (Lacanian) theory and the theories of the French postmodernist philosophers Foucault and Derrida. She rejects the notion of a 'subject'; all identities are products of discursive, normative practices that produce bodies and sexual desires. The performance of gender, the ritualized repetition of gender conventions, creates the illusion that gender has a kind of essence, but it has not. These gender conventions, or gender norms, precede the subject. By repeating them they are reinforced, and as such are reproduced as norms. Thus gender is performative: It is something you do, not something you are. In Butler's views there is hardly a subject anymore to act and resist. The most we can do is to parody the power

structures into which we are born, and in this way create a small space for subversion. According to Butler and other queer theorists, sexual desire is basically ambivalent, but the heterosexual matrix of society makes us renounce our homosexual desires. A man learns to define himself as male by rejecting his femaleness, something that makes him desire the woman he will never be. She is his rejected identification.

"Queer theory questions the concept of 'identity', because it may help stabilize and perpetuate the existing power relations," literary theorist Gert Buelens (2006:131) writes. Political motivations, however, are a poor argument for establishing truth. Unsurprisingly perhaps, queer theorists take the easy way out of disdaining the whole of the scientific edifice as a discourse of power. In this way, they do not have to take scientific findings into account: "Are the ostensibly natural facts of sex discursively produced by various scientific discourses in the service of other political and social interests?", Butler (1990:10) asks rhetorically. And: "The power relations that infuse the biological sciences are not easily reduced, and the medico-legal alliance emerging in nineteenth-century Europe has spawned categorical fictions that could not be anticipated in advance" (Butler 1990:42-3).

Is there any probability at all that Butler's social constructionist views hit the mark? As this dissertation shows, the evidence is overwhelming that they do not. Butler, by the way, does not offer us any arguments or empirical evidence for her claims. She just postulates them, building on the work of other theorists who did not offer any evidence either. One might argue, as Buelens (personal communication) does, that one of her merits is that she warns us about the danger of the normativity of the categories we use. I agree that it might be an important task for philosophers to reflect on this topic, but one hardly needs an untenable view of human nature in order to do this. Moreover, as the liberal philosopher Martha Nussbaum (1999) points out, Butler's opposition to normative notions might well suit her in a world of like-minded people, but this is not the world we live in. Not everyone is convinced that oppression of women and discrimination of gays and lesbians is a bad thing. Subversive performances flouting the norms of human equality, fairness, and social justice may be acts of resistance, but they are not liberating. In order to make this clear, Butler would have to articulate which norms *are*, in her opinion, worth adhering to.

### **1.6. Heterogeneity: Problem or Merit?**

The heterogeneity of feminism can, of course, not be neatly classified. As Valerie Bryson (1999) points out, feminists frequently draw their ideas from more than one

theoretical starting point, and these ideas often reinforce each other. At times they come into conflict, so that two contradictory sets of beliefs are held simultaneously. About this multiplicity of feminisms evolutionary biologist and feminist Patricia Gowaty writes that they "most often arise organically as women (and some men) identify sources of oppression in their lives and struggle to free themselves" (1997b:2-3). It should be no surprise then that there are so many feminisms, she thinks. She continues: "It is also no surprise that divisiveness among feminists is one of the challenges of modern feminism. Each of our political philosophies probably deserves respect, because they have grown out of our lived experiences" (1997b:3).

I wholeheartedly agree with Gowaty's analysis of feminist divisiveness as being one of the challenges of modern feminism, but I think her conclusion is rather problematic. No matter how sincerely a political philosophy testifies to the lived experiences of the theorist, this does not in itself constitute any proof of the analysis being right. Consider radical feminist Andrea Dworkin's crusade against pornography. In *Life and Death: Unapologetic Writings on the Continuing War against Women* (1997) she provides an incisive account of the way her life has been shaped by rape and battering. One cannot fail to be moved by her rawly emotional writing style and by the misery she has been through:

No one knew about battery then, including me. It had no public name. There were no shelters or refuges. Police were indifferent. There was no feminist advocacy or literature or social science. No one knew about the continuing consequences, now called post-traumatic stress syndrome, which has a nice dignity to it. How many times, after all, can one say terror, fear, anguish, dread, flashbacks, shaking, uncontrollable trembling, nightmares, he's going to kill me? At the time, so far as I knew, I was the only person this had ever happened to; and the degradation had numbed me, disoriented me, changed me, lowered me, shamed me, broken me. (Dworkin 1997:19)

Nor can one escape feelings of moral outrage at the plight of (white, middle-class) young women only three decades ago or fail to appreciate the subsequent social changes due to feminism:

It was a time when girls were supposed to be virgins when we married. The middle-class ideal was that women were not supposed to work; such labor would reflect badly on our husbands. Anyone pregnant outside of marriage was an outcast: a delinquent or an exile; had a criminal abortion or birthed a child that

would most likely be taken away from her for adoption, which meant forever then. In disgrace, she would be sent away to some home for pregnant girls, entirely stigmatized; her parents ashamed, shocked; she herself a kind of poison that had ruined the family's notion of its own goodness and respectability. (Dworkin 1997:30)

Dworkin's analysis - and one of the basic tenets of radical feminism - that pornography is the root of female subordination, that it is "the DNA of male dominance" (Dworkin 1997:99) is, however, hardly borne out by the facts (e.g., Diamond 1999; Diamond and Uchiyama 1999; Ellis 1989; Tovar, Elias, and Chang 1999). Her account and that of the many women she has spoken with of how they have been hurt by pornography is very probably true. Yet our empathy with them must not lead us to far-reaching conclusions about power, sadism, and dehumanization working deliberately in pornography to establish the sexual and social subordination of women to men, as radical feminists assume. We can respect the theorist without having to accept the theory.

One problem with Dworkin's analysis is its implicit theory of human nature. When she writes about pornography that it is "what men want us to be, think we are, make us into; how men use us; not because biologically they are men but because this is how their social power is organized" (1997:99), women and men are presented as passive pawns in the social game, with women conditioned to be willingless victims and men to be eager woman haters. A similarly environmentalist conception of human nature underlies the work of many feminist theorists (Brouns, Verloo, and Grünell 1995; Butler 1990, 2000; Connell 1995; Dines, Jensen, and Russo 1998; Michielsens et al. 1999; Nicholson 1994). Theories like these not only cannot explain how present situations ever came to be (how have passive pawns ever been able to create complex social organizations?), they are at odds with modern scientific knowledge about an evolved human nature as well, as this dissertation shows.

Although they seldom state them explicitly, each feminism has an undergirding theory of human nature. According to Patricia Gowaty (1997b), a profitable way to look at all the variety (and potential controversy) among feminisms is to look at the relationships among those theories of human nature. She considers them all proximate levels of analysis, that is, levels describing factors that mediate the expression of behavior (they describe the 'how' of behavioral expression, not the 'why'). Just like an endocrinologist, a geneticist, a sociologist, and a developmental psychologist might come up with different answers to the question of the cause of a given behavior and be

all simultaneously right, the same might apply to the different feminisms, she says: Each describes part of the story. In addition, we can ask about the forces of evolution, about natural selection favoring this behavior or that, explanations biologists label the ultimate causes of behavior.

The stressful behavior of someone with a headache, for example, can be explained on different levels. On a sociological level, there may be a highly industrialized society with demanding jobs. On a psychological level, the person may be rather perfectionist and hence easily stressed. On a genetic level, he or she may have a genetically based tendency toward perfectionism. It is also known that headaches correlate with certain changes in the blood vessels in the neck and in the membranes that cover the brain. So a vascular theory of headaches is another way of understanding this person's condition. Then there is the neurological basis of pain in general, so a neurological theory of headaches is also available (Plotkin 1997). Finally, at an ultimate level, we can ask what benefits in terms of survival getting a headache in a stressful situation might confer.

This 'multiple level of causations' point of view is, as Gowaty argues, certainly something that can help organize and facilitate the discussion among feminists. If one is aware that there are multiple causes of women's oppression, the variety of feminist political philosophies "can be - in theory - discussed without defensiveness about whether one is 'right or wrong'. Perhaps all are correct or partially correct - and we would all be better off for knowing that" (Gowaty 1997b:5).

The concept of multiple coexisting theories of human nature that all hit the mark seems, however, ill-conceived. No matter how many levels of description of human behavior there are, logic demands that there is only one 'human nature'. No matter how valuable ecofeminism, materialist feminism, or existentialist feminism - to name some other strands - might be for highlighting causes of women's subordination, as theories of human nature they inevitably clash. In order to be compatible as proximate explanations of behavior, they must by definition be grounded in a unified theory of human nature that can at the same time account for the impressive variation among individuals and among cultures. According to a growing number of scholars, the Darwinian theory of evolution by natural and sexual selection can do just that. As I try to show, an evolutionary point of view can help feminists solve many theoretical dilemmas. I claim that the confusing and often self-contradictory variety of feminisms not only has to do with the complexity of human behavior and of human social organization, but also with the absence of a deeply historical, evolutionary perspective. Such a perspective could serve to integrate the different feminisms. Sociologists



Joseph Lopreato and Timothy Crippen argue that in its absence, "the sociology of 'sex roles' will continue to stray very far from a productive grasp of subject matter" (1999:169). The extent to which this rather stern-sounding condemnation is justified will be a matter of investigation in this dissertation. It seems inevitable, however, that an evolutionary approach will do away with some much-cherished assumptions of what evolutionary psychologists John Tooby and Leda Cosmides (1992) call the 'Standard Social Science Model', the assumption that the human mind is virtually completely molded by the social environment.

In taking such an approach, one must nevertheless beware of the patronizing stance that Laurette Liesen detects for instance in David Buss's article "Sexual Conflict: Evolutionary Insights into Feminism and the 'Battle of the Sexes'" (1996). "One gets the impression that Buss believes evolutionary psychology can help save feminism from itself, making it more empirical and enlightened through evolutionary psychology's insights into the nature of relationships between males and females," Liesen, a political scientist studying the relationship between feminism and evolutionary psychology, writes (1998:111). Feminists have played an important role in elevating the scientific level of evolutionary theories of human and animal behavior, as this dissertation makes clear, and probably continue to do so.

### **1.7. Sex and Gender**

Another terminological issue that I have to touch upon is that of sex and gender. Feminist accounts of sex-differentiated behavior typically begin by making this distinction, although there is no agreement on the precise meaning of both concepts. Gender can be used in two very different and somewhat contradictory ways. In second-wave feminism a distinction was made between 'biological' sex and 'socialized' gender, with the latter referring to the internalization of sex-typical patterns of behavior. Since gender would explain the social construction of femininity, it would allow women to break out of the confines of what had been deemed their biological fate, it was thought (Segal 1999).

Gender is still often used as a contrasting term to sex, to depict that which is 'socially constructed' as opposed to that which is 'biologically given'. However, as Linda Nicholson says in her article "Interpreting Gender" (1994), the term has increasingly become used to refer to any social construction having to do with the male-female distinction, including those constructions that separate female bodies from male bodies: "This latter usage emerged when many came to realize that society not only

shapes personality and behavior, it also shapes the ways in which the body appears. But if the body is itself always seen through social interpretation, then sex is not something that is separate from gender, but, rather, that which is subsumable under it" (Nicholson 1994:79).

Being a postmodernist, Nicholson, like queer theorist Judith Butler, defends this second usage. The position she would like feminists to endorse is that biology cannot be used to ground claims about women or men transculturally. About the distinction between sex and gender she writes:

[T]his distinction, sex, was a word with strong biological associations. Early second-wave feminists correctly saw this concept as conceptually underpinning sexism in general. Because of its implicit claim that differences between men and women are rooted in biology, the concept of sex suggested the immutability of such differences and the hopelessness of change. To undermine the power of this concept, feminists of the late 1960s drew on the idea of the social constitution of human character. (Nicholson 1994:80)

Her criticism is clear:

Many of those who accept the idea that character is socially formed and thus reject the idea that it emanates from biology do not necessarily reject the idea that biology is the site of character formation. In other words, they still view the physiological self as the 'given' upon which specific characteristics are 'superimposed'; it provides the location for establishing where specific social influences are to go. The feminist acceptance of such view meant that sex still retained an important role: it provided the site upon which gender was thought to be constructed. (1994:81)

Nicholson cannot accept this 'biological foundationalism', as she calls it:

The human population differs within itself not only in social expectations regarding how we think, feel, and act but also in the ways in which the body is viewed and the relationship between such views and expectations concerning how we think, feel, and act. (...) In this alternative view the body (...) becomes a variable rather than a constant, no longer able to ground claims about the male/female distinction across large sweeps of human history, but still there as always a potentially important element in how the male/female distinction gets played out in any specific society. (1994:82)

These quotations reveal her underlying motivation for accepting what counts as truth and what does not: It is clearly political. This attitude, as we will see, resurfaces again and again in feminist thought. Nicholson's "Interpreting Gender" does not contain one single reference to modern scientific insights on the nature of males and females. This should not surprise us, since postmodernists put the entire edifice of knowledge into question and link scientific knowledge primarily to the exercise of power. As we will see, however, not all strands of feminism take an antiscientific stance, and the feminist criticisms of and contributions to particular scientific disciplines often have helped to improve the scientific level of those disciplines.

Another interesting observation to be made about these quotations, is that Nicholson - and a lot of feminists with her - automatically associates biological differences between the sexes with the hopelessness of social change. This association is definitely wrong, as many biologists and philosophers have shown. Still, the misconception persists.

Subsuming sex under gender has the advantage that it leads the outdated nature-nurture dichotomy to disappear. The way Nicholson proceeds is, however, untenable by any scientific standard. As I will argue, feminism needs the biological and evolutionary sciences to settle this question (but the latter also need feminism, for different reasons). As long as feminists refuse to take into account scientific data about the sexes, (some strands of) feminism will stray. As long as there are feminists who, like the Dutch gender theorist Margo Brouns, are convinced that the question whether men and women differ by nature is "a *philosophical* question" (Brouns 1995b:47, my translation, emphasis in original), feminism will continue to find itself faced with contradictions.

In this work I will use both concepts, sex as well as gender, to denote psychosexual and behavioral differences between men and women, whatever their presumed origin.

### **1.8. The Missing Link**

This short - and inevitably caricatured - description of some of the main feminist traditions primarily serves to indicate that feminism is characterized by an immense multiplicity of theoretical, often contradictory perspectives. Although most of them can probably offer valuable partial explanations of gender differences at the proximate, direct level of behavior, none succeeds in providing an overarching explanatory framework. Rather than being wrong, they are somewhat myopic: They use the

structural tendencies they find in society to explain patriarchy, but they leave these tendencies themselves unexplained.

Socialist feminism links the oppression of women to the class society, but why do humans constitute hierarchies in the first place? Radical feminism finds the origin of patriarchy in men's tendency to control women's sexuality, but they do not explain where this tendency comes from. Nancy Chodorow's psychoanalytic theory stresses the reproduction of mothering as a causal factor of male-female differences, but she cannot explain how this pattern of female mothering came to emerge in all known human societies.<sup>7</sup> Existentialist feminism links patriarchy to the male fear of 'the Other', liberal feminism links it to gendered socialization, lesbian feminism links it to the 'dogma' of heterosexuality, and ecofeminism sees the root of the patriarchal evil in androcentrism – the practice of placing male human beings at the center of one's world view. The same problem remains: Their explanation needs another explanation in turn, one that can explain the ubiquitousness of the described behavior.

I believe that, in looking beyond the boundaries of Western and human societies and taking a perspective of humans as organic beings that evolved over evolutionary time, the problems that trouble feminist theories can be solved. If one applies an evolutionary framework, as Darwinian feminists do, one can integrate proximate feminist theories in the ultimate framework of evolutionary theory. Each level can guide discoveries and explanations on the other, thereby eliminating what proves to be unfounded. In taking this approach, an age-old question would be solved which Geert ten Dam and Monique Volman describe as "one of the most pressing questions of women's studies": "How is it possible that, generation after generation, people adjust themselves to the governing patterns of sex relationships?" (1995:160, my translation).

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<sup>7</sup> As can be found in Brouns 1995c, structuralist psychoanalysts consider it a mystery that there are two sexes, no more, no less. It is rather amusing that it does not seem to occur to them that biology might offer some help in solving the mystery - although it must be said that there exist competing biological theories about the evolution of sex.



## 2. SCIENCE AND ITS PROBLEMS

Science it would seem is not sexless; she is a man, a father and infected too.

Virginia Woolf

### 2.1. Introduction

As women's traditional positions have often been justified by claims about a deep difference of nature between the sexes, it is not surprising that many feminists distrust scientific claims about biological differences between men and women. As neurophysiologist Ruth Bleier puts it, "biological theories have provided the scientific justification for ideologies that support, explain, mystify and obfuscate patriarchal relationships of power, domination and control" (1985:19).

The combination of a sad history of misogyny and prejudice in the history of science and the naturalistic fallacy in much of feminist thought probably does a fair job in explaining what I do not hesitate to call feminist biophobia<sup>8</sup>: the hostility to consider evidence from the biological sciences when it comes to elucidating gender difference. The naturalistic fallacy, the (wrong) idea that what ought to be is defined by what is natural, forces many feminists to deny the possibility of objective knowledge. They seem to reason that any unwelcome finding about the world has to be acted upon in a way that leaves no alternatives: "If science, however, simply uncovers 'truths', can we criticize its theories for its *unavoidable political and social implications*? (Bleier 1985:19, emphasis added). Bleier happily continues:

That is a question that does not require tortured analysis because science does not simply uncover truths. Rather, science, a "system of cognitive production", constitutes a "plurality of socially constructed ways of comprehending natural and social phenomena" (Mendelsohn, Weingart, and Whitley, 1977). A cultural product and institution, like literature, film, and political science, it is a body of interpretations and language used by persons who together create and discover meaning in what they study. And those persons, born into, reared, and situated within a particular class, gender, race, ethnic, and national context, have - like all

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<sup>8</sup> A term proposed by evolutionary psychologists Martin Daly and Margo Wilson (1988).

other human beings - a world view. That view and life history of experiences and relationships, a scientist's values, beliefs, and biases, help to determine what questions scientists find interesting to ask, what assumptions they make, what language they use to pose questions, what they see and fail to see, how they interpret their data, what they hope, want, need, and believe to be true. (Bleier 1985:19-20)

The various strands of feminism differ in their appreciation of science, as the next chapter shows. Liberal feminism believes in the possibility of obtaining knowledge that is objective and value-free, despite the obvious social embeddedness of science Bleier refers to in the second half of the quotation. The other feminist traditions tend toward some version of the cognitive relativism that is apparent in the first half of the quotation.

Which brings me to the subject of this chapter: the extent to which the distrust of science exhibited by many feminists (and others) is warranted. What do misogynist scientific theories and practices from the past tell us about the scientific enterprise itself? To what extent is objective knowledge possible? Does the social embeddedness of science sustain Bleier's claim that it is a cultural product just like film and literature? How can we escape scientific relativism?

## **2.2. Misogyny in Science: Facts about the Past**

As many feminist writers have shown, the history of science, and of biology in particular, is characterized by prejudices about and the conscious or unconscious neglect of women and female animals in general.<sup>9</sup> I concentrate here on the history of theorizing about the sexes, as well as on the study of animal behavior. For practical reasons the development of Darwinian evolutionary theory in particular is relegated to chapter 4.

It is not hard to find examples of overt sexism in the history of science and philosophy. The classic Greeks, like Aristotle, Galen, and Hippocrates, are rewarding subjects for showing how values and beliefs can determine theories. Hippocrates (460?-377 BCE) thought the uterus freely traveled through a woman's body, thereby giving rise to a number of physical, mental, and moral defects (the word 'hysteria' is derived from the Greek *hystera* or uterus). He also claimed that menstrual blood was

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<sup>9</sup> E.g., Angier 1999; Birke 1999; Bleier 1985; Brouns 1995a; Blackwell 1875; Cronin 1991; Fausto-Sterling 1992; Fedigan 1997; Fox Keller 1982; French 1992; Haraway 1991; Hrdy 1997, 1999a, 1999b; Hubbard 1990; Hyde 1996; Rosser 1992; Russett 1989; Schiebinger 1999; van Muijlwijk 1998; Zihlman 1997; Zuk 1997, 2002.

poisonous, because according to him women lacked the male capacity for driving away unclean substances through sweating. According to Galen (130?-200 BCE), menstrual blood was a residue of blood in the food, something the small and inferior female body was not able to congest (Angier 1999).

Aristotle (384-322 BCE) 'counted' fewer teeth in the mouths of women than in those of men - adding this dentitional inferiority to all the other kinds of female inferiority (Rosser 1992). He excluded women from serious consideration as moral entities. His claim that women, as totally passive beings, contributed nothing to conception but the womb as incubator, reigned for ages. It led leading microscopists of the seventeenth and eighteenth centuries to assert that they had seen exceedingly minute forms of men with arms, heads and legs complete inside sperm under the microscope (Bleier 1985). As Bleier notes, their observations were constrained not by the limited resolving power of the microscopes of the time but rather by Aristotle's 2,000-year-old concept of women.<sup>10</sup>

The dichotomy between the male as active and the female as passive deeply resonated in philosophy. The German philosopher of the Enlightenment Fichte, for instance, claimed that it was completely rational for a woman not to strive for sexual satisfaction. Since female dignity consists in subjecting herself to the male through marriage, she cannot reasonably want to be free, he thought. Rousseau, Hume, Kant, and many other philosophers of the Enlightenment, too, in proclaiming the freedom and rationality of man (sic), showed themselves to have a rather restricted conception of human beings. Women, they thought, by nature did not possess the rational and moral qualities that would enable them to be active in public life (van Muijlwijk 1998).

According to historian Thomas Laqueur in his book *Making Sex: Body and Gender from the Greeks to Freud* (1990), the belief in the existence of two separate sexes did not emerge in the West until 1800. Before that time a one-body-model reigned: the idea that the male was the primary form, with the female being a less perfect version of it. According to that model, the paradigm of anatomical thought during 2,000 years, women were imperfect men. Only around 1800, with the rise of modern science, did the one-sex-model disappear and did female genitals get their own scientific denomination (Angier 1999; van Muijlwijk 1998).

This idea of the greater perfection of the male sex had for the first time been scientifically explained by Aristotle. His biology was based on the central premise that

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<sup>10</sup> Cynthia Eller (2000) notes, however, that the idea that the woman is merely 'a sack for carrying' or 'the field that nourishes the grain' is not peculiar to Aristotle but is, in fact, found across the ethnographic record. The equal contribution of both parents to the child's biological makeup may seem obvious to us now, but it is a very recent discovery.



heat is the fundamental principle in the perfection of animals. Heat enables matter to develop. On the Aristotelian model, woman is colder than man, and this defect in heat will result in her brain being smaller and less developed than man's. To this Galen added the claim that because of the female defect in heat, her genitals could not emerge and project on the outside. According to him, the only difference between the genitals of the two sexes is that in women the various parts of them have remain stuck within the body, whereas in men they are outside the body (Tuana 1988). Nancy Tuana summarizes Galen's view as follows: "Woman remains, so to speak, half-baked" (1988:154). The history of anatomy attests to the power of Galen's analysis of woman's genitals, she says: "For centuries, anatomical drawings of women's internal genitalia would bear an uncanny resemblance to man's external genitalia" (1988:154).

The long tradition of a one-body-model leads some feminists, such as Anthea Callen, to conclude:

[T]here is no such thing as a "natural" body: all bodies ... are socially constructed; all are representations which embody a complex web of cultural ideas, including notions of race, class and gender difference. Our own bodies, and our experience of them are also culturally mediated. (Callen 1998:402)

In analyzing eighteenth-century anatomical reproductions, Callen further notes that it is significant that female skeletons were rarely represented as embodying the *memento mori* theme. Women, as she points out, were commonly represented as not privy to knowledge: "The female skeleton bore the material, the reproductive, rather than the productive, spiritually or intellectually meaningful symbolism" (1998:412).

One might wonder whether the long reign of this particular one-body-model warrants the conclusion that all bodies are socially constructed. Might it not be that those theories of the past were plainly wrong and that, because of the self-scrutinizing tendency of science, we have now developed better theories? A case to the point might be made, with one caveat, however: Without women to do some of the scrutiny, gender bias will not easily be eliminated. Indeed, the developments of the nineteenth and early twentieth centuries do not inspire much trust in the self-correcting nature of the scientific enterprise when it comes to matters of sex and gender. We would have to wait until the 1970s, when many women entered the academic world, for a thorough correction to start happening.

Nineteenth-century biologists and physicians argued on physiological grounds against the education of young women, for it might cause damage to their

reproductive systems. Their ovaries and uteruses were claimed to require much energy and rest in order to function properly. Studying would deprive these organs of the necessary energy, resulting in their shrivelling away. The fact that poor women bore many children in spite of their working hard was not seen as a refutation of this argument. On the contrary, it was interpreted as a sign that these women were more animal-like and less highly evolved than upper-class females. Women were also held to be less intelligent than men, partly because of their smaller brains and partly because of the overall size differences between the sexes. It was thought that, since women cannot consume as much food as men, less food would be converted into thought, and that therefore men would always think more than women (Fausto-Sterling 1992; Hubbard 1990).

Elephants and whales undermined the brain size argument, however: If size determined intelligence, then these animals ought to be much smarter than humans. Dividing brain size by body weight provided no solution, since in this way women came out ahead. The French naturalist Georges Cuvier decided that intelligence could best be estimated by the relative proportions of the cranial to the facial bones. With this measure, however, birds turned out to be more intelligent than we are (Fausto-Sterling 1992). Later theories tried to locate the site of the highest mental abilities. For a time this was thought to be the frontal lobes, and soon researchers claimed that the frontal lobes of males were larger. When the parietal lobes were thought to be the location of intelligence, those of females were found to be shortcoming (Hyde 1996).

During the nineteenth century, philosophers and physical scientists in many European countries and in the United States devoted themselves to 'proving' not only the inherent inferiority of women, but also that of people of color and Jews, using physiognomy, bumps on the skull, specious intelligence tests, and other contrived evidence (French 1992; Torrey 1992).

The mid-nineteenth-century medical view of women held that all their physical and mental problems derived from some sexual malfunction. In line with this, Victorian doctors taught that excision of the clitoris could cure a plethora of 'feminine weaknesses', including melancholy, hysteria, insanity, and epilepsy. Clitoridectomy was also used to eliminate masturbation, kleptomania, nymphomania, and lesbianism – actual lesbianism, a suspected inclination, or simply aversion to men. The procedure was used in Europe and the United States during the second half of the nineteenth century, in spite of its failure to cure the disorders it was intended to relieve. The last clitoridectomy known to have been performed in England to correct emotional disorder was done in the 1940s on a five-year-old girl (French 1992; Sheehan 1997).

Many examples of gender bias in the twentieth century can be found in anthropology and primatology. Alison Wylie (1997) cites one famous instance of androcentrism in anthropology. In the 1930s, Claude Lévi-Strauss entered one morning's experience in his field journal as follows: "The entire village left the next day in about thirty canoes, leaving us alone in the abandoned houses with the women and children" (1936, as cited in Wylie 1997:45).

Another example is the way in which women have been portrayed in reconstructions of human evolution in reference to subsistence and reproductive behavior in the 1950s and 1960s. The focus lay on 'man the hunter', with a small, passive role reserved for women as mothers and mates. Only with the social climate of the 1970s encouraging questions about women's roles in evolution was the male centrality in social life challenged, with women revealed to be important as gatherers (and sometimes as hunters, too) and to have pivotal roles in social life (Zihlman 1997).<sup>11</sup>

Yet this neglect of women in anthropology is not only explained by male bias. It is true that the first half of the twentieth century figured some (very influential) women anthropologists such as Margaret Mead and Ruth Benedict (see chapter 6). However, at least until 1970 non-Western societies were mainly witnessed and interpreted by male observers, who indeed visualized relations between the sexes from a male perspective, but who were also often excluded in the field from areas of female activity and power. This observation of course underlines the critical importance of women researchers in the social and life sciences.

Historian of science Donna Haraway has documented how "primatologists tell stories remarkably appropriate to their times, places, genders, races, classes - as well as to their animals" (1991c:84). She points out how animal sociology has been unusually important in the construction of oppressive theories of what she calls "the body political" (1991a:11). Apart from being a sexist mirror of our own social world, the science of animal group behavior has also supplied legitimating ideologies of the patriarchal division of authority.

Haraway (1991a) describes how monkeys and apes were long seen as natural objects unobscured by culture. As such they would show the organic base in relation to which culture emerged. Animal sociology developed between 1920 and 1940, at a time when anthropology and sociology claimed to be able to understand humans solely with

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<sup>11</sup> Anthropologist Adrienne Zihlman maintains in this article that in the 1990s "the 'Second Sex' continues to be portrayed as the handmaidens of society's male players," despite the "increasingly powerful current of research demonstrating the centrality of women and female primates in social life and the evolutionary process" (1997:109).

the aid of the concept of culture (see chapter 6). Still, animal societies were seen to have in simpler form all the characteristics of human societies, so one might learn from them how to organize human society. Thus animals retained an ambiguous place in the doctrine of the split between nature and culture.

In analyzing primatology, Haraway describes in particular the work of Clarence Carpenter, who established the skill of naturalistic observation of wild primates in the 1930s. His careful field studies were, however, "fully reflective of social relations based on dominance in the human world of scientists" (Haraway 1991a:15). Carpenter assumed, for instance, that the social field was organized by the dominance hierarchy of the males of the social group. In an experiment with rhesus monkeys he removed the 'alpha male' (the animal judged most dominant) from the group and observed a subsequent increase in intragroup conflict and a loss of territory of the group relative to other groups. His conclusion was that dominance hierarchies are crucial in retaining social order. Without them, social order supposedly is seen to break down into individualistic competition.

Carpenter did, however, not do the control experiment of removing other animals than the dominant males, because this did not make sense within the whole complex of theories and unexamined assumptions of primates being models of human beings. Based on these assumptions, females were found to have a dominance hierarchy as well, but one of lower slope. They were primarily described from the point of view of their sexual relations with dominant males.

In current theorizing, dominance structures are still seen and examined, but other important causal explanations of functional organisation have been added, such as matrilocality, female bonding, long-term social cooperation rather than short-term aggression, and flexibility rather than strict structures. A good case can be made that primatology has been transformed by the perspectives and critiques of women (see chapter 5).

When one looks at the history of science and philosophy from a female perspective, it is difficult to escape the feeling that all forces were united against women in order to handicap their development and to neglect their interests. But did misogyny really rear its ugly head at every level of the scientific enterprise?

### 2.3. Fables about the Past

As we will see, the purported sexism in science sometimes solely resides in the eyes of the feminist beholder, especially when the scientific enterprise as such is under consideration.

Some feminists to a greater or lesser extent consider the scientific method itself an androcentric approach to the world, used to dominate both women and nature.<sup>12</sup> They regard scientific institutions, practice, and knowledge to be especially effective patriarchal tools to control and harm women in general. They trace the historical roots to the seventeenth century, to the "shift from an organic, hermetic approach to science (in which men revered and saw themselves as part of the environment and nature, and women as identified with nature) to a mechanistic, objective approach" (Rosser 1992:62). This glorification of reason and its resulting distance is then supposed to have justified men's domination and exploitation of women and the environment.

In elaborating this myth about an ancient organic world view suddenly to be destroyed by scientific rationality, an accusing finger is often pointed at René Descartes, Francis Bacon, and Isaac Newton. In her article "The Cartesian Masculinization of Thought" (1986) philosopher Susan Bordo explains the epistemological anxiety of the first two of Descartes's *Meditations* as reflecting "anxiety over separation - from the organic female universe of the Middle Ages and the Renaissance." She declares Cartesian objectivism to be "a defensive response to that separation anxiety, an aggressive intellectual 'flight from the feminine' rather than (simply) the confident articulation of a positive new epistemological ideal" (1986:248-249).

In a similar psychoanalytic vein, Evelyn Fox Keller, herself a biophysicist, associates modern science with a masculine fear of merging:

Our early maternal environment, coupled with the cultural definition of masculine (that which can never appear feminine) and of autonomy (that which can never be compromised by dependency) leads to the association of female with the pleasures and dangers of merging, and of male with the comfort and loneliness of separateness. The boy's internal anxiety about both self and gender is echoed by the more widespread cultural anxiety, thereby encouraging postures of autonomy and masculinity, which can, indeed may, be designed to defend against that anxiety and the longing which generates it ... Along with autonomy the very act of

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<sup>12</sup> E.g., Bleier 1985; Bordo 1986; Fox Keller 1982; French 1992; Haraway 1991e; Harding 1986; Hubbard 1990; Rosser 1992; van Muijlwijk 1998.

separating subject from object - objectivity itself - comes to be associated with masculinity. (Fox Keller 1982:239)

She sees this male fear of merging exemplified in the writings of Francis Bacon:

To see the emphasis on power and control so prevalent in the rhetoric of Western science requires no great leap of the imagination. Indeed, that perception has become a commonplace. Above all, it is invited by the rhetoric that conjoins the domination of nature with the insistent image of nature as female, nowhere more familiar than in the writings of Francis Bacon. For Bacon, knowledge and power are one, and the promise of science is expressed as "leading to you Nature with all her children to bind her to your service and make her your slave." (1982:242).

Fox Keller concludes, citing psychoanalyst Bruno Bettelheim, that "[o]nly with phallic psychology did aggressive manipulation of nature become possible" (1982:242).

Perhaps most outspoken is philosopher Sandra Harding, who famously called Newton's *Principia Mathematica* (1687) a "rape manual"<sup>13</sup> and who argues that "the most fundamental categories of scientific thought are male biased" (Harding 1986:290). According to Harding, vicious sexual metaphors played an important role in the development of science. Josephine Donovan also links the Newtonian paradigm to the suppression of "all which did not operate according to reason, according to mathematical principles of mechanism" (2000:19), including women.

Alan Soble (1998) demonstrates, however, that the feminist critics' reading of Bacon's work as loaded with metaphors of rape and torture is a crass case of dragging something in by the head and shoulders. None of the passages quoted by critics (e.g. entering and penetrating into the holes and corners of nature) need be taken as having any sexual or aggressive implications. The phrase about "making nature your slave" is the only clearly ugly line in the thousands of pages that Bacon wrote, and it occurs in a tiny fragment written at the start of his philosophical career and published posthumously. Soble concludes:

To make the case that Bacon deliberately used rape, sexual, or torture metaphors to convince his audience of the virtues of experimental science, the following (only

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<sup>13</sup> "Isaac Newton's *Principia Mathematica* is a 'rape manual' because 'science is a male rape of female nature'" (in *The Science Question in Feminism*, Ithaca: Cornell University Press, 1986, p. 264).

necessary) conditions must be satisfied. The metaphors (1) should clearly be in his texts (which they are not), (2) should be located in vital places (not merely in posthumously published manuscripts), (3a) should appear in several passages (not just once) yet also (3b) not indiscriminately ... , and (4) should not have their thrust diluted by other, contrasting images. (Soble 1998:208)

Knowing that Bacon's writings are often singled out as an especially outrageous instance of the infusion of sexual metaphors into modern science, we can safely infer that there is probably not much to sustain Harding's claim that "the increasing empirical success of the scientific world view depended on the continued presence in it – either explicitly or tacitly – of the gender politics metaphors" (Harding 1981, as cited in Soble 1998:210). Moreover, in Bacon's day, natural philosophy, science, the nation, justice, and the church were also spoken of as female. "Does this mean that a reference to the penetration of Nature by Science alludes to a lesbian affair?" (Patai and Koertge 1994:123).

These feminists often tend to argue for a return to the supposedly organic, holistic world view that once reigned (Bordo 1986; Donovan 2000; Fox Keller 1982; French 1992). They share this desire with ecofeminists such as Carolyn Merchant (*The Death of Nature*, 1980), whose basic tenet is that environmental oppression is linked to female oppression - a linking that, according to liberal feminist Rene Denfeld (1996), highlights an important aspect of current feminist thought. Like many feminists critical of science, ecofeminists believe that human beings existed for thousands of years in a peaceful, balanced, harmonious ecosystem, until the scientific revolution destroyed the harmony.

This mythical past, however, seems to owe its imaginary existence to wishful thinking, and putting the blame for the appearance of dualist thinking on Descartes, Bacon, and Newton is based on an incorrect reading of history. Martin Lewis (1996) points out that it is surely correct to consider the seventeenth century as a crucial turning point in intellectual history, but that the other (eco)feminist contentions do not stand up to scrutiny. The scientific revolution, he explains, was by no means a direct outgrowth of Descartes's or Bacon's beliefs about the relationship between people and nature:

Francis Bacon no doubt inspired many scientists and engineers in the early modern period, but he was not a significant figure in the scientific revolution. Nor was the role of Decartes critical. The latter occupies an important place in the history of thought, both for his mathematics and for his insistence that philosophy must begin

from a standpoint of utter skepticism. Most of his scientific views, however, were soon discredited. In actuality, Descartes' insistent rationalism and unaccommodating mechanism thwarted the development of genuine science, for they discouraged empirical inquiry (Lewis 1996:214).

Of course, Newton, like Galileo before him, was a pivotal figure in the scientific revolution. Moreover, his physics was certainly characterized by mechanistic explanations. That does not mean, however, that the scientific revolution - much less the Enlightenment - was predicated on a thoroughgoing metaphysics of dualistic mechanism. "What was significant was rather the formalization of a view of nature as characterized by regularity and by causal relations, and, more importantly, the development of reasonably reliable methods for answering specific questions about natural structures and processes" (Lewis 1996:214).

Metaphysical conceptions about the nature of life and about the relationship of humans to the rest of the natural world were of little consequence to the scientific revolution. Moreover, people have never needed metaphysical justifications for the exertion of power and control, nor for killing and warfare. To blame the industrial revolution's inventors of machine production for Cartesian dualism is hardly reasonable, since these people were mainly "practical men," with little interest in abstract philosophy or science, whose environment was still profoundly influenced by traditional Christian understanding (Lewis 1996).

What about the "organic female universe of the Middle Ages and the Renaissance," as Susan Bordo calls it? She is probably not talking about matriarchy, since most feminists agree that institutionalized female dominance (as a mirror image of patriarchy) never existed (Fisher 1999; French 1992; Hrdy 1999a, 1999b; Low 2000; van Muijlwijk 1998). She seems to refer to a past many feminists do believe in: a supposedly peaceful, egalitarian past in which people lived in harmony with their environment. This scenario is projected onto the Middle Ages or onto prehistoric Europe, in the latter case sometimes completed with a cult of goddess worship. Contemporary tribal societies and peoples from the past are typically held up as eco-exemplars, proof to the essential human condition in the absence of corrupting Western ideas and practices (Denfeld 1996; Lewis 1996).

There is much to be said about these speculations, but most of it comes down to the simple fact that there are hardly any data to back them up, and a wealth of data that disprove them. In what follows I will discuss the differential aspects of this golden past: 1) its female-centered (in one version) or egalitarian (in another version)



character; 2) its cult of goddess worship; 3) its peacefulness; and 4) its ecological balance. There is a caveat: The more extreme versions of this story are typically not adhered to by academic feminists. As Cynthia Eller, a professor of women and religion who has studied this burgeoning phenomenon found, it is mainly white, middle-class, well-educated women with a spiritual mindbent who believe in this myth (Eller 2000). It is most popular in the US, England, Germany, and Italy, and has been entering the cultural mainstream due to books by popular authors such as Charlene Spretnak, Riane Eisler, and Anne Carson.

In prehistoric times, so the basic story goes, women were seen as incarnations of the goddess and revered for their mysterious life-giving powers. Society was centered around them. It was they who created art and technology, who invented agriculture, and who made the important decisions for their communities. Then something happened due to which men took power over women. As patriarchy is so recent a phenomenon, however, it is possible to overturn it and to restore golden times, under the aegis of the goddess, as it used to be. Although some use the term matriarchy to describe this state of affairs, others have proposed terms such as 'gynocracy' and 'gynosociety', to capture the qualitative difference with patriarchal political systems. Men are not supposed to have been subordinated in these societies. Gynocentric cultures were just centered around feminine values and life events, and women exerted their power in wise, nonpossessive, noncontrolling ways, making everything function so smoothly that formal leaders were not necessary. Men had their own important sex-specific roles, such as hunting, trade, and herding, and were happy with their lot (Eller 2000).

Many women who adhere to this tale are not even interested in the question of its veracity, Eller writes. Its celebration of everything feminine and the hope for change that it embeds is too inspiring and too empowering for them to be interested in questioning its assumptions. The archaeological and ethnographic records overwhelmingly suggest, however, that it is nothing more than a myth. Take, for instance, the premise that is at the basis of the supposed awe in which prehistoric women were held: that people were ignorant of the male role in conception. This idea was first proposed by nineteenth century anthropologists and seemed initially to get confirmation from, among others, Bronislaw Malinowski's reports from the Trobriand Islands. It turned out, however, that the rich variety of stories that people worldwide tell about the specifics of human reproduction has one commonality: the belief that there is a necessary, albeit unpredictable, relationship between sexual intercourse and pregnancy. Sometimes other events are thought to be required as well - such as the

entrance of a 'spirit child' through the top of the head, in the case of the Trobriand Islanders – but there is no evidence that they don't see the connection between intercourse and conception. Neither is there any ethnographic evidence that motherhood raises women's prestige. Often to the contrary: Anthropologist Sherry Ortner has noted that women tend to *lose* status when placed in reproductive roles. Knowing that contemporary hunter-gatherers are more interested in restricting their fertility than in enhancing it also makes it doubtful that childbirth would be so highly valued as some assume. And even if we just stick to the weaker version of the gynocentric thesis - that once women's status was as high as men's - there is the staggering finding from ethnographic reports that women's status across cultures is variable, but that *everywhere* it is lower than men's. This does not give us much ground for assuming that it was any different in prehistoric times (Eller 2000).

What about the likelihood of a monolithic goddess religion in times long past? Archaeologists strongly dispute this, especially over thousands of years. First, it has not been documented anywhere on this planet. Second, prehistoric visual images and art objects, often confidently said by gynocentric feminists to represent goddesses and goddess worship, are extremely difficult to interpret. Crosses, spirals, circles, dots, triangles, ovals, straight lines, wavy lines, zigzags, trees, the moon, the sun, birds, snakes, fish, eyes, hands, shells might mean lots of things. They might be goddess symbols, but more probably they are not. 'Vulva depictions' may be a symbol of birth, but they may also be plain prehistoric pornography. Third, many 'goddess figurines' are not obviously divine, female, or even human. And if they represent fertility, then why are they hardly ever obviously pregnant? These and many other objections make the idea of a prehistoric monolithic goddess religion highly implausible. Of course female deities might have been worshipped in many places, but most probably they were accompanied by male ones, as they always are. Moreover, being a goddess does not automatically imply being benign: Some ancient goddesses have a decidedly unpleasant character, or defend patriarchal interests. We also know that the worship of female deities can easily coexist with male dominance, as it does in, for instance, roman Catholicism (Eller 2000).

There is no sign of prehistoric people living in harmony with each other and with nature either. The evidence from the past indicates warfare, human sacrifice, violence, and depletion of natural resources. Jared Diamond (1999) describes how the colonization of new parts of the world by prehistoric man has always been followed by a wave of extinction of large mammals. Other than African and Eurasian mammals, who had coevolved with man for hundreds of thousands or millions of years and had

thus learned to become afraid of him (or her), those animals were not afraid of man. They were as easy a prey as, millennia later, the dodo would prove to be. Were it not for the lack of a prehistoric philosophy of sustainability, the American continent might still accommodate elephants, lions, cheetahs, and camels. Diamond describes murder as a main cause of death in tribal societies, and he notes that even in so-called egalitarian societies there are always differences in power and prestige, be it that they are informal. Whenever the ecological circumstances permit it, the population will grow and formalized hierarchies will arise.

Data from anthropology show that primitive warfare is characterized by rape and the abduction of women, as it has probably always been. The food sharing of foraging peoples is driven by cost-benefit analyses, not by some intuitive communist feeling. They share when it would be detrimental to them not to do so (Low 2000; Pinker 1997; van der Dennen 2002). Behavioral ecologist Bobbi Low notes about sustainability:

In many traditional societies ... the "fruits of the forest" - berries, mushrooms, and so on - are common-pool resources: any villager can gather them. If the village is small and close-knit, if villagers have lived there a long time, if exploitative cheaters are easily detected and punished, and if there are no external markets, the villagers' use is liable to be shared for subsistence, and to be sustainable over long periods. But if the village has many transients, or if it is hard to catch and punish cheaters, or if anyone can convert forest products into lots of hard cash and move away, "take the money and run" defection is likely. (Low 2000:161)

Thus the problem of the depletion of resources is not new. It appears that it is a very human problem. To present but a few other eye-opening data: The Inca city Machu Picchu was probably deserted by its people because its extremely limited carrying capacity was exceeded by population and environmental pressures. The population of Easter Island was decimated after they committed ecocide: They transformed the densely forested island into a barren landscape (Shermer 2001). Before the population decline of the fourteenth century, many European societies were approaching local ecological limits and were suffering severe consequences (Lewis 1996).

In short, all the evidence indicates that there has never been an 'organic female universe' to be destroyed.<sup>14</sup> Similarly, the scientific revolution was never the monolithic key error of the West many feminists consider it to be.

#### **2.4. Facts and Fables about the Present**

No matter how overtly misogynist - or racist - some theories of the past may sound, this does not in itself prove anything about the supposedly sexist - or racist - character of particular contemporary scientific theories. It does not suffice to point to the past to prove that present-day theories cannot be but prejudiced. We will see that it is often very difficult to decide if the purported sexism really deserves that name, or whether it is a case of feminist watchfulness working overtime.

Two forms of androcentrism or gender bias are commonly detected in the social and life sciences. First, the neglect of women, together with the treatment of masculine attributes and activities as typical of humankind. Second, the treatment of gender differences as a given.

The latter criticism will not be addressed here, since the topic of sex differences is interwoven throughout this work. As to the neglect of women, it is clear that some critiques hit the mark.

A much-cited example is Lawrence Kohlberg's famous and influential 1958 study of moral development in children, in which he argued that people go through a progressive list of moral stages, with the highest stage being the application of abstract, universal principles. According to Kohlberg, girls and women often do not reach this stage, because they 'remain stuck' at the level of letting their moral reasoning be guided by personal relationships and social conventions. In her 1982 book *In a Different Voice*, psychologist Carol Gilligan argued that Kohlberg's study was fundamentally flawed by its dependence on samples comprised entirely of little boys (he followed the development of forty-eight boys for a period of over twenty years). She considered it a typical case of masculine standardization and showed, on the basis of her own research, that women do not think in a less moral way, but that they think differently. Their mode of moral reasoning is contextual, she argued. It centers around

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<sup>14</sup> Interestingly, myths of former female dominance are found cross-culturally. A better explanation than their representing historical events might be that they act as a justification of present-day male dominance. As far as we can tell, all of them have been created by men. They seem to say that it is only fair that men rule now, as women have ruled before – and in many instances have misused their power. Sometimes these myths seem to imply that women's rule is dangerous and unnatural, as in the case of the Amazons. Amazon myths are morality tales: This is what will happen if we give women free reign (Eller 2000).

care, responsibility, and the needs of others, rather than around formal rights and rules.<sup>15</sup>

I suppose everyone will agree that Kohlberg's reliance on boys only for making a statement about human moral development was thoroughly androcentric, and that this study justly serves as an example of gender bias in science. It is less clear, however, whether Gilligan's equally influential study was more scientifically rigid than Kohlberg's. The anecdotal and impressionistic character of her methodology has been criticized by many academic psychologists, feminist and nonfeminist alike. Her claims are found to be lacking in acceptable empirical support (Hoff Sommers 1994, 2000). Indeed, Gilligan offers very little information on the three studies her thesis is based upon. She does not present any statistical analysis. She picks some of the answers of a small number of the 198 people she interviewed and does not tell us anything about the rest of them.

This situation would not be that bad if the studies themselves had been published and could thus be peer reviewed. They have not. They have never been available for public or professional review, something which makes philosopher Christina Hoff Sommers wonder whether Gilligan had *any* significant empirical support for her model. If so, she had a duty to present it, Hoff Sommers contends. "Research in the human sciences is notoriously difficult – all the more reason to present what evidence one has so that others can evaluate it and attempt on their own to replicate it in their research" (2000:107). According to her, other, independent research has not confirmed Gilligan's thesis that there is a substantial difference in the moral psychology of the sexes. The word 'substantial' is of importance here. The sex differences that Gilligan describes seem to be much less pervasive than she herself suggests, but studies do tend to support a weaker version of her view: Women more than men prefer to think in terms of care (Campbell 2002). The debate about Gilligan's work continues.

In psychology and physiology, there is a long tradition of not using females as experimental animals, because that would add unwanted variation as females cycle (Zuk 1997). Needless to say, this produces incomplete science. Many feminists also argue that the predominance of male scientists has led to a bias in the choice and definition of the problems with which they have concerned themselves. Such claims

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<sup>15</sup> Bobbi Low notes that adults who live in small, traditional, kin-based groups with competition from outsiders, also scored relatively 'early' on Kohlberg's scale. She comments: "I am far from certain that I would assume from this a certain moral 'progression' as Kohlberg did. The ecology of social behavior is far different when you live among your relatives and the same friends all your life, than when you spend your life in a large and fluid society, and the rules should also be different" (2000:167).

abound with regard to the health sciences. The androcentrism is, however, not always as unequivocally clear as feminists presume it to be. Sometimes it is absent.

One complaint goes that contraception has not been given the scientific attention its human importance warrants and that, furthermore, the attention it has been given has been focused primarily on contraceptive techniques to be used by women (Fox Keller 1982).

Whereas it is probably true that it took a long time for contraception to be taken seriously by science, it is not clear, however, whether this was caused by androcentrism. Moreover, there are valuable scientific reasons for concentrating on women in the search for contraceptives, because of their different hormonal functioning. Furthermore, the answer to the question whether this focus on women is androcentric or not seems to depend entirely on the interpretative framework of the observer. Suppose the situation had been different and all scientific effort in finding contraceptives would have been directed at men. In that case one can easily imagine feminists raising the claim of androcentrism, because once again, women's fertility would be controlled by men. Similarly then, one can make the case for a female-friendly approach in the situation as it stands, since in this scenario women have their fertility in their own hands.

I am not arguing here that the research on contraceptives really *was* female-friendly. I just want to show that the situation is not always as clear as some feminists consider it to be. Take the example of menstrual cramps. As Fox Keller (1982) writes, many feminists argue that menstrual cramps, a serious problem for many women, has never been taken seriously by the medical profession. They presume that, had the concerns of medical research been articulated by women, this imbalance would not have arisen. At the same time, however, we find Darwinian feminist Marlene Zuk (1997) complaining of the current tendency in the medical establishment and the media to treat premenstrual syndrome (PMS) as a disorder that requires attention and treatment in many women. One might as well say that PMS is finally taken seriously.

Then again there is the dubious discussion of women and acquired immune deficiency syndrome (AIDS). As Zuk (1997) points out, women have constituted an important part of the victims from the beginning. Yet they, and particularly prostitutes, have often been seen as 'vectors' or 'reservoirs' of the virus, of concern because of the likelihood of them spreading the disease to male clients or other sexual partners, rather than as persons with AIDS in their own right. She notes that, as with other sexually transmitted diseases, AIDS is too often seen as something women give to men, with men the real victims.

In her book *Ceasefire!* (1999), liberal feminist Cathy Young weighs the evidence of male bias in medicine in the United States. She concludes that medical research indeed has blind spots where women are concerned, particularly in areas stereotyped as male. For instance, more than 30 percent of studies of alcoholism have been limited to men, while fewer than 6 percent have focused only on women. She also mentions AIDS as another area where female-specific problems did not get enough attention for a long time - an imbalance which, according to her, has now been corrected: "By the mid-1990s, though, women were *overrepresented* in an NIH-funded<sup>16</sup> AIDS clinical trial: They made up over 30 percent of the subjects, even though they accounted for about 12 percent of AIDS cases" (1999:77-78, emphasis in original).

Despite some obvious imbalances in past or current research, however, Young warns for the mistake of blaming every discrepancy in research on sexism. A 1988 American study of the role of aspirin in heart attack prevention, for instance, has become a symbol of male bias in medicine: 22,000 men and not a single woman were tested. As a (woman) epidemiologist explained to Young, however, in terms of getting an answer relatively fast, it made sense to do the trial this way, since heart disease is much more frequent in men than in women. In order to keep the sample at a feasible level, it made sense to look at a group in which one can expect a fairly high rate of heart attacks, and then to decide if a similar study needed to be done in women.<sup>17</sup> Young also shows how some of the discrepancy reflects legitimate priorities: Since men die of heart attacks three times as often as women before the age of sixty-five, greater attention to them is justified. The same logic applies to other diseases which affect the sexes to different degrees.

Some feminist claims are, regrettably, false or deeply misleading. Take Marilyn French's accusation in *The War against Women*, that "[w]oman-specific diseases like breast and ovarian cancer have not been studied as thoroughly as male-specific diseases like prostate cancer and are more likely to be fatal ... *Only 13 percent of the dollar 7.7 million NIH budget is spent on women's issues*" (French 1992:134, emphasis in original).

Yet as Young (1999) shows, from 1981 on the United States has spent much more money on breast cancer research than on prostate cancer research - a discrepancy

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<sup>16</sup> National Institutes of Health (NIH).

<sup>17</sup> Cathy Young does not tell us whether a similar study was indeed proved to be needed in women. She does mention that in 1988, a less rigorous study with nurses recording their own aspirin intake had been underway for three years. Londa Schiebinger (1999) refers to this study. It involved following 87,000 nurses for six years to study the correlation between taking aspirin and the risk of heart attack. However, Schiebinger does not mention the results of the study.

which again reflects legitimate priorities, since prostate cancer kills on average ten to fifteen years later than breast cancer. As to the NIH budget, what French does not mention is that "NIH funding for male-specific health projects accounted for just *under 7 percent* of its total expenditures; 80 percent of the money went to study diseases that afflict both sexes" (Young 1999:76, emphasis in original).

The list of examples of real or supposed sexism in science is long. It makes clear that the scientific enterprise is socially embedded and that therefore we should always be aware of possible forms of bias, in traditional scientific research as well as in feminist research.

## **2.5. The Social Embeddedness of Science**

The history of science offers countless examples of the way in which scientific perception of reality is influenced by expectation. Using the words of William Whewell, a nineteenth-century philosopher of science, Marcy Lawton, William Garstka, and J. Craig Hanks have called this "the mask of theory", a mask that "has always been shaped by culture and history" (1997:63):

[T]he "givens" of any research program include assumptions, conceptual constructs, and reifications that may not be based in fact, but serve as heuristic devices that may limit the field of view offered by the ever-present mask of theory. Thus, the mask of theory, which none can put off, sometimes makes it hard for us to see the face of nature, even after we have had a good look. The full meaning of the data we collect may not be apparent to us, because the theoretical framework within which we ask questions constrains what we see and how we interpret it. (1997:63-64)

They detect at least two ways in which theory may obscure reality. First, it may limit what we choose to look at. The study of cooperative breeding in birds offers one such example. As Lawton, Garstka, and Hanks describe, the phenomenon of birds caring for nestlings that were not their own offspring instead of breeding on their own, was hardly acknowledged from the 1930s until the 1960s. Although there were some observations, they were seen as anomalous and explained away. With the emergence of kin theory in the 1960s and 1970s (see chapter 5), cooperative breeding became theoretically possible and helping at the nest was discovered in hundreds of bird species.



Second, the mask of theory may limit what is *seen*. The authors here offer three examples of the way in which gender bias is woven into the mask of theory, and how it has the power to distort our gaze largely because it is invisible. I elaborate only one of their examples here: that of gender bias in the scientific study of dominance relationships in the pinyon jay, a highly social member of the crow family. Lawton, Garstka, and Hanks (1997) concentrate on the volume *The Pinyon Jay* by Marzluff and Balda (1992). As they describe it, "even after watching pinyon jays *not fight* for 20 years, the authors were constrained by theoretical expectations to find what 'everyone knows' is the case; that is, social organisations are built around male dominance hierarchies" (1997:69, emphasis in original). To find these 'alpha males' required some experimental ingenuity, however, because adult male pinyon jays almost never fight. It was determined that a 'dominant' bird had 'aggressed' against a 'submissive' bird when the former turned its head and looked at the latter. *Female* birds were, however, displaying fierce fighting in late winter and early spring. These behaviors were left out of the analysis of dominance relationships for this species, although strong clues that the behavior of females might influence the so-called male hierarchy were present. The reason was that the authors of *The Pinyon Jay* had not been open to explanations other than that which their theory demanded.

Another example of the mask of theory is offered by sociobiologist Sarah Hrdy in her important book *The Woman that Never Evolved* (1999a, first edition 1981). Infanticide in great apes by males unrelated to the infant was long regarded as a pathological aberration, since in the early days of ethology non-human primates were considered peaceful, group-oriented species. By closely observing one particular species, the Hanuman langur, Hrdy was able to document that infanticide is a recurring event and that it actually serves the reproductive interests of the male. By eliminating a baby unlikely to be his own, the male reduces the number of offspring sired by his competitor. Because the mother lost her baby she becomes sexually receptive again, and the murderous male can then inseminate her himself.

It took her discovery and her explanation of infanticide in primates some time to become accepted by primatologists and social scientists. She notes: "The history of our knowledge about primate infanticide is in many ways a parable for the biases and fallibility that plague observational sciences: we discount the unimaginable and fail to see what we do not expect ... I believe that one of the important factors determining whether infanticide was recorded or missed may have simply been expectation" (Hrdy 1999a:89).

*The Woman that Never Evolved* was such a ground-breaking work mainly because it was the first reconciliation of feminism and evolutionary theory to be published. With it Hrdy wanted to "convince fellow sociobiologists that we had to widen our field of vision to include the interests and perspectives of both sexes if we were to have a comprehensive understanding of the evolutionary process" (1999a:xvi). At the time, females were still stereotyped as passive and coy. Through the expansion of the theoretical framework by female authors such as Hrdy, females were often found to behave in unexpected promiscuous ways (see chapter 5).

Women scientists have transformed the natural sciences, as Hrdy (1999b) writes. Whereas anthropology, primatology, and evolutionary theory were very male centered until the 1970s, the changing genderscape in the academy since then, with its broader inclusion of women, brought new emphases and new topics of study, such as female-female competition and the active role of mothers in evolutionary processes. Before that time, primatologists and those social scientists that relied upon their work focused mainly on the supposedly greater competitive potential of males, the importance of males in structuring the society, and the apparent inability of females to maintain stable social systems. Their models turn out to have been projections of patriarchal fantasies.

Female perspectives have now become part of evolutionary science, and of science in general. In many cases it took female or feminist scientists to make visible data that had always been there, but that had never been recognized by male scientists (see chapters 4 and 5). Androcentric theories and hypotheses probably still abound, but so do gynocentric theories and hypotheses. The 'right' to gender bias has now been extended to both sexes.

The point is that, since we are a two-sexed species, individual bias is probably inevitable in the study of animal and human behavior. As evolutionary psychologist Geoffrey Miller puts it in his epilogue to *The Mating Mind*:

One's understanding of human sexuality and human behavior depends, to some extent, on one's sex. Throughout this book, I have tried to write first as a scientist, second as a human, and only third as a male. Yet some of my ideas have probably been too influenced by my sex, my experiences, and my intuitions. The trouble is, I don't know which ideas are the biased ones ... Perhaps others will be kind enough to identify them. A woman might have written a book about mental evolution through sexual selection with different emphases and insights. Indeed, I hope that women will write such books, so we can triangulate on the truth about human evolution from our distinctive viewpoints. (Miller 2000b:427-428)

Part of the solution to the problem of bias in science thus seems to lie in the collective nature of the scientific enterprise: Men and women can correct each other's biases, just as, supposedly, age, ethnicity, and class will also provide different perspectives. But does this not at the same time amount to a case for scientific relativism? How do we know that we have incorporated 'enough' perspectives for bias to be eliminated? And does not the history of science prove that scientific knowledge is 'just a social construct', changing through the ages, depending on the cultural climate?

## 2.6. Answers to Scientific Relativism

Part of what was once considered scientific knowledge does not meet our present-day standards of scientificity and has hence been rejected. I want to show that this observation does not warrant the scientific relativism or social constructionist epistemology that abounds today in feminism, in philosophy, and in the sociology of science. To cite but a few examples: "We do not have facts in psychology - rather, we have theories and scientific data, but we sometimes start thinking that we have facts ... Constructionism ... argues that people - including scientists - do not discover reality; instead, they construct or invent it based in part on prior experiences and predispositions" (Hyde 1996:107). "Perhaps 'reality' can have 'a' structure only from the falsely universalizing perspective of the master (Jane Flax, as cited in Harding 1986:294). "The natural world has a small or non-existent role in the construction of scientific knowledge (Harry Collins, as cited in Cole 1996:275).

It is clear that these authors think that truth is but an illusion, or worse, that it is a power grab. Is that so? Consider Aristotle's claim about women being imperfect men, which has definitively turned out to be both an illusion *and* a power grab. Does this mean that social constructionism is right and that to call a statement true "is just to give it a rhetorical pat on the back," as postmodernist philosopher Richard Rorty (as cited in Haack 1996a) puts it?

Philosopher Susan Haack (1996a) points to the ubiquitous confusion between truth and truth *claims*. One can say that there are many truths in the sense of there being different but compatible descriptions of the world that are all true. But if one thinks that different and incompatible descriptions of the world may be all true, one is talking about truth *claims*. What passes for known truth is often no such thing, Haack contends. That does not mean that the idea of objective evidence is just ideological humbug:

"True" is a word that *we apply* to statements about which we agree, simply because, if we agree that p, we argue that p is true. But we may agree that p when p is *not* true. So "true" is not a word that *truly applies* to all or only statements about which we agree; and neither, of course, does calling a statement 'true' mean that it is a statement we agree about. (Haack 1996a:61, emphasis in original)

According to Haack, the genuine inquirer is motivated

to seek out and assess the worth of evidence and arguments thoroughly and impartially; to acknowledge, to himself as well as others, where his evidence and arguments seem shakiest and his articulation of problem or solution vaguest; to go with the evidence even to unpopular conclusions or conclusions that undermine his formerly deeply held convictions; and to welcome someone else's having found the truth he was seeking. (1996a:58-59).

Some will probably argue that this ideal of 'assessing the worth of evidence impartially' is unattainable in practice, and they will no doubt be right. But one can at least *try* not to reason in a way that is already made evidence- and argument-proof by one's commitment to a proposition identified in advance of inquiry, and hope that sooner or later one's own biases will be corrected by one's peers.

Haack (1996b, 1997) thoroughly debunks the claim that science is *simply* a social construction. From the true observation that scientific inquiry is a social enterprise one can come to the ambiguous conclusion that scientific knowledge is 'socially constructed'. But to equate this with the conclusion that scientific knowledge is nothing more than the product of processes of social negotiation is false and misleading. According to Haack (1997) objective epistemic standards *do* exist, and they are not internal to science. They are the standards we all use when we try to figure out some empirical question: We make conjectures, test them, and assess the likelihood that they are true. The scientific method is simply an extension of that method. The processes by which scientific knowledge is achieved are processes of seeking out, checking, and assessing the weight of evidence. Science, Haack says, is not epistemologically privileged, *but* it is epistemologically distinguished:

Nevertheless, there is something distinctive about inquiry in the sciences - or rather, a lot of things: systematic commitment to criticism and testing; experimental contrivance of every kind; systematic effort to isolate one variable at a time; instruments of observation from the microscope to the questionnaire; all

the complex apparatus of statistical evaluation and mathematical modelling; and - the engagement, co-operative and competitive, of many persons, within and across generations, in the enterprise of scientific inquiry. The fact that science is, in this sense, social, is an important factor contributing to its epistemological distinction. (Haack 1997:81, emphasis in original)

It is a misunderstanding, Haack points out, that the warrant status of a scientific claim is 'just a matter of social practice'. How justified a scientific community is in accepting a specific claim does not depend on how justified they *think* they are, but on how good their evidence is. It is also a misunderstanding to think that

"how good," here, can only mean "how good relative to the standards of community C," since standards of evidence, it is supposed, vary incommensurably among communities or paradigms. But the supposed community - or paradigm - relativity of evidential standards is not real incommensurability, but deep-seated disagreement in background beliefs, producing disagreement about what counts as relevant evidence. (Haack 1996b:262-263)

As an example of background beliefs she gives the belief in graphology. Suppose, she says, A thinks this candidate for the job should be ruled out on the grounds that his handwriting indicates that he is not to be trusted. B thinks graphology is bunk and scoffs at A's 'evidence'. Their judgements of relevance of evidence depend on their background beliefs, but relevance of evidence is, nevertheless, objective.

As we will see in the next chapter, this disagreement in background beliefs is also of crucial importance in feminist conceptions of science.

Finally Haack (1996b) analyzes an analogous kind of confusion: the claim that the objects of scientific knowledge are socially constructed. Scientific theories are of course devised and articulated by scientists, she argues. Theoretical concepts like electron, gene, force, and so forth, could be considered their creation. But it does not follow, and neither is it true, that electrons, genes, forces, and the like are brought into existence by the intellectual activity of the scientists who create the theories that posit them. It is true that, as science proceeds instrumentation and theory get more and more intertwined, and one increasingly encounters claims that refer to what one might call 'laboratory' phenomena. But that such phenomena are created in the laboratory does not mean that they are made real by scientists' theorizing. Nor does the fact that we cannot describe the world without using language prove that reality is socially constructed; one does not follow from the other.

In criticizing social constructionism, physicist Loren Fishman (1996) notes that the arguments of the constructionists depend, essentially, on the view that feelings - in particular, feelings generated by social demands - can generate beliefs of the kind that scientists typically adhere to. In the constructionist view, one believes because social pressures force one to believe. A belief is, however, not just a proposition that is assented to in some haphazard fashion, as Fishman points out. Rather, it is a deep, intricate, and finely coordinated mental structure that bears the traces of complex inference. These characteristics are an important part of what makes scientific beliefs scientific. One cannot believe just because one wants to, any more than one can forget or be happy by wilful act.

Of course, social factors limit the evidence available to an inquirer and direct his or her attention to one class of questions rather than another. This kind of 'construction' is more or less universally conceded. "But that beliefs, in and of themselves, with their necessary mechanisms of justification standing at the ready, are adopted in toto independently of internal logical coherence and with indifference to observable evidence, out of the need or desire to conform with some kind of shadowy social ethos, defies plausibility" (Fishman 1996:92).

There are also potential hindrances to scientific knowledge due to the organization and environment of science: pressure to find evidence supporting a politically desired conclusion or to ignore questions perceived as socially disruptive; pressure to solve problems perceived as socially urgent; the necessity to spend large amounts of time and energy on obtaining resources; dependence for resources on bodies with an interest in the research coming out a certain way, and so on (Haack 1996b; Stengers 1997).

Because of this dependence of the scientific enterprise on social, political, and industrial interests, science is seldom 'pure' in the sense of 'completely disinterested'. It does not follow, however, that knowledge cannot be objective. Disinterestedness and objectivity are not synonyms. It is possible for a scientist to do objective research on a topic for deeply personal, subjective reasons. And even if the passions and ambitions of individual scientists may stand in the way of objectivity, and despite the fact that bias sometimes reigns, the communal enterprise of science as a whole, with its inherent self-criticism, its high standards of proof, and its ability to generate new insights in the end leads to knowledge that is relatively trustworthy.

Sociologist of science Stephen Cole (1996) writes that social constructionists have never been able to show that social processes have influenced the actual cognitive content of some piece of science rather than the foci of attention or the rate of

advance. While this may ultimately be true, it is also somewhat misleading. The supposition that female primates are not competitive nor sexually assertive, for instance, has long been part of the "actual cognitive content" of evolutionary science, until women primatologists started to correct this bias in the 1970s. This suggests not only that science is subject to bias and self-correcting, but also that it can take very long for this self-correction to take place if bias is deeply ingrained - something which the history of theorizing on the sexes makes clear.

But despite its flaws at times, science is still the best method ever devised for understanding reality, the best knowledge filter ever invented. The scientific methods developed over the past four centuries were specifically designed to help us avoid errors in our thinking. The fact that scientists, just like everyone else, are prone to find what they are looking for is the very reason that science is constructed to be self-correcting. It has built into its methods to detect both conscious and unconscious bias, and this is what sets it apart from all other knowledge systems and intellectual disciplines. "If it were not for this self-correcting mechanism, in fact, science could not have made the remarkable progress it has over its 500 year story" (Shermer 2001:317). Science's greatest weakness is also its greatest strength. Others concur: "Improvement is not guaranteed. But science shows it more reliably than most human activities" (Cronin 1991:4). "Scientific method can be the antidote to hidden agendas" (Campbell 2002:22).

Loren Fishman's conclusion is analogously optimistic:

The influence of cultural factors on thought and feeling is undeniable. The power of culture to dictate which facts we focus on, which conclusions we are most interested in, is all too apparent. Yet all facts are equally accessible to logic. The consistency of the principles of science is what holds science together. The characteristics of a society may hold its science together - for example, through practical respect for the scientific method, widely applied standards of measurement, a cultural commitment to free speech and telling the truth, and so forth. But in general the idiosyncrasies of factious, polymorphous society are not part of science. (Fishman 1996:94-95)

Liberal feminists will agree with Shermer, Cronin, Fishman, and Campbell, whereas many feminists from other strands will tend to raise objections of various kinds. The various feminist conceptions of science are highlighted in the next chapter.





### **3. FEMINIST VIEWS OF SCIENCE**

I am suggesting that a feminist science practice admits political considerations as relevant constraints on reasoning ... [I]f faced with a conflict between [political] commitments and a particular model of brain-behavior, we allow the political commitments to guide the choice.

Helen Longino

#### **3.1. Introduction**

As it is the purpose of my dissertation to analyze the often conflicting relationship between feminist and evolutionary theory, it will be necessary to investigate the various feminist views of the scientific enterprise more in detail. Comprehension of the underlying conceptions of science is needed to understand fully the vigor of many feminist attacks on the application of evolutionary theory on human behavior and the human mind, as happens in sociobiology and evolutionary psychology. I thereby make use of Sandra Harding's (1986) categorization of feminist epistemological positions into (traditional) empiricism, (fairly radical) standpoint theory, and (very radical) postmodernism. As the focus of this dissertation is on feminism, it does not discuss other (nonfeminist) critiques of science.

In my mind the continuum from traditional to radical positions at the same time represents a continuum from constructive science criticism, with viable alternative hypotheses and experiments being offered, to a destructive attack on the scientific enterprise as a whole. Since the boundaries are vague, my attribution of particular epistemologies to particular feminist traditions and theorists can only be tentative.

It shows that radical science criticism is riddled with contradictions and that most feminist contributions to science are ultimately grounded in what Sandra Harding calls an empiricist position, that is, traditional scientific methodology. This observation leads me to a further elaboration of a question already touched upon in the former chapter: the question whether there are really so many different ways to do science. Is the incorporation of female perspectives in explanatory models not merely inherent to the maturation of a scientific discipline? And hence, does something like feminist science really exist?

### **3.2. Empiricism: The Belief in Gender-Free Science**

The empiricist position holds that good scientific research is not conducted differently by men and women. It recognizes that no individual can be neutral or value-free, but it assumes that the scientific method, when properly used, permits unbiased research due to the collectivity of the scientific enterprise. It suggests that now that the bias of gender has been revealed by feminist critiques (such as the exclusion of females as experimental subjects and the focusing on problems of primary interest to males), scientists can take this into account and correct it. Empiricism is embraced primarily by liberal feminists. The liberal feminist combination of the belief in the validity of the scientific method and the typical assumption that there are no inherent gender differences also implies that once social barriers are removed and women are no longer discriminated on the basis of sex, they will constitute 45 percent of scientists. That is, after all, their proportion in the overall workforce population. No changes in science itself are needed (Rosser 1997).

Sociobiologist Sarah Hrdy considers herself a liberal feminist, albeit one whose views on the sexes is informed by a Darwinian perspective (personal communication, 2001). Hence she trusts that research on sex differences will be able to rid itself of its problems. As she puts it:

There are of course antidotes to the all-too-human elements that plague our efforts to study the natural world. Common sense in methodology is one. No one will ever again be permitted to make pronouncements about primate breeding systems after having studied only one sex or after watching only the conspicuous animals. A recognition of the source of bias is another. If, for example, we suspect that identification with same-sex individuals goes on or that certain researchers identify with the dominant and others with the oppressed and so forth, we would do well to encourage multiple studies, restudies, and challenges to current theories by a broad array of observers. We would also do well to distinguish explicitly between what we know and what we know is only interpretation. But really (being generous) this is science as currently practiced: inefficient, biased, frustrating, replete with false starts and red herrings, but nevertheless responsive to criticism and self-correcting, and hence better than any of the other more unabashedly ideological programs currently being advocated. (Hrdy 1986, as cited in Segerstråle 1992:227-228)

One does not have to identify oneself as a liberal feminist to defend the merits of standard science. Historian of science Londa Schiebinger (1999), for instance, who

writes approvingly of postmodernist feminism, acknowledges that in many cases the feminist cause has been advanced through the use of standard methods of scholarship. Schiebinger adheres to scientific epistemology while at the same time urging that deep structural changes within the culture of science are needed if we want women to thrive in it. Since science at its origins was structured to exclude women, adding them to the process will not suffice, she argues.

Defenders of standpoint theory and postmodernism - and, hence, critics of traditional scientific epistemology - usually adhere to one of the more radical feminist traditions.

### **3.3. Standpoint Theory: The Objectivity of Science Questioned**

Standpoint theory holds that the knowledge claims of the oppressed are truer to the world and hence more objective than the traditional scientific claims they want to replace. The Dutch theorist Baukje Prins (1994), for instance, writes that women are in an advantaged position as knowledge seekers, because of their alienated 'double gaze': They know social institutions from within *and* from the margins. Many socialist feminists, black feminists, lesbian feminists, and radical feminists defend this kind of epistemology. Standpoint theorists claim that women's experiences and their traditional caring labor provide a foundation for an epistemology that is less dominating and more interactive and holistic. Their research is aimed at demonstrating how interests fashion knowledge, at uncovering supposedly sexist terminology, and at articulating alternative approaches and theories.<sup>18</sup> Rather than being antiscientific, standpoint theorists are science revolutionaries. Is it a potentially fruitful revolution?

As an example of feminist critiques of supposedly masculinist language, I take "The Importance of Feminist Critique for Contemporary Cell Biology" (1989), an article written by nine coauthors calling themselves The Biology and Gender Study Group.<sup>19</sup> The authors write that "this paper focuses on what feminist critique can do to strengthen biology. What emerges is that gender biases do inform several areas of modern biology and that these biases have been detrimental to the discipline" (Beldecos et al. 1989:173).

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<sup>18</sup> E.g., Beldecos et al. 1988; Bleier 1985; Bracke & de la Bellacasa 2002; Dines, Jensen, and Russo 1998; Fausto-Sterling 1992, 1997, 2000a, 2000b; Fox Keller 1982; Harding 1986; Hubbard 1990; Rose 1983; Rosser 1992.

<sup>19</sup> The authors are Athena Beldecos, Sarah Bailey, Scott Gilbert, Karen Hicks, Lori Kenschaft, Nancy Niemczyk, Rebecca Rosenberg, Stephanie Schaertel, and Andrew Wedel.

The Group describes how biological descriptions of the interactions between sperm and egg have frequently been modeled on various courtship behaviors. While this may seem like a clear example of 'the mask of (gender-laden) theory', influencing the resulting body of knowledge, this impression wanes, however, when we take a closer look at the examples given. It appears that, while indeed some of the language used is not emotionally neutral, there is no proof at all that "these biases have been detrimental to the discipline," as the authors assert. One passage comes from a book for expectant mothers<sup>20</sup>:

Spermatozoa ... swarm up through the uterine cavity and into the Fallopian tube. *There they lie in wait for the ovum. As soon as the ovum comes near the army of spermatozoa, the latter, as if they were tiny bits of steel drawn by a powerful magnet, fly at the ovum. One penetrates, but only one.... As soon as the one enters, the door is shut on other suitors. Now, as if electrified, all the particles of the ovum (now fused with the sperm) exhibit vigorous agitation.* (Russell 1977, as cited in Beldecos et al. 1988:175-176, emphasis added by Beldecos et al.)

The interpretation given by The Biology and Gender Study Group seems rather far-fetched:

In one image we see the fertilization as a kind of martial gang-rape, the members of the masculine army lying in wait for the passive egg. In another image, the egg is a whore, attracting the soldiers like a magnet, the classical seduction image and rationale for rape. The egg obviously wanted it. Yet, once *penetrated*, the egg becomes the virtuous lady, closing its door to the other *suitors*. Only then is the egg, because it has fused with a sperm, rescued from dormancy and becomes active. The fertilizing sperm is a hero who survives while others perish, a soldier, a shard of steel, a successful suitor, and the cause of movement in the egg. The ovum is a passive victim, a whore and finally, a proper lady whose fulfillment is attained. (Beldecos et al. 1988:176, emphasis in original)

As biologist Paul Gross and mathematician Norman Levitt (1994) note with regard to this passage, this is a serious case of overinterpretation. Nowhere in the literature of science will the egg be called something like a 'proper lady' or a 'whore'. The same is true of the other examples given by the Group: The language of the quotation is far

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<sup>20</sup> K.P. Russell (1977), *Eastman's Expectant Motherhood*.

more moderate than its paraphrase, certainly in passages that they derive from scientific literature.

Surely there is nothing wrong with criticizing the use of inappropriate metaphor. Nowhere, however, do the authors succeed in substantiating their initial claim that this kind of gender bias has been detrimental to biology. Their assertion that in traditional biology the egg is still seen as passive while sperm are active is false. According to Gross and Levitt, there is now a vast and serious science of what the egg does - actively - relative to the sperm, a science that "has emerged over the past thirty years, independently of feminism or any other kind of cultural criticism" (1994:122).

Feminist language criticism has extended itself into the domain of evolutionary theorizing, demanding, for example, nonanthropomorphic language for describing animal behavior, such as 'forced copulation' instead of 'rape' (Blackman 1985; Fausto-Sterling 1992; French 1992; Harding 1985; Tobach and Sunday 1985). While this may often be a legitimate demand, it is doubtful whether changing word use has ever resulted in a reshaping of the actual body of knowledge. The implicit feminist assumption is that our language and its categories shape our thoughts and worldview. We cannot think beyond the literal meaning of concepts, and what our language does not classify, we do not see or do not attend to. Although it does not seem that far-fetched to think that language use may sometimes constrict thought, extreme versions of this view have been refuted (Brown 1991). As cognitive psychologist Steven Pinker explains in *The Blank Slate* (2002), virtually all cognitive scientists and linguists agree that language is neither a prisonhouse of thought nor a prerequisite for it. The fundamental categories of thought, such as objects, space, cause and effect, number, probability, and agency are present in the minds of infants and nonhuman primates, although they have no language. Moreover, we do not store our knowledge in the exact words that we read or heard, but remember the *gist* of it; we have a 'semantic memory'. In cognitive science this memory is modeled as a web of logical propositions, images, motor programs, strings of sounds, and other data structures connected in the brain.

A further indication that thought does not equal language is that we don't always succeed in expressing what we really want to say. We have difficulty finding words, and often find that they do not convey what we were thinking. Because of this, and because the world is constantly changing, languages are changing as well. People coin new words and phrases to fill the gaps between thought and language. Finally, in order to understand a text we use of a lot of implicit knowledge about the world and about other people. Without realizing it, we are filling in countless unsaid steps, interpreting

ambiguities, inferring intentions. Processes of thought are going on that obviously stretch far beyond language (Pinker 2002).

Feminist critics, it seems, overestimate the power of words. There is nothing wrong in sensitizing people to inappropriate metaphor, but as a serious critique of science this search for sexist terminology turns out to be rather poor.

What about standpoint theory in general? Hilary Rose, a leading standpoint critic of science, argues that science is "an ideology having a specific historical development within the making of capitalism" (1983:274). According to her, the bourgeois and male character of science leads to highly abstract and depersonalized knowledge. She links abstraction to the alienated labor of the capitalist mode of production and to the sexual division of labor, which keeps women from entering the paid work force. In order to construct a new science and a new technology, the input of women's caring experiences is needed, thus adding "heart" to "brain" and "hand". Rose thereby stresses the "social genesis of women's caring skills" (1983:276).

Rose's analysis is a typical example of standpoint theory. Its practitioners want to reinvent science. Discarding most of 'male' logic, rationality, and abstraction, they stress subjectivity, concreteness, relatedness, and inclusiveness. The goal is to develop 'female sciences', such as female logic, mathematics, physics, astronomy, and philosophy.

Since the project of reinventing science sounds quite spectacular, my evaluation of it takes more time than that of the empiricist position. We will have a look at its problems and its results respectively.

Standpoint theory sees itself confronted with an inherent contradiction. If standard science is in essence the product of the ruling classes, then standpoint theorist scientists cannot but engage themselves in a capitalist, patriarchal enterprise in trying to correct it. Hilary Rose recognizes this problem when she says that "[t]he trouble with science and technology from a feminist perspective is that they are integral not only to a system of capitalist domination but also to one of patriarchal domination" (1983:266). To try to discuss science under both these systems is peculiarly difficult, she says, adding that historically, it has been women outside science, such as the novelist and essayist Virginia Woolf, who have dared to speak of science as male, as part of a phallogentric culture.

For Rose, the explanation of the dearth of female scientists who attack the underlying conceptual basis of science seems to go without saying: "For women inside science, protest has been much more difficult. Numbers are few and developing the network among isolated women is intractable work" (Rose 1983:266-267).

There might, however, be another explanation of the fact that so few female scientists appear to regard science as a patriarchal construction: Since they are thoroughly acquainted with scientific methodology, they simply *know* that it is not inherently male. Many feminist standpoint theorists are familiar with the practice of science only through the work of sociologists of science, and in the field of the latter, social constructionism reigns partly because many sociologists of science are not acquainted with scientific methodology either. As Susan Haack argues, good sociology of science, which acknowledges the relevance of evidential considerations, requires some grasp of scientific theory and evidence, while bad sociology of science does not. She adds that "[a] cynic might suspect that this partially explains why there is so much bad sociology of science about" (1996b:260).

Yet Paul Gross and Norman Levitt are probably not being cynical when they state that common to almost all critiques of standard science is "a failure to grapple seriously with the detailed content of the scientific ideas they propose to contest" (1994:235). This is because the critics are not familiar enough with the sciences they criticize. They simply sail so wide of the mark, and have so little to say about the actual ideas with which scientists contend, that the latter generally ignore these critiques. To put the matter bluntly: Only for people who do not know what they are talking about does the radical attack on standard science sound reasonable - apart from a small group of ideologically motivated scientists. One simply cannot make profound criticisms of a technical subject of which one is entirely ignorant.

A second problem standpoint theory has to contend with is cognitive relativism. Sandra Harding (1986) wonders whether there should not also be Native American, African, and Asian sciences and epistemologies, based on the distinctive historical and social experience of these peoples. She thereby points to "the fatal complication for this way of thinking - the facts that one-half of these peoples are women and that most women are not Western" (1986:297). Indeed, on what grounds would feminist sciences and epistemologies be superior to those of other oppressed groups? Harding suggests that we might regard them all as valuable in their own right, not as one being better than another. Thus standpoint theory easily slips into complete relativism, with one difference: The knowledge claims of 'the oppressed' are regarded as truer than those of 'the oppressors'.

Although science has its roots in medieval Arabic culture, it is undeniable that the modern scientific method originated in Western Europe and not anywhere else. It might, however, be wrong to speak of *Western* science, because there are no indices that other sciences might exist:

Far from being an attribute of Western culture, scientific thought transcends cultural context. All scientific claims, of course, are shot through with cultural expectations, but science itself is a self-correcting process that over time weeds out the culturally contingent for the universal. It was precisely because of its universalism that modern science diffused so rapidly across the globe, creating a contemporary scientific project that is remarkably cosmopolitan. (Lewis 1996:216)<sup>21</sup>

Moreover, as Lewis points out, Western Europe is wrongly represented as an isolated entity. Well into the modern period it was just one of a series of linked Afro-Eurasian civilizations that had historically moved more or less together in economic and technological evolution and that even supported similar ideological structures. Nor can Western Europe lay any special claim to rationality. Historically, reason and unreason have coexisted in every civilization, in the West as well as in the East.

If one wants to contrast traditional Far East medicine with Western medicine, he continues, then

one must examine the *traditional* medical practices of western Europe - in other words, the humoral theory of disease, associated with such 'curative' practices as massive bloodletting. Such medical 'science' was, after all, standard throughout the

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<sup>21</sup> This quote by Lewis is preceded by the following remark: "[T]o a certain extent, genuine science emerged as much in spite of as because of Western culture. It was vigorously opposed, after all, by the foundational institution of Western civilization, the Roman Catholic Church, and a continuous line of Western thinkers ... has always stridently opposed scientific methodology if not rationality itself." It is, however, a popular misconception that the historical relationship between science and Catholicism was necessarily strained. In this respect Galileo's trial by the Roman Catholic Church is often offered as an example of the conflict between science and religion. In 1633 Galileo was forced to sign a declaration recanting his belief in Copernican heliocentrism, and was put under house arrest. As historians of science have discovered over the past few decades, however, the 'Galileo affair' was far more complex than is commonly assumed. Galileo was indeed tried by the Inquisition, but almost all historians agree that it was not primarily because he defended heliocentrism. By 1616, when he went to Rome to defend his writings on heliocentrism, many Church officials already accepted that the Copernican system was the most accurate way of predicting astronomical positions. The question whether it was also a true depiction of reality was, however, still open to them. The Bible suggested that the earth was stationary at the center of the universe, and no convincing proof to the contrary had been offered yet. Galileo's conflict with the Church seems to have arisen due to a variety of reasons, one of which was his failure to keep his promise that, as long as a definitive proof of heliocentrism was lacking, he would discuss it only hypothetically. He also happened to be pushing his arguments at the time of the Protestant Reformation. With Catholic doctrine being under assault, many within the Church hierarchy considered it a very bad moment to liberalize it. Galileo's careerism and his intellectual arrogance had also garnered him many powerful enemies. It is much closer to the truth to argue that for most of the medieval and Renaissance periods, and stretching into the eighteenth century, the Roman Catholic Church was a primary supporter of scientific research (Moy 2001).



West until well into the nineteenth century. It would eventually yield to modern medicine, not least because its own methods were often deadly. If 'Eastern medicine' survives to this day as an alternative to modern healing - in California no less than in Japan - it is largely because its 'cures' are at worst rather innocuous. (Lewis 1996:216, emphasis in original)

Since the end of the eighteenth century other ethnicities have increasingly come to be represented in science, such as Jews, Indians, Arabs, Pakistanis, and Chinese. As individuals, many of them have made contributions of the first rank and of enormous influence, but they did not invent a new multicultural science. Indeed, it is unclear how they could have, even if they had wanted to. Take Goethe's battle against Newton over color and light. For Goethe, light was a fundamental entity of nature and must not be decomposed. He waged a war against abstraction and the use of experiments, insisting instead upon a closeness to and an identification with nature. This substitution of intuition for logic, analysis, and abstraction, a characteristic of romantic natural philosophy, was a root cause of its failure to produce useful science (Gross and Levitt 1994).

The supposedly nondualistic world view of the East did not prevent environmental degradation. Similarly, traditional, non-Western world views have never protected women from discrimination; on the contrary. We might argue that, instead of being bad for women, properly done science combined with rational, open discussion of its results is a liberating force, not only for women, but for all oppressed groups.

"For generations, talented girls were discouraged from science because of ill-founded ideas about women's (in)abilities. Now there is a danger that talented girls will be discouraged by ill-founded ideas about the masculine or masculinist values with which science is allegedly imbued," Susan Haack (1997:90) writes. Many liberal feminists share her opinion, and consider the rejection of rationality as contrary to women's purposes.<sup>22</sup> Regarding 'white, male thought' Cathy Young claims that "it would be ludicrous for women to deny themselves that heritage" (1999:38). Philosopher of science Noretta Koertge puts it more sharply:

If it really could be shown that patriarchal thinking not only played a crucial role in the Scientific Revolution but is also necessary for carrying out scientific enquiry as we know it, that would constitute the strongest argument for patriarchy that I can think of! I continue to believe that science - even white, upperclass, male-

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<sup>22</sup> Campbell 2002; Hoff Sommers 1994, 2000; Koertge 1996a, 1996b; Nanda 1996; Patai 1998; Radcliffe Richards 1995; Roiphe 1993.

dominated science - is one of the most important allies of oppressed people.  
(Koertge 1996b:413)

### **3.4. Scientific Contributions of Standpoint Theory**

Have standpoint theorists, with their epistemology of holism, harmony, and care, made any important contributions to science? Many feminists see the work of biologist Barbara McClintock as exemplary (Donovan 2000; Fox Keller 1982; Rosser 1992; Tuana 1997). In the 1940s McClintock discovered that pieces of DNA can 'jump around' on the chromosomes. After having been ignored by the scientific establishment for decades, her discovery was finally confirmed and in 1983 she was awarded the Nobel Prize (Ridley 1999).

As Evelyn Fox Keller, who wrote a biography of McClintock (*A Feeling for the Organism*, 1983) describes it, McClintock's discovery did not fit within the then predominant view of genes as immovable beads on a string and of DNA as the 'master molecule', encoding and transmitting all instructions for the unfolding of a living cell. Hers was a more interactionist model. Fox Keller has interpreted McClintock's insistence on the importance of "letting the material speak to you" and of having "a feeling for the organism" as particularly feminine (Fox Keller 1982:243). For her, McClintock's research is definitely an example of what a different science, "a science less restrained by the impulse to dominate," might look like (1982:245). Nancy Tuana (1997) concurs that the image that we get of McClintock is very different from that of the disinterested, detached observer. "McClintock's respect for the complexity of nature and her desire to listen carefully led her to embrace a close relationship with the maize she studied" (1997:24). "In addition to her admonition to take time to listen, to develop an intimate relationship with the subject of study, McClintock's approach was a blend of reason and passion" (1997:25).

McClintock herself has, however, never accepted Fox Keller's interpretation of her work as representing a woman's perspective. To her, science was not a matter of gender, but a place where, ideally, the matter of gender drops away (Hoff Sommers 1994; Radcliffe Richards 1995).

Gross and Levitt (1994) share McClintock's view. They point out that her closeness to the experimental material is characteristic of some scientists and less so of others. Moreover, there is no lack of abstraction in her work; it is solidly grounded in the abstractions of genetics. McClintock simply saw things that others didn't see. They

argue further that good experimentalists *must* be close to the experimental object in order to make effective designs; otherwise they are unable to identify and exclude intervening variables. In addition, just what does McClintock's 'listening' to maize mean? It is, after all, just a metaphor, an empirically empty phrase. According to Alan Soble (2003), it can be interpreted in two ways: by saying that she worked slowly and patiently, and by saying that she noticed differences and did not ignore anomalous data. There is nothing particularly feminine or scientifically deviant about this, he notes.<sup>23</sup>

As to the idea of DNA as 'master molecule', Gross and Levitt write that it is not, even among the most radically reductionist biologists, a literal one: Only secondary writers think *ex DNA omnia*. It is just a shorthand for 'initial information source', nothing more, and it carries no implication of dominance. Interactive relationships have been a central concern of cell and molecular biology for more than forty years.

If McClintock's work does not testify to a feminine way of knowing, then perhaps more recent feminist research does? In trying to assess this matter, it is important to keep in mind the difference between 'female contributions to science' and 'female science'. It is undeniable that because of the underrepresentation of women in the social and life sciences, the actual practice of science has sometimes failed or still fails to live up to its norms. These norms comprise logical clarity, logical consistency, generality of principles, and empirical validity.

When, for example, medical or psychological theories are not adequately tested on female subjects, the theories lack generality of principles and empirical validity. Science presents other genuine issues of concern. Laboratories can be very unwelcoming to women, for instance. Women scientists sometimes find that their work is not taken as seriously as that of comparable male colleagues and that they may not be included in informal communication networks. A Swedish study (Wennerås and Wold 1997) showed that women scientists need to publish two and a half times more

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<sup>23</sup> In an amusing pastiche, Soble (2003) psychoanalyzes McClintock, just like Fox Keller has psychoanalyzed Francis Bacon (see section 2.3.). Knowing from Fox Keller's biography of McClintock that the famous geneticist was a loner, a recluse, low in social interests and skills, and lacking any need of emotional intimacy, Soble concludes that she perfectly fits Fox Keller's image of the (male) scientist as constitutionally autonomous and alone. "McClintock's favorite expression "a feeling for the organism" both conceals and exposes her unconscious wish for the feeling of the orgasm, where by "orgasm" I mean that which McClintock's life severely lacked: an appreciation of the sensuality of the body and how it can be shared in ecstatic love with another human being. David Levine's exquisite caricature of McClintock, in which she lovingly holds, if not caresses, a fat phallic ear of maize, perhaps unwittingly exposes her unconscious wish for orgasmic ecstasy and explains why she attached herself to, became fascinated with, corn in the absence of deeply satisfying human relationships" (2003:94).

papers to rank equally with male colleagues (see chapter 8 for further elaboration). Other studies revealed that a paper attributed to a man is rated more favorably by both sexes than when the same identical paper is attributed to a woman (Schiebinger 1999). Thus women can still change a lot in the world of science, apart from bringing in new heuristically valuable points of view and providing additional sources of scrutiny.

This is not the same, however, as developing a *female* science, with a new methodology, new rules of evidence, and another interpretation of objectivity. And the fact is: Feminists do not seem to have been able to develop this kind of science yet, and it is doubtful whether they ever will. In her description of the various strands of feminism, Sue Rosser (1997) offers examples of the scientific contributions within each tradition. When we take a closer look, however, we see that her examples are the same for *all* feminist traditions that epistemologically adhere to empiricism or standpoint theory: flawed research within anthropology and primatology brought to light by regular women scientists such as Sally Slocum, Sarah Hrdy, and Jane Goodall.<sup>24</sup> There is no sign of a female way of knowing; this is just standard science, albeit that as women those scientists were more focused on female subjects in their research. Rosser's examples testify only to the self-correcting nature of science.

In discussing radical feminism and its complete rejection of current scientific epistemology, Rosser confesses that a new female science has not yet been constituted:

It is difficult to imagine what might result if women scientists congregated regularly for sustained periods in the absence of men to decide what constitutes knowledge. Moreover, if women scientists also dominated and controlled the leadership positions within the scientific establishment, the government, and academia for decades, who knows what might emerge? (Rosser 1997:33-34)

Thus, following Rosser, we may conclude that as yet there is only standard science - although that is surely not what she intended to demonstrate.

Other authors concur. Mathematician Mary Beth Ruskai (1996) does not know of any cases in mathematics in which someone has alleged that a theorem is wrong because a woman proved it. If a result is right, it is right. She continues:

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<sup>24</sup> Jane Goodall had no scientific background when she left for Tanzania to study chimpanzees in the wild (Goodall 1999). Her work is now, though, generally acknowledged as being of primary scientific importance.

In some of the gender-difference literature the arguments seem to me particularly flawed because they define feminine in terms of certain well-known, common characteristics. They also define science in terms of other characteristics (sometimes of questionable validity, such as noncreative and nonintuitive) that they consider masculine. If one points out that there are many examples of women who do not fit this stereotype, the response is that the paradigm is cultural rather than biological, so that the women who do not fit are masculine and the men who do fit are feminine. To a mathematician this sounds suspiciously like "assuming what you're trying to prove." (Ruskai 1996:440)

An example of feminist algebra is described from a critical perspective by Gross and Levitt (1994). It concerns, however, again a case of "unobjectionable", but "futile" linguistic alterations (1994:114). The authors of their sample disapprove, for example, of a particular problem in which a girl and her boyfriend run toward each other because it portrays a heterosexual involvement. Or they object to a problem about a contractor and the contractor's workers (sex undeclared), because they assume that the student will envision the workers as male.

According to Gross and Levitt, "[f]eminist cultural analysis has not yet identified any heretofore undetected flaws in the logic, or the predictive powers, or the applicability of mathematics, physics, chemistry, or - much complaining to the contrary notwithstanding - biology" (1994:112). Whether their mentioning of biology in this context stands up to scrutiny depends, I think, on the exact interpretation one prefers to give to the terms 'predictive powers' and 'applicability'. Does the long neglect of female-female relationships in ethology constitute a flaw in the predictive powers and applicability of ethology? One could say that, indeed, it did for a long time, until this flaw was corrected by female ethologists. One could also say that the fact that female ethologists found this flaw testifies to the built-in self-scrutiny of the scientific enterprise and thus to its ultimate applicability. The same is true of research in the health sciences and other life sciences.

Psychology does not seem to have been altered by 'female' science either. Psychologist Lynne Segal wonders about it that within psychology feminism has made a comparatively small impact. Feminist critique of psychology's statistical methods has remained marginal, she observes, "despite the remarkable shift in the numbers of women entering the discipline: 400 per cent *more* women than men studying psychology today, compared with the 50 per cent *less* women than men back in 1969" (1999:151, emphasis in original). Thus, although no doubt women psychologists will have brought new perspectives and accents to the discipline, they have not changed

its methodology. The use of logic, statistics, and abstraction remains as valuable as ever.

Feminist ethologists Donna Holmes and Christine Hitchcock (1997) have examined the research preferences of male and female scientists in their field. As they say, the science of animal behavior is a field where women are participating comparatively equally as professionals, at least relative to biology as a whole.

Holmes and Hitchcock surveyed almost 2,600 abstracts from presentations of national meetings of the Animal Behavior Society from 1981 to 1990. They found that both sexes study mammals most often. Women are, however, still more likely than men to study them. When all animal taxa were analyzed together, their data failed to support the hypothesis that women are more likely than men to focus on female animals or on young. When they investigated primate studies only, however, they found a marked tendency to focus on animals of the investigator's own sex. This may not surprise us, since primates are "animals with which we all presumably have a heightened capacity for empathy or intimacy, or a 'feeling for the organism'" (Holmes and Hitchcock 1997:196). Women were in general more likely than men to focus on some aspect of social behavior, especially parental care. Social behavior was, however, one of the topics investigators of both sexes mentioned most often. There was no evidence that men were more likely than women to focus on aggression or male combat, but researchers who studied sexual selection, regardless of sex, were much more likely to focus primarily on the sexual behavior and combat of males.

Thus Holmes and Hitchcock find that there are (small) sex differences in choice of research topics by ethologists, and that these differences will grow when research focuses on animals one can more easily identify with: Male primatologists tend to focus on male apes and female primatologists on female apes. A heightened 'feeling for the organism' thus seems to be more closely related to the kind of organism studied than to the investigator's sex. By extension, we can expect identification with one's own sex to be still stronger in the study of human subjects.

This testifies again to the need of female researchers *in disciplines in which sex is itself intrinsic to the subject being studied*, that is, in the life sciences and the social sciences. In disciplines such as mathematics and physics, the sex of the investigator is not expected to make any difference. There is no indication, however, that men and women do science in a qualitatively different way (a question that Holmes and Hitchcock did not directly address; they think that to investigate this may prove an impossible task).

The data thus seem to indicate that what some feminists consider 'female' science is just standard science performed by female researchers. At the end of this chapter we will see that this observation was to be expected on strictly logical grounds.

### **3.5. Postmodernism: The Whole Project of Science Questioned**

The postmodernist line of thought has already been sketched in the introduction. As Harding writes, a postmodernist view of science holds that standpoint theory is still too firmly rooted in "distinctively masculine modes of being in the world" (1986:294). It implies the complete rejection of rationality and of dispassionate objectivity and thus seems to challenge the legitimacy of trying to describe the world from a feminist perspective.

Postmodernist critics of science are resistant to any generalizing theory, fearing that it necessarily represses or ignores contradictory evidence. Adherents of queer theory, radical feminism, some strands of psychoanalytic feminism, and postmodernist feminism can often be found defending this epistemology. Many ecofeminists share its complete rejection of 'male' rationality.

The line between standpoint theory and postmodernism is vague, however. As indicated above, a postmodernist kind of epistemology can sometimes be found within the writings of standpoint theorists as well. Sarah Bracke and Maria Puig de la Bellacasa (2002) reject the representation of standpoint theory and postmodernism as opposites, arguing that epistemological pluralism is inherent to standpoint theory, due to the context-dependency of epistemologies and due to the differences among women. As for the criterion that we should avoid contradictions, to them this testifies to "scholastic sourness" (2002:25, my translation).

At the risk of the accusation of being a scholastic sourball: The contradiction at the heart of postmodernist epistemology is this: If all scientific statements are historical fictions made facts through the exercise of power, then how can feminists produce knowledge which is more *true*? Postmodernist feminists do not seem to find the answer. They treat the problem in a highly abstract way, such as by saying that they have a dream "not of a common language, but of a powerful infidel heteroglossia" (Haraway 1991d:181) and by talking about "situated and embodied knowledges" which sustain "the possibility of webs of connections called solidarity in politics and shared conversations in epistemology" (Haraway 1991e:191). "[W]ith many other feminists, I want to argue for a doctrine and practice of objectivity that privileges contestation, deconstruction, passionate construction, webbed connections, and hope

for transformation of systems of knowledge and ways of seeing," Donna Haraway (1991e:191-2) states firmly. According to her, "it is precisely in the politics and epistemology of partial perspectives that the possibility of sustained, rational, objective enquiry rests (1991e:191). It is unclear why this project would be any more objective, however. Radical feminists sometimes use consciousness-raising groups, in which they meet to examine their personal experiences, to determine what counts as knowledge.

Philosopher of science Mario Bunge notes about cognitive constructionists that it would "go against the grain of their school to propose its own clear-cut criteria of scientificity" (1996:106). But, he wonders, how is it possible to discuss rationally the scientific status of an idea or practice otherwise than in the light of *some* definition of scientificity? He thereby touches upon the logical inconsistency within the phrase 'feminist epistemology' that will be elaborated at the end of this chapter.

### **3.6. Should Science Be Politically Progressive?**

There exists a deep divide between, on the one end of the epistemological continuum, those feminists who believe in value-free science and who consider scientific rationality a source of empowerment for women, and, situated near the other end, those who explicitly reject standard science and rationality as inherently patriarchal. The second attitude leads to the demand that science should be guided by political commitments.

Although sounding rather outrageous at first hearing, this demand follows quite logically from the social constructionist line of thought. Since constructionists believe that science is always disguised ideology (to a greater or lesser extent, depending on the theorist), they want to infuse it with the 'correct' political and ideological values. On this view, science not only is but should be politics by other means. The aim no longer is value-free science.

As an example I quote feminist biologist Anne Fausto-Sterling from her influential book *Myths of Gender*, an attack on biological theories about sex differences. She describes a scientist's standard of proof as "a standard dictated in turn by political beliefs" (1992:11), adding:

I impose the highest standards of proof, for example, on claims about biological inequality, my high standards stemming directly from my philosophical and political beliefs in equality ... This book is a scientific statement and a political statement. It could not be otherwise. Where I differ from some of those I take to task is in not denying my politics. (Fausto-Sterling 1992:11-12, emphasis in original).



When reading the book, however, one gets the impression that *no* scientific research will ever meet her standards of proof, simply because she a priori assumes that almost all differences between men and women are socially constructed. Since her political beliefs determine which theories can be valid, she will never accept theories which are not to her liking.

As I pointed out in this chapter and the previous one, there are good reasons for believing that social constructionist epistemology is built on quicksand. In that case, its argumentation for making science explicitly political becomes invalid. If science, as a collective and cumulative enterprise, is (ideally) value neutral, there is no logical necessity to let it be driven by 'better' values.

But on the face of it, the suggestion to harness science to the task of making our society more just and more politically progressive has an attractive humanistic ring to it, as philosopher of science Noretta Koertge (1996a) admits. Who can be against justice and political progress? And since the quest for pure scientific truth is already restricted by ethical prohibitions on harming experimental subjects and mitigated by a responsiveness to social needs, why not make an opening for deliberate ideological intervention?

How would the constructionist proposal impact on the process of scientific inquiry? In the traditional account, the context of application of scientific results lies outside the domain of science proper, and it is here as well as in the choice of funding priorities that social values and policies take their rightful place. Now everyone would agree that extreme care should be taken in applying scientific results that are still preliminary or could easily cause harm, Koertge argues. As she says, however, the constructionists go much further, asserting that some research is so politically dangerous that it should never be done. Hence, they try to suppress publications or research conferences on possible biological correlates of crime, intelligence, or sexual orientation. They thus introduce political or ideological considerations directly into the heart of the context of justification of research. So we should, for example, study the social construction of sexism, not sex differences, and analyze the origins of homophobia instead of the etiology of homosexuality.

Such an ideological filter could seriously reduce the topics that can be investigated and damage the ethos of free inquiry so treasured in science. That is the first reason why the constructionist proposal should not be defended. The second reason is yet more important. Whereas censure of specific research topics would not in itself distort the content of scientific findings, such a distortion would happen if ideology were to affect the process of *hypothesis formation*, something which is defended by feminist

constructionists. As the quotation of Helen Longino at the beginning of this chapter makes clear, they want to subordinate science to their political aims. On their agenda, the scientific acceptability of a claim would depend on its perceived political suitability.

History should have taught us by now the futility of such a strategy, Koertge (1996a) argues:

[T]he act of banning Copernicanism hurt the Catholic Church much more than heliocentrism could ever have done. Lysenkoism<sup>25</sup> did nothing to help peasants improve their agricultural practices while it delayed the adoption of hybrids developed in the West. Women will not benefit in the long run from attempts to block the study of biological differences. (Koertge 1996a:271)

Thus her conclusion is that a constructionist epistemology can only be detrimental to women. Not only is it a waste of time and energy to try to block standard science, it also keeps women from participating in science and thus from gaining power. As Lopreato and Crippen argue, "[w]hen science and politics are mixed, both activities may suffer" (1999:69).

### 3.7. Does Feminist Science Exist?

In her cogently argued article "Why Feminist Epistemology Isn't (and its Implications for Feminist Jurisprudence)" (1995), philosopher Janet Radcliffe Richards investigates what 'feminist knowledge' and 'a feminist epistemology' do actually mean. Investigating the foundations of science, epistemology, logic, or ethics is a perfectly respectable philosophical activity, in which feminists seem as entitled to join as anyone else, she says. In a long line of argument, she subsequently demonstrates, however,

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<sup>25</sup> The 'Lysenko affair' refers to the fact that from about 1935 to 1965 the development of genetics in the Soviet Union was halted. Mendelian genetics was replaced with a doctrine about the inheritance of acquired characteristics championed by Trofim Lysenko, a political figure put in charge of attempts to improve agriculture (Segerstråle 2000; see chapter 4 for information about acquired characteristics).

Sociologist Ullica Segerstråle adds this interesting remark on Lysenkoism: "The Lysenko affair has become something of an exemplar referred to by academics to emphasize the importance of freedom of science, or as an example of what happens when scientific objectivity is abandoned for political reasons. It seems that the Lysenko affair is as routinely invoked by scientific traditionalists as the notorious sterilization laws or Immigration Act are invoked by radical scientists. Ironically, both sides use their chosen precedents in order to demonstrate the same thing: the dangers of politically influenced science" (2000:228, emphasis in original). It is, though, not exactly the same they want to demonstrate. Whereas scientific traditionalists want to show what happens when you let scientific results be influenced by politics, radical scientists maintain that science is *always* politically influenced and that, therefore, we better be selective in choosing our topics of research.

that feminism can provide no justification for holding one theory rather than another. Ultimately each scientific theory, whether it calls itself feminist or not, is evaluated by the same traditional epistemological standards that *everyone* uses, although some may not recognise that they use them. It is simply logically impossible to reject standard epistemology.

Radcliffe Richards starts her argument by showing that, although feminist epistemology is supposed to be completely at odds with traditional epistemology, there is some common ground. To be a feminist obviously implies, after all, having a view about the way things *are*, otherwise one could not think there was anything wrong with the position and treatment of women. These beliefs about the way things are, are supported by empirical, often scientific, investigation. This means that one also has beliefs about epistemology and the scientific method, since one's conclusions about what the world is like depended on assumptions about how these things can be found out.

Similar points apply to questions of value. In order to complain about the position of women, one must be appealing to moral standards of right and wrong. The belief in such standards in turn implies beliefs about metaethics, about the way one reaches ethical conclusions.

Thus feminism necessarily starts from the appeal to traditional standards of ethics, epistemology, and science, and from the use of traditional logical inference. It was by appeal to these standards that the position of women was first found to be wrong, for feminism as a movement as for individual feminists. At this stage the feminist's beliefs are still not feminist in the sense of there being any reason for a feminist to hold them that a nonfeminist - someone who has not yet recognized that women have grounds for complaint - does not have. The feminist can, for example, come to the conclusion that traditional ideas about women cannot be justified by traditional epistemological standards, and she can demonstrate this to any impartial investigator who shares her basic standards.

Here an important point in Radcliffe Richards's argument follows, "simple and obvious once seen", but nonetheless "widely overlooked":

You may change your views because of feminism in the sense that you would not otherwise have embarked on the inquiries that led to those changes, but that does not mean you change them because of feminism in the sense that feminism provides the justification for the change ... Feminism may set investigators on the track of new discoveries, and the feminist program may expand as a result of

them, but that provides no ... reason to count the new beliefs themselves as feminist. (1995:373-374, emphasis in original)

The new beliefs are thus the result of the application of standards of science and rationality that are not themselves feminist. The question now is: How might the feminist be *led by her feminism* to reject these traditional ideas about reason and science and eventually adopt radically different ones?

Of course, by its very nature, feminism must challenge some received ideas. As Radcliffe Richards explains, however, standards of knowledge come in hierarchies, and many changes can be made at intermediate levels long before the fundamentals of rationality and epistemology are even approached. It is in particular essential to recognize that changes in beliefs about what the world is like and how it works always amount to potential changes in standards, because these beliefs are automatically used as the basis for assessing other, less well established beliefs. In forensic medicine, for example, we decide guilt by reference to our fundamental beliefs about blood groups or DNA, whereas once, long before forensic medicine existed, we might have decided it by whether the accused sank or floated in water. Thus it is likely that feminism leads eventually to extensive changes of standards at this intermediate level. If the idea is challenged that women's nature allows them to find happiness only through marriage, for instance, this will lead to a fundamentally different approach to the assessment of women who feel unhappy about their lives.

Another example: Suppose feminists are right in claiming that women have ways of knowing that have been disregarded because they are different from paradigmatic scientific procedure. If feminist-inspired investigation eventually showed not only that such female techniques exist, but also that they were just as effective, by ordinary criteria for scientific success, as the paradigmatic ones, that would support feminist demands for changes in the standards for the assessment of knowledge claims. It would do so, however, only on an *intermediate* level. There would be no reason for changes in epistemology or fundamental attitudes to science. Quite the contrary, as Radcliffe Richards asserts: Whether or not these female ways of knowing would be accepted as reliable *depends*, once again, on the acceptance of more fundamental standards of science and epistemology. If they were shown to be reliable, they would then be included into traditional scientific procedure and become one of the standard ways of investigating the world.

To show that more fundamental changes were needed in the criteria for scientific success it would be necessary to imagine women's being *unsuccessful* by current

standards - having theories which tests kept showing were getting nowhere, making predictions that were usually unfulfilled, and so on - and then saying that scientific standards should be changed to count *this* as good science. As she says, it is difficult to imagine either what such standards would be, or that any feminist would recommend them. She continues with a claim similar to the one made by Susan Haack (1996a):

[I]t would be a serious mistake to respond by saying that if these [knowledge claims] were what traditional epistemology counted as knowledge, there must be something wrong with traditional epistemology. This would not only be much too precipitate; it would also give far too much credit to patriarchal man. It would by implication concede that whatever he had claimed as knowledge must, by traditional standards, really be knowledge, to be dealt with only by complicated revolutionary epistemologies through which it could be shrunk into mere phallogocentric knowledge, or otherwise emasculated. It is usually much simpler - and, you would think, much more feminist - to start with the assumption that what has been *claimed or accepted* as knowledge may not be knowledge of any kind, even phallogocentric, but, by patriarchal man's very own epistemological standard, plain, ordinary (perhaps patriarchal) *mistakes*. (1995:377, emphasis in original)

Thus the fact that claimed proofs can be mistaken does not even begin to show that there is something fundamentally flawed about traditional epistemological ideas of propositional knowledge. It is Radcliffe Richards's suspicion that a great deal of the impulse toward feminist involvement in epistemology and philosophy of science arises from the blurring of this distinction between the epistemological standards themselves and a wrong application of them.

An indication that confusions of level may be a source of problems is the typical shift in feminist writings from the discussion of a particular aspect of science or its applications to a general conclusion about science in general, without systematic discussion of how the different levels relate to each other. She describes how she has "often been struck in practice, for instance, by the way feminists who are (quite reasonably) angry about the male takeover of obstetrics describe the insensitive use of gadgets as 'subjecting women to male science', then go on to take this as indicating some kind of global, woman-oppressing maleness of every aspect of the scientific enterprise" (1995:378).

Radcliffe Richards's essential point is this: One cannot logically leave traditional epistemology behind *and* keep earlier conclusions about the position and treatment of

women that were actually based on the rejected epistemology. Criteria for proper treatment and assessment need to be in place before it can be said that the present state of things is falling short of them. Feminist theories are *at all stages* dependent on more fundamental ideas that have nothing to do with feminism. No beliefs about matters of fact, and no theories of ethics, epistemology or science, can be required by feminism, because feminist conclusions depend on them.

Even the argument that we must adopt the epistemological ideas claimed as feminist because the progress of women depends on it presupposes the idea that epistemology is a sort of thing that is logically secondary to ethics, which is itself an epistemological theory. Moreover, if we can tell what is going to benefit women, we must think we know something about the way the world works and therefore must presuppose an epistemology other than the one we are supposed to be defending.

Radcliffe Richards's conclusion is clear: There can be no *feminist reasons* for adopting beliefs of any kind. Feminism can provide no justification for holding one theory rather than another. If a theory that goes by the name of feminism turns out to be good science, it just becomes standard science. *The fact that some belief is held by a feminist does not make it a feminist belief.* Feminism may prompt women to raise particular questions, but it cannot be the determinant of the answers. The worthwhileness of ideas must be assessed in complete independence of their claimed connection with feminism.

If one really wants to fight the oppression of women, there is only one way to go, according to Radcliffe Richards:

Once you have reached such conclusions as that traditional claims about the nature and position of women have always been inadequately supported by the evidence and are often mistaken, that women have had various direct and subtle obstacles placed in the way of their acquisition of knowledge, and that their abilities have never been impartially assessed or their achievements acknowledged, that shows the direction your feminist politics must take. You must therefore be positively opposed to any movement that encourages women to disdain as patriarchal the very ideas in philosophy and science you have been trying to ensure they are given full opportunity to learn, or that demands recognition as special ways of knowing for the contrived ignorance you have been struggling to remedy ... And if such a movement calls itself feminist, that only provides a reason for redoubling your efforts to thwart it. (1995:392)

The qualification 'feminist' with regard to science and epistemology is thus unnecessary or even misleading. Nothing is lost by approaching the issues of feminism in this way, Radcliffe Richards argues, since it

leaves completely open all questions about what theories, standards and methods should be accepted, how different the sexes actually are, how much injustice to women still remains, and everything else. It does not in the least imply that the approaches now claimed as feminist should not be adopted; all it does is undermine the spurious status the feminist label has given them. (1995:400, emphasis in original)

With the issue of feminist knowledge and feminist science thus somewhat more clarified (or so I hope), we can now proceed to the history of evolutionary theorizing. Whenever I refer to 'feminist criticisms' of Darwinian theory, this will mean 'formulated by feminists'. We will see that, whenever these criticisms turned out to be well-founded (as assessed by traditional epistemological and scientific standards), they were sooner or later incorporated within evolutionary theorizing - although often later than sooner.

The history of Darwinism testifies to the argument Janet Radcliffe Richards developed above: The only productive way for women to correct male bias in science is not by dismissing the scientific endeavor as 'patriarchal', but by engaging in it themselves.

#### **4. THE SEXES IN VICTORIAN TIMES**

[W]ith the dawn of scientific investigation it might have been hoped that the prejudices resulting from lower conditions of human society would disappear ... When, however, we turn to the most advanced scientific writers of the present century, we find that the prejudices which throughout thousands of years have been gathering strength are by no means eradicated.

Eliza Burt Gamble

Adapted from: Vandermassen, Griet (2004). Sexual Selection: A Tale of Male Bias and Feminist Denial. *European Journal of Women's Studies* 11(1):9-26.

and

Adapted from: Vandermassen, Griet, Marysa Demoor, and Johan Braeckman (2005). Close Encounters with a New Species: Darwin's Clash with the Feminists at the End of the Nineteenth Century. In: *Unmapped Countries: Biological Visions in Nineteenth-Century Literature and Culture*, ed. Anne-Julia Zwierlein. London: Anthem Press, pp. 71-81.

##### **4.1. Introduction**

As we will see in this chapter, there can be little doubt that Charles Darwin (1809-1882) let his theorizing on the sexes be constrained by his Victorian worldview. Yet it might still be argued that his proposition of female choice in sexual selection was revolutionary at the time. When reading feminist accounts of Darwinian theory, however, one gets the impression that no feminist wants to acknowledge this element of female agency within Darwin's writings (with 'feminist' I mean 'non-Darwinian



feminist'; in referring to Darwinian feminists I will always explicitly use the appellation 'Darwinian').

An example of this typical kind of selective feminist reading is Donovan (2000), who summarizes the content of Darwin's major work on sexual selection, *The Descent of Man and Selection in Relation to Sex* (1871) in one sentence, saying that the book "promulgates a doctrine of male superiority" (2000:58). Now it cannot be denied that Darwin indeed thought that "man has ultimately become superior to woman" (Darwin 1871/1874:585). In evaluating his view of women it seems, however, unfair to focus only on the embarrassing mistakes he made. Moreover, the observation that he could not prevent Victorian values from slipping into his theorizing does not at all detract from the scientific value of evolutionary theory. As Antoinette Brown Blackwell, the first woman to publish a critique of Darwin's and Herbert Spencer's view of the sexes argued, the precise relationship between the sexes should be decided upon the basis of fact.

According to Darwinian feminist Sarah Hrdy in her preface to the second edition of *The Woman That Never Evolved* (1999a), female strategies are now center stage in sociobiology, and there is an unprecedented funding for female-focused research in this field. She adds: "One of the great strengths of science, after all, is the power to correct (however belatedly) erroneous ideas" (1999a:xviii).

It took indeed more than a century for Antoinette Brown Blackwell's hypothesis to be seriously tested, a sad fact which will not exactly serve to decrease the feminist suspicion of science. It is, then, not entirely without reason that many feminists have judged an evolutionary account of the psychosexual differences between men and women to be sexist.<sup>26</sup> But although this negative reaction may be understandable, I am convinced that feminism throws away a valuable tool for understanding sexism in denouncing an evolutionary approach to the human mind.

In this chapter I give an account of the development of evolutionary theory in the nineteenth century. I will focus on its (lack of) attention to females and on feminist criticisms of its basic premises. I will also look at the ways in which Victorian scientists and intellectuals appropriated evolutionary theory to pronounce upon women's capabilities and women's rights. The chapter further glances at the disparate reactions of women intellectuals to the frequent undermining of feminist demands under the guise of scientific authority, and tries to determine the role Darwin played in all of this.

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<sup>26</sup> Angier 1999; Bleier 1985; Fausto-Sterling 1992, 1995, 1997, 2000a; French 1992; Gray 1997; Haraway 1991e; Hubbard 1990; Noske 1989; Sapiro 1985; Rose 1983, 1997; Rosser 1992; Segal 1999; Sork 1997; Sunday and Tobach 1985; Tang-Martinez 1997.

#### **4.2. The World before Darwin**

Living in the twenty-first century, with evolutionary theory firmly established in most parts of the Western world, it is difficult to imagine what it must have been like to live in a pre-Darwinian world. Much of natural history was closely wedded to natural theology, which held that all species were consciously designed by God, as described in the bible. Species were considered immutable; they had an 'essence', created by the deity. In this static and essentialist worldview, there was no place for evolution. Although evolutionary ideas had been around since the eighteenth century, they were not very influential (Braeckman 2001).

Historically the most serious alternative to Darwinian theory has been proposed by the French biologist Jean-Baptiste Lamarck (1744-1829). His theory as it was taken up in Britain can be summed up in the phrase 'use-inheritance'.<sup>27</sup> The idea is that the activity of an organism shapes the organism appropriately for that activity, and that these "acquired characteristics" will then be passed on to the organism's offspring. Adaptations arise as a response to needs. The more a giraffe stretches its neck in order to reach the leaves it feeds on, the longer its neck becomes, and its offspring will then inherit this longer neck. Toward the end of the nineteenth century, the German biologist August Weismann showed the inheritance of acquired characteristics to be impossible (Cronin 1991).

#### **4.3. Evolution by Natural Selection**

By the middle of the nineteenth century, the idea of evolution gradually came to be accepted. Evolutionists were unable, however, to pin down a mechanism of change. They called in conscious design or remained stuck in vagueness. It was Darwin's great triumph that he found a mechanism for evolution that explained the complexity of adaptive design, that is, the careful fit between an animal or plant and its environment. It also solved the puzzle of the astonishing diversity combined with fundamental similarity among groups of organisms (Cronin 1991).

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<sup>27</sup> The idea of use-inheritance was, however, not originally Lamarckian; it had been around a long time before Lamarck picked it up. Neither was it the essence of his theory. Lamarckism was based on the thought that the workings of the laws of nature on living matter change according to the circumstances and that organisms have an inherent tendency toward more complexity. The main problem of Lamarckian evolutionary theory was its failure to provide a mechanism that can cause adaptations. Five decades later, Darwin proposed such a mechanism: natural selection (Braeckman 2001).

Darwin called this mechanism 'natural selection', the workings of which he explained in *On the Origin of Species by Means of Natural Selection: Or the Preservation of Favoured Races in the Struggle for Life* (1859). Natural selection consists of three essential ingredients: variation, inheritance, and selection. There is always variation among organisms. Some of these variations can be inherited, others cannot. Selection can only work on the heritable ones. As a blind and nonintentional force, natural selection acts as a kind of sieve. An organism with a variation that makes it better adapted to its present environment will be more successful at surviving and/or reproducing relative to others. It will thus leave relatively more offspring. The favorable characteristic will be passed on to future generations at ever greater frequency, until it has become a characteristic of the species itself - that is, as long as the environmental circumstances do not change in such a way that the characteristic becomes detrimental to the organism. The various shapes of the beaks of the finches at the Galapagos Islands, for instance, are adaptations to the different types of flowers each kind of finch feeds on (Darwin 1859).

The process of sexual selection, which is, simply said, not about the struggle for life but about the struggle for reproduction, is only briefly mentioned in *On the Origin*. A full elaboration of the theory would have to wait until 1871, when *The Descent of Man and Selection in Relation to Sex* was published.

Initially Darwin's theory of natural selection met with a lot of resistance, also from biologists. One correct objection was that it lacked a coherent theory of inheritance - the fusion of Darwinism with the discovery of gene inheritance would not happen until the 1930s. Another objection was that it was difficult to imagine how the early stages of the evolution of an adaptation could be useful to an organism. It is now known that partial forms can indeed offer adaptive advantages. Many people had, as was to be expected, problems with the materialism of the theory: They could not believe that the emergence of humans and other species resulted from the slow, unplanned, cumulative process of selection, instead of them being created ready-made by God (Buss 1999).

Today the modern Darwinian theory of evolution is the unifying and nearly universally accepted theory within the biological sciences (Buss 1999). Feminist critiques of it have focused mainly on the aspect of sexual selection. Some feminists, however, have tried to undermine Darwin's scientific credibility by pointing to the congruence between his theory of evolution by natural selection, with its focus on competition, and the values of upper-class Victorian England (Bleier 1985; Haraway 1991e; Hubbard 1990; Rose 2000; Rosser 1992, 2003).

As a biologist, Sue Rosser can of course not deny "the significance of the theory of natural selection for the foundations of modern biology" (1992:57). Note her choice of words: She does not positively state that she believes the theory to be *true*. Her other remark speaks for itself: "[S]cholars have suggested that natural selection, as described by Darwin, was ultimately accepted by his contemporaries because it was a paradigm laden with the values of nineteenth-century England" (1992:56). It must be said, however, that it was the notion of *evolution* which was accepted. Natural selection remained a contentious issue for a long time.

Like Rosser, Ruth Bleier suggests that Darwin's theory of evolution cannot be separated from its genesis in a capitalist society and thus cannot be neutral science:

Historians of science have documented the intertwining, interdependence, sharing, and trading of concepts, language, and metaphors between the natural sciences and the dominant social-economic order. The concepts of "struggle for existence" and "survival of the fittest," central to Darwinist theories of natural selection, were also essential for the laissez-faire philosophy of a new, rising, competitive capitalism. (Bleier 1985:21)

In *Why Feminism?* (1999) psychologist Lynne Segal devotes an entire chapter to Darwinism and especially to evolutionary psychology ("Few things are more depressing for me to have to write about than the renaissance of Darwinian fundamentalism", she remarks on page 80). In appealing to postmodernism and rejecting any belief in universal laws of human nature, she attacks the "monetarist rhetoric" of the neo-Darwinian "tale" (1999:101). Hilary Rose, on her part, describes Darwin's theorizing as "part and parcel of his times - the innovation lies in transferring a social theory into biological discourse" (2000:109).

The social theory Rose is referring to is that of competition over scarce resources within human populations, as developed by economist and demographer Thomas Malthus in his *Essay on the Principle of Population* (1798). Malthus's *Essay* made an end to the optimistic belief of his days that population growth automatically meant more prosperity. He argued that, since the number of people grows much faster than the amount of food, problems will inevitably arise. The population will always automatically be reduced because of starvation. Malthus's *Essay*, and above all his observation that in nature, too, plants and animals have more offspring than can possibly survive, was instrumental in the development of Darwin's evolutionism (Braeckman 2001).

Does this mean that Rose and the other critics are right in suggesting that Darwin was nothing but an ideologue? Do the premises really justify the conclusion? Biologist John Maynard Smith asks the same question:

Both Darwin and Wallace<sup>28</sup> have told us of their debt to Malthus. The formal parallels between the theory of natural selection and the competition implicit in a capitalist society are obvious. Must Darwinism therefore be rejected by socialists? ... The Marxist scientists of my youth - Bernal, Haldane, Levy - drew a distinction between science on the one hand and other human intellectual constructs, for example, theology and law, on the other. They saw science as genuine knowledge about the world, although they emphasized the distortions arising from society. (Maynard Smith 1997:523)

His answer is unequivocal: "To reject Darwin because some of his ideas came from an analogy with the capitalist society in which he lived, is, precisely, the kind of thing we should not allow our prejudices to lead us to" (1997:523).

As philosopher Johan Braeckman (2001) notes, the crucial point is whether Darwinian theory can provide a scientific explanation for the phenomena it purports to explain, irrespective of Darwin's sources of inspiration. And it can. Braeckman cites historian Peter Bowler,<sup>29</sup> who argues that, indeed, natural selection was not simply an induction made on the basis of empirical facts, but neither was it just a reflection of the competitive ethos of Victorian capitalism. Clearly both scientific and nonscientific factors played a role in shaping Darwin's thoughts. He let himself be inspired by many sources and synthesized them into a unique explanatory model of the origin of species. According to Bowler, he used his scientific and cultural sources of inspiration in such a highly creative way that the resulting theory by far outstripped his contemporaries in imaginative skill. Philosopher Daniel Dennett (1995), too, acknowledges that Darwin, who was after all just a human being like the rest of us, was influenced by the values and concepts of his time. But, as Dennett points out, the metaphors of economy, that come to mind so readily when one is talking about evolution, *derive their power from* one of the basic characteristics of Darwin's discovery.

The fundamental processes underlying evolution by selection have been observed many times in the laboratory and in the field and have never been countered by a

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<sup>28</sup> Alfred Russel Wallace (1823-1913) discovered the principle of natural selection independently from Darwin. At the time, Darwin's theorizing had already made much more progress than Wallace's. Both copresented the theory at a meeting of the Linnean Society in 1858.

<sup>29</sup> Peter Bowler, *Charles Darwin: The Man and His Influence* (1990). Cambridge: Cambridge University Press.

single study or finding, so that evolution by selection is viewed by many biologists as a fact. The theory has those characteristics that scientists seek in a scientific theory: It organizes known facts about organic life, it leads to new predictions, and it provides guidance to important domains of scientific inquiry (Buss 1999).

Thus we must conclude that far from being a "social theory being transferred into biological discourse," evolution by natural selection is a firmly established scientific theory, which cannot in the least be undermined by linking it to capitalism or to other value systems, whether by feminists or by science critics in general. It can even be said that evolution by natural selection is now established as a *fact*. This does not mean, of course, that everyone agrees about the details of the process. The fact that Darwinian theory has undergone some important modifications in the course of the twentieth century and that fierce debates are going on about, for instance, the exact role of natural selection relative to other agents of evolutionary change (e.g., Dennett 1995; Gould 1997; Gould and Pinker 1997; Wright 1990, 2000), only testifies to the self-correcting and self-critical nature of the scientific enterprise.

#### **4.4. Social Darwinism**

A comparable and sometimes simultaneously used feminist strategy of discrediting Darwinian theory is equating it with social Darwinism, here interpreted as the view that social inequality between the sexes, classes, or races is the product of natural and sexual selection and is therefore right. Taking measures to reduce that inequality means impeding the progress of the species and hence should be avoided. Women's function, in this line of thought, is primarily that of childbearing.

The simple and most common answer to this claim about Darwinian theory amounting to social Darwinism is that it concerns two very disparate concepts. The first is a scientific theory; it tries to explain how the natural world works. The second is an ideological doctrine; it justifies colonialism and laissez-faire conservatism, and does this, moreover, in a way that has less to do with Darwin than some people seem to think. The leading theorist of social Darwinism, the sociologist and philosopher Herbert Spencer (1820-1903), combined neo-Lamarckian ideas with Darwinian ones, proclaiming that progress is inherent to evolution, something that Darwin did not agree with. Spencer believed that competition between organisms causes adaptations, which are subsequently inherited by the organism's offspring. In general, a better term than 'social Darwinism' might be 'social Spencerism' or 'social Lamarckism'. Darwin considered Spencer's work much too speculative and obscure and, apart from

borrowing his phrase 'survival of the fittest', distanced himself from Spencer's writings (Browne 2002).

The more complex account of the relationship between Darwinian theory and social Darwinism is that for Victorian scientists the relevance of biology for social theory and policy went without speaking; indeed, the term 'social Darwinism' would have baffled Darwin (Paul 2002). Social Darwinism, in this sense, is just the then self-evident search for the social and political implications of evolutionary theory. And in the late nineteenth-century this theory was to many people a mixture of the work of Darwin, who stressed the primacy of the mechanisms of natural and sexual selection, neo-Lamarckian theories, explaining evolution by the inheritance of acquired characteristics, and the work of Herbert Spencer. Those who wanted to apply evolution to social behavior thus could pick and choose from these and other theories the aspects that appealed to them ideologically and then construct their own theoretical framework (Hermans 2003). Furthermore there was Darwin's own ambivalence in his writings, as well as the fact that, strictly speaking, Darwinian theory can be used to accommodate almost *any* political line of reasoning. Indeed, in the late nineteenth century it appealed to socialists as much as to defenders of laissez-faire, which means that socialists were social Darwinists, too, in the broad sense of the word. It just depends on what elements you prefer to focus on in Darwinian theory: cooperation or competition.

Darwin dissociated himself from social Darwinism in its strict sense - the sense in which it tends to be interpreted by biologists and philosophers of science - something that Rose (2000) does acknowledge. Bleier, however, continues the quote on Darwinism and capitalism as follows:

The other side of the coin - the implication of the disastrous effects of the weak, the inferior, or "degenerate" on the survival and vigor of the species or, more usually, the "race" - became scientific bases for proposals for eugenics programs in the United States and England in the nineteenth and twentieth centuries and for the ultimate program of extermination of inferior (i.e., non-Aryan) peoples in Europe in the 1930s and 1940s. (Bleier 1985:21)

Bleier thus makes a straight inference from Darwinism to fascism, without providing any justification for this kind of 'logic.' A sober reading of Darwin's work reveals that it takes a huge leap of the imagination to pass the responsibility for the evils of fascism onto Darwin. As to eugenics, this program was not introduced by

Darwin, but by his nephew, Francis Galton, and never defended by Darwin. Bleier, however, does not make this clear.

This kind of misleading argument can be countered in the same way as the 'Malthus-argument': A scientific theory has to be evaluated on its scientific validity. Nobody will be better off by equating Darwinism with a pernicious ideology, neither feminists, who only lose their intellectual credibility in informed people's eyes, nor their audience, which, misinformed, runs the risk of turning its back to science.

#### **4.5. Evolution by Sexual Selection**

Before discussing Darwin's theory of sexual selection, it might be useful to explain what is meant by sex itself. Sex is the process of combining genes from more than one source. It exists among viruses, bacteria, and all major groups of higher organisms. Among most higher organisms, we find two distinct types - male and female - contributing genetic material. In mammals, the gamete (sex cell - egg or sperm) of each sex contains a single or haploid set of chromosomes. The fusion of these gametes creates a new, genetically unique diploid organism. An individual offspring thus inherits genes from two parents, but is identical to neither. Important to know is that biological sex is determined simply by the size of the gametes: The organisms with the larger gametes, or ova, are females, and those with the smaller gametes, or sperm, are males (Birkhead 2000).

The question of why sexual reproduction has ever evolved at all has been one of the most persistent puzzles within evolutionary biology. Many species, after all, such as certain species of mites, reproduce asexually, with the offspring being identical copies of the parents (with the exception of whatever mutations occur). Sexual reproduction could never have evolved if there had not been some reproductive advantage to it, relative to asexual reproduction; such is the logic of evolution by selection. The leading explanatory theory, developed by evolutionary biologist William Hamilton and biologist Marlene Zuk (1982), holds that parasites are responsible for the origins of sex: Since sexual reproduction provides genetically diverse offspring, parasites cannot spread as easily from host to host as in the case of genetically identical offspring. Thus more offspring can survive.

In *The Descent of Man and Selection in Relation to Sex* (1871/1874) Darwin defined sexual selection as selection caused by the reproductive competition between members of the same sex and species. As he observed, in most species with sexual reproduction, members of one sex, usually the males, compete between themselves



for mating access to the other sex. They do this by way of threats, combats, and useful weapons such as antlers, sharp claws, and strong muscles, but also in a far less intimidating way: through aesthetic display. They show off with beautiful colors, with conspicuous behavior, or with elaborate songs. Darwin posited sexual selection as a way to account for many of these conspicuous physical and behavioral traits in males that could endanger their survival.

The evolution of the peacock's elaborate tail, or of male animals displaying for female ones, for example, is difficult to explain by the process of natural selection as Darwin described it in *On the Origin of Species*. These traits are so energy demanding and so likely to make the animal vulnerable to predators that natural selection would have normally selected them away in an early evolutionary stage. According to Darwin, the reason this did not happen is female choosiness: Male ornamentation and competition for females evolved because females prefer to mate with the strongest and best-ornamented males. Female choice thus influences the course of evolution: The chosen males will have a greater reproductive success relative to the unsuccessful ones. Over evolutionary time, their traits will spread through the population and become evermore exaggerated, since females will continue to choose the strongest and best-ornamented males (Darwin 1871/1874).

The 'prize' of the winners in the sexual contest is thus not survival, but leaving more offspring. In extreme cases of sexual selection, such as with the elephant seals, the number of losers is huge and that of winners very small: 5 percent of the males sire 85 percent of all offspring produced in a breeding season (Buss 1999).

Darwin made a correct observation about female choosiness in most sexually reproducing species. He could not, however, answer the question of why it is the females that are generally the choosiest or why there is choosiness at all. It would take the work of evolutionary biologist Robert Trivers (1972) to solve this puzzle. We will see the exact explanation for female choosiness in the next chapter. Here I concentrate on the trouble with Darwin's view of females.

#### **4.6. Darwin and the 'Coy' Female**

As I argued before, Darwin's claim that female choice had shaped striking male ornaments and behavior over evolutionary time was in fact quite revolutionary - apart from the already revolutionary character of Darwinian theory as a whole. To be sure, male competition was readily accepted by his evolutionarily minded contemporaries,

but female choice as a driving force in the evolutionary process was not. As Darwin himself said:

Most ... naturalists ... admit that the weapons of male animals are the result of sexual selection - that is, of the best-armed males obtaining most females and transmitting their masculine superiority to their male offspring. But many naturalists doubt, or deny, that female animals ever exert any choice, so as to select certain males in preference to others. (Darwin 1882<sup>30</sup>, as cited in Cronin 1991:114)

Darwin applied sexual selection theory very liberally; he detected female choice "at the drop of a feather" (Cronin 1991:243). Reaction against the theory went so far, however, that after Darwin's death it was almost completely neglected for nearly a century. The few people who did recognize its value, such as geneticist and mathematician Ronald Fisher, were fiercely criticized (Miller 2000b). The reasons for the neglect are diverse, but an important aspect of it was the uneasiness over female choice of mates. It was assumed that females are passive in the mating process. Conspicuous male traits, it was assumed, evolved just for the sake of species recognition.

Only in the 1970s would scientists gradually come to accept the profound importance of female choice in the animal world, and only in the 1980s would scientists begin to document within our own species the active strategies that women pursue in choosing and competing for mates (Buss 2003). Meanwhile the agency that Darwin had conferred to females, however slight it may have been when compared to current theorizing on sexual selection, was largely forgotten.

What exactly did Darwin write about female choice and about the nature of the sexes? Some representative quotes make clear what Sarah Hrdy means when she notes: "Guided by a theory that was not only powerful but largely correct, Darwin had an uncanny knack for separating the anecdotal chaff from the true kernels of natural history ... but when it came to females, and especially female choice, his vision was impaired by the blinkers of Victorian prejudice" (1997:8):

When the organs of sense and locomotion are ... more highly developed in the one [sex] than in the other, it is, as far as I can discover, almost invariably the male which retains such organs, or has them most developed; and this shows that the

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<sup>30</sup> A Preliminary Notice: "On the Modification of a Race of Syrian Street-Dogs by Means of Sexual Selection." *Proceedings of the Zoological Society of London*, 367-36.9

male is the more active member in the courtship of the sexes. The female, on the other hand, with the rarest exceptions, is less eager than the male ... she is coy, and may often be seen endeavoring for a long time to escape from the male ... the female, though comparatively passive, generally exerts some choice and accepts one male in preference to others ... The exertion of some choice on the part of the female seems a law almost as general as the eagerness of the male. (Darwin 1871/1874:229-230).

Man is more courageous, pugnacious and energetic than woman, and has a more inventive genius. (Darwin 1871/1874:576-577)

Woman seems to differ from man in mental disposition, chiefly in her greater tenderness and less selfishness ... Man is the rival of other men; he delights in competition ... It is generally admitted that with woman the powers of intuition, of rapid perception, and perhaps of imitation, are more strongly marked than in man; but some, at least, of these faculties are characteristic of the lower races, and therefore of a past and lower state of civilization. The chief distinction in the intellectual powers of the two sexes is shown by man's attaining to a higher eminence, in whatever he takes up, than can woman - whether requiring deep thought, reason, or imagination, or merely the use of the senses and hands. (Darwin 1871/1874:583-584)

Thus man has ultimately become superior to woman. (Darwin 1871/1874:585)

Before and after Darwin, more enlightened views of woman have been written down, to put it mildly. Clearly he did not succeed here in separating his scientific attitude from his social prejudices. As a scientist, the least he should have done was to consider the ways in which women's freedom and capabilities were being socially curtailed, instead of taking the plight of women for granted. But then again, in doing so Darwin only complied with the traditional wisdom of his time and class. It would take the feminist movement to undermine some age-old prejudices about women.

As to female choice within the (nonhuman as well as human) animal kingdom, it has now become clear that Darwin's conception of it was much too narrow, as was his conception of sexual selection. First, he thought that in modern society it was males rather than females who exercise sexual choice, and he regarded this as a sign of

progress. Second, in current theorizing, female choice has become much more active, and female choice and male-male behavioral contests are seen as just two of the mechanisms of sexual selection. Male choice of mates, female-female competition, forced copulation, and aggressive conditioning of female behavior are among the other ones, as well as postcopulatory strategies: sperm competition and sperm choice.<sup>31</sup> The current view of the sexes, and the important role women researchers have played in establishing it, will be further elaborated in chapter 7.

The exact extent to which in Darwin's view the female exerts a choice is not completely clear: She "generally exerts some choice," but she is also "comparatively passive" (1871/1874:230). What is one to make of this? Darwinian feminists differ in their interpretation. Hrdy (1997) explains the contradiction (females making a choice and being passive at the same time) by saying that Darwin just concurred with Victorian wisdom about women, which held that the sexual feelings of the majority of them did not amount to much. According to Laurette Liesen (1995a), Darwin made it clear that females play only a minor role in the explanation of male traits, since female choice occurs only after males have competed with each other. Patricia Gowaty, however, thinks that to Darwin female choice was as important as male-male competition. Pondering the neglect of female preferences after Darwin's death, she adds: "I consider the long-standing theoretical primacy of male-male competition to be one of the most potentially misleading notions in evolutionary biology" (1992:229).

Gowaty thus seems to concur with what I suggested above: that Darwin attributed a far more important evolutionary role to females than evolutionary biologists would do for almost a century after him. Female choice would be rejected, but the appellation 'coy' was to remain unchallenged dogma for the succeeding hundred years. Even today the term has not disappeared from evolutionary writings. We can find it, for instance, in Robert Wright's *The Moral Animal* (1994b), an introduction to evolutionary psychology.

What is inappropriate about the term 'coy'? For one thing, it is plainly wrong. During the past three decades, research has revealed that the females of most species are anything but passive or sexually coy. Through their mate choices, they direct the course of evolutionary change - at least, to the extent that their choice is not thwarted by males (Birkhead 2000; Fedigan 1997; Gowaty 1997b, 2003; Hrdy 1997, 1999a, 1999b; Mesnick 1997; Smuts 1995, 1996). A primary causal factor in this greater

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<sup>31</sup> Birkhead 2000; Buss 1992, 1994, 2000; Cronin 1991; Ellis 1992; Gowaty 1992, 1997b; Hrdy 1997, 1999a, 1999b; Mesnick 1997; Miller 2000b; Shields and Shields 1983; Smuts 1995, 1996; Thornhill and Palmer 2000; Thornhill and Thornhill 1983.

attention to female interests and strategies was the rise of women in the field of animal behavior. Partially because of them, new questions were being asked and new answers given.

Yet the females of most sexually reproducing species *are* more discriminating than males about mating. There is a huge difference, however, between 'coy' and 'discriminating': The former is not a value-neutral term. It is laden with sex-linked cultural meanings and as such does not belong within a scientific vocabulary. As Helena Cronin notes:

I can't resist wondering what words would be used if the sex-roles were reversed. Would a (male) investor or business executive be called coy for not rushing headlong into the first option? If males were choosy about mates, would they be "coy" - or discriminating, judicious, responsible, prudent, discerning? (And, by the way, would females be "eager" - or would they be wanton, frivolous, wayward, brazen?) (Cronin 1991:248)

#### **4.7. Antoinette Brown Blackwell: The Road not taken**

Antoinette Brown Blackwell was the first woman to publish a critique of *The Descent of Man*, four years after its publication. Darwin (and Spencer), she argued in *The Sexes Throughout Nature* (1875), had not given enough attention to the role of females in natural and sexual selection. As she writes: "With great wealth of detail, he [Darwin] has illustrated his theory of how the male has probably acquired additional masculine characters; but he seems never to have thought of looking to see whether or not the females had developed equivalent feminine characters" (1875:16). She knows that, as a woman, she will be considered presumptuous for criticizing evolutionary theory, but she sees no alternative: "Only a woman can approach the subject from a feminine standpoint; and there are none but beginners among us in this class of investigations. However great the disadvantages under which we are placed, these will never be lessened by waiting" (1875:22).

Blackwell thus identifies Darwin's limited perspective as a male observer as one of the main problems of the theory of sexual selection. For all male secondary sexual characteristics that Darwin describes, there are equally important corresponding traits in females, she stresses. The more complex an organism, the greater the division of labor between the sexes. The net effect of the complementations, however, leads to sexual equality.

Her view of the sexes was, as was Darwin's, influenced by Victorian values, but it was less superficial than his when it came to women. As Blackwell sees it, the greater sexual passion, aggression, and constructive intellect of the male is balanced, among others, by the deeper parental and conjugal affection of the female and by her higher intellectual insight and greater facility in coping with details. She does not doubt the correctness of her inference that sexual equality is inherent in evolution. The precise character of these complementary male and female characteristics is, however, advanced more as a hypothesis. As she says, the facts need careful investigation. "Let science investigate the whole subject quantitatively. It may be found, process for process, in detail and in totality, that the average woman is equal to the average man. By all means let the sexes be studied mathematically" (1875:111).

Blackwell thus writes in a scientific spirit, thinking logically, weighing the evidence. Although part of her ideas turn out to be ill-founded, such as her Lamarckian-Spencerian belief in the progress of evolution, her reasoning was methodologically sound. It is a great pity, therefore, that her critique was not heard and that, as Hrdy writes, "[h]er contribution to evolutionary biology can be summed up with one phrase: the road not taken" (1999a:13). "This turning point," Hrdy says, "over a century ago, left a rift between feminism and evolutionary biology still not mended." The focus in evolutionary theorizing would for long remain mainly on the supposed pivotal role of male-male competition in the evolution of a species, with females coyly safeguarding their fertility until the appropriate male partner arrives and after that being preoccupied with motherhood. Hrdy continues:

Small wonder, then, that audiences sensitized to both the excesses of social Darwinism and conventional sexism have found this emphasis upsetting. Yet evolutionary biology, and its offspring, sociobiology, are not inherently sexist. The proportion of "sexists" among their proponents is probably no greater than the proportion among scientists generally. (Hrdy 1999a:14)

In evolution, Blackwell finds a basis for demanding more freedom for women:

Evolution has given and is still giving to woman an increasing complexity of development which cannot find a legitimate field for the exercise of all its powers within the household. There is a broader, not a higher, life outside, which she is compelled to enter, taking some share also in its responsibilities. (Blackwell 1875:135)

As to the question of the relationship between evolutionary knowledge and politics, it must be clear that *no* direct inference can be made from facts to values, from nature to ethics and politics. The fact that science discovers that something is the case, does not make it good or right. At the same time it seems clear, however, that in order to make wise and efficient political decisions, knowledge of human nature, that is, of human needs and propensities, is indispensable. Indeed, a political ideology is *always* implicitly or explicitly informed by a view of human nature, even if that view holds that it is the nature of humans to have no nature. There is thus an *indirect* link between human nature and politics. As Blackwell was probably the first to show, evolutionary knowledge can be used in a liberating way, to argue for social equality between the sexes.

Reading feminist accounts of Blackwell's critique, however, one is struck - again - by the authors' inability to distinguish between the scientific and the ideological character of a theory. Sue Rosser mentions Blackwell, Wallace, and Darwin himself, as persons raising doubts about some key points of the theory of sexual selection. "Why, then, one wonders, did Darwin insist on the theory so much?" she asks, concluding that it must have been for ideological reasons:

In order to make the differentiation between males and females as strong as possible, the theory of sexual selection is needed. The theory is the agent of differentiation, that which assures an ever-increasing separation between the sexes and their operation in two quite distinct realms that only touch for the purpose of procreation (Rosser 1992:58).

Would Rosser from the resistance against female choice also infer that Darwin insisted on it only for ideological reasons? It is a strange kind of logic to conclude that, because a scientist has troubles with some aspects of his theory, he should reject it, and that if he does not do so, this means that the *whole* theory is an ideological construct. Moreover, since Rosser seems to agree that some of the doubts raised about sexual selection may have hit the point, she seems to imply that there might be a theory that is scientifically *right*. Something can only be wrong measured against things that are right. But how can she know that if she rejects the existing standards of scientificity, as we saw she does in the previous chapter?

Anne Fausto-Sterling's (1997) account is a comparable one. She describes with admiration Blackwell's chiding of Darwin and especially her conclusion that evolution dictates that men should prepare the food. Subsequently she cites Eliza Burt Gamble,

another Victorian female writer who criticized Darwin. Gamble argued that evolution proved female superiority (see below). Fausto-Sterling detects traces of Victorian values in Gamble's work, but for the rest she does not seem to have any trouble with the kind of inferences Blackwell and Gamble make on the basis of evolutionary theory. Although she definitely condemns any sociobiological approach to humans ("the entire process strikes me as misguided at best, socially pernicious at worst," Fausto-Sterling 1997:48), not one word of criticism is uttered when women use the theory to their own purposes. She calls it "tactics" (1997:46).

One wonders how this kind of inconsistency within feminist theorizing can ever be constructive. If a theory is bad science, why not make it better science, instead of rejecting the whole of it as an ideological construct, but still making use of it when it suits one down to the ground?

#### **4.8. Male Scientists on Female Inferiority**

When the American feminist Eliza Burt Gamble published *The Evolution of Woman: An Inquiry into the Dogma of her Inferiority to Man* (1894)<sup>32</sup>, she was one in a long line of Victorian women intellectuals who decried the use of evolutionary theory to argue for female inferiority. Ever since the publication of Darwin's *On the Origin of Species*, evolutionary arguments justifying women's subordination had been circulating. Although Darwin himself barely mentioned human evolution in the *Origin*, and only briefly touched upon the subject of sexual selection, others were quite happy to expand his theories and apply them to the "woman question", in 1895 defined by Helen Watterson as "first, the question as to woman's right to live in the world on the same terms as a man does ... and, second, the question as to woman's competence to do so" (Waterson 1895:796).

When it came to gender many Victorian scientists were unable to think beyond the principle of separate male and female spheres that had emerged in the late eighteenth century although they might hold progressive ideas on other subjects. The Victorian period was a time of "hyperbolic gender difference" (Michie 1999:409), with women and men seen not as part of a continuum, but as polar opposites. The view of man as an essentially competitive being, having to struggle in the amoral world in order to provide for his family, and of woman as an essentially caring, domestic being making home a peaceful place where he can come to rest, led scientists in their theories and in the interpretation of their 'evidence'.

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<sup>32</sup> In 1916 revised as *The Sexes in Science and History*.



When Darwin published his *Origin* in 1859, he did this in a social climate in which the woman question had become a matter of public concern. Property rights for married women, the right to education, and, in the mid-1860s, the franchise, were continuously debated by literate Anglo-American men and women. In this climate, with so much at stake in gender terms, Darwin's pronouncements on sex could hardly be neutrally received. Although the *Origin* does not speak out on humans, it does present the preliminaries of the theory of sexual selection as fully elaborated later in *The Descent of Man* (1871). Sexual selection, the reproductive competition between members of one sex, usually the males, for members of the other sex, leads to increasing gender specialization, Darwin argued. Some of his supporters immediately started teasing out the implications of this theory for human males and females. Unsurprisingly perhaps, they generally tended to interpret it as evidence that women were, indeed, biologically inferior to men. By combining the findings from the new social anthropology with evolutionary theory, they 'demonstrated' that the subordination of women was a hallmark of civilization, since primitive societies were characterized by a near-equality of the sexes. The philosopher Herbert Spencer played an important role in this linking of anthropology and evolutionary theory. In his work *First Principles* (1862) evolution and, hence, increasing gender difference, became a prescription. Feminist claims were misguided, in his view, as they hindered evolution (Erskine 1995).

Many other influential works of the 1860s could be named in the same context. There is Carl Vogt's *Lectures on Man*<sup>33</sup>, which claims that the development of woman's brain is stuck at the level of the child and the "savage", or Thomas Huxley's widely read essay *Emancipation – Black and White* (1865). Huxley ambiguously defends women's right to education because even then, it will still be men who carry the day. Still, and unusually for male scientists in those days, the focus of his essay is much more on the necessity of equal rights for both sexes than on the bar that nature might put to their equality:

We reply, emancipate girls. Recognise the fact that they share the senses, perceptions, feelings, reasoning powers, emotions, of boys, and that the mind of the average girl is less different from that of the average boy, than the mind of one boy is from that of another; so that whatever argument justifies a given education for all boys justifies its application to girls as well. (Huxley 1865:72)

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<sup>33</sup> Translated in English in 1864.

Although agreeing with the conviction of his times that women and “primitive” people had smaller and simpler brains than did white men, Huxley was less sexist and racist than most of his male contemporaries. Set against his Victorian background, we might even call him a feminist.<sup>34</sup>

Darwin was influenced by the work of these and other authors. In the *Descent* he refers, for instance, to Vogt for his claim that women are physiologically and mentally more childlike than men. When writing about sexual selection in humans, he forsakes his usual scientific carefulness, drawing largely on anthropological accounts by fellow Victorians and, just like them, letting prejudice and Victorian values pervade his views. He writes unabashedly that, as a result of sexual selection, man has become superior to woman. Because our prehistoric male ancestors had to compete with rival males and had to hunt, as well as to defend females and children, they have inevitably become stronger and more intelligent than women:

As explained in section 4.7, this bias in Darwin’s sexual selection theory does not imply that the whole of the theory is an ideological, patriarchal construct.<sup>35</sup> First, in proposing the importance of female choice of a sexual partner in many species, Darwin contravened the expectations of his male contemporaries regarding female agency – and, indeed, most of them rejected the idea of sexual selection. “[I]ts valid action has to be proved,” *The Quarterly Review* wrote (Mivart 1871:71). “[W]e cannot refrain from an expression of regret that so vain a parade should have been made of the presumed effects of sexual selection,” *The Athenaeum* countered (Leifchild 1871:277). Secondly, and most importantly, the theory of sexual selection had much more to offer to women than first thought. Since its major revival since the 1970s, and with the correction of male prejudice by (often women) biologists, its refined, modernized version has proven to be very fruitful scientifically, and to be an indispensable theoretical instrument for understanding the ultimate roots of gender difference.

The publication of the *Descent* in turn lent a scientific aura to the large number of studies of the mental and moral differences between men and women that appeared in

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<sup>34</sup> Some feminist authors, such as Evelleen Richards (1983, 1989, 1997) and Rosemary Jann (1994, 1997), have suggested that the main aim of Huxley and the other new Darwinian theorists was to justify the status quo. Whereas ideological assumptions undeniably pervaded evolutionary thought, these authors probably underestimate the deep drive for knowledge and the genuine concern for their fellow beings underpinning the thought and actions of at least some of the male scientists in question, Darwin on top.

<sup>35</sup> I agree here with George Levine, who criticizes “the all too common assumption [by cultural critics] that Darwin’s implication in the values and ideals of his own culture somehow closed off the possibility that his work extends beyond the limits of that culture to make genuine discoveries” (2003:38). As Levine rightly says, after having read Darwin’s work, his letters and his notebooks, one can only concede that “his highest priority was not to enforce his sexist assumptions or his preferred economic theories but to get it right” (2003:43).

the 1870s and 1880s, such as comparative psychologist George Romanes's essay 'Mental Differences between Men and Women' (1887) and the highly influential book *The Evolution of Sex* (1889) by the Scottish biologists Patrick Geddes and J. Arthur Thomson. The high degree of speculation, the heavy reliance on folk wisdom and the ideological bent of their theories make these and other late-Victorian works on sex differences decidedly unscientific to modern eyes, but, as historian of science Cynthia Russett explains, psychology at that time was still in its infancy, only just beginning to acquire some experimental and clinical grounding (Russett 1989:45). A comment such as that made by Romanes that "it must take many centuries for heredity to produce the missing five ounces of the female brain" was perfectly legitimate to most Victorians.<sup>36</sup>

#### **4.9. Victorian Women Reply**

In the nineteenth century the influence of the social subordination of women seems to have been so strong that it was hard for people to question the premise that a person is so radically determined by his or her sex, and so radically different from the other sex, that women and men necessarily have to occupy separate spheres. Most Victorian women viewed the existing gender roles as entirely natural, as shown, for instance, by the many women who were willing to fight against female suffrage. They argued that women were too ignorant and too weak for that task and insisted, moreover, that getting embroiled in politics would impair women's typically feminine moral sensibilities (Helsing, Sheets, and Veeder 1983).

Those who demanded expanded opportunities for women, such as Florence Nightingale, the British antivivisectionist Frances Power Cobbe, feminist freethinker Harriet Martineau, and the British journalist Eliza Lynn Linton, often viewed this enlarged female role within the confines of the biologically determined female sphere: that of teaching, medicine, and social service (Erskine 1995). Darwin's niece and suffragette Julia Wedgwood took a similar view, asking to give the natural feminine qualities, such as a taste for beauty and a feeling of responsibility for the young, their due respect, because without women men would not be able to learn these qualities (Wedgwood 1889).<sup>37</sup> George Eliot, who was an ardent Darwinian, was concerned with the cultural and intellectual restrictions put on women, but she was not a feminist, and

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<sup>36</sup> Mosedale (1978) provides a detailed discussion of the work of Spencer, Romanes and Geddes and Thomson.

<sup>37</sup> Wedgwood adhered to the (wrong) idea that some mental qualities were transmitted only in the male line and others only in the female line.

her female characters did not reflect her personal life as an independent woman (McSweeney 1991). In her later novels Eliot applied sexual selection theory in her own idiosyncratic way: It is often the women, not the men, who choose their partner, and make their choices. Strong women characters such as Dorothea Brooke in *Middlemarch* and Gwendolen Harleth in *Daniel Deronda* determine the course of their lives even if they make the wrong choice. Eliot wanted to demonstrate that, although governed by the laws of evolution as a species, individual human beings are to some extent unpredictable.

This is a crucial modification of the then predominant essentialist notions about women. By comparison one might look at the views held by Iosefa Ioteyko, a Polish feminist residing in Belgium, some three decades later. Ioteyko made a scathing analysis of the inconsistencies in the evolutionary explanation of presumed female intellectual inferiority as advanced by the Belgian child psychologist Medard Schuyten. The finding of greater intellectual variability in men than in women, for instance – a finding then generally regarded as ‘proof’ that males were the more active element – tells us nothing about the average man’s intellect, Ioteyko argues. Espousing sexual difference, she holds a plea for regarding the sexes as equivalent (de Bont 2002; Ioteyko 1906). In 1862 Clémence Royer, a Frenchwoman living in Geneva, provided the first French translation of the *Origin*, supplying it with a long anticlerical preface and rewriting parts to fit her own ideas – this to Darwin’s great dismay (Browne 2002). Being the major disseminator of Darwinian ideas to a French-speaking audience, she was also highly critical of the male-dominated scientific establishment. “Up until now,” she declared in 1874, “science ... has too often considered woman as an absolutely passive being, without instincts or passions or her own interests; as a purely plastic material capable of taking any form given her without resistance ... Woman is not made like this” (as cited in translation in Harvey 1997:146).<sup>38</sup>

Our apelike ancestry was cunningly played out by feminist women writers to advance their cause. Whereas Henry Rider Haggard’s dazzling and immortal queen Ayesha shrivels into a monkey at the end of *She* (1886) – seemingly entailing the message that, at bottom, feminist demands for power and equality are absurd – monkeys served more undermining purposes in the work of the Spanish Emilia Pardo Bazán and the British Marie Corelli. Through her fiction and her essays Pardo Bazán, the most important woman writer of nineteenth-century Spain, tried to instil a feminist consciousness in her readers. In one of her splendid, surprisingly modern short stories,

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<sup>38</sup> From her paper “Sur la natalité”, a communication read before the Société d’Anthropologie de Paris in 1874.

"Piña" (1890), she uses the behavior of the monkeys Piña and Coco to draw attention to the problem of female abuse, a problem that was rarely addressed in those days. In "The Oldest Story" (1893) she offers a delightful revision of the story of Genesis, suggesting that woman's subordination is not divinely or biologically ordained, but the result of her having been brainwashed into believing that she is inferior (Pardo Bazán 1996). In her essay "Coward Adam" popular writer Marie Corelli scorns men for blaming their own lack of will on women, just as Adam did with Eve when she, unselfish as she was, wanted to share her apple with him. "She *had* thought him a man, – and when he suddenly changes into a monkey, she doesn't understand it" (Corelli 1905:147-8, emphasis in original). But Woman, superior as she is, is now beginning to claim her rights. She should take care not to want to imitate Man, who is but a vain animal who wants to be admired: "Like the peacock, he struts forward and spreads out his glittering tail" (Corelli 1905:172).

#### **4.10. Women Rewriting Darwin**

Most feminists thus seem to have been content to argue that women's qualities were not inferior to men's, just different and complementary, and asked that these qualities should be equally valued in society. Feminists who made evolutionary theory a source of radical liberation for women, were few. The work of Antoinette Brown Blackwell (1825–1921) has been discussed earlier in this chapter. In what follows I will concentrate on the work of three other feminists who reinterpreted the work of Darwin, Spencer, and other evolutionists to more subversive ends. They are Eliza Burt Gamble (1841–1920), Charlotte Perkins Gilman (1860–1935), and Olive Schreiner (1855–1920).<sup>39</sup> It is important to add that these women did not draw on the work of Darwin only. As laid out in section 4.4, evolutionary theory in the late nineteenth century was, to many people, a mixture of the work of Darwin, neo-Lamarckian theories, explaining evolution by the inheritance of acquired characteristics, and the work of Spencer, who was more a Lamarckian than a Darwinian. Spencer also thought that evolution inevitably entails progress and that, therefore, it is our duty not to thwart its course. Those who wanted to apply evolution to social behaviour thus could select from these and other theories the things that appealed to them ideologically.

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<sup>39</sup> All are Americans except Schreiner, who was South-African.

A number of feminists and social radicals, such as Alfred Russel Wallace (1890)<sup>40</sup>, argued that the subjugation of women was thwarting sexual selection, since women were no longer in the position to freely choose their mates, and that therefore the future of humanity was endangered. This was the course taken by Charlotte Perkins Gilman, in her bestseller *Women and Economics* (1898) and in her subsequent *The Home: Its Work and Influence* (1903). Olive Schreiner, a socialist just like Gilman, developed a similar line of argument in *Woman and Labour* (1911), a book that was also widely acclaimed.<sup>41</sup> Both authors emphasized the values of love, altruism, and cooperation in the evolution of our species and both twisted the conventional biological wisdom of their time to their own ends.

Woman, Gilman argued, is the natural worker, because of her motherhood. When man started subjugating her, she could no longer choose her own marriage partner, and hence could no longer do what she had always done: to improve the race by going for the right marriage. Her subjugation was a necessary step in human evolution, however, because it was through this process that man learned to love and to take care of his family. And because of his passion and energy, the race could reach a higher stage in the intellectual and cultural evolution. Now, however, this process has become deleterious, because woman, by being dependent on the male, has been forced to overdevelop her femininity and she has become weak and ignorant as a result. She is in a state of arrested development: being overprotected and shielded from external stimuli, natural selection can no longer act on her:

Man, in supporting woman, has become her economic environment ... [I]n her position of economic dependence in the sex-relation, sex-distinction is with her not only a means of attracting a mate, as with all creatures, but a means of getting her livelihood, as is the case with no other creature under heaven. Because of the economic dependence of the human female on her mate, she is modified to sex to an excessive degree. (Gilman 1898:19-20)

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<sup>40</sup> Although Wallace had always opposed Darwin's theory of sexual selection, in this article he espouses the idea for the first time, but only with regard to humans. The idea of female choice as an agency for evolution settles a difficult problem for him: how to advance the human race without objectionable eugenic measures. A first precondition is socialism. Only then, he argues, will women become truly economically independent and will they be able to exercise free sexual choice. As Wallace feels confident that they will only choose high-quality men, the future of the race is thereby ensured (Fichman 1997).

<sup>41</sup> *Women and Economics* was reprinted seven times in the United States and Britain in the 25 years following its publication. It was translated into seven languages. *Woman and Labour* had two English editions by 1914, was translated into Dutch in 1911, and into German in 1914 (Love 1983).

Under these circumstances, woman can no longer develop the common humanity that she shares with the male. The women's movement, according to Gilman, is an evolutionary sign that the time has come to restore the proper role of women as workers and sexual selectors. In her subsequent *The Home* (1903) she cleverly deconstructs all the myths about traditional home life, showing it to be harmful to both women and men, and holding a passionate plea for the professionalizing of the household, which she considers "savage" (Gilman 1903:85). Only when freed from domestic tasks will women be happy.<sup>42</sup>

Like Gilman, Schreiner argues that it is unnatural for women not to step out in the world to work. Women have always been natural labourers, being the ones who fed and nurtured the race, whereas men fought. But men have robbed them of their ancient domain of social labor, making woman's condition today that of a parasite. Woman is reduced "to the passive exercise of her sex functions alone" (Schreiner 1911:78). It is as a result of not being able to exercise all her human functions that woman is restless and prone to all kinds of ailments, not because she is inherently biologically weak.

Quite rightly Schreiner has come to the conclusion that, when it comes to inherent psychological differences between the sexes, "it is exactly as we approach the sphere of sexual and reproductive activity, with those emotions and instincts connected directly with sex and the reproduction of the race, that a difference does appear" (1911:185). Therefore it is obligatory that women should be able to defend the interests of their sex when it comes to matters of sexuality, such as prostitution and adultery, because men will not do it for them, she says. And, for the sake of humanity, all opportunities should be open to women, because only then can man and woman progress together, as they should.

Whereas many of their contemporaries interpreted nature as sanctioning traditional sex roles, Gilman and Schreiner came to the opposite conclusion. Their arguments drew heavily on the neo-Lamarckian supposition that social change will effect biological change and on other ideas which we now know to be wrong, such as the progressist belief that humans are inevitably advancing toward higher civilization. But what is important is that they taught their public that the evolutionary wisdom of the time did not necessarily imply that feminist aspirations were 'unnatural'.

Less influential was the work of two of their precursors: Antoinette Brown Blackwell (see section 4.7) and Eliza Burt Gamble. Blackwell's *The Sexes Throughout*

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<sup>42</sup> For a good introduction to the social philosophy of Gilman, as well as to its intellectual roots, see Egan 1989; see also Dосkow 1997.

*Nature* is primarily a critique and a deconstruction; it does not really offer a new theory. It is more narrowly aimed at the field of evolutionary biology than the other books considered in this section, and less a work of social philosophy. To be sure, Blackwell, too, makes excursions into the realms of ideology, for example when she says that evolution dictates that men, not women, should prepare the food. And, like the others, she is very Victorian in her tentative description of male and female qualities, women having 'risen above' the 'animal sexual passions' that still predominate in men.

Darwin does not seem to have read this book. And when the second major feminist attack on his theories of female inferiority appeared, *The Evolution of Woman* by Eliza Gamble, in 1894, he had already been dead for twelve years. This book did not cause much of a stir, either. Attempts like these to radicalize sexual selection theory received little attention from feminists and Darwinians alike (Richards 1997). Yet it was the first defence ever of female *superiority* based on Darwinian arguments – probably the reason why it got mixed reviews.<sup>43</sup> In her subversive interpretation of Darwin's sexual selection theory, Gamble argues that his evidence shows the existence of female superiority on all levels of organization. The female, she says, is more stable than the male and has no need for conspicuous and useless ornamentation like the males of so many species. Therefore she has more energy for the development of a higher intelligence and of a more refined physiological and mental structure. It is in her that, thanks to her maternal instincts, the social instinct and the moral sense have originated. The male principle, by contrast, is destructive and egoistic. If women were freed from the unnatural restrictions imposed upon them by men, they would reemerge as the dominant sex, and sexual choice would once again become their prerogative, as it was in prehistoric times.

Historian of science Evelleen Richards has argued that feminists like Blackwell and Gamble were trapped by their belief in science once a biological basis for mental differences between the sexes had been established. The only recourse left to them was to challenge claims about female inferiority, rather than to dispute the innateness of these differences (Richards 1983, 1989, 1997). Whereas it is certainly true that these women (and men) were caught up in a Victorian worldview, and that their views might be called 'biological determinist,' leaving hardly any room for environmental influences, the unarticulated assumptions behind this kind of argument are disputable. Surely the well-established role of culture and socialization in human behavior does

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<sup>43</sup> According to Jann (1997), the reviewers' estimation of the book's scientific merits seem to be directly related to their degree of sympathy with Gamble's conclusions.



not preclude the role of biological factors. Indeed, as we see in this dissertation, the evidence for an interactionist framework is by now overwhelming.

#### **4.11. Darwin and Women's Emancipation**

Darwin very probably would not have been convinced by Gamble's arguments. Yet his views were much more congenial to feminist aspirations than those of many of his contemporaries. Indeed, Darwin was not a typical Victorian patriarch at all. Thus he supported the vote for women, a view which was adamantly opposed by some prominent intellectual women under the leadership of Mary Humphry Ward. He also advocated education for women. "[I]mprove the women (double influence) & mankind must improve," he had written in his notebook in 1838. And when, many years later, women were admitted to the 'Little-Go' and Tripos examinations at Cambridge – albeit that they could not get a degree – he reacted with enthusiasm (Russett 1989:102). Yet, certain presuppositions about women's mental capabilities were probably too deeply ingrained – even for the gentle Darwin – to allow for rebuttal. Moreover, Darwin seems to have been rather conservative in other respects: He opposed contraceptives for fear of female promiscuity, and he liked 'real women': pretty, soft, and caring creatures; he did not long for self-assured intellectual equals (Browne 2002). His interpretation of the overtaking of female sexual choice by men in modern societies as a sign of evolutionary progress also testifies to his male bias.

In short, Darwin succeeded in being a revolutionary *as well as* an old fogy. That evolutionary views of female inferiority became so widespread in late-Victorian society can, however, hardly be written on his account. Scientists, real and phoney, had throughout the century tried to prove the inferiority of the female sex on the basis of so-called scientific observations (lighter brains, the influence of female reproductive organs etc). Darwin's theory merely compounded those viewpoints and was used and abused henceforth by antifeminists to serve their own purpose.

Many feminists would probably stand perplexed at the Australian feminist Elizabeth Wilson's urge that they should "find 12 \$ to buy a copy of *The Origin of Species*, as it may turn out to be one of the most important feminist texts you will read" (Wilson 2002:185). Although an overstatement, it has a certain truth to it. Darwin's theory of evolution is, after all, essentially a theory of becoming, of variation and change, of the constant interaction between an organism and its environment, of the ways in which we are all sites of identity and difference. Darwin might not have meant his theory to be feminist, but neither did he mean it to be antifeminist. He just wanted to

understand the workings of nature. And we, knowing now where he seems to have been wrong or prejudiced, can only try to learn from his insights as well as his mistakes.



## 5. 1930s-1975

Of course there was a decided bias toward concentrating on adult male monkeys: large, active, aggressive animals with helpful identifying scars.

Alison Jolly

Adapted from: Vandermassen, Griet (2004). Sexual Selection: A Tale of Male Bias and Feminist Denial. *European Journal of Women's Studies* 11(1):9-26.

### 5.1. Introduction

After Darwin's death in 1882, interest in his theory of sexual selection plummeted. It would take almost 100 years for the theory to be put to fruitful use again. In the meantime, many important theoretical developments took place within evolutionary biology, turning it into a full-blown science. Its insights were used by ethologists: students of animal social behavior, but not always in the most sophisticated of ways, as we will see – at least not when it came to human behavior.

In this chapter I give an account of the history of evolutionary biology, including primatology, from the 1930s to the period just before the official birth of sociobiology in 1975. Primatology stands out within ethology for its ability to attract many women researchers, as well as for their historical impact in the discipline. As a result some feminists have pronounced it, among others, an example of the transformation that a feminist (or female) perspective can effect within a scientific field. What are the grounds for accepting this view? It is an interesting observation that female primatologists tend to dismiss this kind of analysis, whereas 'outsiders', those who study the process of science, tend to embrace it.

This is, at least, what I found to be the case. Something similar happened with regard to Donna Haraway's 1989 book *Primate Visions*, a nearly 500-page feminist analysis of the history of ideas and practices within primatology, with a focus on how

race, gender, and colonialism have an impact upon the content of scientific theories. Primatologist Linda Fedigan (1997) recounts how her reading some forty reviews of the book revealed that it was almost universally panned by primatologists. They could not concur with the history of the discipline as Haraway portrayed it ("infuriating" was a regularly used adjective). It got the highest praise, however, from historians of science and feminists: They found it brilliant and stunning.

## **5.2. The 1930s and the Rise of Ethology**

In the 1930s the modern synthetic theory of evolution, also called the 'Modern Synthesis,' was forged. It was the first time that evolutionary theory was really coming together, with the integration of Darwinian thought and Mendel's genetics, the rejection of Lamarckian inheritance, and with natural selection reestablished as the major evolutionary process. Darwinian theory was now put on a firmer footing. Ironically, this fusion happened at exactly the time when sociology, anthropology, and the other human sciences were getting rid of evolutionary principles (see next chapter). Through the works of Theodore Dobzhansky, Ernst Mayr, Julian Huxley, George Simpson, John Haldane, Ronald Fisher, and Sewall Wright in the 1920s to 1950s, evolutionary theory gained a solid theoretical foundation and could finally be regarded as a mature science (Laland and Brown 2002).

In the 1930s, the first major discipline around the study of behavior from an evolutionary perspective was formed: the field of ethology, the study of animal behavior from an evolutionary perspective (from the Greek *ethos*, meaning character). Darwin, after all, envisioned his theory of natural selection as being just as applicable to behavior as to physical structures. That behavior is not exempt from the sculpting hand of evolution is suggested by the observation that all behavior requires underlying physical structures and that species can be bred for certain behavioral characteristics using the principle of selection. Based on their knowledge of the natural history of animals, ethologists examined behavior patterns characteristic of one species and not of another. The idea was that behavioral similarities and differences between species could be used in the same way as physical characteristics to trace common ancestry and reconstruct the evolutionary past. Konrad Lorenz and Niko Tinbergen pioneered this approach to the study of behavior. Its method typically consisted of an extensive period of observation of an animal in its native environment, followed by a description of the stereotypical behavior patterns for that species. These patterns were assumed to be the product of instincts: inherent and innate dispositions. In 1963 Tinbergen

formulated the 'four questions of biology,' questions that he believed should be asked about any behavior if we want to fully understand it. These are: causation (what are the stimuli that originate the behavior?), ontogeny (how does the behavior develop with age?), function (what is its survival value?), and phylogeny (what is the evolutionary history of the behavior?). The first two questions study proximate or direct mechanisms of behavior, the other two ultimate or evolutionary mechanisms of behavior (Buss 1999; Laland and Brown 2002).

One of the first phenomena documented in this new branch of evolutionary biology was imprinting. Ducklings form an association with the first moving object they observe in life - usually the mother - and follow it wherever it goes. Imprinting is clearly a preprogrammed form of learning and part of the evolved structures of the duckling's biology. Proximate mechanisms here are, for instance, the movement of the mother and the events during the duckling's lifetime that cause changes. The ultimate function or adaptive value of behavior is to keep the baby duck close to the mother, which helps it to survive (Buss 1999).

Ethologists, however, often did not go very far in explaining behavior. They still tended to describe observable behavior rather than to look for the underlying mechanisms responsible for generating it, and they did not develop rigorous criteria for discovering adaptations (Buss 1999). They also made the mistake of thinking that natural selection operated for the good of the species (see section 5.5) Important critiques leveled at ethology at the time were that the developmental environment is as essential as genes, and that its practitioners neglected individual variation (Laland and Brown 2002).

As we saw in chapter 2, at that time the study of animal behavior was also still very male biased: The focus was on male dominance hierarchies, which were supposed to be the basis of social organization. Females were not considered very interesting. Now that we know more about the reception of Darwin's theory of sexual selection, it should be easier to understand why females escaped the attention of (male) ethologists: After Darwin's death, female agency had been removed from 'the mask of theory.' Neither should it surprise us that it was mainly through the work of women *primatologists* that this bias was finally corrected in the 1970s. As indicated in chapter 2, primates seem to be the only nonhuman animals that generate so much empathy on the part of the investigator that he or she starts to focus on his or her own sex. With the rise of women in primatology, some major theoretical changes were thus more to be expected than, say, with the rise of women in entomology (see below).

### 5.3. Human Ethology

Ethologists did not stop at animal behavior; some of them addressed human behavior as well. Iranaus Eibl-Eibesfeld traveled round the world photographing facial expressions of people from different races, including aboriginal people with little previous contact with the outside world. In the States, Paul Ekman did the same. Both men concluded that facial expressions represent the same feelings all over the world – thus refuting some anthropologists' claims that facial expressions are culturally determined. Human ethology did not always proceed in a scientifically adequate manner, however. Lorenz's views on human behavior, for instance, were tarnished by Nazi politics. In the early 1940s he wrote scientific papers that are commonly interpreted as supporting the Nazi ideal of racial purity and selecting out of 'degenerate elements' in society. Many years later he confessed that he had been politically naive. His 1963 book *On Aggression* caused a considerable uproar among intellectuals and social scientists, because he argued that fighting and war are the natural expression of human instinctive aggression. According to his theory of instincts, this aggression inevitably manifests itself, unless we channel it, and it will be discharged spontaneously and without reason (Laland and Brown 2002).

Other 1960s books on human ethology suffered from similar problems of oversimplification, combined with loose, teleological thinking. The best-known is Desmond Morris's *The Naked Ape* (1967), that was to become a huge bestseller. Morris's basic premise was that humans have evolved as typical primates that had turned to hunting. This heritage as hunting apes still shines through in everything we do, he argued. The book is filled not only with unsupported evolutionary explanations of many aspects of our social behavior, such as sex, parenting, and aggression, but also with pieces of advice based on the biological 'truths' that he described. He warned that if women take on masculine traits, they risk making their sons homosexual, for instance. Many fellow ethologists, such as Lorenz, did not approve of Morris's book. One of the comments was that he treated human behavior as if culture did not matter (Laland and Brown 2002).

Other popular books in this genre include Robert Ardrey's *The Territorial Imperative* (1966), Lionel Tiger's *Men in Groups* (1969), and Lionel Tiger and Robin Fox's *The Imperial Animal* (1971). Ardrey described the widespread occurrence of territoriality in nonhuman animals, proposing that this showed how territoriality was an instinct humans have inherited from an extinct territorial animal. This evolutionary heritage accounts for our interest in owning property and for the zealotry with

which nations are willing go to war over disputed territory, he stated. Few biologists took Ardrey seriously, because many animal species are *not* territorial, so there is nothing universally imperative about the trait. Why, then, should our ancestor have possessed it? This was obviously a case of selecting the species whose behavior fits the theorist's preconceptions. Moreover, it was clear that the territorial behavior of human groups shows an enormous variability, thus demonstrating that our so-called territoriality is remarkably different from the rigid, aggressive territoriality that Ardrey found in other species (Alcock 2001).

Kevin Laland and Gillian Brown (2002) conclude that, with hindsight, books like *The Naked Ape* are in the tradition of those of Darwin's contemporaries who used evolutionary arguments to convince the reader of what is 'right,' 'natural,' or 'inevitable.' From the beginning, some have tried to put evolutionary arguments to the use of their ideological convictions, while many others have been much more cautious and scientifically correct and have objected to the more excessive claims, suggesting that prejudice is what lies behind them.

One of the problems with human ethology was that its adherents clung to the notion of group selection. When in 1973 Lorenz, Tinbergen, and Max Von Frisch were awarded the Nobel Prize for Physiology or Medicine, the field of ethology was starting to be overshadowed by a new approach that brought with it novel (and in some respects better) methods and insights: sociobiology (see chapter 7).

#### **5.4. Women in Primatology**

Because of the important role of women in primatology, the field is often singled out for praise by feminists, and sometimes interpreted as a feminist science (Fox Keller 1982; Rosser 1992; Segal 1999). This observation elicits the following remark from primatologist Linda Fedigan: "What strikes me as curious ... is the possibility that theirs is an unrequited love affair, because there are so few primatologists who acknowledge that they are feminists or admire, much less pursue, feminist goals" (Fedigan 1997:58).

Is primatology a feminist science? In an article by the same name, Fedigan (1997) ponders this question. As we saw in chapter 3, however, feminist science, if it is really science, is just traditional science done by feminists, and thus the appellation 'feminist' is superfluous.

A better question would be: How much did feminism have to do with this transformation in primatology (and, as a consequence, in sociobiology)? The answer



is: a lot, but mainly in an *indirect* way. The primary impact of feminism was that it led to more women studying and contributing to biology. Feminism also led to a world in which men were faced with women who took control of their own lives. As a consequence, 'female choice' did not seem so strange anymore (Miller 2000b). The result of more women entering the field was a widening of the theoretical framework to include female interests and strategies. With the entrance of women researchers this change was to be expected, since in the field of primatology gender is intrinsic to the subject being studied. Feminism as such seems to play only a minor role on this level.

Darwinian feminist Sarah Hrdy sees it as follows:

Feminism was part of the story, but not because women primatologists and biologists had different sensibilities than male scientists, or because feminists do science differently. Rather, women fieldworkers were predisposed to pay more attention when females behaved in "unexpected" ways. When, say, a female lemur or bonobo dominated a male, or a female langur left her group to solicit strange males, a woman fieldworker might be more likely to follow, watch, and wonder than to dismiss such behavior as a fluke. Women were also more likely to have been affected by feminist ideas. My own interest in maternal strategies grew directly out of an emphatic identification with my study subjects ... women scientists were less likely than male scientists to identify with authority and with the scientific status quo. Women fieldworkers ... may have been more willing to entertain unorthodox ideas about sex roles ... But feminism per se had little to do with the conclusions I reached. (Hrdy 1999a:xviii-xix)

She concurs with the view that feminist science does not exist when she says:

A few have gone so far as to ask whether the incorporation of "the female perspective" into evolutionary biology should be read as a 'triumph' for science or for feminists. I think such questions are mischievous. The answer is so obvious: any time wrong ideas are corrected, science wins. If biases were there in the first place because of sexism, and a feminist perspective helped us to identify them, it is still science that comes out ahead when they are corrected. (1999a:xix)

What kind of conclusion does Fedigan reach? She is in doubt. She points out that the nearly equal proportions of women and men primatologists are not particularly striking from the perspective of the behavioral sciences, such as anthropology and psychology. Yet it does seem, she continues, that women have been more responsible

than men for developing our present model of the female primate, which stresses female sexual assertiveness, female bonding, female competition, and female social strategies. Primatology has shown itself to be very responsive to criticisms of androcentric language and interpretations, and quite willing to redress the past focus on male behavior with a present focus on both sexes and on the relationship between the sexes. "If this is a feminist transformation, then it has happened in primatology" (1997:67).

Fedigan thinks we should give credit to the feminist critique for drawing our attention to androcentric bias in science. She is, however, not sure that it is really due to feminist ideology that we have come to a better understanding of female primates. The patient observation needed to study these complex, long-lived animals in the wild, for instance - a practice that was uncommon in the early years of ethology - leads to a very different attitude than that developed when studying short-lived creatures in the laboratory. Fieldwork has made clear that many primate societies are female bonded, something that may facilitate a strong focus on females. She concludes:

[S]ome of the trends in primatology that have been identified in this chapter, such as the development of a female as well as male perspective, and the move from reductionism and dualisms to increasingly complex, sophisticated explanatory models, could arguably result from the processes intrinsic to the maturation of all scientific disciplines. It is possible that any new science would go through initial stages of being relatively mechanistic and making simplifying assumptions. As the science matures, it would be expected to graduate to sophisticated models that are more complex, dynamic, and multi-factorial. Thus, the goals of those who try to develop a better, more mature science of primatology may sometimes dovetail with the goals of those aspiring to a feminist science. (Fedigan 1997:70)

In looking back upon primatology in the 1960s, primatologist Alison Jolly (2000) concludes that there was a bias, but that it was a subtle one. It was not a proclamation of male primates being more important than females; they were just much more visible and, hence, easier to study. Jolly remembers there being a wide spectrum of views, with basically people reporting as much as they could see - it was all very new to them. Although it was obviously men who held power in primatology then, many of them, such as Richard Leakey, Sherwood Washburn, and Robert Hinde, are famous for their sponsorship of women, and women, although by no means represented equally, were already present. Jolly thinks that the shift toward a female-centered primatology was much more a shift in gender consciousness than in actual content: the emergence

of a - sometimes tough-minded - view of females as having their own agendas. What she thinks of as perhaps a more profound shift is the gradual scientific acceptance of animal individuality and animal consciousness. Jane Goodall had to fight to keep the names of individual chimpanzees in her first scientific monograph, but this has changed. The study of animal awareness has become scientifically respectable, due to the contributions of female *and* male primatologists. "It does not seem to me that we have swung *dramatically*, as sometimes believed, toward a female-centered science," Jolly concludes (2000:80, emphasis added).

### **5.5. The 1960s and Inclusive Fitness Theory**

Inclusive fitness theory or kin selection theory was formulated by evolutionary biologist William Hamilton in the early 1960s. The theory transformed the entire field of biology. In essence it meant a change from an organism-centered view to a gene's-eye view. Classical Darwinian explanations, before the 1960s, focused on survival and reproduction from the point of view of the individual organism or the group. That was the level at which natural selection works, it was thought. Modern Darwinian theory is about 'selfish' genes, as Richard Dawkins (1976) famously called them. In practice, however, natural selection at the level of genes often means the same as 'at the level of the organism', since a successful strategy of a selfish gene is very likely to promote the survival and reproduction of the organism that houses the gene (Cronin 1991).

Hamilton reasoned that natural selection favors characteristics that cause an organism's genes to be passed on, *regardless of whether its offspring is produced directly*. An organism's genes are also housed by its genetic relatives: It is genetically related by 50 percent to its brothers and sisters, by 25 percent to its grandparents and grandchildren, by 12.5 percent to its first cousins, and so on. Not only is its fitness thus enhanced by producing offspring directly; it can also increase the reproduction of its genes by helping relatives to survive and reproduce. Hamilton called the sum of both kinds of reproductive success 'inclusive fitness'. Adaptations, which may be defined as evolved solutions to a specific problem of survival or reproduction, arise by this process. Genes that have effects that increase their reproductive success will replace other genes, producing evolution over time (Buss 1999).

Genes, of course, are not really selfish; they have no consciousness or intentionality. It is just a metaphor Dawkins thought fitting. The gene's-eye view now predominates in evolutionary biology and has been a stunning success. It is finding answers to questions such as how life arose, why there are cells, why there are bodies,

why there is sex, why animals interact socially, and why there is communication. It has become indispensable to researchers in animal behavior (Pinker 1997).

### **5.6. The 1970s and Parental Investment Theory**

Evolutionary biologist Robert Trivers is famous for a number of seminal papers, but the one most of interest to us here is "Parental Investment and Sexual Selection" (1972). By clarifying the relationship between Darwin's theory of sexual selection and parental care, Trivers succeeded in solving the problem of why females typically had evolved to be more choosy than males. The article brought female choice back to the foreground.

Part of the answer is anisogamy, from the Greek *aniso* (meaning unequal) plus *gametes* (eggs and sperm): gametes differing in size. As said earlier, the female is, by definition, the sex that produces the larger gamete. In the late 1940s, laboratory experiments revealed the relevance of this gamete dimorphism to sexual selection. Biologist Angus Bateman showed that a male fruitfly's fitness (defined here as the number of healthy offspring) rose in an approximately linear way along with the number of females he mated with, whereas a female gained little by copulating more than once. This asymmetry, he concluded, is caused by the limited egg production capacity of the female (Trivers 1972).

Trivers expanded Bateman's work. One consequence of eggs being larger and much more nutritious than sperm is that in cases in which internal fertilization has evolved - as it has done many times independently - it almost invariably occurs within the female. This in turn sets the stage for the evolution of mammalian pregnancy and lactation. Thus the reproduction of a female mammal is not limited merely by her egg production capacity, but also by the time and energy devoted to pregnancy and lactation. In taxa such as mammals, females make, as Trivers called it, a greater parental investment in each individual offspring than males, defining parental investment as "any investment by the parent in an individual offspring that increases the offspring's chance of surviving (and hence reproductive success) at the cost of the parent's ability to invest in other offspring" (Trivers 1972:139). The minimal cost of successful reproduction for a female mammal is thus a large investment of time and energy in pregnancy and lactation. The male, however, often invests nothing more than some sperm. He can garner the same fitness for no more parental investment than the cost of a copulation.

Before continuing, it is important to note that no conscious intent is implied on the part of the animals described, as it never is within evolutionary discourse. The point is

that behavioral strategies that increase an organism's fitness relative to others will spread through the population and become evolutionarily successful.

Various sex differences in sexual behavior follow from the asymmetry in initial parental investment, Trivers showed. For males more than females, reproductive success is limited by the number of fertile partners they mate with. For females more than males, on the other hand, reproductive success is limited by the time and energy required to successfully raise offspring. Males therefore are usually more eager than females to mate at any time with any partner who may be fertile, whereas females are usually more careful than males to choose mates who seem likely to provide good genes, protection, parental care, or resources. This basic asymmetry sets the stage for the evolution of male exploitation of the female's reproductive efforts, since the male can disappear after conception in order to fertilize other females (Trivers 1972). Again, no conscious strategizing is implied.

Since females are relatively more choosy, males will compete with same-sex rivals for mating opportunities. Resulting male adaptations include not only weaponry such as antlers, but also other physical and behavioral traits that advertise the male's genetic quality. Indeed, conspicuous secondary sexual characteristics such as an elaborate tail or bright colors have been found to be markers of genetic quality in animals, just as symmetry has been found to be such a marker in human and nonhuman animals. The reason is that factors such as harmful genetic mutations, parasites, and a lack of food inhibit the normal development of an organism. By being symmetrically built and by displaying conspicuous characteristics, the male animal demonstrates to the female that he is healthy, so healthy that he can afford this kind of costly characteristics (Etcoff 1999). Female taste can thus be explained adaptively, which means that, ultimately, sexual selection falls within the scope of natural selection. It is because of natural selection that sexual selection acts the way it does.

Although Trivers reintroduced female choice in evolutionary theory, he did not entirely escape the androcentric views of his time. The 'mixed reproductive strategy' that he proposed for socially monogamous species (forming a pair bond but having extra-pair copulations as well) was supposed to apply only to males, because females were not thought to benefit much from being promiscuous. Only in the last few decades have the benefits of female promiscuity been established (see chapter 8).

Thus the pieces of the puzzle of natural and sexual selection seem to come together. One final question remains. What is the evidence that the principle of anisogamy - the suggestion that the production of eggs is energetically costly and that

of sperm is cheap - is right? This is an important point, since in evolutionary biology anisogamy is the basis for explaining all other differences between the sexes.

### **5.7. Costly Eggs and Cheap Sperm: But Is It True?**

In feminist literature we frequently find the principle of anisogamy questioned (Fausto-Sterling 1992, 1995; Hubbard 1990; Snowdon 1997; Tang-Martinez 1997). There is, of course, nothing wrong with questioning the interpretation of earlier scientific research; that is the way science makes progress. So let us have a look at what the critics say.

To recapitulate: The principle of anisogamy holds that eggs are very costly to produce, since they are large in size and contain large amounts of expensive nutrients, such as yolk. Sperm, on the other hand, are considered to be cheap, since they are tiny, compared to eggs, and generally are nothing more than a packet of chromosomes without nutrients. This concept of unequal investment, called 'Bateman's principle', was expanded by Trivers in 1972 to include a parent's entire investment in its offspring - including gestation, feeding, and protection. As a result, Trivers argued, females have evolved to be discriminating in selecting mates, whereas males have evolved to be relatively indiscriminating. This process in turn governs the operation of sexual selection (Trivers 1972).

"This premise," Zuleyma Tang-Martinez writes in reference to Bateman's principle, "has achieved dogmatic proportions in biology" (1997:129). She thinks it is wrong, arguing, as do Fausto-Sterling (1992), Charles Snowdon (1997), and Ruth Hubbard (1990), that one should compare the cost of one egg to the cost not of one sperm, but of one ejaculate, which contains *millions* of sperm. This sounds, indeed, like a very reasonable critique. Furthermore, as she points out, the costs incurred by males that must defend territories in order to mate and that engage in active combat prior to mating must be enormous. This, again, sounds plausible. She continues:

The preponderance of the evidence at present suggests that a major tenet of modern evolutionary and sociobiological theory - namely, costly eggs and cheap sperm - has been based on what appear to be invalid and unwarranted assumptions. Scientists influenced by the sexual dynamics (coy females; sexually aggressive males) of modern, Euro-American societies apparently could not imagine that females in other species (and cultures) might behave differently. They, therefore, erected a theoretical framework (costly eggs and cheap sperm) to rationalize their biases. (Tang-Martinez 1997:130-131)

Now this interpretation seems rather rash. If it were true that evolutionary biologists only wanted to "rationalize their biases," then how can we explain that the principle of anisogamy still persists, despite the fact that the sexual assertiveness of females is now recognized as real by most evolutionary scientists (Birkhead 2000; Buss 1999, 2003; Cronin 1991; Gowaty 1997b, 2003; Hrdy 1999a, 1999b; Mealey 2000; Miller 2000b; Pinker 1997; Smuts 1995, 1996; Zuk 2002) and, certainly, despite the fact that some of these scientists are ardent feminists? Hrdy, for instance, writes about the critiques:

Such objections are valid in that the theory of anisogamy has been used too deterministically and without adequate consideration of such important exceptions as those species of cockroaches and butterflies where male sperm is accompanied by various nutrients in addition to the genetic material, or the many birds and mammals where male care is essential to survival of offspring. Nevertheless, critics of the theory of anisogamy often suffer from an unrealistic assessment of just how difficult it is in the natural world to obtain the resources necessary to reproduce ... At their most extreme, I have heard such critics downplay as "trivial" the energetic costs of egg production, gestation, and even lactation. Such criticisms assume an infinite resource base and are not pertinent to mammalian evolution. (Hrdy 1999a:205-206)

Thus on Hrdy's account the critics were right in pointing out that the theory had to be applied in a more nuanced way, but this does not at all mean that the principle of anisogamy has become invalid. Hrdy wrote this originally, however, in 1981. Maybe the preponderance of the evidence really suggested otherwise in 1997? Fausto-Sterling definitely seems to think so when she writes that her critique has "turned out to be right on target," adding: "Few things have pleased me more than to see my and Hubbard's early prediction that there was something wrong with the anisogamy argument born out" (Fausto-Sterling 1995:172).

In saying this, Fausto-Sterling refers to Darwinian feminist Lorette Liesen (1995a), who acknowledges that studies of primates and of the hermaphrodite worm *Caenorhabditis elegans* challenge the idea that male sperm is cheap and unlimited. Early descriptions failed to emphasize that this judgment is true only in comparison to female eggs, Liesen says. Indeed, behavioral ecologist Tim Birkhead (2000) concedes that for the majority of species we have absolutely no idea how much energy is needed for sperm formation. Studies suggest, he says, that the cost is not trivial, and that it may at least be equivalent to the costs of courting, copulating, and fighting rivals.

Does this observation, however, warrant Fausto-Sterling's conclusion? It seems not. As Hrdy stresses with regard to humans – but the argument seems to hold for mammals in general - “[w]hat is costly ... is not the egg, or even the conceptus, but the *nurturing* it takes to rear a human being” (Hrdy 1999b:423, emphasis in original). The anisogamy argument is not only about costly eggs, but also about the time and energy devoted to pregnancy and lactation. When all costs for both sexes are thus adduced, the asymmetry in investment seems to remain. The conclusion thus remains valid that females devote more of their total reproductive effort to parental effort, while males devote more of it to mating effort.

What are the indications that the theory of anisogamy is right on target, albeit that there might be many complexities to it that were not immediately recognized? First, it has been very successful in predicting the degree of sexual differences across animal species (Buss 1999). It obtains its strongest support, however, from the existence of a few species that exhibit ‘sexual role reversal’. Although this may at first seem like counterevidence, it in fact emphatically *confirms* the theory. Exceptions, after all, test the rule.

Trivers's theory of parental investment and sexual selection, as based on the principle of anisogamy, made two profound predictions. First, individuals of the sex whose typical parental investment is greatest (usually, but not always, the females) will be more discriminating or selective about mating. Second, individuals of the sex investing less in offspring will compete among themselves for sexual access to the high investing sex (Trivers 1972).

There exist animal species where males intrinsically invest more than females, because the males are the ones delivering the nutrients or hatching the eggs. In these species we see the males being discriminating about mating, and the females competing with each other for access to males. This is the case with, among others, Mormon crickets, phalaropes, some species of pipefish, and Panamanian poison arrow frogs. These are species in which males provide more parental effort than females. The male Mormon cricket produces a large spermatophore (a capsulized mass of sperm) that is very nutritious and that may amount to 30 percent of his weight. In high-density areas, where food is relatively scarce, large spermatophores become extremely valuable to the female, but simultaneously become difficult for the male to produce, because they require extensive food consumption. As a result females aggressively compete with each other for access to the males holding the largest spermatophores. Females are larger than males, and males are discriminating. The females that are accepted for depositing their spermatophore contain 60 percent more eggs than



females who are rejected. In low-density areas, where food is relatively abundant, many males are able to produce spermatophores. Under these conditions, female-female aggression and male choosiness disappear (Trivers 1985).

The group of shore birds known as phalaropes (sea snipes) is another example of a sex-reversed species. Here the males incubate the eggs and care for the chicks for several weeks; females invest nothing in their offspring after their eggs are laid. Females compete for males and males choose between females. Females are larger and more aggressive than males and have a brighter plumage. The evolutionary rationale for this pattern is that females have a potentially higher reproduction rate than males. Due to high nest predation, they have been selected to lay replacement clutches. They can produce a clutch of eggs each week, whereas the incubation time for males is close to three weeks. It therefore benefits the female reproductively to leave in search of another male once her clutch is laid, and she typically does. Males breed only once per season, whereas some females succeed in polyandrous matings (they have to find a male who lost his clutch or failed to pair). As the variance in reproductive success is higher in females than in males, sexual selection operates more strongly on them. In the Panamanian poison-arrow frog, females lay a clutch of eggs every five to ten days, while males care for each clutch for ten to thirteen days and then carry the tadpoles to standing water. Females are more vigorous in courtship and have been seen chasing males (Trivers 1985).

The seahorse-pipefish family (Syngnathidae) presents something of a puzzle. In seahorses the female transfers her eggs into the male's pouch, after which he releases his sperm and fertilizes the eggs. His pouch thus becomes the brood chamber for as many as 1,500 seafoals. In their relatives, the pipefishes, females stick their eggs to or in the male's abdomen, where they get fertilized. Despite ubiquitous male pregnancy – and, hence, high paternal investment – in these species, mating patterns and sex roles differ greatly. Some pipefishes are strongly polyandrous, with complete sex role reversal and females being larger and more ornamented than males, whereas others are polygynandrous (both sexes have more than one sex partner during a breeding season), and one or two have been observed to be socially monogamous. In contrast to this diversity, all of the existing fifty-some seahorse species exhibit social monogamy, as far as we know. Recently it has been found that they are not always genetically monogamous, but this may be out of necessity rather than choice (e.g., if one's mate has disappeared). The possible advantages of monogamy for both sexes appear to be twofold: Monogamous pairs have a shorter interbrood interval than the

few polygamous pairs that have been observed, and a pair's capacity to produce offspring increases the longer they have been together (Kvarnemo et al. 2000).

This observation may provide the answer to the question why seahorses are not polyandrous, as many scientists expected them to be due to the effort males put in parental care. It does not preclude the possibility, however, that there may be behavioral differences between the sexes. Frustratingly, the sources that I consulted contain inconsistent information on male and female behavior. According to Robert Trivers (1985), several seahorse species have been studied in the laboratory. Courtship was found to be mutual in these species, but more active on the part of females, and females were more brightly colored than males (coloration correlates with motivation to breed). Trivers also mentions two field studies showing that females typically contain more eggs than males carry within their brood pouches, suggesting that female reproductive success is limited by access to male pouches and, hence, indicating a potential for polyandry. Trivers concludes: "In summary, in the Syngnathidae, male parental investment is unusually high and may be higher than female parental investment. In turn, females compete with each other for access to males, are more vigorous in courtship, and are more brightly colored" (1985:216-7). This would fit with a sex role reversal interpretation. None of the studies Trivers mentions have been published, however, so it is impossible to check his information. A more recent study (Kvarnemo et al. 2000) states that "behavioural studies of several seahorse species suggest that males are the predominant competitors for mates" (p. 883), implying that there is *no* sex role reversal. The studies may have been about different species of seahorse; we simply do not know. In the Western Australian seahorse, Charlotta Kvarnemo, Glenn Moore, and Adam Jones (in press) found that females are under much stronger sexual selection than males, meaning that there is much greater variability in female mating success than in male mating success. Mated females were larger than unmated ones, whereas mated and unmated males did not differ in size. This appears to be generated by a male preference for large females and by a female biased sex ratio (there are more adult females than males). The finding suggests that they are sex-role reversed in their behavior, too, but the researchers did not collect any data on mating behavior, so we cannot know whether this is the case.

An additional complicating factor is that the evolution of classical polyandry is not well understood (Andersson 2005). In classical polyandry, sex roles are reversed, with a female reproducing with several males, each of whom takes sole care of the offspring. The specific ecological variables giving rise to this mating system are, however, still much-debated. According to zoologist Malte Andersson (2005), the

findings at this moment suggest that its evolution generally takes place in three steps. First, male care for eggs evolves. Regarded as an important precondition by many researchers, it is not a sufficient one for classical polyandry to evolve. Most fishes with sole male care do not have reversed sex roles, for instance. Second, females become able to produce a larger clutch than a male can accommodate. This can happen because of several reasons, such as a shift to a richer habitat during the breeding season. Third, females start competing to lay more than one clutch for different males. The competitively successful females will have more offspring, and their traits will spread over the next generations. Feedback loops may then drive male and female traits further away from their initial state.

In seahorses the first step (male care for eggs) has been taken, but it seems too early to tell whether in some of these species step two has been taken as well. At this moment there are hardly any indications that there are species that have taken step three. According to Andersson, the differences between polyandrous pipefishes and monogamous seahorses may be related to differences in the presence of food (abundance for pipefishes, that live in the North Atlantic, but not for seahorses, that live in more tropical seas) and in water temperature (lower for pipefishes, due to which it takes eggs longer to hatch for males). Added to this is the aforementioned finding of a shorter interval between broods in monogamous seahorse pairs than in mate-switching pairs, which may also favor monogamy. Much is still unknown about seahorses, however. More research is needed.

To conclude, species with sex-role reversal testify to the correctness of Trivers's principle that the sex that invests most in offspring will be the more discriminating one, with only seahorses being, at this moment, an open question. There is no biological law that dictates that it must always be the females who invest more, but in the 4,000 mammalian species and the more than 200 primate species, it is the females, not the males, who undergo internal fertilization and gestation. In more than 95 percent of these species, females can effectively provide all of the parental care and in fact do so. High levels of biparental care are found when food resources are so scarcely distributed that the efforts of both parents are needed to raise the young successfully, as is the case in many bird species (Buss 1999; Geary 1998).

Several research groups are now putting the principle of anisogamy to rigorous tests, in species with sex-role reversal as well as in species with conventional male and female roles. The results so far indicate that the basic principle is sound, but that, as was also suggested earlier, there are intriguing complexities. In fruit fly seminal fluid, for instance, proteins have been found that increase the time that a female waits

before allowing another male to copulate with her. This might indicate that female fruit flies are not holding back from mating out of choosiness, but because they are being manipulated by a male protein (Birkhead 2000; Knight 2002).

Other complications have arisen, such as the discovery of very large sperm (almost six centimeters!) in several species of fruit flies. Still the general conclusion seems to hold that the principle of anisogamy usually leads to male reproduction being primarily limited by access to females and to female reproduction being primarily intrinsically limited and affected by access to resources such as nutrients and nest sites (Birkhead 2000; Gowaty 1997b).

Before proceeding to a consideration of the application of evolutionary theory to the human mind, it might be good to first devote some thought to the biophobia of many feminists. I will do this in the next chapter.



## **6. BIOPHOBIA WITHIN FEMINISM**

To set humans apart from even our closest animal relatives as the one species that is exempt from the influences of biology is to suggest that we do indeed possess a defining 'essence' and that it is defined by our unique and miraculous freedom from biology. The result is an ideological outlook eerily similar to that of religious creationism.

Barbara Ehrenreich and Janet McIntosh

### **6.1. Introduction**

Criticizing feminism is not a risk-free activity. Even dedicated feminists, such as Christina Hoff Sommers and Cathy Young, are accused of 'feminism bashing' whenever they dare to question some of the ruling tenets within academic feminism today. These tenets include a social constructionist view of knowledge, as we saw in chapters 2 and 3, and an extremely environmentalist notion of the 'construction' of sex differences, as we will see in this chapter. References to biology in the explanation of human traits tend to be dismissed as 'reductionist', 'biological determinist' and 'politically dangerous', not only in academic feminism, but also in the social sciences in general.<sup>44</sup>

There are some feminists who stress the human-animal continuity. Some do so because they defend animal rights and want to challenge anthropomorphism, such as the Dutch anthropologist Barbara Noske (1989). Others, such as the American science journalist Natalie Angier in her book *Woman: An Intimate Geography* (1999), believe that we can learn a lot about ourselves from studying our biological heritage, since we are just one species among others. Both Noske and Angier, however, fervently attack the use of evolutionary principles in the study of human behavior and the human mind, as is the case in sociobiology and evolutionary psychology. Noske seems to dismiss this approach out of hand - something that makes her argument about human-animal continuity inconsistent. Angier's line of reasoning is somewhat more consistent. She does not a priori condemn an evolutionary approach of human

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<sup>44</sup> Allen 1997; Bleier 1985; Donovan 2000; Dusek 1998; Fausto-Sterling 1992, 1995, 1997, 2000a, 2000b; French 1992; Gray 1997; Haraway 1991b; Hubbard 1990; Hyde 1996; Nicholson 1994; Rose 1983, 1997, 2000; Rosser 1992; Sapiro 1985; Sunday and Tobach 1985; Talarico 1985; Tang-Martinez 1997.

behavior; she only does so when she considers it male biased. The problem with Angier is that she too often relies on (androcentric) theories that had long been established as inadequate when she wrote the book.

Feminist biophobia has many facets and multiple causes. It will not work to dispose of the feminist critique of sociobiology and evolutionary psychology as merely being antiscience. Although a lot of it probably is, intelligent and stimulating books such as Angier's show us that it need not be so, and that the feminist suspicion of biological arguments about the sexes owes a lot to the tradition of androcentrism in science. This tradition has only been countered with the massive entrance of women in science. That does not mean that, today, male bias has disappeared from the scene. It does mean that whenever it arises, it will be critically analyzed and corrected by women researchers.

Sometimes, alas, it will be replaced by female bias. Christina Hoff Sommers (1994, 2000), Daphne Patai (1998), and Cathy Young (1999) have laid out the poor scientific level of some feminist research, due to its politicized character. Studies about sexual harassment, for instance, are often tailored to fit the preconceived radical feminist scheme of sexual harassment as a patriarchal tool for keeping women in subjection. That leads, among others, to the absence of serious research on the incidence of false accusations against men (Patai 1998). Philosopher Alan Soble (1999) has analyzed some mistakes made by feminist scholars (Ruth Bleier, Ruth Hubbard, Susan Bordo, Sandra Harding, and Rae Langton), mistakes that seem to have been made because the political concerns of these writers led them to ignore their scholarly responsibilities. Misquoting scientists who produce unwelcome data (see also section 6.9), manufacturing evidence for one's own feminist thesis, misconstruing research so that it fits one's political agenda, seeing only what one wants to see and avoiding to look for what one doesn't want to find, plain sloppiness and errors: These are instances of carelessness that no one, I assume (and hope), would defend as good (feminist) scholarship.

Theories devised by women, whether they call themselves feminist or not, and whether they are working within the evolutionary sciences or not, need to be scrutinized as severely as those devised by men. It is my strongest belief that women can only benefit from setting themselves high standards of rationality and scientificity in deciding what research they consider to be reliable, instead of letting themselves be guided by ideological motives. Therefore I am convinced that the feminist biophobia, however understandable it may be, is counterproductive. Not only is it scientifically

untenable, it is even unwelcome when consistently considered from a feminist point of view.

The former argument is also defended by feminist biologist Lynda Birke in her book *Feminism and the Biological Body* (1999), but for entirely different reasons: According to her, feminists need to focus on the body in order to analyze the ways in which physiological concepts are socially and culturally contingent. Birke argues for a nonmechanistic and a more descriptive approach, not only because she thinks mechanism gives a limited understanding of our bodies, but also "for more political reasons, because such a view of biology leads to determinism" (1999:136). "For most feminists, the idea that we are simply passively responding to controlling genes or organ systems, like puppets on strings, is anathema," she says (1999:164-165). But where are the biologists who assert such things? Birke does not do justice to the reigning interactionism in the biological sciences, probably because, to her mind, speaking of limits or constraints to what humans might do equals reductionism and determinism.

## **6.2. Fear of Sex Differences**

In discussing feminist biophobia, I will use the term 'environmentalism' for the predominant view in feminism as well as in the social sciences in general that gender is "created and re-created, in response to specific tasks, roles and changing power relations" (Knapp 1998:368). Although I might also call this view 'social constructionism', confusion may arise with epistemological social constructionism. Therefore I prefer environmentalism.

It is not difficult to find expressions of this environmentalist position on gender; they abound within feminism. A few examples:

Gender is social practice that constantly refers to bodies and what bodies do, it is not social practice reduced to the body ... Gender exists precisely to the extent that biology does not determine the social. It marks one of those points of transition where historical process supersedes biological evolution as the form of change. (Connell 1995:45, emphasis in original)

[B]iology cannot be used to ground claims about "women" or "men" transculturally. (Nicholson 1994:89)



[S]exual identity (and its normative ties with heterosexual desire) is only ever a precarious achievement ... Identities, of whatever sort, are ... generated in social contexts which are nowadays always dynamic and shifting, involving a plurality of signifying practices and competing cultural narratives. (Segal 1999:158)

Gendered characteristics – typically masculine or feminine behaviors, interests, or values – are not innate, not are they arbitrary. They are formed by historical circumstances. (Schiebinger 1999:72)

If the inner truth of gender is a fabrication and if a true gender is a fantasy instituted and inscribed on the surface of bodies, then it seems that genders can be neither true nor false, but are only produced as the truth effects of a discourse of primary and stable identity. (Butler 1990:174)

At the same time, the search for biologically based sex differences is made ideologically suspect. Rosser, for instance, writes: "One can imagine that a society free from inequality between the sexes would not view sex differences research as a valid scientific endeavor" (1992:71-72), by which she suggests that this research is motivated by the wish to sustain socioeconomic inequality between men and women. Similarly, biologist Ruth Hubbard (1990) believes that sex and gender dichotomies are set up as instruments of social control (so does Birke [1999]), and that our preoccupation with sexual matters is responsible for the fact that evolutionary theory is constructed around sex and procreation. Despite her argument to the contrary, however, the focus on the male-female difference seems to be a basic tendency in every human culture (Brown 1991). Humans automatically notice whether someone is male or female, something that is predictable from a Darwinian point of view, since partner choice is an evolutionarily vitally important matter.

Others argue that sex differences should be ignored because of the great deal of overlap between men and women. Fausto-Sterling, for example, thinks that further research into sex differences in cognition is uncalled for: "If there are any differences at all, they are so small that intrasexual variation swamps them" (1992:221).

Biologically based explanations of sex-typical behavior seem to frighten many feminists to death. We will see, however, that the environmentalist theories they put forward to account for behavioral differences between the sexes fail to explain these

differences exhaustively. Before taking a look at these theories, we may ask why, indeed, we should study sex differences at all. Why not just ignore them?

According to neuropsychologist Doreen Kimura (1999), the answer is very simple: Because they are there. Another important reason, Kimura argues, is that discovering the mechanisms for sex differences, such as those in the brain, often helps us understand differences between individuals of the same sex as well. The same applies to studying the relationships between sex-hormone levels and cognitive function. As to the objection that the overlap is more important than the differences, she replies:

It is certainly true that, in the larger context of comparison with other species, the similarities between men and women far outweigh the differences. However, if we were to adopt the criterion of *no overlap* between groups as a requirement for accepting a difference, we would find almost no behavioral data in any field to be acceptable. (Kimura 1999:7, emphasis in original)

She offers the example of the effects of aging on memory. There will, of course, always be overlap in the scores of older and younger people. Yet we infer with some confidence that memory is, on average, not as good in the elderly. Even factors that have dramatic effects, such as damage to the brain, will often show a fair amount of overlap in the performance of those with and without brain damage. So, Kimura wonders, why should sex differences be treated differently from other kinds of data?

From the feminist point of view, the answer is self-evident: out of political motives (Fausto-Sterling 1992, 1997; Hubbard 1988, 1990; Nicholson 1994; Rosser 1992). This reasoning has a certain kind of logic to it. If, as proclaimed by many feminist critics, science always has a political agenda, then there is no reason why one should not try to model that agenda to one's own political ends. We have seen, however, that the existence of bad science or of politically induced scientific practices does not justify the conclusion that science as a collective enterprise is political. Therefore this kind of reasoning is untenable.

It is a frustrating but ineluctable finding that some strands of academic feminism today have lapsed into dogmatism. I realize this is a heavy indictment. It is, however, the most adequate description of the feminist refusal to even consider the possibility that gender has something to do with biology. I am, of course, not the first to point this out. Barbara Ehrenreich and Janet McIntosh, for instance, call "the trend - in anthropology, sociology, cultural studies and other departments across the nation - to dismiss the possibility that there are any biologically based commonalities that cut

across cultural differences" a "new creationism" (1997:11). According to them, it is not simply a case of well-intended politics gone awry; it represents a grave misunderstanding of biology and science generally.

This trend of dismissing or completely ignoring the role of biology in human behavior is not limited to the United States; it extends to Europe as well (e.g., Braidotti 1994; Brouns, Verloo, and Grünell 1995; Halsema and Schreurs 1998; Hermesen 1997; Michielsens et al. 1999; Oldenziel 1994; Orobio de Castro 1994; van Muijlwijk 1998; Verstraten 2004). In what way exactly biology is misunderstood is explained later in this chapter. As to the reluctance to weigh the biological evidence on sex differences, I hand the floor over to Kimura:

It is not only unjustified scientifically to take such a biased view of how behaviors are determined, it is contrary to common sense. The business of science is to find out how the world really works, not how it ought to work according to some wishful schema or other. Scientific explanations change as more information comes in, but at any one point in time a scientific analysis attempts to encompass all relevant facts. In human cognition, this must include data from biologically relevant sources such as hormonal and brain research and studies in nonhuman species. (Kimura 1999:2, emphasis in original)

### **6.3. Intellectual Developments at the Turn of the Nineteenth Century**

Toward the end of the nineteenth century psychology and sociology started to emerge as sciences. The progenitor of sociology, August Comte, advocated the use of evolutionary theory for the study of human society, and early psychologists, such as Wilhelm Wundt, referred to Darwin's theory as well. There was no synthesis, however. Psychologists did not study distal causes of behavior, with the one exception of William James. He believed in the importance of using the concept of adaptation in explaining the existence of certain mental features, like consciousness (Lopreato and Crippen 1999; Plotkin 1997).

This fairly promising start would soon falter. Skepticism about the strength of natural selection and about the application of evolutionary theory to humans caused Darwinian theory to lose much of its force at the turn of the century. The rise of genetics in the first decade of the twentieth century dealt a further serious blow to Darwinian ideas, because it was thought that genetics could replace Darwinism to account for evolutionary change. The conceptual marriage of evolutionary theory and

genetics would only happen later, in the 1930s. At the turn of the century and into its first decade, however, Darwinism seemed to be dying (Plotkin 1997). The turn to radical environmentalism can further be understood as a reaction to the ideological use of biology made by social Darwinists. It was not safe for social scientists to embrace Darwinian theory openly, since it had been tainted (Lopreato and Crippen 1999). The evolutionary connections that had been forged by the early sociologists and by William James were thus soon lost, and would be so for a long time.

Another founder of sociology, Emile Durkheim, set the future course of the discipline in *Rules of the Sociological Method* (1895). Durkheim argued that social phenomena formed an autonomous system and could be explained only by other social phenomena. The founders of anthropology, such as Alfred Kroeber and Franz Boas, were equally united on this point. By separating psychology from biology, the social sciences withdrew from the process of scientific integration that had been unfolding since the Renaissance (Tooby and Cosmides 1992).

#### **6.4. The Rise of Behaviorism**

In psychology behaviorism would come to dominate, especially in the United States. The birth of this school of thought, which destroyed the place of evolutionary thinking in psychology for almost half a century, is usually put at 1913 with the publication of John Watson's article "Psychology as the Behaviorist Views It." Watson rejected any explanation of behavior rooted in unobservable causes, such as mental states or consciousness, which he considered subjective and unmeasurable. Psychology had to confine itself to the study of overt behavior and how it was controlled by external stimuli. To Watson, B. F. Skinner, and the other behaviorists, the causes of behavior were not to be found inside the organism, but in the external world. They assumed that the only innate property of humans was a general ability to learn by association and by reward and punishment. This entailed that any behavior could be shaped as easily as any other merely by reinforcing it. The nature of humans, it was thought, is that they have no nature. They could be conditioned into anything.

The central tenets of behaviorism were challenged for the first time in 1959, when Noam Chomsky wrote a now-famous critical review of Skinner's work on language acquisition. In 1966 John Garcia showed that two fundamental assumptions of behaviorism, equipotentiality and contiguity, were wrong. The equipotentiality assumption holds that any behavior can be shaped as easily as any other, because the rules of learning are independent of the stimuli used. The contiguity assumption holds

that reinforcement will be more powerful if it is linked closely in time and space with the behavior being reinforced. In a series of experiments Garcia gave rats some food, and after a few hours gave them a dose of radiation that made them sick. Despite the time that had elapsed, the rats immediately learned not to eat the seemingly poisonous food anymore. They did not learn to pair the nausea with flashes of light or buzzers, however. Thus rats seem to be preprogrammed by evolution to learn some things spontaneously, but not to learn other things at all (Buss 1999). In 1971 Harry Harlow's experiments with monkeys showed that baby monkeys raised in isolation preferred the comfort of an artificial terry cloth 'mother' to that of a wire mesh mother, although it was the latter one that dispersed food to them. The baby monkeys would go to the wire mesh mother for food, but spent the rest of their time with the terry cloth mother. It became clear that the external environment is not the only determinant of behavior. These and other experiments eventually led to the decline of behaviorism (Buss 1999; Pinker 2002; Plotkin 1997).

### **6.5. Cultural Anthropology: To Tropical Paradises and Back Again**

The dominating assumption in psychology and sociology that humans have no nature seemed to be confirmed by the astonishing cross-cultural variability found by anthropologists. The findings seemed to show that the human mind is indeed a blank slate, almost infinitely malleable, with all psychological phenomena, such as emotions, being social constructions. Perhaps most influential was Margaret Mead, a student of Franz Boas. To most Boasians anthropology and politics were inextricably entwined. If they were able to find cultures free from competition, rape, and murder, then perhaps people would recognize what the Boasians themselves believed to be the case: that our own problems all derived from the evils of capitalism, Western sexual morality, and Western values. According to them, Western capitalism did not write anything positive on the blank slate of the human mind.

In her 1928 bestseller *Coming of Age in Samoa* Mead purported to have discovered a society where stress, competition, problems of puberty, violence, war, rape, sexual jealousy, or sexual proprietariness were unknown. According to her, the Samoans derived their emotional well-being from their living in communes. In *Sex and Temperament in Three Primitive Societies* (1935) she described cultures in which she had found the Western sex roles to be completely reversed. With the Chambri, she said, women were dominant, whereas men were emotionally dependent. The men wore makeup, they painted and danced. With the Arapesh, the men were peaceful

because Arapesh children were educated in a very affectionate way. In a similar vein Ruth Benedict, the second most important Boasian, argued in *Patterns of Culture* (1934) that culture could mold personality in any arbitrary way.

Subsequent researchers found, however, that many of the original reports of these tropical cultures were simply products of wishful thinking. Arapesh men turned out to be violent headhunters, who were dominating their wives. The face paint of Chambri men was not feminine makeup, as Mead supposed, but a sign of honor signaling that they had killed an opponent. The painting of totem poles and the ritual dances in order to inaugurate them were important male activities, with no women allowed. Anthropologist Derek Freeman found Samoa to be a very authoritarian, hierarchical, and patriarchal society, with murder and rape rates higher than those in the United States. Furthermore, the men were intensely sexually jealous. When Freeman presented the results of his forty-year study of Samoa in *Margaret Mead and Samoa: The Making and Unmaking of an Anthropological Myth* (1983), this created a storm of controversy. He was widely criticized by a social science community that had eagerly embraced the findings of cultural anthropologists such as Mead. Subsequent research has, however, confirmed Freeman's findings and, more important, the existence of numerous human universals, such as romantic love, facial expressions, and male sexual jealousy (Brown 1991; Buss 1999; Evans 2001; Torrey 1992).

How is it possible that Mead could have been so misled? For one, due to a lack of time prior to her departure, she did not know the language; Freeman did. She was at Samoa for nine months, staying with white people in a comfortable house; Freeman's visits to the island amounted in total to six years, and he lived among the Samoans themselves. Mead did not consult the then available archives about life at Samoa since the beginning of the nineteenth century. Her informants were adolescent girls, who stated afterward that they had been pulling her leg. Moreover, in her fieldwork Mead was not known for her steady patience, bullying her informants and interpreters. The scientific level of Mead's work and of that of the Boasians was, in short, abominable, and at the end of the sixties it became clear that they had failed collectively. Meanwhile, however, their ideas on human nature, politics, and sexual norms were embraced by the students of that time. Boasian ideas on the nearly limitless malleability of human nature would live on for a while, not because they were scientifically based, but because of their political attractiveness (Brown 1991; Torrey 1992).

That this attractiveness endures is proven by philosopher Val Dusek, who indignantly attacks the "campaign against anthropological relativism" (1998:3) by

pointing to Boas's and Mead's antiracist views and by trying to discredit Freeman as someone who "had many axes to grind and was as committed to sexual repression (including being outraged by the display of human genitals on statues in a public park) as Mead was committed to sexual freedom" (1998:3). Dusek does not mention the confirmation of Freeman's findings by others, nor Mead's obvious scientific shortcomings. Anthropologist Mary Pipher, in her preface to the 2001 edition of *Coming of Age in Samoa*, only writes, misleadingly, that "[s]ophisticated scientists with the benefit of decades of hindsight may pick at Mead's work" (p. xix). But scientists have done much more than to simply "pick" at Mead's work; they have thoroughly refuted it. As for anthropologist Mary Catherine Bateson's comment in her preface to that same 2001 edition, that "[i]n spite of *occasional opportunistic attacks*, [Mead's] colleagues continue to value her visionary and groundbreaking work" (p. xiii, emphasis added): We should probably make allowances for her, as she is Mead's daughter.

#### **6.6. Social Constructionism, Environmentalism, and the Left**

The cultural relativist position seemed to be on the brink of annihilation when its scientific inadequacies were laid bare in the 1960s. However, another new development would come to the aid of cultural relativism: epistemological social constructionism. The view that there is no objective truth and that the scientific method is just a Western, white, male product intended to dominate everything that is 'other' would become very useful for those who saw themselves confronted with scientific findings they were not willing to accept, such as findings on a universal human nature. It is no surprise that environmentalism and epistemological social constructionism often go together, as they tend to do in many strands of feminism.

How did this view come about? According to Stephen Cole (1996) and Ullica Segerstråle (2000), the single most important influence was the 1962 classic book by Thomas Kuhn, *The Structure of Scientific Revolutions*. Kuhn showed that the history of science is not an asymptotic curve of progress toward Truth, but that it consists of long periods of paradigmatic status quo, occasionally interrupted by shifts in the shared worldview, resulting in a new and different way of interpreting nature. The book seemed to give warrant to the view that social consensus determined 'nature' rather than nature determining social consensus - although Kuhn himself, after learning what constructionists made of his theory, rejected this interpretation (Kuhn 1962 [1996]). It

is no surprise that feminists, too, often refer to Kuhn (Rose 1983; Rosser 1992; Segal 1999).

It has for the most part been self-identified left-wing intellectuals who have developed and embraced epistemological social constructionism.<sup>45</sup> This is rather astonishing. Just having a quick look at human history should make it clear that science has dispelled a lot of myths about female nature, race, sexual orientation, and many other human attributes that have long been a basis for discrimination. These developments took place in spite of science's faults. In contrast, it is difficult to see how social constructionism could offer criteria for distinguishing reliable knowledge about our fellow human and nonhuman beings from superstitious beliefs.

Moreover, as Ullica Segerstråle (2000) argues, the link between environmentalism and progressive politics, although seemingly obvious to many, is a historical contingency, not a logical necessity. After all, hereditarian explanations prevailed in academia at the beginning of the twentieth century, and they were used for both conservative and progressive social policy recommendations. She also points out that most leading evolutionary theorists are far from being politically right-winged, thereby citing sociobiologist Pierre van den Berghe, who has said that a review of leading sociobiologists would lend more credence to the contention that sociobiology is a *communist* conspiracy. John Haldane, who is generally credited for having first touched on the notion of kin selection, a theoretical cornerstone of sociobiological theory, was a leading member of the British Communist Party. So was John Maynard Smith. Robert Trivers has been heavily involved in radical black politics, and most other sociobiologists are left-of-center liberals or social democrats.

Still, many eugenicists connected their belief that genes are the crucial determinants of human behavior to a belief in the inequality of mankind. This included the proclaimed inferiority of some ethnic groups, such as Jews and peoples from Eastern Europe, as well as antidemocratic tendencies. Therefore the shift in the 1930s from hereditarianism toward environmentalism in the explanation of social behavior had scientific as well as ideological reasons. Scientifically, there was the (sloppy) work of anthropologist Franz Boas and his students, who promoted the idea of culture over biology. Ideologically, there was the dwindling support for the eugenics movement after reports of escalating Nazi sterilization practices. Scientific racism lost its

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<sup>45</sup> Luckily not all left-wing intellectuals think that way. Noam Chomsky, for instance, thinks it important for political radicals to postulate a relatively fixed human nature in order to be able to struggle for a better society. We need a clear view of human needs in order to know what kind of society we want. He doubts, however, that science will be able to say much about it. According to him, we might rather try to find the answer to human nature in literature (Segerstråle 2000).



respectability (Torrey 1992). These developments led to a dramatic decrease in articles on race and sex differences during the 1930s and 1940s. The final turning point came with the explicit declaration of environmentalism as the politically and intellectually correct approach by UNESCO in 1952. To secure the goal of dissociating science from racism after the horrors of the Second World War, the newly formed UNESCO had commissioned a statement on race by a group composed primarily of Boasian cultural anthropologists. This statement, published in 1950, rejected the idea of race as a scientific concept. It was subsequently reformulated by geneticists, but the argument that race was not a scientific concept remained constant (Rose and Rose 2000b). With the climate in society and academia shifting in favor of environmental explanations, they were taken for granted by a new generation of scholars.

As for social constructionism, Gross and Levitt (1994) offer several possible reasons for the frequent link of this paradigm with a leftist political position. First, it is difficult for opponents of capitalism to leave science exempt from what they regard as capitalism's omnivorous tendencies. Science is, after all, well integrated into the capitalist system. However, as Gross and Levitt object, a more correct view would be that scientists have never been granted as much autonomy of thought and freedom of ideas as today. Second, it cannot be denied that Western science has been plagued by misogyny, racism, class snobbery, and other ideological evils. As the third and most important factor lying at the social and ideological roots of antipathy toward science and its standards of validity, they see the disillusionment with post-Enlightenment humanism. In this they follow George Steiner in his 1971 essay *Bluebeard's Castle*. Whatever may be said in praise of Western civilization, Steiner ponders, its level of cruelty and selfishness has not fallen very much below that in other times and places.<sup>46</sup> In the meantime our weapons have grown unimaginably lethal. Science is sometimes the eager accomplice of atrocities. Thus it should not surprise us that it becomes "an irresistible target for those Western intellectuals whose sense of their own heritage has become an intolerable moral burden," Gross and Levitt assert (1994:220). They point out something crucial:

We are bound to Enlightenment values - the universality of moral principles, the sanctity of individual volition, a detestation of wanton cruelty - and yet we have no choice but to indict the very civilization that begat those values as it goes

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<sup>46</sup> Yet tribal societies tend to have much higher homicide rates than industrialized nations, and in some European countries the homicide rate has declined spectacularly since medieval times. Today an Englishman's risk of being murdered is less than 5 percent of what it would have been in the thirteenth century (Daly and Wilson 1988).

careening through time leaving pain, death, bewilderment, the wreckage of aboriginal tribes and of rain forests in its wake. *But again, the terms of that indictment can be spelled out only in the language of those values.* This, and not the mincing word games of the deconstructionists, is the true aporia. The criminal is also accuser and judge. (Gross and Levitt 1994:218, emphasis added)

It may thus not be possible for us to escape Enlightenment values, just as we cannot escape traditional standards of rationality and logics. Gross and Levitt further link the attempt of many contemporary leftist academics to do just this to the counterculture of the sixties, with its inclination to regard heterodoxy, per se, as intrinsically valuable. A predilection for the unconventional almost always reigns among rebellious spirits, they argue, spying a strong echo of the spirit of the sixties in modern-day challenges to science. Many academics who are most acitively hostile toward science are affiliated with areas of study that first arose during that time, such as women's studies and ethnic studies.<sup>47</sup> In their very origins, however, these subjects were linked as much to the oppositional culture of the sixties as to the formal traditions of research and scholarship. The current phenomenon "has entirely lost its playfulness and now parades as serious scholarship and solemn theory" (Gross and Levitt 1994:223).

Everything we have seen thus far seems to lead us to the conclusion that (1) it is impossible to leave traditional standards of epistemology and ethics *completely* behind, and (2) that people who aspire to do so are basically trying to find convoluted ways of making sure that they reach their political ends, *while this move is not necessary at all in order to get that far.* One need not assume that science is just a contingent social construction in order to condemn its sometimes disastrous effects, or in order to make sure that non-Western peoples' habits and belief systems are respected - that is, inasmuch as these habits and beliefs are not in flagrant contradiction with basic human rights. One need not assume that women and men are the same in order to make sure that they get equal opportunity and are equally treated before the law (although, indeed, it will be a matter of debate what 'equal' in this case means - does it just mean offering them the same opportunities, or does it imply adjusting for women-specific elements such as pregnancy?).

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<sup>47</sup> Feminist biologist Lynda Birke implicitly acknowledges the factors laid out by Gross and Levitt when she writes: "Feminist science groups of the 1970s drew upon insights gained from other political issues; many of us involved, for example, were also engaged in the radical science movement, which had grown up in the late 1960s from the awareness of the part played by science in war and genocide, and global environmental damage" (1999:13).

So we have gone from a fairly promising interdisciplinary start of sociology and psychology at the beginning of the twentieth century to the intellectual isolationism that has become politically correct since the 1950s. Since that time, however, many new developments have laid bare the shortcomings of environmentalism. While we will have a look at these in the next chapter, I focus first on three misconceptions that plague environmentalism: a false dichotomy between nature and nurture, the myth of genetic determinism, and the naturalistic fallacy.

### **6.7. The Nature-Nurture Controversy**

Although the falseness and outdatedness of the dichotomy between nature and nurture has been laid out countless times,<sup>48</sup> the misconception stubbornly persists.

In its simplest form, human behavior is regarded as *either* biologically based *or* culturally constructed, and we have to find out which aspects of behavior are which (Donovan 2000; Nicolson 2000). In a somewhat more sophisticated vein, a neat distinction is made between nature and nurture, with nurture overtaking where nature ends. The key question then becomes: Where does nature end and where does nurture begin (Brouns 1995b)? The accusation of biological or genetic determinism frequently launched at the address of sociobiologists and evolutionary psychologists (e.g., Benton 2000; Coyne 2000; Gray 1997; H. Rose 2000; Rose and Rose 2000b; Scott 2001; Shakespeare and Erickson 2000; Tobach and Reed 2003; Travis 2003a) testifies to this kind of (sometimes willful?) misunderstanding. When one adds the (correct) complication that our perception of nature is always guided by cultural meanings and values, we are getting at the (incorrect) postmodern conclusion that nature, too, is culturally constructed. Sex thus becomes subsumable under gender (Birke 1999; Butler 1990, 2000; Nicholson 1994; Scott 2001).

This latter option is, indeed, one possible way of leaving the nature-nurture dichotomy behind. The problem is that the world does not seem to be constituted like that, as converging evidence from multiple scientific disciplines shows (see next chapter). Moreover, all of the aforementioned views of the relationship between nature and nurture are based on a conception of biology that is fundamentally wrong.

As Margo Wilson, Martin Daly, and Joanna Scheib (1997) point out, many people falsely equate biology with its subdisciplines, such as genetics, endocrinology, and

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<sup>48</sup> E.g., Browne 1998; Buss 1999; Daly and Wilson 1988; Gowaty 1995; Kimura 1999; Liesen 1995b; Lopreato and Crippen 1999; Low 2000; Nelissen 2000; Pinker 1997, 2002; Plotkin 1997; Pratto 1996; Ridley 1999, 2003; Roele 2000; Shermer 2001; Thornhill and Palmer 2000; Tooby and Cosmides 1992; Vandermassen 2005; Vandermassen, Braeckman, & Demoor 2004.

neurology. Moreover they think of biological influences as intrinsic and irremediable. From there it is a short step to seeing these biological influences as the antitheses of extrinsic and remediable social influences.

Strictly speaking, however, biology is the study of the attributes of living things, and since only living things can be social, the study of social behavior also pertains to biology. The developmentally, experientially, and circumstantially contingent variations manifested in behavior are inherently part of a biological mode of explanation. Thus every aspect of any living thing is, *by definition*, biological.<sup>49</sup> Furthermore everything biological is always a result of interaction between genes and environmental factors. Even an individual cell is a product of genes and the environment (e.g., various chemicals). And since all traits and behaviors require environmental input, this means that they can be altered by manipulating one or more of their developmental causes.

As true as the above is it is, however, uninformative to people who want an answer to the question whether there are genes for a certain trait. The reply that genes *always* play a role in the development of *any* trait, and that we are equally the product of both genes and environment, was probably not what they were looking for. They were asking about individual *differences*: whether differences between people are caused by differences in genotypes. This question necessarily ignores all of the immensely complex structure that people share. It is a question about *heritability*: the degree to which the variability of characteristics that vary between people is genetic in origin. Are IQ differences or personality differences between people more a matter of genes or the environment? Heritability estimates can range from 0 percent (the difference in question between individuals is not caused by genetic variability) to 100 percent (the difference can be completely attributed to genetic variability). Most mental traits fall somewhere in the middle: Genes are in some way involved, but there is something beyond genes that is important. Heritability is studied by behavioral geneticists (not by evolutionary psychologists), drawing on, among others, twin studies and adoption studies (Marcus 2004).<sup>50</sup>

The nature-nurture dichotomy as it is often found in the writings of feminists and social scientists dates from the 1950s, when ethologists were defending adaptive

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<sup>49</sup> I realize that in this work I, too, have sometimes used "biological" in its more popular, dualistic sense. It just seemed a less cumbersome way of proceeding.

<sup>50</sup> Heritability should not be confused with inheritance: genetic instruction for species-typical attributes. When a trait is important for survival it is strongly selected and goes to fixation, which means that its heritability is driven to zero. Having two hands as a human, for instance, has a heritability of near zero: The genetic variation for hand number has been used up by selection. But hands are, of course, built by genetic instruction. Hand number is inherited.

behavior to be 'instinctive', whereas psychologists were stressing learning and nurture. Current scientific theorizing on the subject, however, has become much more sophisticated, with the breach between nature and nurture having been filled for the first time by ethologist Konrad Lorenz in his 1965 book *Evolution and Modification of Behavior*. Lorenz's great insight was that learning *itself* is adaptive. Genetic information somehow ensures that only certain events or acts or relationships are learned. It gives rise to neural structures that are a consequence of past selection pressures.<sup>51</sup> They make sure that the individuals of a species will filter out the irrelevant information and learn what they need to learn in order to survive and reproduce (Plotkin 1997).

The next chapter describes the accumulating evidence from many different disciplines that learning is indeed constrained. No learner of any species is a generalist. Thus the common assertion made by feminists and social scientists that cultural learning is not biological is wrong. Learning is, as are all other traits and behaviors, a product of gene-environment interactions. We easily learn to become afraid of heights and spiders, but not of cars and electrical outlets. The latter have been invented too recently. Although they constitute real hazards for us, there has not been sufficient time to evolve psychological adaptations against them.

It is a crucial observation that these learning constraints are caused by past selection pressures. Thus, as Plotkin, and many others with him, concludes: "Nature and nurture are inextricably enfolded within one another because nurture has nature, and yet nature must be nurtured and nurture is a part-cause of nature" (1997:68-69).

The same applies for culture. One cannot contend that some human behaviors are biological and others are cultural and hence nonbiological. Some *differences* in behavior between individuals could indeed be caused entirely by cultural influences. That does not mean, however, that an individual's culturally influenced behavior is entirely caused by the environment. Cultural behavior is always a product of gene-environment interactions. And we can learn nothing without underlying adaptations for learning. In this sense evolutionary psychology argues squarely in favor of the primacy of nature: Nurture – learning in all its forms – doesn't happen simply by exposing an organism to the environment; it occurs when *evolved adaptations for learning* are exposed to the environment (Hagen 2006).

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<sup>51</sup> Selection pressures are the things an organism must do to reproduce, as well as the things it could do to enhance reproduction. Both either have resulted or could result in selection for an adaptation (Hagen 2006).

A good example of this is language. In order to speak a language, social learning is needed, so it is clearly a cultural trait. One cannot learn a language, however, without specialized underlying brain structures. These structures (modules) ultimately evolved through natural selection, but are at the same time the proximate product of complex interactions between genes and environment during a person's life. Hence, although language is cultural, it is just as much biological (Pinker and Bloom 1992; Pinker 1997). If we want to understand any particular fact about humans, we need to analyze how their cognitive architecture, which is a product of evolution and is embodied in a physiological system, interacts with the world around it.

Do these insights on the nature of biology testify, as psychologist Lynne Segal insists they do, to "a biological absolutism more incompatible than ever with any serious recognition of the dynamics of culture, and its role in the formation of human existence" (1999:99)? Segal is quite sure that the objections of those who stress the significance of culture do not derive from "misinformation" or from "a refusal to listen," but from "obstinate attention to certain new twists in the curtailing of culture" (1999:99). What we find here, however, does not really fit the picture of biological absolutism as she paints it. The problem seems to be that she fails to grasp the multilayeredness of the model. She interprets the interactionism as a reductionism, in the sense that she thinks that an evolutionary framework leaves no room for environmental or cultural influences. The irony is, however, that evolutionary theory is *as much* about the role of the environment in ontogeny (the development of the individual) and phylogeny (the evolution of the species) as it is about biologically based dispositions. Adaptations can only develop when confronted with the right environmental triggers, and a change in the environment will in the long run cause evolutionary change.

### **6.8. The Myth of Genetic Determinism**

No one contends that genes alone direct development and behavior. It is often the failure to understand evolutionary psychology's interactionism that leads many feminists to the wrongheaded accusations of genetic determinism and biological determinism (with regard to the latter it must be repeated that biology refers to any aspect of living organisms, which means that the phrase 'biological determinism' is meaningless). Whereas critics equate evolutionary mechanisms with behavioral inflexibility, a fundamental message of evolutionary psychology is that evolution

sculpts organisms to behave contingently on their environment and their own current state.

This view is consistent with what modern genetics tells us about the workings of genes. Genes are designed to take their cues from the environment. They remain active during life, responding to experience, switching on and off, allowing us to learn, to remember, to imitate, and to absorb culture. They are the agents of nurture, predisposing us to extract certain kinds of information from the environment. They push us toward the goals that are physically and emotionally rewarding to us, such as food, social status, and affection – things likely to have had adaptive value in our evolutionary past. Small genetic differences between people will be multiplied by the environment. Sporty children will want to practice sports, intellectual children will want to read, and the more time they spend at doing what they enjoy, the better they will become at those tasks. They create their own environments, as we all do, seeking out those stimuli that are rewarding to the evolved beings and unique individuals that we are. The way we live our lives will at the same time affect which genes express themselves (Jacob 1997; Ridley 2003).

Some critics, such as biologist Sue Rosser, continue to represent current evolutionary theories in a highly misleading way: "[E]mphasizing separation or differences between males and females often leads to a form of biological determinism implying that differences in social and cultural role, status, and behavior are caused by genetic, hormonal, or anatomical differences between the sexes" (1992:157). By crudely distorting the subtlety of the interactionist model, Rosser plays along with the common misconception within academic feminism that evolutionary psychologists leave no room for environmental influences. Her political motivation for doing this is evident from her argument: She is afraid that differences in social status between the sexes will be accepted as natural and inevitable.

However, "[n]either 'biology', 'evolution', 'society', or 'the environment' directly impose behavioral outcomes, without an immensely long and intricate intervening chain of causation involving interactions with an entire configuration of other causal elements" (Tooby and Cosmides 1992:39). At each link of such a chain intervention is possible, so that we might change the final outcome. Talking of genes is, furthermore, not even *needed* in evolutionary theorizing. Although most biologists do assume that genetic mechanisms of heredity are common and important, all they need to know is that phenotypes vary and that there are correlations between phenotypes and survival and reproductive success. The exact mechanisms of heredity do not have to be clear in order to study evolution – Darwin did not know them either (Gowaty 1995; Waage and

Gowaty 1997). It is adaptations, not genes, that are the unit of analysis in evolutionary theorizing.

Apart from that, one might wonder why genetic influences are thought to be so much more inescapable in their effects than environmental ones. As Richard Dawkins points out, genetic and environmental causes are in principle no different from each other. Some may be hard to reverse; others may not be so. A child whose mathematical deficiency has a genetic origin may flourish when it gets the right teacher, for instance. Severe parental neglect during childhood may, however, have ineluctable negative consequences on the later emotional development of a child (Radcliffe Richards 2000).

Moreover, if one is shy because of something that happened to one as a child, this is no less a determinist event than if one's shyness had a genetic basis. We are all the product of the many determinants that have shaped us to the persons we are now. The real mistake is to equate determinism - be it environmental, genetic, or some other kind - with inevitability. Determinism is about the causes of a particular situation, not about the consequences. Having a strong inclination or emotion, regardless of its origins, never forces people to act in a way determined by it (Ridley 1999). And even if it is true that characteristics are mainly socially induced, we would still need to know how to control them. Experiments in changing human nature by large-scale political reorganization have not yet shown much sign of achieving their purpose (Radcliffe Richards 2000).

### **6.9. The Naturalistic Fallacy**

It may still not be clear *why* exactly the idea of a nearly infinitely malleable human nature is politically attractive to some. One might object, for instance, that on these conditions it would be relatively easy to install a totalitarian political regime (just make sure that humans are molded to obey authority, no matter how that conflicts with their own interests). Moreover, and worse, there would be no objective basis for contesting this state of affairs. Human nature is a yardstick for measuring evil. If there is no human nature, then there is nothing wrong with, for example, teaching women that it is a pleasant experience to be raped, beaten, and oppressed. The sheer outrageousness of this proposal already indicates that a gross inconsistency is lurking within the heart of a radical environmentalism.

As we have seen, however, it is not surprising that when the idea of environmentally produced differences between the sexes came up, feminists were



eager to embrace it, since women's oppression had long been justified by means of biological arguments. At the time the enthusiastic feminist reception of works such as Simone de Beauvoir's *The Second Sex* (1949), which explicitly defends an environmentalist view, may have been a very understandable move. One would expect this vigorous reaction against previous misconceptions of the nature and the appropriate place of women in society to boil down after a while, however. It should have made place for a more balanced view of the sexes, which takes into account all available evidence on the ways men and women are constituted. It did not work out that way. On the contrary, the environmentalist position seems to have become only more extreme with time.

Androcentric bias and a lack of theoretical sophistication within early sociobiology have probably scared many feminists away, something that is, again, quite understandable. When we see sociobiologist David Barash equating femininity with noncompetitiveness (1979:113), for instance, an alarm bell starts ringing. The female-friendliness and explanatory power of current evolutionary theorizing should, however, be able to appeal to feminists. It does not. Doreen Kimura points out another possible reason for this state of affairs:

The bias against biological explanation seems to have arisen from egalitarian ideologies that confuse the Western concept of equal treatment before the law - the societal application of the idea that "all men are created equal" - with the claim that all people are in fact equal. People are not born equal in strength, health, temperament, or intelligence. This is simply a fact of life no sensible person can deny. We have chosen a system of governance which has decided that *despite such inequalities* each individual shall have an equal right to just treatment before the law, as well as equal opportunity. (Kimura 1999:3, emphasis in original)

The confusion between both kinds of concepts is an example of the naturalistic fallacy. According to Oliver Curry (2002), there is not one 'naturalistic fallacy' (NF), but there are seven: (1) the direction of evolution is the direction that we ought to go in; (2) what currently exists ought to exist; (3) natural is good; (4) good is identical with its object, i.e., it is possible to exhaustively define good in terms of properties such as pain and pleasure (the NF as defined by George Moore); (5) good is a natural property; (6) you can go from facts to values; (7) you can go from 'is' to 'ought' (the NF as defined by David Hume).

The naturalistic fallacy as encountered in feminist theory is usually a mix of (3), (6), and (7): What ought to be is defined by what is, and especially by what is natural. Nature, however, does not constitute a moral order. "Values are not properties of things or events but are the projections of human needs and desires" (Symons 1979:62). The lack of compelling reasons for going from is to ought, or for arguing that what is natural is good, should be obvious when we think of disease, death in childbirth, or natural disasters. For tens of thousands of years, people have used their 'scientific' insights to fight the harsh environment they found themselves living in: By making fire they could protect themselves against the cold and against predators; using weapons turned out to be a much more efficient way of hunting. One of the reasons why we have developed science and technology is precisely that we wanted to overcome our natural vulnerabilities. Sure, (pseudo)scientific insights have sometimes been used for political reasons, but therefore to call science "an ideology" and "the great legitimator" (Rose 1983:274) seems shockingly simplistic. Despite its obvious shortcomings as a human endeavor science is, in the first place, a quest for the ways the world works. Then why does Dorothy Nelkin describe an evolutionary approach to human nature as "a guide to moral behavior and policy agendas" (2000:20) and why does Zuleyma Tang-Martinez write that it "serves only to justify and promote the oppression of women" (1997:117)? Why have biologist Randy Thornhill and anthropologist Craig Palmer been accused of being ideological, of justifying rape, and of blaming the victim after the publication of their 2000 book *A Natural History of Rape: Biological Bases of Sexual Coercion*, not only in countless reviews in the popular press, but also by serious academics (e.g., Kimmel 2003; Shields and Steinke 2003; Rosser 2003; Wertheim 2000)?

According to Thornhill and Palmer themselves (2000), one reason is that the naturalistic fallacy is often committed in the writings of social scientists themselves, and that as a result social scientists assume evolutionary theories as well to be intended to imply a position about how the world ought to be. That might well be one explanatory element. Apart from that, it is, as I pointed out earlier, quite 'reasonable' for those theorists who, like Fausto-Sterling, think that "all scientific writing embodies political agendas" (1995:171, emphasis in original), to infer that evolutionary scientists are making political statements. The thing is that feminists are not always chasing phantoms. It cannot be denied that some dubious things have indeed been asserted, something that evolutionists seldom acknowledge in their many refutations of the naturalistic fallacy. Sarah Hrdy (1999a) notes that as late as 1980, one can find it seriously suggested that differences in competitiveness between girl and boy

athletes may be adaptive for our species and therefore should not be erased. Whereas this is an instance of the naturalistic fallacy, the following quote is an expression of genetic determinism: "[M]en and women differ in their hormonal systems ... every society demonstrates patriarchy, male dominance and male attainment. The thesis put forth here is that the hormonal renders the social inevitable" (Steven Goldberg 1973, as cited in Fausto-Sterling 1992:91).

Both fallacies are closely intertwined, since genetic determinism amounts to nearly the same as saying that the behavior *should* exist, because it is the way nature works.

The observation that there has been flawed reasoning does not, however, warrant the fabrication of quotations from others, as Hilary Rose does. Rose (2000:116) cites sociobiologist David Barash as having written "If Nature is sexist don't blame her sons" (in *Sociobiology: The Whispering Within*, 1979:55). The phrase does not appear anywhere in Barash's book. On the contrary, he points out more than once that the fact that some behavior is natural does not mean that it is good or that it ought to be. The misunderstanding seems to have arisen from this passage:

To my thinking, sexism occurs when society differentially values one sex above another, providing extra opportunities for one (usually the males) and denying equal opportunities for the other (usually the females). As such, it has nothing to do with sociobiology. On the other hand, sexism is also sometimes applied to the simple identification of male-female differences, and on this count, sociobiology is, I suppose, sexist. No one would think it awful to state that a man has a penis and a woman, a vagina. Or that a man produces sperm and a woman, eggs. But when we begin exploring the behavioral implications of these facts somebody is sure to cry "Foul." If male-female differences are sexist, we should put the blame where it really belongs, on the greatest sexist of all: "Mother" Nature! (Barash 1979:90)<sup>52</sup>

Rose may also have conflated her reading of Barash with a misrepresentation in an article by Ruth Hubbard:<sup>53</sup> "As sociobiologist David Barash presents it, 'mother nature is sexist', so don't blame her human sons" (Hubbard 1988:8). Needless to say, such distortions of the original material, by Rose and by Hubbard, do not attest to good scholarship.

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<sup>52</sup> The 1981 Penguin Books edition, *The Whisperings Within: Evolution and the Origin of Human Nature*, is an exact reprint of the original 1979 Harper and Row edition, but with a slightly different title.

<sup>53</sup> This is suggested by Robert Kurzban (2002).

My examples of the naturalistic fallacy and of genetic determinism date from a few decades ago, and erroneous reasoning like this is not representative at all of current scholarly writing. I suppose everyone will agree that it would be unfair to judge current evolutionary theorizing on humans by mistakes made in the past or by the (inevitable?) straying of some scholars. Yet these examples, certainly when seen together with the androcentric bias obvious in much of early sociobiological views of the sexes, may also help to explain the feminist wariness of putative instances of political intentions within current evolutionary theorizing. Many prominent critics (e.g., Fausto-Sterling, Hilary Rose, Segal) seem to have been so put off by early sociobiology that, if they concern themselves with the current evolutionary approach to humans at all, they find it impossible to evaluate it in a relatively unbiased manner.

The harsh criticisms, (Darwinian) feminist as well as nonfeminist, of early sociobiology have helped the field to mature, to become more sophisticated and more scientifically based. But for many feminists the case seems to be closed. In 1997 Fausto-Sterling made an update of her thinking on sociobiology. Her list of references, however, hardly contains any publications of the 1990s. Yet she feels quite confident to stick to her argument that "[b]iological claims about social difference are scientifically invalid" (1997:58). In her contribution to *Alas, Poor Darwin, "Beyond Difference: Feminism and Evolutionary Biology"* (2000a), she does not do any better.

As for the naturalistic fallacy, there is, indeed, the danger that evolutionary insights might be used to justify a conservative political agenda. Understandable as the feminist fear of naturalizing and legitimizing traditional gender roles may be, one would think that feminists would better devote their time and energy to informing the public about the predominating misconceptions regarding biology, instead of reinforcing them by writing things like "[e]volutionary principles imply genetic destiny" (Nelkin 2000:22).

Second, there is the danger that criminals might be exonerated for their behavior on the basis of evolutionary arguments (Fausto-Sterling 1992). But, as Anne Campbell (2002) argues, the misuse of scientific research by defence attorneys, being doubtless widespread, is certainly not confined to evolutionary theory. Not only is contemporary work on neuroanatomy, hormones, and clinical disorders misapplied in this way, environmental factors are far more commonly misused. Parental abuse and neglect, inadequate educational opportunities, and drug addiction have all been put forward to mitigate guilt and reduce sentences. The issue here, as she rightly stresses, is not evolutionary theory but the prevailing legal philosophy of responsibility and free will. Moreover any cause of behavior, not just the genes, raises the question of free will and

responsibility. "The difference between explaining behavior and excusing it is an ancient theme of moral reasoning, captured in the saw 'To understand is not to forgive'" (Pinker 1997:53).

Besides, as legal scholar Owen Jones (2001) writes, evolutionary theories address statistical probabilities and predictions. They cannot explain in detail why this particular individual, in this particular circumstance, did what he or she did. Jones deems it highly uncertain that criminals will ever be exonerated on the basis of evolutionary arguments.

### **6.10. Current Socialization Theories**

Feminists typically explain gender differences through theories of socialization.<sup>54</sup> No single researcher will deny that socialization practices are indeed important in channeling male and female behavior. Behavioral ecologist Bobbi Low (1989), for instance, has shown that the degree to which boys and girls are trained differently cross-culturally depends in a predictable way on the kind of society they live in: stratified or nonstratified, polygynous or monogamous, patrilocal or matrilocal.

Low's evolutionarily based approach, which assumes an interaction between genotypes and environments, differs tremendously from the dichotomous way in which sex differences are explained in traditional feminist accounts. The latter often seem inadequately thought through. Not only do they assume the human mind to be more or less a blank slate - a concept dating back from behaviorist times - they also seem to regard it as an entity floating free from the body. They retain the Cartesian distinction between the body as a physical organism and the mind as nonphysical. The evidence is overwhelming, however, that our mental life depends entirely on patterns of physiological activity in our brain, the basic plan of which is largely shaped in the womb. People born with variations on the typical plan have variations in the way their minds work. Although learning and practice certainly affect brain structure - indeed, *consist of* implementing changes in connections between brain cells - most neuroscientists believe that the brain is not indefinitely malleable by experience (Pinker 2002). Natalie Angier (1999) criticizes her fellow feminists for rejecting all arguments having to do with hormones, with the senses, or with the body. They consider the body to be only a vehicle, never the operator, as if humans were

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<sup>54</sup> Abbey et al. 1996; Brouns 1995a; Brownmiller 1975; Bryson 1999; Butler 1990, 1997; Callen 1998; Connell 1995; French 1992; Hyde 1996; Nicholson 1994; Rose 1983; Rosser 1992; Segal 1999; ten Dam and Volman 1995.

*completely* different from other species, she says. In this respect I can only agree with her.

Sue Rosser, for instance, accounts for sex differences in the domain of science in this way: "The forces of socialization begin at birth and continue throughout an entire lifetime." Although "[e]ach educational or socialization incident may be minor", added together they may be the "final factor" that steers women away from decision-making positions in science (1992:36-37). Antonia Abbey and her colleagues provide us with one of the typical feminist theories of socialization:

From birth, girls and boys are frequently treated differently by parents, peers, and teachers, thus shaping their responses in gender-specific ways ... Through direct reinforcement and vicarious learning through modelling, members of a culture learn to behave in ways viewed as appropriate for their gender and to internalize gender-consistent self-schemas. (Abbey et al. 1996:139)

Or consider Marilyn French:

[W]ar requires fighters, and people who have not been indoctrinated into a gender cult, have not been taught that aggression equals identity, do not want to fight. To get men to fight rather than flee, male leaders had to turn them against life, identified with women, sensual pleasure, children, the growing and eating of food. (French 1992:179)

Pornography and the mass media are often mentioned as important ways of shaping and perpetuating gender roles (Brownmiller 1975; Denmark and Friedman 1985; Dworkin 1997; French 1992; MacKinnon 1994; Michielsens et al. 1999; Schwendinger and Schwendinger 1985). Sometimes vague references are made to "patriarchy", the "gender divisions of labor," and the "practices that shape and realize [heterosexual] desire" (Connell 1995:46-47). Some go so far as to claim that heterosexual desire is "eroticised power difference," with no roots in biology at all (Jeffreys 1990,<sup>55</sup> as cited in Patai 1998:130). Some, realizing that sex-specific socialization alone cannot possibly explain the ubiquitousness of the same gendered patterns throughout the world, point to psychoanalytic theory to further account for this phenomenon or to account for the frequent failure of the moulding of gender

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<sup>55</sup> Jeffreys, Sheila (1990). *Anticlimax: A Feminist Perspective on the Sexual Revolution*. Berkeley: University of California Press.

identities (e.g., Chodorow 1978; Gilligan 1982; Scott 2001; Segal 1999; ten Dam and Volman 1995).

Some do refer to the body, but in the way mentioned earlier: with the mind floating free from it. Psychologists Alice Eagly and Wendy Wood, for instance, point to men's greater size and strength and to women's childbearing and suckling ability, physical differences that, according to them, "interact with shared cultural beliefs, social organization, and the demands of the economy to influence the role assignments that constitute the sexual division of labor within a society and produce psychological sex differences" (Eagly and Wood 1999:409). While they recognize those physical differences to be the result of evolutionary pressures, they do not seem to recognize them as *automatically implying* behavioral and psychological differences. Physical characteristics do not evolve out of the blue. Our upright posture implies bipedalism. Our digestive system reflects what our ancestors ate. Functional breasts would not have evolved without the simultaneous evolution of particular behavior patterns, such as placing an infant to the breast.<sup>56</sup> Greater upper-body muscle mass in males would not have developed without the simultaneous evolution of behavior such as grabbing and wrestling (in fighting), and wielding weapons (in fighting and in hunting medium and large game).<sup>57</sup> Moreover, the evolution of these behavior patterns implies psychological adaptations, both cognitive and emotional, to guide those behaviors. Without inherent goals and drives an organism would not do anything (Thornhill and Palmer 2000).

References to patriarchy and to gender divisions of labor are merely descriptions of existing phenomena; they do not *explain* anything. Psychoanalytic theories cannot help us any further either if we want our explanations of sex differences to be firmly scientifically grounded (see section 1.4). The other above-mentioned socialization explanations depend heavily on the concept of a blank slate mind being molded by reinforcement (behaviorism) and imitation (social learning theory). Nobody doubts that reinforcement can indeed shape behavior and that imitation is a central primate capacity. The question is, however, whether these effects are strong enough to account for the patterns of sex difference that are noticed worldwide.

Research from a variety of disciplines, including the biological and evolutionary sciences, indicates that the bottom line of the existence of sex differences lies

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<sup>56</sup> The focus is here on the mammary glands, not on the prominent shape of women's breasts. In principle human females did not need to evolve permanent breasts in order to feed their babies. Nonhuman primates have enlarged breasts only when the female is lactating (Hrdy 1999).

<sup>57</sup> The effects of selection for hunting versus fighting can probably not be told apart.

elsewhere. Yet socialization explanations remain predominant in feminist literature as exhaustive accounts of the phenomenon. They represent what Tooby and Cosmides (1992) have coined the Standard Social Science Model (SSSM), which has served as the intellectual framework for the organization of the social sciences for a century. In a simplified form, this model holds that whatever innate equipment infants are born with must be highly rudimentary, such as an unorganized set of drives, plus the ability to learn. Mental organization is acquired from some source outside themselves: the social and cultural world. This sociocultural level is an autonomous and self-caused realm. The SSSM denies that human nature can play any notable role as a generator of significant organization in human life. It is acknowledged to be a necessary condition for it, but merely as embodying the capacity for culture. Thus general-purpose learning becomes a central concept.

### **6.11. Evaluating Some Environmentalist Contentions**

Critics of research on the biological basis of sex differences typically nitpick at each study. They demand much higher standards of evidence than they would for socialization theories, offer alternative and sometimes far-fetched explanations, and do not take into account well-established, corroborating evidence from other disciplines.

Anne Fausto-Sterling's *Myths of Gender* (1992) is such a critical study, serving as an important work of reference for many feminists. While I think - as doubtless many scientists do with me - that sternly scrutinizing existing research is essential to good science, Fausto-Sterling's work is, unfortunately, not always to be trusted - something to which her politicized stance might have greatly contributed. Her critiques of sociobiology and evolutionary psychology, for instance (Fausto-Sterling 1992, 1997, 2000a), consist virtually solely of political imputations, misunderstandings, selective reading, and misrepresentations, and are characterized by a lack of knowledge of the main principles of evolutionary biology and of the theoretical developments of the 1990s. To give just two examples: She does not seem to understand the tremendous importance of the ultimate-proximate distinction in evolutionary biology (see next chapter for an explanation of this distinction). She considers it a trick, "clever, because it is totally unassailable" (Fausto-Sterling 1992:193). In her contribution to *Alas, Poor Darwin* (2000a), she seems ignorant of the evolutionarily inspired and confirmed hypothesis about superior female spatial location memory, a finding that is mentioned in all major evolutionary textbooks of the 1990s. Rather embarrassingly, her ignorance about evolutionary psychology leads her to hypothesize that females might well have



evolved well-developed spatial and memory skills, adding that "without more data and a far more specific hypothesis, we have no way of knowing" (Fausto-Sterling 2000a:177-178). Because she is regarded as an authority in the field, however, many feminists feel perfectly happy putting their trust in her work and hence denouncing evolutionary accounts of gender as obviously flawed and politically inspired.

The list of possible remarks on her writings is long; I will offer only a few more examples here.

In her attempt to disprove the 'naturalness' of the sex gap in physical strength she writes that, whereas in the 1976 Olympics female swimmers were 10 percent slower than men for the 100- and 400-meter freestyle, now "East German female swimmers ... swim a mere 3 percent more slowly than the men" (1992:220). Thereby she conveniently ignores that their prowess was not only due to training, but also to steroids (Young 1999).

When claiming (Fausto-Sterling 1992) that studies on mathematical achievement of the sexes done before 1974 found significant differences, but that the difference today has been reduced to almost zero, she fails to mention that one of the reasons is that out of political correctness items performed better by one sex have been deleted from the tests (Kimura 1999).

When arguing (Fausto-Sterling 1993) that the very idea of two sexes is a cultural construct since there is a large number of intersexed children, her only proof is a 4 percent figure coming from an informal estimate by gender expert John Money, who has turned out to be rather unreliable. In *Sexing the Body* (2000b) her frequency estimate of intersex conditions has dropped to 1.7 percent, a number that she has found by leafing through the medical literature. As pointed out by Leonard Sax (2002), however, her definition of what counts as intersex is too broad. Clinically, intersex conditions are those in which chromosomal sex is inconsistent with phenotypic sex, or in which the phenotype is not classifiable as either male or female. Fausto-Sterling defines as intersex, however, all those individuals who deviate from the Platonic ideal of physical dimorphism at the chromosomal, genital, gonadal, or hormonal levels. Thus she includes, for instance, individuals born with chromosomal variations other than XX or XY, all of whom develop as phenotypically normal males or females. Misleadingly, all the case histories that she presents in her book are instances of true intersexuality. When the clinical definition is applied, the prevalence of intersex drops to a mere 0.018 percent, which is almost 100 times lower than Fausto-Sterling's estimate. She has artificially inflated the prevalence of intersex conditions in light of her politics: She wants to propagate a flexible gender system. Her unabashedly political approach to

scientific knowledge has led her to distort the evidence. There is, moreover, no discussion about how this view of sex as a cultural construction would mesh with theories of reproduction or with evolutionary biology.

This is not to say that there is *nothing* to be said for her point of view. Labeling harmless conditions such as intersex as pathological is indeed, as she contends, an expression of social preferences. So is the precise interpretation of male and female bodies, which to some extent differs through time and space. Whereas a muscular build in females might have been considered masculine once, for instance, this is no longer the case today. I see no benefit in denying, however, that we are *essentially* a dimorphic species, as long as it is acknowledged that there can be variations on the basic theme. We might even decide to call these variations a third sex.

Fausto-Sterling allows a role for biology in defending developmental systems theory (DST), which stresses an interactionist framework in which all levels of nature/nurture, from nerve cells to interpersonal interactions, co-produce one another. In this framework, however, talking about innate predispositions is regarded as dichotomous and genetically determinist, because according to DST there is no underlying program. The genome has no privileged role in development (Fausto-Sterling 2000b; Gray 1997). In this way a potentially limitless flexibility of behavior seems to become possible. DST cannot account, however, for the many universal patterns of human behavior and the universal differences between male and female minds (e.g., Brown 1991; Buss 1989; Schmitt et al. 2003a, 2003b, 2004)); nor can it explain that the brains of girls and boys are already wired differently at birth (Kimura 1999, 2002). That Fausto-Sterling's preference for DST has more to do with dogmatism than with a scientific spirit is shown by her refusal to go into the argument that the expression of very unpopular sexualities, such as transsexualism, despite strong contrary social pressure points toward the existence of prenatally determined dispositions. Her dismissing reaction is that this form of interactionism "calls for a large dose of body and only a little sprinkling of environment" (2000b:259).

Doreen Kimura reacts to critics like Fausto-Sterling as follows:

Such critics often use the word *prove*, suggesting that a particular study, because of some limitation (and no study of human beings can ever be perfect) does not prove a hypothesis. Quite true, no one study is likely to sufficiently support a hypothesis to the point where we accept it wholly. Scientists do not expect to prove a position, they expect either to disprove it or to find sufficient and wide-ranging evidence for it, so that it becomes more and more plausible and alternative

explanations become less and less likely. Human behavioral science, especially, must operate by looking at the cumulative evidence, not just at one study. (Kimura 1999:5, emphasis in original)

Another important criterion for accepting a hypothesis, Kimura continues, is how well it fits with facts in other related fields of science, such as physiology, neuroscience, or evolutionary biology. As we will see in the next chapter, the environmentalist account of sex differences does not fit in at all with other scientific fields, whereas an evolutionarily based approach does.

If environmentalism were correct as an exhaustive explanation of sex differences, the world would look completely different. First of all, we would not find this curious pattern of similar sex differences around the globe. Evolutionary psychology is sometimes charged of describing 'the obvious'. Scientific 'predictions' of already known phenomena are, however, not less compelling tests of a theory than are predictions of previously unknown phenomena. Moreover, the obvious is only obvious to us because it is part of human nature. In principle countless other ways of living are imaginable. People might not live in groups and might meet members of the other sex only for mating, for instance. Or they might as a rule find elderly people more physically attractive than younger ones. According to the environmentalist paradigm, whenever a hitherto unknown people would be found, the prediction of it being a matriarchy with women desiring younger men and men doing the bulk of the childcare would be as plausible as any other - or, for that matter, a society where no gender distinctions are made at all. It might even be a society where people are conditioned to be sexually attracted to tree trunks, as Ellis (1992) notes.

Such societies do not exist. As we saw, everywhere people live in groups, speak, have characteristic emotions, know violence, rape, and murder, have inequalities of power and prestige, are hostile to other groups, have romantic relationships, make tools, have sexual regulations, favor their close kin, make plans for the future, have a sense of rights and obligations, have rituals, know how to dance and make music, and so on (Brown 1991). Evolutionary psychology is the only theory that can explain why the human mind should show this underlying universal design. If children really were that malleable, moreover, they would not be confounding all of their parents' expectations from the moment they are born. People would be easily drilled and indoctrinated, in the way one can read it in dystopian science fiction literature.

An experiment that has come to be known as the Baby X experiment has been considered by some as definite proof that gender differences are the result of

socialization. In a room with a number of toys a woman was asked to look after a baby for a few minutes. When she was told the baby was a girl, she more frequently offered it a doll to play with. As Campbell (2002) argues, however, the reason for this behavior does not seem to be what defenders of the behaviorist account, which holds that sex differences derive from boys being encouraged to fight and climb trees and girls being forced to wear dresses and play with dolls, think it is. It is quite likely that parents are simply responding to the child's own preferences, since it has become clear that children are active participants in their own development. They prefer sex-appropriate toys even when they are not specifically encouraged to do so. Sex-differentiated preferences for toys have been found in infants from nine months of age. Moreover, the Baby X finding does not prove anything unless it can be shown that the toys changed the child's subsequent behavior. If the behaviorist account were correct, we would furthermore expect the most sex-typed adults to have the most sex-typed children. No such relationship has been found.

Moreover, there is hardly any evidence for differential treatment of sons and daughters by Western parents. In their 1991 meta-analysis of 172 studies, psychologists Hugh Lytton and David Romney found that on most accounts in North American and other Western countries parents do not rear boys and girls in a significantly different way. The effect sizes for most socialization areas were nonsignificant and generally very small, fluctuating in direction across studies. The only areas that showed a significant (but still fairly modest) sex difference were encouragement of sex-typed play and activities, and physical punishment, with more of it being inflicted on boys. As the authors themselves say, parents' encouragement of sex-typed activities may build on the child's already existing preferences rather than creating them (Lytton and Romney 1991)

As for imitation theory and other kinds of environmentalist accounts, children not only have their own toy preferences; they also prefer to interact with members of their own sex and show sex differences in social behavior before they know their own sex or before they can label these behaviors as being more common among boys or girls. Even at seven years of age, there is no relationship between children's gender knowledge and how sex-stereotypic their own behavior is (Campbell 2002).

Anne Campbell (2006) sums up the findings about gender segregation in childhood: It appears cross-culturally, and does so in the third year of life, intensifying so that between the ages of eight and eleven the median time spent with the opposite sex is zero, after which it recedes. It depends on the presence of a critical mass of children: If not enough children are present, the sexes will play together. It appears

independent of parents' views about the desirability of mixed-sex or same-sex play. It can be modified by reinforcement in the short term, but once the reinforcement stops it reasserts itself. It shows no relationship with children's IQ. We might connect these findings with the Westermarck hypothesis, holding that children who are reared together – usually siblings – develop a mutual sexual aversion. Seen in this light, sex segregation seems to serve an adaptive function: It seems to operate to maintain distance from the opposite sex in childhood, making them potential sexual partners in adolescence (Campbell 2006).

Sex differences in social organization found in human children from diverse cultures parallel those found in chimpanzees, which also suggests a genetic basis for these behaviors (Benenson 2002). Toy preferences – and all behaviors so far studied that are sexually dimorphic – have indeed been established to be related to the influence of sex hormones, the working of which is genetically based. In mammals the 'default' form of an embryo is a female. In order to yield a male, the masculinizing influence of androgens is needed. These androgens, being released in several stages of embryonic development, not only make sure that male genital structures are produced; they also have organizational effects on the brain, with lifelong effects on behavior. In their absence the female brain pattern develops.

We know this partly from human sexual anomalies, such as cases of congenital adrenal hyperplasia (CAH). These are individuals (male and female) who, prenatally, have been overexposed to androgens. The girls are born with partially masculinized genitals and turn out to be more tomboyish than unaffected girls. Their toy preferences are strikingly similar to boys and they have a higher incidence of homosexual fantasy and preference (Kimura 1999, 2002).

The existence of transsexuals (people who typically desire to become a member of the opposite sex) also undermines radical environmentalism. Transsexual people have been raised and their behavior has been reinforced according to their anatomical sex. Still they develop a gender identity that does not conform with it. An explanation may be found in Bailey (2003), who suggests that variation in prenatal exposure to sex hormones might be the basis for variation in sexual orientation. Since not all behaviors are susceptible to hormonal influences at the same time, there are several moments when variation from the 'norm' can occur. This may, for instance, lead to a non- or little-masculinized brain structure in a fully masculinized body.

Another strong indication of the importance of early brain organization is provided by cases in which a boy's penis had been severely damaged shortly after birth. Because constructing a vagina is easier than constructing a penis, in the 1970s the

solution in such rare cases used to be to surgically alter the boy and to raise him as a girl, a practice that had been installed by John Money, a then-renowned expert in gender identity. The first and most famous case of such a gender reassignment is that of David Reimer. At the time known as the John/Joan case, it was readily embraced by the feminist movement and the social sciences as evidence that newborns are psychosexual blank slates. It has, however, turned out to be a failure (Colapinto 2000).

John Money knew the operation to be a failure from the outset. He has, however, never acknowledged this, not even when the tormented girl - who never had shown any feminine behavior and even tried to stand up to urinate - in 1981 let herself be made into a boy again, at the age of seventeen. By the age of eight, she had already felt strongly that she was a boy. When at fourteen she decided to live as a male, her parents had finally decided to tell her the truth.<sup>58</sup>

When the failure was brought out in the open in 1997, many intersex people who had undergone normalizing genital surgeries as babies (as Money had advised), now came to speak out about their lives. Their stories were similar to that of David Reimer, be it that, being born intersexed, they had a complicated sexuality and sense of self. The point is that many of them had never been able to feel that the sex to which they had been surgically reassigned fitted them. They are now still lobbying for the abolishment of genital surgery on infants until these are old enough to speak for themselves (Colapinto 2000; Fausto-Sterling 2000b). They can then choose the sex they want or, indeed, choose not to have surgery at all. There is no reason why society should force intersexed people into a binary scheme, instead of plainly appreciating them as they are.

One criticism of the Reimer case is that the infant boy lost his penis at age eight months, with the decision to surgically reassign him as a girl being made at seventeen months. Perhaps, some reason, he was simply too old to make the transition, having been socialized as a boy for too long already. A second similar case, with the decision of sex reassignment occurring approximately between two and seven months of age, indeed has a more ambiguous outcome. The boy-who-became-a-girl has stayed that way, living socially as a woman. During childhood, however, she recalls having been a 'tomboy' and enjoying stereotypically masculine toys and games. She has had sexual experiences with both women and men, but is attracted predominantly to women in fantasy. She has a 'blue-collar' job practiced almost exclusively by men (Bradley et al. 1998).

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<sup>58</sup> Sadly enough, David Reimer committed suicide in 2004.

There are only two cases of this kind of accident (called 'ablatio penis') that are reasonably well documented in the scientific literature. Two cases are not enough to allow us to draw any firm conclusions, especially since they point in partially different directions. There is another condition that might be considered even closer to the perfect nature-nurture experiment, however: cloacal exstrophy. Boys with cloacal exstrophy are born with poorly formed bowels that open into their bladder and with poorly formed penises. It is a very rare and very serious condition, and until the early 1970s babies suffering from it died shortly after birth. Now, due to the advancement of medical science, they can live. For some twenty years, most boys born with it were castrated and reassigned as girls immediately after birth. The development of fourteen of them has been followed up (last follow-up between ages fourteen and twenty), and these results definitely undermine the theory of psychosexual neutrality at birth. Seven of these female-assigned children have declared that they are boys. Five did that spontaneously and two after hearing from their parents what had happened. Of the seven others, one had wished to become a boy as a child but had accepted her status as a girl. Later, when her parents came clean about her birth, she became angry and withdrawn, refusing to discuss the matter. The parents of the other girls have decided never to tell their daughters. Follow-up reports suggest that these children are less than happy. All fourteen of these girls are sexually attracted to females, and all have unfeminine interests and behavior (Bailey 2003).

With regard to these and similar cases (for instance, cases of very feminine boys who state that they want to be girls), some environmentalists argue that maybe the child's gender socialization was inconsistent and ambivalent, due to the parents' knowledge of its birth status or due to their unconscious wish for a child of the other sex. Or maybe the psychologist who did the follow-up asked the children leading questions that caused them to question their gender identity. This would mean, however, that these very subtle features of interaction were much more consequential than calling a child a girl or boy and giving her or him a sex-typical name and sex-stereotyped toys and clothes. If gender identity development could really be undermined that easily, gender identity problems would be much more frequent (Bailey 2003).

Another phenomenon that is sometimes considered proof of the social construction of gender identity is the berdache. "[T]he Native American berdache undermines European notions of gender," Linda Nicholson (1994:96) writes. What is a berdache? Nicholson provides this description: "Certain Native American societies that have understood identity more in relation to spiritual forces than has been true of modern

European-based societies have also allowed for some of those with male genitals to understand themselves and be understood by others as half man/half woman in ways that have not been possible within those European-based societies" (1994:96). Margo Brouns notes that in some previous Native American cultures more than two sexes were acknowledged. "Certain individuals (male or female) to whom a privileged position was conferred could switch gender identity" (1995b:37, my translation). Sometimes they were men, then they were women again, Brouns says.

These accounts raise some questions. Both Nicholson and Brouns acknowledge that only *certain* individuals were allowed to understand themselves in that special way. Who were they? Why was not everyone allowed to do so? And could they just be half man/half woman or did they actually *switch* between a male and a female gender identity as they wished, which is something rather different? Did berdaches always have male genitals, as Nicholson seems to assert, or could male as well as female individuals be a berdache, as Brouns writes? And if only males could be so, then why were females not allowed to? Even without any further background information one thing seems for sure: Although in these societies gender identity may have been much more flexible than in the West, it was also subject to societal regulations, and only some people were allowed to be a berdache.

Can we infer from the existence of berdaches that gender identity is culturally constructed? This conclusion seems rather rash and does not seem to make sense. After all, berdaches have grown up in a society that ascribes different roles to males and females, just like societies everywhere do. If it were really that easy to make people digress from the sex-typical roles just by not reinforcing them into these roles, then that should work in our societies too. We know that it does not. It just is not that easy.

We need an expert here to supply us with the missing puzzle pieces. Historian Will Roscoe is. *The Zuni Man-Woman* (1991) is the account of Roscoe's nine-year research on alternative gender roles in Native American culture. By combining the methods of history and anthropology and by sharing his work with the Zuni, the culture he has been studying most intensively, he hopes to have avoided the pitfalls that troubled early anthropologist writings on this subject. Boasians like Ruth Benedict, in *Patterns of Culture* (1934), and Elsie Clews Parsons, a committed feminist, sought and found in Zuni culture a model to be copied. Having rejected the restraints that Western society imposed on genders, they had arrived with a predisposition to find Native American culture somehow more organic, Roscoe (1991) notes. It is to these ideologically



predisposed anthropologists, seeking for unconventional ways of living, that we owe nearly all of our knowledge of Native American berdaches.

Although Roscoe's work is centered on the male berdache, he points out that there were female berdaches as well. A berdache was an individual who was allowed to act and dress as a member of the opposite sex. Female berdaches assumed male roles as warriors and chiefs or engaged in male work or occupations, whereas male berdaches engaged in domestic work. The phenomenon has been documented in over 130 North American Native American societies, in every region of the continent. Berdaches were integral and valued members of their communities, who had a very special and sacred place.

What makes the role of the berdache unusual to Western eyes is the high social status that was conferred to someone who would have been (or still is) considered deviant in our society. Still, according to Roscoe, it is clear that the individuals in case did not have flexible genders. They were lesbians or gays, whose inclinations were socially accepted, even sanctified. Male berdaches are not known to have had sexual relationships with women, but only with men. The key to defining berdaches, however, was less their sexual behavior than it was their preference for work typically done by the other sex. Berdaches were identified in childhood on the basis of their inclinations and skills. A boy who showed a preference for domestic work and association with women at the age of five or six was interpreted by adults as a berdache, so that at the age of ten he could wear a woman's dress. Thus people were not likely to label a child as a berdache without some demonstration of berdache inclinations.

Individuals, as Roscoe notes, are social actors, who do not passively await labels to trigger their behavior, but actively participate in shaping their identities and status. He firmly rejects the environmentalist interpretation of gender identity as a product of social influences and not as the manifestation of inherent drives. The existence of berdaches has been asserted as proof of the environmentalist paradigm, but this interpretation is at odds with the conclusions of Native Americans themselves. Some scholars even have gone so far as to deny the possibility of any connection between berdache and Western homosexual roles. Contemporary gay Native Americans, however, clearly see an overlap, but for them the berdache tradition encompasses spiritual and social dimensions as well as sexuality.

Gender identity, Roscoe (1991) concludes, is 'constructed' in the sense that inherent sex and gender variant behavior is organized into formal social roles in different ways in different societies. To the extent that a child's actual interests corresponded with the conception of berdache status, this role provided a unique

opportunity for personal growth, an opportunity that has historically been denied to Western homosexuals. I emphatically agree with Roscoe's argument that we can learn a lot by studying these cultural variations, since they can free us from single-dimensional definitions of homosexuality.

Thus the berdache tradition does not corroborate the environmentalist account of gender differences. It can be used, however, as a plea for the social acceptance of multiple kinds of gender identity, since it is clear that many people fall somewhere in between the two basic categories of male and female when it comes to gender identity. This observation, I may add again, does not detract from the evolutionary conception of our species as essentially dimorphic. The existence of variations on the basic theme is consistent with a Darwinian point of view; evolution is, after all, as much about variation (as the ineluctable byproduct of the fact that nothing is perfect) as it is about the mainstreaming of the most successful phenotypes into the next generations. However, the continuum from anatomical female to anatomical male is not, as Fausto-Sterling (1992) seems to present it, a smooth uncurving line. In reality, most individuals are firmly located somewhere at one end of the continuum. As we saw, the number of children born with intersex genitals is not 4 percent, as Fausto-Sterling (1992) writes, nor 1.7 percent (Fausto-Sterling 2000b), but 0.018 percent (Sax 2002). The existence of these poles does, of course, not imply at all that society should try to force this rich anatomical and psychosexual variety into a binary sex and gender system, as we can learn from Native American cultures.

Environmentalism theories have no answer to the crucial question why children should learn so easily to behave in sex-typical ways, whereas their simultaneous socialization as prosocial and nonaggressive human beings turns out to be much more difficult. This is one of the questions that are addressed by evolutionary psychology.

## **7. SOCIOBIOLOGY AND EVOLUTIONARY PSYCHOLOGY**

[A]ppplied to females, pejorative-sounding words like "promiscuous" only make sense from the perspective of the males who had been attempting to control them - no doubt the origin of such famous dichotomies as that between "madonna" and "whore." From the perspective of the female, however, her behavior is better understood as "assiduously maternal."

Sarah Hrdy

### **7.1. Introduction**

Darwinism has gone a long way from the early sociobiological presupposition of essential differences between 'ardent' males and 'coy' females to the recognition that females are as dynamic strategists as males are and that female choice - which remains a cornerstone of sexual selection theory - is often constrained by male coercion. Although current Darwinian theory is not monolithic and although doubtless less-enlightened views of female nature will still be found<sup>59</sup>, I think that evolutionary theorizing on the sexes has become fairly balanced.

Anne Fausto-Sterling (1995) doubts whether the new, critical literature really dominates the field. It depends on what she means by that. If she means that female-oriented approaches are uncritically incorporated into the current body of knowledge, the answer is no. But if she means that most of these hypotheses are considered valuable points of view, potentially yielding new insights, and able to correct past biases, the answer is yes. Many evolutionary theorists are eager to investigate the fruitfulness of taking a female-centered approach, such as looking for mechanisms of mate evaluation in females, for instances of male circumvention of female choice, for

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<sup>59</sup> Robert Wright, for instance, writes that "Hrdy ... may take a more than scientific interest in arguing that female primates tend to be 'highly competitive ... sexually assertive individuals'" (1994b:69). It leads Hrdy to complain: "as if female primates really aren't, but owing to inner impulses of my own I yearned them to be so" (1999a:xxviii). Still it must be added that Wright continues: "[t]hen again, male Darwinians may get a certain thrill from saying males are built for lifelong sex-a-thongs" (1994b:69), which shows him just being concerned for possible sources of bias in *both* sexes.

mechanisms of female-female competition, and for the benefits of female promiscuity.<sup>60</sup>

In the end the ultimate value of these theories and hypotheses is decided by testing them - because most evolutionary hypotheses about behavior *are* testable, despite many allegations to the contrary.

This chapter deals with the development of and controversy about sociobiology and evolutionary psychology, a discipline that in the 1990s evolved out of sociobiology and the cognitive sciences. Although critics tend to dismiss evolutionary psychology as not being any different from its infamous predecessor (Dupré 2001; Hyde 1996; H. Rose 2000; S. Rose 2000; Scott 2001), the difference is in fact quite big. As the name indicates, evolutionary psychology is in essence a science of the *mind*. It studies the role of the evolved architecture of the mind in mediating behavior. Sociobiology, in particular 1970s sociobiology, concentrates more on gene-driven *behavior*. It is an interplay of evolutionary ecology, population biology, and population genetics. Another difference is that evolutionary psychology does not assume human beings, nor any other organism, to be driven by the general goal of promoting gene survival. The evolved cognitive mechanisms that mediate behavior all serve some *specific* function and have been retained in the course of evolution because they just happened to help our ancestors to survive and reproduce. As the human mind is designed to deal with environments that, in some respects, no longer exist, we should not expect modern human behavior to be necessarily adaptive, according to evolutionary psychologists (Symons 1987a, 1992). Sociobiology, on the other hand, in the words of one of its early proponents, "proposes that our most important need is to maximize fitness" (Barash 1979:171-172). Sociobiology shares this premise with its sibling, human behavioral ecology. Whereas traditional anthropologists emphasize the influence of culture on individual behavior, human behavioral ecologists are interested in how an individual's behavior is influenced by his or her (ecological) environment and how the alternative behavioral strategies that people adopt produce cultural differences. They study human, mostly non-Western, populations to see whether humans are able to alter their behavior flexibly, depending upon the environment, to maximize their reproductive success (Laland and Brown 2002).

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<sup>60</sup> E.g., Birkhead 2000; Ellis 1992; Gowaty 1992, 1997b, 1997c; Hrdy 1997, 1999a, 1999b; Low 2000; Malamuth 1996; Mealey 2000; Mesnick 1997; Miller 2000b; Shields and Shields 1983; Smuts 1995, 1996; Thornhill and Palmer 2000; Thornhill and Thornhill 1983; Waage 1997; Wilson and Mesnick 1997.

Before starting to describe the historical developments leading to the rise of evolutionary psychology, one crucial conceptual distinction made within evolutionary biology has to be pointed out: that between proximate and ultimate explanation levels.

## **7.2. Proximate and Ultimate Levels of Explanation**

Critics who do not understand the difference between the two levels of causation that are studied in evolutionary biology are, understandably, likely to infer that evolutionists intend an evolutionary approach of human behavior and an analysis in sociological terms to be mutually exclusive. Both approaches are, however, complementary.

Janet Hyde, for instance, writes that both biological-evolutionary and feminist explanations for the greater aggressiveness of males have been offered, but that feminist theories generally reject explanations that rest on biological factors. According to the feminist view, "the gender difference in aggression is a direct result of males being socialized into the male role and females being socialized into the female role" (Hyde1996:113-114). She does not seem to recognize that *both* types of explanation may well hold, at a different level. Evolutionists do not deny the role of socializing, but they regard it as a direct, proximate cause that is in need of a broader level of explanation: an ultimate, evolutionary one.

Proximate causes refer to the immediate events that lead to a behavior or a certain trait. They include genes, hormones, physiological structures (such as brain mechanisms), and environmental (social, cultural, etc.) influences. Environmental influences are the ones typically studied by social scientists. The question always remains, however: *Why* do these proximate causes exist? We know that vision is enabled through, among others, a series of rods and cones in the eye, but why have eyes ever evolved? Behavioral differences between the sexes may be ascribed partly to hormones, but why do males and females have different hormonal levels in the first place? Socialization may be another part of the explanation, but why is it so easy to socialize children into the 'appropriate' sex roles, whereas one will find it very hard to obtain the opposite purpose?

According to evolutionary psychologists, the answers to this kind of why-questions have to be sought in our evolutionary history. They are called ultimate or evolutionary explanations. *Proximate and ultimate explanations may, but need not conflict.* Both are needed if we want to completely understand any aspect of life.

Take Hyde (1996) again. She and Mary Beth Oliver conducted a meta-analysis of gender differences in sexuality.<sup>61</sup> They found a robust gender difference in attitudes about casual sex, with males typically looking for sexual gratification and females typically looking for emotional commitment. This is, indeed, what is to be expected from an evolutionary angle. Following Robert Trivers's parental investment theory, the less-investing sex is predicted to be less selective about mating than the more-investing sex. Hyde writes that "[s]ociobiology, social learning theory, social role theory, and script theory all predict this gender difference" (1996:115). In the rest of her argument she seems to assume that either it is a matter of biology or of gender-role socialization. Since gender role socialization, and the sexual double standard in particular, have both predicted and can explain the phenomenon, we do not need an evolutionary approach, she reasons.

I believe she is wrong. This is like saying that languages vary between countries and ethnicities because people are raised in different languages. Indeed, that is one level of the explanation, and it explains why a French-speaking community does not turn into a Japanese-speaking one overnight. But clearly we do not get a firm grasp of the phenomenon of differing languages if our analysis remains stuck at this level. How have languages ever come to develop in different ways? We need a historical approach here. And how has speech itself ever come to evolve? Only an evolutionary approach can provide an answer to this. We will have to clarify not only why our species has evolved the ability to speak, but also how the intricate process of attuning this mechanism to the cultural specifics works. All these levels of analysis are complementary. Lynne Segal is fighting a non-existing enemy when she writes that "[t]here is not, and never could be, any single, unified project with the capacity to encompass the different levels of explanation necessary for understanding the complexity of human affairs" (1999:113). No one is suggesting that the complexity of human life could be reduced to one level of analysis.

Socialization theory can only predict how gender roles will affect people if one already knows what these roles are. And yes, socialization matters a lot - something no evolutionary theorist will deny. What socialization theories cannot explain, however, is how these gender roles came to be in the first place, and why the same basic pattern of sex differences is found in all known cultures - although the cultural expression of them can vary tremendously. The theory of evolution by natural and sexual selection provides a broader framework that does not only explain the

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<sup>61</sup> Mary Beth Oliver and Janet Hyde (1993). Gender Differences in Sexuality: A Meta-Analysis. *Psychological Bulletin* 114:29-51.

ubiquitousness of these sex differences in many species, but can also predict them - although, as I have stressed quite a few times, it took the contribution of (mainly) women researchers to point out the ways in which female behavior had often been assessed from a patriarchal point of view.

An ultimate account of behavior (which posits that the behavior exists because it was favored by selection) does not at all deny that learning is involved in its occurrence (which is a proximate account). Yet there is sometimes an incompatibility between our knowledge of how evolution works and the specific proximate causes proposed by social scientists. The Freudian Oedipus complex, for instance, could never have evolved as a fundamental part of human nature. Because of the reduced viability of offspring produced by incestuous mating, the trait would soon have died out. The Oedipus complex, one of the core presumptions of psychoanalytic theory, would never have been given any credence if anyone had considered the evolutionary fate of a trait that produced such incestuous desires in each and every child. The same goes for Freud's proposition of the death instinct, and for many other psychoanalytic concepts as well.

The process of natural selection thus constrains the number of traits that could possibly exist as evolved psychological adaptations. This observation can spare us a lot of fruitless theorizing, such as in the debate on the origins of sex differences.

To ask *why* a given trait or behavior exists is a legitimate scientific question. It need not be proof of teleological thinking. Darwinian theory is only *seemingly* teleological, because the consequences of biological phenomena constitute an essential part of their explanation. If wings had not conferred evolutionary advantages, they would have been extinguished at an early stage of their development. Why an organ or a preference or a behavior exists is just as legitimate a scientific question as how it works. Answers of the form "in order to..." are legitimate scientific answers. We can say that the liver exists for detoxification, our preference for sweet foods for promoting the ingestion of nutritive sugars, and male sexual jealousy for paternity insurance (see next chapter) (Daly and Wilson 1996). Natural selection is a blind mechanism, but this does not mean that traits are retained in a haphazard way: They are only retained if on average they promote or do not compromise the survival or reproduction of the organism in one way or another.

A common confusion, however, is to imagine that fitness *itself* is what people and other animals strive for. An evolutionary explanation does, however, not imply a conscious intent to reproduce. As the offspring of successful forebears, individuals are predicted to be *adaptation executioners* rather than maximizers of personal

reproductive success (Tooby and Cosmides 1992). A distinction has again to be made between explanations at the proximate and at the ultimate level of behavior. An example: People like to have sex because sex is fun. This is a very good proximate answer to the question: Why do people have sex? The pleasure we experience while having sex, however, evolved 'in order to' ensure that we would do what is necessary in order to propagate our genes. This is an ultimate answer to the question why people have sex. Both answers are right; they are just complementary.

With our modern methods of birth control, sex and reproduction are no longer automatically linked. Sex, however, is still fun. Our bodies and minds have evolved over millions of years in an environment without birth control and they have retained the traits that were adaptive then, although these may no longer be adaptive now. Because evolution occurs slowly, existing humans are necessarily designed for the previous environments of which they are the product. Thus the currently nonadaptive or actually maladaptive character of some traits (such as our desire for fat and sugar) does not imply that they cannot be adaptations.

### **7.3. Sociobiology: Of Genes and Men**

The official birth of sociobiology is dated at 1975 with the publication of Edward O. Wilson's ambitious and notorious book *Sociobiology: The New Synthesis*. In it Wilson had drawn together theoretical ideas (such as those developed by William Hamilton and Robert Trivers) and empirical studies (from the fields of ethology, population genetics, and behavioral genetics) from the last decades in one huge construction, by which animal social behavior was viewed as genetically controlled and evolving through natural selection. Although Wilson did not say anything fundamentally new, his important contribution was that he gave the emerging field a name, and that he advocated its importance in a social climate suspicious of evolution and the genetics of behavior. Much more than ethology, on which it built, sociobiology studied the evolutionary function of behavior (*why* have animals been selected to behave in certain ways?). It used novel methods and insights, with kin selection and the heuristic of the 'gene's-eye view' being two of the most prominent. Looking at a problem from the perspective of a gene and asking which traits would be most likely to increase its frequency in the next generation can greatly help us to understand and hypothesize what characteristics (ought to) have evolved (Laland and Brown 2002; Segerstråle 2000).



When seen against the background of the environmentalist paradigm, which was then (and still is) predominant and considered politically correct, it is not surprising that Wilson's book caused a lot of controversy. Wilson owed the uproar partly to himself, however. Of the nearly 700 pages, the last 30 were devoted to humans. Empirical evidence on the genetic underpinnings of human behavior was scarce in those days. Still he asserted that sociobiology would "cannibalize psychology" (1975:575) and suggested that the other social sciences would suffer the same fate.

Wilson made other dubious claims, such as putting forward the possibility that the time had come "for ethics to be removed temporarily from the hands of the philosophers and biologized." One has, he thought, to consider "the ultimate ecological and genetic consequences" of ethical systems (1975:562). Whereas these are vague assertions - Wilson's position on ethics remained rather unclear and self-contradictory throughout the years (Seegerstråle 2000), they seem to come dangerously near the naturalistic fallacy.

In this respect Wilson differs tremendously from Dawkins (1976), who explicitly disconnects values from facts, as most sociobiologists do. Seegerstråle (1992) notes that feminist critics of sociobiology in general have, however, not cared about the considerable differences in content and approach between sociobiologists. They seem to use 'sociobiology' as an umbrella term for practically any study of sex differences, be it psychological, physiological, or biological. Their criticisms have, moreover, remained remarkably similar during the last decade, although evolutionary theorizing has become much more sophisticated.

Since early sociobiology was an integration of ecology, ethology, and evolutionary biology, it is not that strange that it inherited some of the androcentric points of view that at that time characterized those disciplines. They have already been addressed throughout this work: the focus on dominance relationships and on the importance of males in organizing social life; the stereotyping of females as relatively monogamous, passive, and coy; the neglect of female interests and strategies; the supposed pivotal role of male-male competition in the evolution of a species; and, with respect to humans only, the focus being more on the evolutionary importance of men as hunters than on women as gatherers.

Although female choice was gradually coming to be more accepted in the 1970s, it would still take some time before female interests and strategies were conferred the same status as those of males in evolutionary accounts of behavior. As we saw, various societal and theoretical developments came together to produce this state of affairs. Feminism led to more women studying and contributing to biology, it probably

informed the theoretical perspectives of some of them, and it created a society in which female choice did not seem so strange anymore. There was Robert Trivers's 1972 seminal article on parental investment, which emphatically confirmed the evolutionary importance of female choice. There was the field work of women primatologists - some of them feminists - attesting to the correctness of their suspicion that a lot of earlier work in primatology had been too much a reflection of a patriarchal society. There were also the (feminist and other) critics outside the field who, according to Segerstråle (2000), unintendedly helped strengthen the sociobiological approach, since because of their criticisms, claims about sex differences and about other issues had to be increasingly carefully substantiated.

#### **7.4. Sarah Hrdy and the Lusty Female**

Hrdy's 1981 *The Woman that Never Evolved* (1999b) was of critical importance in challenging several assumptions about female mating behavior. Sociobiological theory maintained that females would tend to be relatively monogamous since, having a quite limited capacity to conceive, reproductively they could win nothing by mating around. Males on the other hand always had the possibility of doing better. Since a male's reproductive success was thought to be dependent upon his eagerness to copulate with any fertile female, selection would have favored sexually assertive males. But, so the argument ran, since copulation serves no function other than insemination and since females in a natural state breed at or near their reproductive capacity, selection would not favor the evolution of a sexually assertive female (Hrdy 1999a).

Hrdy pointed out, however, that actually the females of many primate species are lusty creatures. They solicit sex, actively select their mates, and are willing to take risks in order to mate with many more males than is necessary for insemination. A chimpanzee female, who will have no more than five offspring in a lifetime, will solicit thousands of copulations from dozens of males. Many female primates also engage in sex while not ovulating, which means the chance of conception is minimal. The undeniable eagerness of females in a wide array of primates to engage in nonreproductive copulations with a lot of partners needs an explanation, Hrdy asserted.

Until then, it was supposed that all nonhuman primate species showed strictly cyclical sexual behavior (the period of sexual activity is known as estrus). The continuous receptivity of human females and other womanly attributes such as prominent breasts and buttocks were most commonly explained as a service to males.

With Desmond Morris as the most prominent spokesman for this view in his 1967 book *The Naked Ape*, the human female was assumed to have become uniquely sexualized in order to attract and keep her man, so that he would stay with her and help her rear the highly dependent babies (Hrdy 1999a). Although Hrdy assumes that there is some connection between pair-bonding, paternal investment, and the evolution of continuous female receptivity, her evidence about the sexual behavior of other primates showed that that is not all there is to it, and that the prevailing view of female primate sexuality, human as well as nonhuman, had been extremely male focused.

She showed the sexual sophistication of the human female to be at the highly erotic end of a primate continuum, thus not necessarily demanding a special explanation applicable *only* to humans (another manifestation of this continuum is the observation that an increase in libido occurs among women at midcycle, just as it does in other primates). She pointed out that, instead of females in a natural state breeding at reproductive capacity, there is in fact considerable variance in their reproductive success. This leaves room for natural selection to operate on them. Female strategies that lead more offspring to survive will in the long run become widespread among the population. Female promiscuity may under certain circumstances be such a strategy: Through mating with more than one male, she makes paternity uncertain for the male. This may be a way of preventing infanticide by males and of extracting additional resources for her offspring (Hrdy 1999a).

While to some this may sound like an untestable proposition, it is not. In Hrdy (1999b) we find the results of some research on paternity in langurs and dunnocks. The langurs of Nepal live in harems with frequent overtakes by new males, with most males living as nomads and awaiting their chance to take over a harem. Infanticide by new troop leaders accounts for 30 to 60 percent of all infant mortality. DNA evidence indicates that *none* of the infants killed could have been sired by the males who killed them. The mother's past relationship with the male (before he became troop leader) provides the cue for him to either tolerate or attack a particular infant. Thus by mating with nomad males, who might become troop leaders later on, a female langur seems to try to protect her future offspring from infanticide, since a male virtually never attacks an infant born to a female with whom he has mated, even if she has mated with other males as well.

Evidence that male animals are capable of remembering whether they mated with a particular female comes from European sparrows called dunnocks. Female dunnocks live in cooperative breeding groups in which a female solicits multiple males. These

males, in turn, help provision the chicks more or less in proportion to how much opportunity they had to inseminate the female when she was last fertile. Males are significantly more likely to bring food to young they fathered or young they might have fathered. DNA evidence revealed that males were often *but not always* accurate in assessing their fatherhood.

A female, Hrdy (1999b) concludes, is doing much more than just selecting the one best male from available suitors. She is actively manipulating information available to males about paternity, in order to protect her offspring and to get resources. By being promiscuous, she is doing all she can to secure the survival of her young.

In the next chapter I take a further look at current theories about the benefits of female promiscuity, as well as at the existing evidence for them.

### **7.5. Other Feminist Critiques of Sociobiology**

The list of feminist critiques of sociobiology is long. The discipline was (and is) charged with being fundamentalist, sexist, genetic determinist, unscientific, reductionist, making selective use of animal samples, falsely universalizing behavior, making political statements, and using sexist language. Feminists also objected to the whole notion of animal analogies to human behavior.<sup>62</sup>

Some of these critiques were warranted at the time. There was little hard evidence on humans and analogies to animal behavior were sometimes made without caution. Today it is recognized that one should not look at isolated cases but try to draw principles from a whole range of species, try to discern the patterns in it. Under what circumstances, for instance, do males defer to females? (Hinde 1986; Hrdy 1999a). Another example of a – theoretically predicted *and* found - pattern is that across animal species paternal care will be small or nonexistent when paternity certainty is low, when it does not substantially improve offspring survival rates, or when it severely compromises mating opportunities with other females (Geary 2000). Also, across species with internal fertilization the less investing sex – typically the males – is predicted and found to try to regulate the female's copulation behavior in order to ensure paternity (Trivers 1972; Birkhead 2000).

A particularly telling example of a pattern is that of the relationship between relative testes size and level of promiscuity in primates. A neat correlation can be found between sperm volume as indicated by testicular weight corrected for body size

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<sup>62</sup> Bleier 1985; Blackman 1985; Fausto-Sterling 1992; French 1992; Haraway 1991; Harding 1985; Hubbard 1990; Lenington 1985; Noske 1989; Rose 1983; Rosser 1992; Sapiro 1985; Segal 1999; Tobach and Sunday 1985.

and degree of sperm competition (that is, the likelihood that the female has recently mated with another male, with her reproductive tract still containing competing sperm). The function of producing a large amount of sperm is hypothesized to be that of displacing rival sperm, hence increasing the odds of fertilizing a female's egg. Gorillas, who guard their harem of females very intensively and thus do not have to fear rivals, have very small testes (accounting for 0.02 percent of body weight). They are followed by orangutans (0.05 percent of body weight), with orangutan females being slightly promiscuous. Chimpanzees, who are not able to keep females from mating around, have very large testes (0.27 percent of body weight). Human testes are larger than those of orangutans, but much smaller than those of chimpanzees (0.08 percent of body weight), indicating that our female ancestors were not monogamous. They were more promiscuous than orangutans, but not nearly as promiscuous as female chimpanzees (Hrdy 1999b; Miller 2000b).

Segerstråle (1992) notes that the critiques in fact address fundamental problems of science in general and biology in particular, while formulated as attacks on individual scientists. She thinks that the sociobiology controversy was not only a nature-nurture conflict, but that it was also a matter of clashing conceptions of good science, particularly with regard to the study of human behavior. To sociobiologists there was nothing wrong with being speculative, nor with deliberate oversimplification. They believed this to be crucial for theory formation. In their eyes the criterion for a good theory was testability and hence they felt entitled to draw conclusions about sex differences in behavior on the basis of physiological or psychological research.

Some critics on the other hand believed such studies to be inappropriate for our species. When studying humans one must act in a purist way: not working with assumptions, but only with data that are known to be true. What sociobiologists considered creative science, the critics considered bad science. To them it seemed clear that sociobiologists could only be choosing to do 'bad' science out of political motives, whereas sociobiologists believed that errors would be filtered out simply by doing *more* science (Segerstråle 1992, 2000). And this is indeed what has gradually been happening during the past few decades.

All of the earlier-mentioned charges are repeated today with respect to evolutionary psychology and current sociobiology, in spite of current theory being much more sophisticated, evidence based, and female oriented. I focus on one typical habit of the critics: what Segerstråle calls "massaging texts through moral reading" (2000:208).

## **7.6. Moral Reading**

According to some feminist critics (Blackman 1985; Bleier 1985; Fausto-Sterling 1992; French 1992; Hubbard 1988, 1990; Segal 1999), an evolutionary account of sex differences may well be *presented* as a mere explanation of the existence of sex roles, but what sociobiologists *really intend to demonstrate* is that it is impossible to establish a society where true sexual equality exists. What is remarkable is the selective way in which the critics scrutinize the target texts in order to arrive at their preferred interpretation.

According to Segerstråle (2000), the basic idea behind this kind of 'moral reading' is to imagine the worst possible political consequences of a scientific claim. In this way, maximum moral guilt might be attributed to the perpetrator of this claim. Because the critics 'know' what evolutionary theories are necessarily about, they 'help' the reader by teasing out the 'true' underlying messages. This guided reading starts with the necessary assumption that evolutionary theorists have a political point to prove, after which all nonpertinent quotations are ignored, and only the ones that bring out the true meaning are presented out of context.

Take the way in which some of Wilson's quotes on sex differences are taken as proving his "patriarchal agenda" (French 1992:124). Often Wilson's position is represented in a misleading way, and sometimes in a downright false way. We find Marilyn French saying that Wilson "asserts 'males are dominant over females'" (1992:122), whereas he actually states that "males are *usually* dominant over females" (1975:291, emphasis added) and thereby offers examples of species in which females are dominant, such as the hyena, the vervet monkey, and Sykes' monkey. With regard to Wilson's treatment of the territorial behavior of pike blennies and his observation that female blennies are not challenged by the males, she writes that he "interprets this to mean males control females" (1992:123). In fact the only thing Wilson writes is that "[v]ery probably the tolerance toward them is the prelude to courtship during the breeding season" (1975:260). Nowhere do we find Wilson writing that he thinks males are "superior", as French asserts he does (1992:123). Obviously French tailors her interpretation to fit her preconceived scheme of things.

Only with regard to Wilson's choice of language do her critiques seem reasonable. The use of the word 'harem', for instance, may often be misapplied when discussing all-female societies where females associate with males only at mating season or societies where females live together with one resident male. It is possible that females created such an arrangement to avoid male aggression (Smuts 1995, 1996).

Wilson's description of female sexual posture as 'receptive' or 'submissive' is another example of word use that is rightly criticized by French, because it seems to imply that penetration equals male domination.

To infer on this small linguistic basis that Wilson is defending a patriarchal agenda does, however, not seem to be justified. A more moderate, sensible interpretation would be that Wilson's word choice unwittingly reflects the cultural climate of that time. That interpretation gets reinforced if one knows that Wilson actually considers himself a feminist (Segerstråle 2000). Indeed, one obvious way to assess the correctness of the critics' assumptions about their targets' political motivation would be to see whether these hold up *empirically*. But as we have seen, the connection between right-wing political interests and sociobiology or evolutionary psychology, however politically useful it may be for the critics, does not hold up in practice.

Wilson's elaboration on sex differences in his 1978 book *On Human Nature* has been another object of moral reading. He suggested that "at birth the twig is already bent a little bit" (1978:132) and that, as a society, we can choose what to do with that. He offers three possible ways to follow: We can condition people so as to exaggerate sex differences in behavior, as almost all societies do; we can train them so as to eliminate these differences; or we can just provide equal opportunities but take no further action. All three options, he points out, have their social benefits *and* their costs. The only firm conclusion to be drawn, according to him, is that "the evidences of biological constraint alone cannot prescribe an ideal course of action", but "they can help us to define the options and to assess the price of each" (1978:134).

Wilson clearly writes that it is "the modest *predisposition* toward sex role differences" that is "unavoidable" (1978:135, emphasis added). Fausto-Sterling (1992) takes this as evidence that he is defending the status quo. In a later interpretation this becomes: "[H]e sets a price on malleability's head and tells us that this is too dear for most of us in a democratic society to be willing to pay" (Fausto-Sterling 2000a:184).

No such thing is asserted by Wilson. He is just conducting an analysis of different alternatives and their consequences. One would think it is a wise strategy to assess the options in a relatively dispassionate manner before starting to reform humanity by trying to erase all sex differences. We might want to try and learn something from other large-scale historical attempts at reforming human nature, such as those in Stalinist Russia and in China under the Cultural Revolution, which turned out to be a nightmare. The ambition to remake human nature turned Stalin and Mao into dictators and mass murderers. There have been attempts to create a new and better society with less terrible results – utopian communities, the Israeli kibbutzim – but none that

are unqualified successes. The communes that sprang up in the United States and Europe in the nineteenth century and early decades of the twentieth, all collapsed from internal tensions. The collectivist philosophy of the kibbutzim was undermined by their members' desire to live with their families, to own their own clothing, and to keep things acquired outside the kibbutz (Pinker 2002).

From an evolutionary point of view, human behavioral flexibility is expected not to be boundless. That does not mean that flexibility is not considered a crucial asset of our species, and evolutionary psychology stresses it still more than does sociobiology.

### **7.7. Cognitive Science Setting the Stage for Evolutionary Psychology**

In the 1960s a deep change took place in psychology. Radical behaviorism was refuted by many experiments showing that the external environment is not the sole determinant of behavior and that organisms come equipped with particular types of learning. Learning language, for instance, comes easily in children, although the rules are very complicated. This ability stands in sharp contrast with learning how to read or carry out divisions. We obviously learn a lot of complex things with seeming ease: making coherent sense of a mass of information coming through the eyes, for instance, or performing everyday but highly complicated motor maneuvers (Buss 1999; Pinker and Bloom 1992; Plotkin 1997).

Behaviorism gave way to cognitivism, which became the dominant approach in psychology and has remained so ever since. Cognitivism accepted the existence of hidden causes of behavior and made it acceptable again to have recourse to them in psychological theory. These hidden causes were, and are, assumed to be identifiable with brain structures and functions. Noam Chomsky, for instance, argued that the spontaneity, rapidity, and uniformity of language learning in children can only be explained by the existence of neurological structures that are the source of this rule-governed process. Similarly it was argued that certain features of human memory can only be explained by the presence of some information-processing device. Both kinds of neurological device are examples of structures of the mind that in nontrivial ways cause our behavior to be what it is (Plotkin 1997).

In cognitive science (and in evolutionary psychology) the word 'mind' refers to an information-processing description of the functioning of an organism's brain. With 'information' any psychological process can be meant, such as reasoning, emotion, motivation, or motor control. Cognitivism is about information processing: It describes what kinds of information an organism takes as input, what procedures it uses to



transform that information, what kinds of data structures (representations) those procedures operate on, and what kinds of representations or behaviors it generates as output (Tooby and Cosmides 1992).

What the early cognitivists did not do, however, was ask about the origins of mental devices such as the neural structures underlying learning and intelligence. Moreover, most cognitivists carried over the behaviorist assumption that the mind is domain-general. Human cognitive mechanisms were seen as constituting a large computer designed to process any information it was fed. The idea that the human mind might be biased to attend to specific kinds of information did not occur. Whereas in behaviorism the mind was regarded as a blank slate or a sponge, it was now seen as a general-purpose computer (Buss 1999).

The mind, however, evidently is not indiscriminate in the knowledge it accumulates, nor does it simply solve problems in the way a computer does. Just contrast the ease with which children acquire language with the effort it takes them to learn how to read, write, and solve abstract mathematical problems, and it will become clear that the human mind is not a general-purpose computer. It is a creative system that seems to contain lots of specialized devices for solving specific and highly complex problems, such as making sense of speech sounds, of the visual environment, and of the intentions of other human beings. In the 1980s many cognitive psychologists started to address the nature and number of these devices, which were called 'modules'. Jerry Fodor was the first to introduce this idea of modularity in his 1983 *The Modularity of Mind*. The existence of modules was attested by numerous lines of evidence, including their linkage to specific brain regions, their characteristic patterns of development in children, and the patterns found when they break down. Face recognition, for instance, seems to be a separate module within the visual system. This is strongly suggested by the fact that newborn infants automatically attend to facelike patterns; that humans are capable of recognizing a very large number of faces while being very bad at describing them with words; and that prosopagnosia, the inability to recognize faces, arises from damage to a specific region of the prefrontal cortex (Mithen 1996; Plotkin 1997).

Today cognitive scientists acknowledge that there can be no learning without innate circuitry to do the learning. They agree that the mind is modular. There is not something like 'the intellect' or 'the understanding' that does all the work; rather, there are many parts cooperating or struggling among themselves to generate thoughts and behavior. Cognitive scientists are divided, however, on the question of just how much standard equipment comes with the human mind. The disagreements

are over the details: how many innate learning networks there are, and how specifically engineered they are for specific jobs. Is their innate organization restricted to simple biases in attention or memory, or is it specified largely by the genes? (Pinker 2002). Informed by a Darwinian framework, evolutionary psychologists argue in favor of the latter.

### **7.8. The Mind as a Swiss Army Knife**

Evolutionary psychology, which is simply psychology informed by evolutionary biology, argues that we can only understand the nature of the human mind by trying to grasp the purpose for which it was designed. It endorses the claim that our cognitive architecture is largely the product of natural selection. The mind is such a complex, functional structure that it could not have arisen by chance. The only known process that can organize complex functional design, that is, complex design that can solve an adaptive problem, is evolution by selection. Evolutionary psychology thus wants to supply the necessary connection between evolutionary biology and the complex, *irreducible* social and cultural phenomena studied by social scientists.

Evolutionary psychologists want to do for the brain what physiologists have done for the body: identify its functions and explain how they work. They assume that the information-processing mechanisms that constitute the human mind are adaptations: mechanisms<sup>63</sup> that evolved as a way of coping with recurring problems of survival and reproduction, such as parenting, selecting the right foods to eat, and selecting the right mate with whom to have children, in the course of our evolution. We probably share some aspects of these cognitive traits with other primates. Other aspects, however, are unique to humans and must have evolved during the two million years our ancestors spent as Pleistocene hunter-gatherers.

Two million years is, of course, a very long time period. The climate was highly variable, and humans during that time spread throughout Europe, Asia, Australia, and perhaps even North-America, thus encountering very different ecologies. Yet to some extent the past was much like the present, because countless features of the environment remained stable. The laws of physics and chemistry were the same, for instance. At an abstract level, geography and ecology did not really change either:

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<sup>63</sup> Modules might be neatly mapped upon discrete pieces of neural tissue, or they might be constituted by distributed characteristics of the brain. This implies that neurobiologists will not necessarily be able to localize existing modules. Moreover, it is far from obvious that modules will be elegantly designed. Evolution proceeds by tinkering with what is already in place, not by starting all over. New cognitive systems will probably be messy patchworks and modifications of ancient systems (Samuels 2000).

There were rivers, hills, caves, plants, animals, pathogens, predators, snakes, and so on. The social environment remained relatively stable as well, with there being two sexes, with people living in groups, having children and close and distant relatives, and with women getting pregnant whereas men did not. A host of other problems recurred with sufficient regularity to retain or produce selection pressures for specific problem-solving devices, such as the problems of group living, cheater detection, and social cooperation. Those aspects of the ancestral environment that were relevant to the evolution and functioning of our adaptations are called the environment of evolutionary adaptedness or EEA. Roughly stated, the EEA is the environment in which we evolved and to which we are adapted. It must be seen as a statistical set of selection pressures, rather than as an actual physical environment (Hagen 2006).<sup>64</sup>

According to evolutionary psychologists, it is unlikely that new *complex* designs could have evolved in the short time span since the appearance of agriculture 10,000 years ago - equaling 400 human generations - since natural selection does not work that fast (Cosmides, Tooby, and Barkow 1992). Recently, however, studies have suggested rapid brain evolution in humans in the past 10,000 years (Evans et al. 2005; Mekel-Bobrov 2005; Voight et al. 2006). With some of the genetic changes probably being linked with brain size and intelligence, and having spread more in Europe, Asia, and the Americas than in sub-Saharan Africa, these studies have drawn sharp fire from critics. If they are found to be correct, evolutionary psychologists will have to revise their concept of modern humans possessing a 'Stone Age mind'. This may, however, not dramatically impact upon their theorizing. Evolutionary psychologists' core research program is to analyze the universal design of the human mind. They want to find out what makes us all human (taking the evolutionarily predictable male-female difference into account), rather than teasing apart the causes of individual differences or group differences. Changes that have taken place in the past 10,000 years are most probably changes that made human groups differ from each other.<sup>65</sup>

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<sup>64</sup> The EEA concept was first formulated in 1969 by John Bowlby and incorporated into evolutionary psychology by Donald Symons (1979). Organisms cannot evolve adaptations to random variation; only to features of the environment that are relatively stable. Their structure therefore reflects the structure of the environment in which they evolved: their EEA. The EEA concept is a logically necessary aspect of the theory of evolution by selection. Each species has its own EEA, and the same goes for each organ. Our lungs, for instance, evolved in an oxygen atmosphere (the lung EEA). Our immune system evolved in response to pathogens (the immune system EEA) (Hagen 2006).

<sup>65</sup> It is quite ironic that vehement critics of the concept of a Stone Age mind will have to accept that recent brain evolution implies a high probability of inherent racial cognitive differences, a politically incorrect notion.

The view of the mind advanced from an evolutionary framework is that of a Swiss army knife, consisting of hundreds or thousands evolved psychological mechanisms or mental modules. Just as our bodies contain thousands of specialized mechanisms, directed at the solution of specific adaptive problems (we have lungs for oxygen uptake, a liver to filter out toxins, a heart to pump blood, etc.), so does our mind - which is, after all, a physical part of our body (Humphrey 1992, 2000). It is this multiplicity of domain-specific mental modules, guiding us to correct adaptive solutions to adaptive problems, that gives rise to the tremendous flexibility of behavior that characterizes modern humans, according to evolutionary psychologists (Buss 1999).

Although it may seem sensible to think that a general problem-solving mechanism is more flexible than are content-specialized mechanisms, since the organism is not kept from doing what is desirable (or adaptive) by a 'rigid' architecture, this view is wrong. As Donald Symons has expressed it, "[t]here is no more reason to anticipate that all problems can be solved by one general-purpose mental mechanism than there is to anticipate that all physiological processes can be the result of one general-purpose organ" (1987a:126). He continues: "Extreme behavioral plasticity implies extreme mental complexity and stability; that is, an elaborate human nature. Behavioral plasticity for its own sake would be worse than useless, random variation suicide" (1987a:127). After all, the greater the variety of possible adaptive behaviors, the greater the variety of possible maladaptive behaviors. David Buss (1999) suggests that we think of a carpenter's toolbox. The carpenter gains flexibility not by making use of one highly general tool, but by having many specific tools in his toolbox. These can then be used in many combinations that would not be possible with the one general tool.

Indeed, cognitive and artificial intelligence researchers consistently find domain-general systems too weak to solve virtually any complex real world task. The reasons for this can be expressed by two related concepts, called by artificial intelligence researchers and other cognitive scientists 'combinatorial explosion' and the 'frame problem'.

Combinatorial explosion refers to the fact that with each new degree of freedom added to a computational system, the total number of alternative possibilities that it faces grows exponentially. The system cannot possibly compute the anticipated outcome of each alternative - something that is called the frame problem - and thus must make a choice without complete consideration of the overwhelming range of possibilities. The frame problem is known by different names in linguistics, semantics, developmental psychology, and perception as well. A system that only has a domain-

general architecture could never solve this problem. To be sure, it *does* need general problem-solving techniques, such as the ability to make associations, the ability to recalibrate based on the consequences of actions, and the ability to reject propositions because they are contradicted. But it also needs specialized problem-solving techniques that are only activated when they encounter the domains to which they are applicable, such as faces, grammar, or falling in love. Any past design for an organism that could not generate appropriate decisions or perceptions would not have propagated and consequently would have been removed from the population in the next generation.

The frame problem was illuminated for the first time by artificial intelligence researchers. To their great surprise, they found that it was very difficult to discover methods that would solve problems that are easy to humans, such as seeing or moving objects. To get their programs to handle even absurdly simplified tasks such as moving a few blocks around, they had to build in substantial "innate knowledge" of the world. To move an object, make the simplest induction, or solve a straightforward problem, the computer needed a sophisticated model of the domain in question. It needed content-rich and specialized frames. A frame provides a worldview; it carves the world into defined categories of entities and properties, defines how these categories are related to each other, provides methods for interpreting observations, suggests what information is lacking and how to get it, and so on. Whether talking about an artificial intelligence system or an evolved organism, the problem is the same: The world cannot supply to the system what the system needs first in order to learn about the world. Therefore the essential kernels of content-specific frames must be supplied initially by the architecture. In humans these content-specific mechanisms (modules) are, among many others, a face recognition module, a spatial relations module, a fear module, a social-exchange module, an emotion-perception module, a kin-oriented motivation module, an effort allocation and recalibration module, a child-care module, a sexual-attraction module, a semantic-inference module, a friendship module, and a grammar acquisition module. It is difficult for us to imagine, however, that these frames are indispensable prerequisites for functioning as a human being, precisely because they make us feel as if we steer through the world effortlessly. We suffer from 'instinct blindness' (Tooby and Cosmides 1992).

Hence behavioral flexibility does not mean that responses are unlimited. It means the capacity to adjust behavior in an appropriate or successful way to the specific circumstances faced. Thus evolved structure does not constrain; it creates or enables. It is because of, and not despite, this structure that our behavior is so context-

sensitive. Some social scientists, however, think that both notions of flexibility (flexibility as the absence of any limits on responses and flexibility as contextually appropriate behavior) are the same, or that the first kind automatically leads to the second kind. The problem of combinatorial explosion and the frame problem show that this cannot be true (Tooby and Cosmides 1992).

It is not, however, because life's machinery is designed by natural selection that it incarnates some generalized reproductive striving. People want many things, but they do not want such a hazy thing as 'to reproduce'. They long for sex because they have a sex drive and because sex feels nice. They may long for children because the idea of having a child appeals to them. But that is not the same as wanting a child because of the desire to *reproduce* (this, by the way, makes it possible that people adopt children and love them as their own).

One must not confuse the general process that produces adaptations with the adaptations themselves. No mechanism can serve the general function of promoting gene survival because there is no general, universally effective way of doing so. Adaptations serve *specific* functions, such as regulating blood pressure, perceiving edges, detecting cheaters in social exchange, and thousands of other things. Selection acts in such a way that the things that enhance our survival or reproduction tend to be experienced as pleasurable. Thus human beings, like all other organisms, have been designed by selection to strive for specific goals, such as keeping warm, finding a good mate, achieving social status, and having sex. Our ways to achieve these ends are, however, uniquely flexible, and the psychological mechanisms underpinning this flexibility make possible new means to the same ends. Our love of sweet foods, for instance, was shaped by natural selection in prehistoric times, when high-calorie food was scarce. Flexible as we are, we have been able to develop many ways of obtaining and concentrating sugar, but the goal of eating it remains the same: to experience the sensation of sweetness (Symons 1992).

The evolved architecture of the brain processes environmental information in a way that guides feelings and behavior toward ends that were adaptive in past human environments, but that does not mean they are still adaptive today. Take again the example of sugar. In ancestral populations, sweet foods were so scarce that problems of obesity were improbable to arise. In industrialized societies today we no longer need a sweet tooth in order to survive, because there is food in abundance. But we have retained this preference for sweet tastes, with fatness and teeth filled with cavities as a result (Low 2000). The same goes for our tastes for salt and fat: Until recently, when salt and fat were hard to come by, these tastes were adaptive. Today they make us

suffer from diseases of civilization. Indeed, the circumstances of modern Western life provide unprecedented scope for people to express their adaptations, as Donald Symons (1987b) explains. Our preferences for sugar, salt, and fat are evidenced much more dramatically in modern Western societies than in traditional ones, because we can produce and buy almost anything we want. Following this train of thought, we might expect many highly successful commercial products (e.g., fast food, porn, romance novels) to evince humans' underlying evolved tastes. This does not mean that there should be any reproductive advantage in consuming those products; they just constitute evidence about the human – or male, or female – psyche. What it does mean, is that for students of human evolution who tend to think of human behavior as adaptive: sociobiologists and behavioral ecologists, modern societies will be least instructive, because life circumstances there differ tremendously from those in natural environments.

### **7.9. Neural Plasticity: A Challenge to the Modularity View?**

The most significant challenge to the view that the human mind consists largely of innate, domain-specific modules comes from neuroscientific experiments indicating high cortical plasticity. Some neuroscientists (e.g. Quartz and Sejnowski 1994) have argued that these findings make nativist theories appear implausible. Some commentators have used the findings to especially dismiss evolutionary psychology. David Buller and Valeries Gray Hardcastle (2000), for instance, claim that "while the adult human mind/brain typically contains a degree of modularization, its 'modules' are neither genetically specified nor evolutionary adaptations. Rather, they result from the brain's developmental plasticity, which allows environmental task demands a large role in shaping the brain's information-processing structures" (2000:307). Before assessing the validity of these interpretations, we will have a look at some of the neurobiological findings.

In the 1960s some pioneering experiments were conducted by neurophysiologists David Hubel and Torsten Wiesel. With an eye patch they deprived newborn kittens of visual experience in one eye. As a result the amount of brain tissue of the visual cortex devoted to the open eye expanded, and the amount devoted to the covered eye shrank. The finding seemed to indicate that early brain structure is the product of experience. In a second experiment, however, kittens were deprived of visual experience in both eyes, and their brain tissue developed pretty much normally. Taken together, these two studies suggest that neural architecture is shaped prior to

experience, but that this rough draft is followed by a stage of fine-tuning to environmental circumstances.<sup>66</sup> Other, more recent experiments yield similar findings. In primates, for instance, it was shown that the part of the visual cortex receiving signals from the right and left eye actually forms in the dark of the womb. In ferrets who had their eyes removed right after birth, this part of the cortex developed just fine as well. Even when cutting off information from *all* the senses in mice through genetic engineering, researchers couldn't find any differences between the brains of normal mice and the brains of newborn mutants. Internally generated neural activity seems to suffice for normal cortical development (Marcus 2004).

There are, however, also experiments indicating that brain organization can radically alter due to certain kinds of experience. Working with newborn rats, when transplanting primordial (not yet fully developed) cells from the part of the brain that interprets touch to the visual cortex, researchers found that these neurons started behaving as visual neurons. It is even possible to transplant neurons from one species (e.g. fetal pigs) to another (e.g. adult rats). When the 'object recognition part' of the brains of newborn monkeys was removed, within ten months these monkeys succeeded in recognizing objects nearly perfectly, apparently because the task of object recognition had shifted to (mostly nearby) uninjured parts of the brain. In animals that have been deafened at birth and in humans born deaf, parts of the brain that are normally devoted to hearing start responding to visual stimuli. And vice versa: In people born blind the visual cortex starts responding to auditory input. Other natural experiments with humans also indicate a remarkable resilience of the young human brain. Infants who suffer severe brain damage at birth, for instance, have been known to develop almost normal cognitive functioning. And a few young children who had to have their entire left hemisphere to be removed, learned to talk more or less normally (Marcus 2004).

What do these findings mean? First, as cognitive psychologist Gary Marcus (2004) says, there is no reason to see plasticity as being in conflict with the idea of innate structure. Innate does not mean unmalleable; it just means organized prior to experience. What the experiments show is that this initial structure can be changed afterward in response to experience. The brain seems to use internally generated cues to prewire itself and environmentally generated cues to rewire itself. This flexibility does not at all entail an equipotentiality in which any part of the cortex could grow into

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<sup>66</sup> Psychology textbooks discussing the subject of experience and early brain development almost always point at this experiment, but they almost always stop at the first half of the story (Marcus 2004).



any other, Marcus stresses. In transplant studies, not every transplant takes on the properties of its new surroundings. Moreover, there have been no demonstrations of primordial cell exchanges between *nonsensory* areas. Thus the transplant studies may rely heavily on the similarities between donor and host. The early stages of visual and auditory processing are, for instance, quite similar. And although children can recover considerably from early brain damage, it is also true that they face lasting deficits.

Second, what these findings show is that the brain can recover from an injury. This is not as exciting as it may seem, Marcus asserts, because this also goes for the rest of the body. Seen from this broad perspective, perhaps the only real surprise is how *inflexible* the brain is. Most parts of the body constantly replace their cells, whereas the brain has to repair itself mainly by modifying the connections between neurons, not so much by generating new neurons.

Third, the cortex is not the entire brain. Beneath it are other brain structures driving important parts of human nature, such as the amygdala (processing emotions) and the hypothalamus (originating sexual desire and other appetites). These subcortical structures are far less plastic. Dismissing evolutionary psychology on the basis of cortical flexibility, as Buller and Hardcastle (2000) do, is not convincing, as any innately shaped human ability would have to be implemented in a network of cortical and subcortical areas, not in a single patch of sensory cortex (Pinker 2002).

Fourth, according to Steven Pinker (2002), the plasticity metaphor is misleading. The principal function of plasticity is not to allow variable environments to shape variable bodily or brain organs. Our - genetically specified - developmental programs do the opposite. They ensure that despite variations in the environment (nutritional variations, other genes, growth rates over the lifespan, the physical and social environment, etc.) a *constant* organ develops, an organ that is capable of doing what it should do. Like the rest of the body, the brain must use feedback circuits to attain that goal. The end result may be a brain some faculties of which are located in different places in different people. There are severe limits to what a brain can take, however. That children have been able to grow up relatively normal after the loss of an entire hemisphere may be a special case, due to the primate brain being basically symmetrical. It is not improbable that both hemispheres are genetically programmed with more or less the same abilities, together with small biases that lead each hemisphere to specific specializations. If one hemisphere is lost, the other may be put to full use. In cases where a child lost a part of the cortex in *both* hemispheres, it suffered permanent damage. If cortical regions were interchangeable and organized by

the input, another part of the brain should have taken over these functions (Pinker 2002).

In short, there does not seem to be any reason to reject the idea of innateness. Researchers who are doing so are putting up a false contradiction between built-in structure and plasticity. Moreover, some of them seem to be wildly exaggerating the brain's flexibility potential.

### **7.10. Indications of a Panhuman Design**

No single discovery can prove that there is a universal, panhuman design of the mind stemming from our hunter-gatherer existence, but many lines of evidence converge on it. Findings from anthropology, evolutionary biology, cognitive science, linguistics, comparative psychology, neuroscience, developmental psychology, and artificial intelligence research all point in the same direction: that of an evolved and specialized architecture of the mind - be it that men and women have evolved to behave differently on a psychosexual level (Brown 1991; Buss 1999; Geary 1998; Low 2000; Pinker 1997, 2002; Tooby and Cosmides 1992). We have a look at a few examples stemming from anthropology, developmental psychology, and neuroscience.

Human life and human societies are full of structural patterns all over the world. In *Human Universals* (1991) anthropologist Donald Brown describes more than 400 statistical regularities recurring in every known culture. Humans have characteristic emotions. They live in groups and often favor their close kin. They have a sense of being a distinct people, and important conflicts are structured around in-group-out-group antagonisms. They distinguish right from wrong. Their ideas include a worldview. They compete over limited social or subsistence resources. They create enduring, mutually beneficial relationships with nonrelatives. They use language to organize, respond to, and manipulate the behavior of others. Their speech is highly symbolic. They gossip. Their kin terminology includes terms that distinguish male from female and some generations from others. They have a sex terminology that is fundamentally dualistic, even when it comprises more than two categories; in that case the third (and sometimes fourth) category is a combination of the two basic sexes or a crossover sex. They know romantic love, sexual attraction, and sexual jealousy. Sex is a topic of great interest to them, and there are societal regulations with regard to it. They have a concept of the person in the psychological sense. They know that people have a private inner life. They are tool makers and use tools to make tools. They have rituals, including rites of passage. They have standards of sexual

attractiveness, including signs of good health and a male preference for female youth. They have leaders, although these may be situational or ephemeral. They have statuses and roles. They show affection as well as feel it. They have laws proscribing violence, murder, and rape (although they may justify these actions in some contexts). They have a division of labor, minimally based on sex and age. Women have more child-care duties. Men are dominant in the public political sphere and are more physically aggressive. The list goes on and on. Tooby and Cosmides (1992) conclude that our immensely elaborate species-typical physiological and psychological designs not only constitute regularities in themselves, but that they also impose within and across cultures all kinds of regularities on human life, as do the common features of the environments we inhabit.

The knowledge that evolved cognitive modules generate is always *implicit*: It is spontaneously inferred by regularities in the outside world, without awareness of the underlying principles. Young children everywhere intuitively recognize that living things and inanimate objects are fundamentally different, for instance. They automatically attribute an 'essence' to different kinds of living creatures; thus they will still recognize a cat with only three legs as a cat. In all societies children seem to have this kind of intuitive knowledge about the world in at least four domains: language, psychology, physics, and biology. Their social behavior indicates an implicit understanding of the costs and benefits of reciprocal relationships. They do not have to be taught Euclidean geometry in order to know that the shortest distance between two objects is represented by a straight line, or to be able to navigate through a room. Infants everywhere spontaneously cut up the strings of sounds that come from their parents' mouths into intelligible units. They have a rudimentary understanding of the emotions signaled by facial expressions. From a very early age they grasp the properties of physical objects: solidity, gravity, and inertia. They understand physical causality. No explicit instruction is needed for these cognitive abilities to develop, and they appear too early in development to result from the infants' experience of the world. Not surprisingly, they all concern relationships that reflect the structure of the world as it has been for thousands of ages or longer. In other words, it concerns knowledge that is directly related to a hunter-gatherer lifestyle. The classification of plants and animals, for instance, is similar in all cultures and turns out to be highly consistent with the scientific categorization of these species (Geary 1998; Tooby and Cosmides 1992).

This implicit understanding of the structural properties of the physical, biological, and social world appears to be represented in the structure and functioning of the

underlying neural systems. In the view of many developmental researchers, most of these innate competencies are only skeletal at birth and are refined through the child's interactions with its environment. "[I]nnate skeletal knowledge biases the types of information that infants and children attend to, influences the ways in which this information is processed and represented, and motivates infants and children to engage and to learn about their local ecologies." Also, "an inherent motivation to seek out environments that correspond to the evolved modules ... is expected" (Geary 1998:200). Although the specific architecture of these cognitive modules is not completely known, it seems clear that most of them are open systems, designed to be influenced by contextual factors, especially during childhood (Geary 1998).

Another example of an evolved cognitive module is the 'theory of mind' module. At roughly three years of age children across cultures develop a theory of mind: the capacity to make inferences about the beliefs and desires of other people. Cognitive psychologist Nicholas Humphrey (1976) has proposed that individuals with an ability to 'read' other people's minds would have achieved a relatively greater reproductive success, since they would have been able to predict the behavior of others. Thus we can identify selection pressures for a theory of mind module and we find evidence for its existence in developmental psychology. Moreover, evidence from cognitive neuroscience suggests its localization in the brain. Developmental psychopathologist Simon Baron-Cohen (1995) showed the condition of autism, in which individuals seem to be unaware of what other people are thinking and feeling, to probably arise from an impairment of this module. Having no theory of mind means not being able to empathize, to put oneself into someone else's shoes. In an extension of this approach, Baron-Cohen (2003) considers mindreading in the broader context of sex differences in empathy. He describes the autistic brain as "the extreme male brain": autistic individuals have impaired empathizing, a quality in which females typically show an advantage, but are obsessed by systemising, a quality in which males typically excel.

Evolutionary psychology's metatheory is still evolving. Some evolutionary psychologists think, for instance, that leading researchers such as John Tooby and Leda Cosmides, Steven Pinker, and David Buss, put too much stress on the universality of evolved human nature and too little on individual differences. Thus Patricia Gowaty (1992, 1997b, 2003) argues that the importance of within-species variation has been underestimated within the leading paradigm. According to Geoffrey Miller (2000a, 2000b) current metatheory is too restrictive, focusing too much on the survival value of the human mind and underestimating the role of sexual selection, which accounts much better for high individual variation. In the future the relative

value of these different perspectives will have to be measured through multiple criteria, such as empirical testing, explanatory power, and predictive success.

### **7.10. Characteristics of Adaptations**

The concept of adaptation has been carefully analyzed by evolutionary biologist George Williams in a now-classic work: *Adaptation and Natural Selection* (1966). An adaptation may be defined as an evolved solution to a specific problem that contributes either directly or indirectly to successful reproduction. Sweat glands, for instance, may be adaptations that help solve the survival problem of thermal regulation. Mate preferences may be adaptations that guide the successful selection of mates. Williams believed that the concept of adaptation should be invoked only when necessary and provided criteria for determining when we should do that. In order to call something an adaptation a lot of criteria must be fulfilled. It must be a system of inherited and reliably developing properties that recurs among members of a species. It must be so well-organized and such a good engineering solution to an adaptive problem that a chance coordination between problem and solution is ruled out. Standards for recognizing adaptations thus include factors such as economy, efficiency, complexity, precision, specialization, and reliability, which render the design too good a solution to a defined adaptive problem to be a coincidence (Williams 1966). This does not mean that it is a *perfect* solution. Selection favors a mechanism when the benefits outweigh the costs relative to other designs.

Looking for adaptations means distinguishing them from by-products of adaptations and from random effects or noise. The umbilical cord, for instance, is an adaptation. The belly-button that comes along with it is, however, a by-product. The particular shape of a person's belly-button may be considered as just a random effect (Buss 1999).

The standard example of an adaptation is the vertebrate eye. It consists of an extraordinarily complex, organized arrangement of specialized features, such as the pupil, the iris, the lens, the retina, the rods and cones in the retina, which transform light into electrochemical impulses, the optic nerve, and the visual cortex, where the incoming signals are further analyzed by a whole array of information-processing mechanisms that also constitute crucial parts of the visual system. Besides being highly coordinated and complex, the eye does something very useful for the organism: It provides information about the outside world. Through retaining those accidental modifications that improved performance, selection has gradually made the original

light-sensitive patch of the original single-celled founder organism into the complex vertebrate eye (Humphrey 1992; Tooby and Cosmides 1992).

Ironically, this single most uncontroversial example of an adaptation is *as much* a physiological adaptation as a psychological one, as Tooby and Cosmides (1992) point out. It is designed to construct cognitive models of the world: of the objects that are present, of colors and shapes, of the faces that are present, and of the emotional expressions on those faces. The argument that perceptual mechanisms may well be adaptations but that the 'higher' cognitive capabilities are not, since the first are evolutionary older and hence have had more time to become highly elaborated, will not do. A lot of other adaptive problems have also been with us for tens of millions of years, such as the problems of reciprocation, maternal care, threat perception, mate selection, foraging, and emotional communication. Hence we have had the time to develop adaptive responses to them as well. Our language faculty, moreover, has the same overwhelming functional complex design as the visual system and yet it is a recent and human-specific adaptation.

Evolutionary psychologists do not automatically assume that, whenever a trait is found to be universal, it is an adaptation. In their classic study *Homicide*, for instance, Martin Daly and Margo Wilson point out that "[i]t is important to note that our evolutionary psychological approach in no way depends upon homicide *per se* being 'an adaptation'" (1988:12). As we saw, a number of criteria have to be fulfilled before a trait is thought to deserve that name. Furthermore this appellation has to be generally consistent with the findings from other disciplines.

With this consideration of adaptations we have touched upon a hotly debated issue: the degree of scientificity of evolutionary psychology.

### **7.11. Is Evolutionary Psychology Scientifically Defensible?**

A critique frequently leveled at sociobiologists and evolutionary psychologists is that they are just engaging in after-the-fact-storytelling. They are producing unverifiable "just so" stories, because their claims are untestable and thus unfalsifiable. Evolutionary psychology, it is concluded, is not a science (e.g., Dupré 2001; Fausto-Sterling 1992; S. Rose 2000; Segal 1999; Tang-Martinez 1997). As Brian Haig and Russil Durrant (2000) note, the basis of this charge seems to be grounded in what critics see as the problematic nature of adaptationist explanations, because the concept of adaptation is necessarily a historical one. Since we can never directly observe natural selection in operation, we can never unequivocally demonstrate that

any given characteristic really is an adaptation and hence amenable to an evolutionary explanation.

It must be acknowledged that just so stories *have* been told, such as Desmond Morris's unsubstantiated account of human female sexuality. Adaptive scenarios are, however, often mere heuristic models, ways to identify and study some of the many factors needed to fully understand the selective origin of traits suspected to be adaptations designed by selection. The use of these heuristic models is not the same as reaching conclusions (Waage and Gowaty 1997). Unfortunately some evolutionists have done exactly that, as many popularizers have. The reason that Morris's theory is no longer accepted today, however, is precisely because it has been empirically established as being untenable. This implies the point I want to make: Evolutionary explanations *are* falsifiable, and they are so at all levels of analysis, including the metatheoretical level.

A few examples. If mechanisms would be found in one species that are designed exclusively to promote the welfare of another species, the evolutionary metatheory would be falsified, since such mechanisms cannot arise through natural selection. They have not been found yet. If in any species the sex that invests more in offspring (usually the females) were in general less discriminating in choice of mates than the sex that invests less (usually the males), a key assumption within Trivers's parental investment theory would be falsified. All known species, however, fit the prediction (Ellis and Ketelaar 2000). The evolutionary hypothesis that men prefer attractive women because a woman's appearance provides a wealth of cues to her fertility can be falsified by testing whether the features that men consider attractive in women, such as youthfulness and a low waist-to-hip ratio, are linked to fertility. They are (Etcoff 1999).

Although sometimes it may take some creativity to design experiments, explanations in terms of adaptive function are generally testable, though not all to the same degree. One strategy for generating evolutionary hypotheses is called the observation-driven or bottom-up approach ('reverse engineering'): Researchers try to figure out the possible adaptive function of known phenomena, such as language, bipedal locomotion, pregnancy sickness, standards of physical attractiveness, or sexual jealousy. To do this, it must be shown that the phenomenon is well designed for solving a specific problem of survival or reproduction, and that it is not better explained as a by-product of another adaptation. This kind of analysis often leads to important new insights into the phenomenon and opens up new lines of investigation. A complementary strategy is the theory-driven or top-down approach: On the basis of

evolutionary theory and knowing that our hominid ancestors lived as hunter-gatherers, we can make educated guesses about what design features our mind should have. These hypotheses can then be tested. If the hypothesized adaptations did evolve, they will manifest themselves as a reliable part of human nature across cultures, given the appropriate environmental input.

Evolutionary functional analysis thus provides a framework for the explanation of known facts and forms a powerful heuristic system for the generation of new knowledge. Although this may sound like a circular argument, it is not. Harvey asked why there were valves in the veins, and it led him to discover the circulation of the blood. Ever since, asking why a particular design exists has proven to be a very productive line of research in biology. It has led us to the prediction and subsequent finding of thousands of facts that were not known before (Tooby and Cosmides 1992). William Hamilton's formulation of inclusive fitness theory in the early 1960s, for instance, led to the discovery of psychological mechanisms producing behavior that conformed to this nonintuitive theory in many animal species. Knowing that our female forebears spent a lot of time gathering led Irwin Silverman and Marion Eals (1992) to predict that women should have evolved a superior object location memory, a prediction that was subsequently confirmed.

The 'just so story'-charge can be countered in a second way: In modern philosophy of science, verification is generally considered too high a standard to be of practical use in evaluating scientific explanations.

It was philosopher of science Karl Popper who in his 1959 *The Logic of Scientific Discovery* explained that verification is untenable as a criterion for evaluating scientific statements. No amount of empirical evidence, he argued, actually *proves* that a particular explanation is true. Scientific statements can only be corroborated, that is, they can only be established as being consistent with the data. This is done by trying to falsify or refute them, on the basis of practical applications and experiments. From the set of non-falsified (corroborated) alternative accounts, the best available explanation is then chosen (Ellis and Ketelaar 2000; Ketelaar and Ellis 2000).

Popper's concept of corroboration instead of verification has been retained in current philosophy of science. Indeed, strict adherence to verifiability as an evaluative criterion would eliminate, among others, archaeology, cosmology, evolutionary biology, forensic medicine, paleontology, tectonic geology, quantum physics, and all of the behavioral sciences as legitimate scientific enterprises (Ellis and Ketelaar 2000). This means that well-validated evolutionary explanations can count as acceptable knowledge claims.



The strict use of Popper's strategy of falsificationism, however, has been challenged by many philosophers of science as an inaccurate depiction of the way science actually works. Popper's contemporary Imre Lakatos, for instance, argued that in practice, scientists do not immediately reject a theory from the moment that a prediction derived from it has been falsified. This is because there are always different levels of explanation in science: There is a 'hard core' of metatheoretical basic assumptions that are consensually held and not tested anymore, because they have been empirically established. These metatheoretical assumptions are the starting point for developing and testing more specific middle-level theoretical models. When finding anomalies here, scientists do not conclude that their metatheory has been falsified, but only that *this specific middle-level statement* has been falsified. Scientific theories are always evaluated by the cumulative weight of the evidence in relation to alternative theories. Scientists just try to create the best approximations of phenomena, based on evidential grounds and on certain agreed-on metatheoretical first principles, such as Newton's laws and Maxwell's laws in physics (Ketelaar and Ellis 2000).

Timothy Ketelaar and Bruce Ellis (2000) have analyzed evolutionary psychology from a Lakatosian perspective and have found its standards and procedures to be consistent with normal paradigm science. The three levels of analysis that Buss (1999) describes are consistent with the Lakatosian model of science, be it that instead of two there are three levels of explanation: the 'hard core' of the general theory of evolution by natural selection, which includes inclusive fitness theory; middle-level evolutionary theories such as Trivers's theory of parental investment; and the level of specific evolutionary theories, such as the hypothesis that women have evolved specific preferences for men with a lot of resources. If predictions made at one level of the hierarchy are falsified, then the hypotheses on which they were based are called into question, but this does not in itself prove that the higher-level theory is wrong. The evaluation of evolutionary theories rests with the cumulative weight of the evidence, and not with any single prediction, which is just the way science works as described by Lakatos.

In evolutionary psychology, this evidence can come from a wealth of sources and can be obtained by a variety of methods. Potential sources of data for testing hypotheses are, for instance, archaeological records, data from hunter-gatherer societies, observations of people's behavior, self-reports, public records, and human products. Possible methods for testing hypotheses are to compare different species; to compare males and females, to compare individuals within a species, to compare the same individuals in different contexts, and the use of experimental methods. Again, it

is the cumulative weight of the evidence that will be decisive in accepting a hypothesis (Buss 1999).

Another criterion of evaluation stressed by Lakatos and many other philosophers of science is a theory's ability to predict novel facts. Ellis and Ketelaar (2000) offer a list of thirty recent empirical discoveries about human psychology derived from the application of evolutionary principles to the human mind. They include sexually dimorphic mating strategies; waist-to-hip-ratio as a determinant of attractiveness judgements (Singh 1993, 2002); the use of cheater detection procedures in social exchange; stepchild abuse at forty times the rate of nonstepchild abuse (Daly and Wilson 1985, 1988, 1995); sex-linked shifts in mate preferences across the lifespan; predictable patterns of spousal and same-sex homicide (Daly and Wilson 1988); maternal-fetal conflict during pregnancy; superior female spatial location memory (Silverman and Eals 1992); design of male sexual jealousy; profiles of sexual harassers and their victims; sex differences in the desire for sexual variety; socialization practices across cultures differing by sex and mating system (Low 1992); patterns of risk taking in intrasexual competition for mates; shifts in grandparental investment according to sex of grandparent and sex of parent; and mate guarding as a function of female reproductive value.

Besides predictive success and explanatory power, another potent criterion for evaluating scientific theories is their ability to mesh with other well-accepted theories and entrenched knowledge. Evolutionary psychology again meets this criterion effortlessly, as it does other criteria that scientists use as well to assess theories, such as their elegant simplicity, their internal coherence, and their ability to explain the underlying causal machinery at work (Fletcher 2000). We may thus conclude that the charge of unscientificity is not tenable.

Evolutionary psychology is frequently charged of being reductionist, whereby critics make reductionism sound like it is necessarily flawed (Benton 2000; Kimmel 2003; Rose and Rose 2000b; Segal 1999). This need not be the case, because actually there are different kinds of reductionism. In a positive sense, reductionism is just the way science works. It is now the virtually universally held position in science that (1) all things are physical things and nothing else (materialism), and that (2) the more complex and less fundamental can be explained in terms of the less complex and more fundamental. A human society consists of people who, being mammals, obey the rules of biology. Mammals consist of molecules obeying the laws of chemistry, which are, in turn, subject to the laws of physics (Dennett 1995; Plotkin 1997).

That does not mean that the more complex and less fundamental can be *reduced* to the less complex and more fundamental. This is reductionism in a negative sense, and it is this kind of reasoning that evolutionary psychology seems to be charged of - the critics seldom clarify what they actually mean by the term. Negative reductionism implies, for instance, that scientists would think that one does not need the levels of psychology and sociology in order to explain the rise of fascism or cubism: Molecules suffice (or, in this case, genes). This, of course, would be foolish, because different levels of organization have emergent properties that cannot be predicted from lower levels. No one is a reductionist in this sense. Although we have seen that Wilson (1975) hinted that traditional sciences like psychology would eventually disappear, he has shifted his position markedly over a period of about a decade (Dennett 1995; Plotkin 1997).

The charge of reductionism may stem from the critics' impulse to keep a chasm between ourselves and the rest of the natural world. Scientists who refuse to do this and who seek to develop theories that are compatible with the rest of our knowledge are nailed down as reductionist, whereas the case can be made that their approach is actually much more scientifically sound. As we saw earlier in this section, a potent criterion for evaluating scientific theories is their ability to mesh with other well-validated theories. Evolutionary psychologist Jerome Barkow (1990, 2006) calls this striving for compatibility 'vertical integration'. Vertical integration is simply the understanding that different levels of organization require different theories and that theories at all levels of organization must be mutually compatible, without being reducible to another. Within the natural sciences, apparent incompatibilities with current consensus in related disciplines are regarded as signs of error at one level or the other and as a reason for further research. Much of the progress of the natural sciences stems from this rule. The social sciences, however, are in a state of chaos due to the lack of this compatibility requirement, Barkow contends. If we want to understand the complexities of human experience and of human life we will need multiple levels of explanation, but many social scientists keep thinking in dated dichotomies such as nature versus nurture, mind versus body, and culture versus biology. Their lack of a basic training in evolutionary biology surely contributes to their opposition to applying evolution to human behavior and the human mind.

An example of a confused interpretation of evolutionary accounts of the human mind is found in Segal (1999). "Accounts of 'loving' and 'working' direct us immediately toward quintessentially human narratives; 'surviving' and 'mating' strip away this human dimension," Segal complains (1999:80). She obviously conflates the

causal forces that produced our psychology and that psychology itself, thinking that evolutionary scientists want to reduce our mental life to the forces that gave rise to it during our evolutionary past.

Explaining the ultimate origins of our subjective experiences, as evolutionary psychology does, obviously does not make these experiences any less real or any less valuable. Consistently thought through, Segal should level her critique at any research that regards humans as physical, biological beings (neuroscience, genetics, hormonal research, etc.), since these could also be said to "strip away the human dimension." Even the paradigms that she finds inspiring, Marxism and psychoanalysis, should be made her target, since humans are considered here as a product of certain historical or psychological laws. It should be clear, however, that doing so would be absurd. All these approaches just try to explain human functioning and behavior at yet another, complementary level of description.

Evolutionary psychologists are sometimes charged of being reductionists for another reason: because they fail to include the full range of variables that are needed to account for a given behavior. This is, however, the way science works: It tries to elucidate the nature of a phenomenon by simplifying its complexity and diversity into empirically manageable parts. If we would take on its full complexity as it appears in the real world, we could only offer a description and nothing more. We would not be able to generalize beyond the historical moment and the aspects involved. That this procedure of necessary reductionism works is demonstrated by the vast amount of knowledge produced by scientific disciplines (Campbell 2002; Thornhill and Palmer 2000).

Evolutionary psychology is producing a fast-extending body of knowledge on the human mind and human social behavior, such as on cognition, kinship relations, mating, cooperation, parenting, aggression and warfare, status striving and social hierarchies, and attachment. As my focus is on the evolved psychologies of women and men, I will now turn to the ways in which evolutionary theorizing can be of use to feminism.



## 8. A METATHEORY FOR FEMINISM

[E]volutionary theory not only considers *how* men exercise power over women, as feminist theory does, but also investigates the deeper question of *why* males want power over females in the first place, which feminists tend to take as a given.

Barbara Smuts

### 8.1. Introduction

An environmentalist account of gender difference presents feminists with an insurmountable problem. As Josephine Donovan, reasoning within an environmentalist framework, recognizes: "[I]f gender identities and the cultures that go with them are historically a matter of social construction, then any political ideology based upon them ... seems less secure than if based upon an immutable construct such as biology" (2000:76). Again it has to be added that Donovan is wrong in thinking of biology as 'immutable'.<sup>67</sup> The false nature-nurture dichotomy that informs her thinking puts her in a difficult situation: *Either* it is a matter of 'biology', which means nothing can be done about it, *or* it is a matter of cultural construction, which means feminism will have a hard time legitimizing itself. Indeed, cultural determinism easily slips into cultural relativism, with 'culture' being used as a rationale for brutalizing women. What would, after all, be wrong with denying women education, sexual self-expression, or personal autonomy when their identity is just a cultural construct and they therefore have no inherent needs that can be ignored or violated? In her article "Is Multiculturalism Bad for Women?" (1999) ethicist and political scientist Susan Moller Okin tackles the issue of the troubling connections between gender and culture. She argues that the current interest in multiculturalism – the turn to claiming special group rights for minority cultures – holds great dangers for women's equality. It leads to cultural defences of practices that would definitely be considered illegal or harmful when imposed on Western women. Many cultures endorse the control of men over women in various

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<sup>67</sup> Of course, *something* is immutable, namely adaptations (except insofar as they can be altered over long periods of time by selection). Adaptations are immutable in the sense that the members of a species can develop, ontogenetically, only their species-typical adaptations. No environmental variation or manipulation can lead to the development of a heretofore nonexistent adaptation.

ways, through condoning customs like clitoridectomy, claustration, polygamy, child marriages and coerced marriages, and through less overt forms of discrimination, such as the strict control of women in the private sphere. Many of these practices are especially aimed at bringing women's sexuality and reproductive capabilities under male control. Under such conditions, feminism and multiculturalism cannot be reconciled, Moller Okin contends. One or the other has to give.

Historically feminism has seen itself faced with similar perplexing questions. How to create a theory that allows for differences between women while at the same time justifying universal claims about them? Again the assumed polar opposition between 'biological determinism' and environmentalism blocks the possibility of finding any constructive way out. How to account for the fact that, despite many attempts to the opposite, girls and boys of each new generation start acting in sex-typical ways? How to explain the perhaps unsettling observation that "the available analyses suggest no consistent tendency for sex differences in social behavior and personality to have eroded or increased over time" (Eagly 1995:148)?

As we have seen, the nature-nurture dichotomy is thoroughly outdated. Any attempt to exhaustively explain human behavior in terms of nature only or nurture only is doomed to fail, as are attempts to account for gender differences in terms of cultural roles being 'written upon' anatomical differences. Reality is much more complex and much more elegantly simple at the same time: Socialization is tremendously important, but it does not shape the development of behavior without guidance from innate dispositions. These dispositions, or potentials, have developed during the evolutionary history of our species. This means that males and females are not passive lumps of clay that culture can mold in any direction - an observation that can be empirically verified. They are active partitioners in their own development, acting in context-sensitive ways that were once adaptive to both sexes.

In this chapter I show that an evolutionary account of sex differences serves us with an answer to many questions that have divided feminism since its earliest days. I believe that evolutionary psychology can provide a unifying metatheory for feminism. That does not mean that the rationale of the existence of a multiplicity of feminisms is denied here. Evolutionary psychology, after all, only provides us with explanations; it does not prescribe how to go from here. It is up to us to choose to what extent we want to endorse our evolved predispositions and, as always in politics, points of view are expected to differ tremendously. The only way to make progress in feminism seems, however, to start from a scientifically defensible view of the nature of the sexes. Feminism is missing this - as are the social sciences in general. As Ellis and

Ketelaar (2000) note, there are now about nineteen different grand theories of human nature in psychology, most of them making no precise or testable predictions, generating few laboratory studies, and frequently leading to disputes of opinion rather than fact. In this respect it is quite ironic that evolutionary psychology, which *does* meet these prerequisites, is considered by many as being unscientific.

The observations of male and female psychosexuality as made by feminists and evolutionary psychologists often converge, something that already indicates that the gap between both groups may be more imaginary than real. The difference is, however, that evolutionary psychologists tend to describe without indicting. As scientists, their job is to find out how things work. They try to provide the observed phenomena with an ultimate scientific explanation. Due to this attempt at neutrality, they are often considered sexist by feminists, but in fact this approach is their strength. As Simon Baron-Cohen says in an email exchange with Lynne Segal, “[t]he training of a scientist is not to emphasize or package the results to make them politically correct, but to report on what is found. As scientists, we are judged by whether we are even-handed with the evidence” (Segal and Baron-Cohen 2003). Moreover, and not surprisingly, many evolutionists sympathize with feminist goals; knowledge of the evolved differences between the sexes promotes awareness of the costs of being a woman. Feminist socialization explanations can be valuable as accounts of the ways in which the innate behavioral predispositions of the sexes are culturally reinforced.<sup>68</sup> They can help us to find ways of attenuating sex differences where we consider that a desirable goal. But feminists need a good underlying theory of human nature, and the modern theory of evolution by selection is exactly that. This is no intellectual imperialism. Evolution by selection is as sure a fact as is gravitation, and just like the laws of gravitation apply to all physical beings, so do the laws of evolution apply to all organic beings.

Evolutionary psychology does not want to do away with feminism. On the contrary, an evolutionary account of the sexes even attests to the importance for women to stand strong against men, because from an evolutionary point of view coalitions of men are predicted to try to control female sexuality. Feminists need to get rid of their biophobia. As this chapter hopefully shows, biology can be our ally in the struggle for a more gender equal society.

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<sup>68</sup> It is, however, also important not to lose sight of the possibility that in modern-day societies socialization may sometimes be designed to, and have the effect of, minimizing sex differences. For example, most middle-class parents have the same standard for the amount of physical violence that their sons and daughters should exhibit: zero.



## 8.2. Feminist Observations

Marilyn French (1992) notes that men are obsessed with female reproduction. "Because women bear children, men try to control or appropriate their bodies" (1992:18). The drive to control female reproduction, she says, is "a silent agenda in every level of male activity" (1992:19). She further presses charges against most states for trying to regulate sexuality by regulating *women*, for criminalizing prostitutes, although the consumers of prostitution are almost exclusively men, and for appropriating the right to determine whether women have access to contraception or abortion. Women, she points out, have been and still are being killed for losing virginity (even if they were raped) and for extramarital sex. They are put in purdah<sup>69</sup> or are infibulated. They are denied rights to divorce or to child custody. None of these constraints were ever imposed on men. Men have been killed for adultery in some societies, but only for having stolen another man's property - his wife - not for having sex with women other than their own wives. French interprets all these correct observations as signaling a conscious war against women, being waged because men do not want to take responsibility of babies.

Beauty is the main weapon in the competition between women, Susan Brownmiller (1984) observes. She further notes that, whereas being middle-aged does not detract from a man's perceived attractiveness, it does so for a woman. Behind this pattern she detects a male conspiracy to keep women weak and unsure by making them obsessed with their physical appearance. Joseph Lopreato and Timothy Crippen (1999) cite a study by Leslie Margolin and Lynn White<sup>70</sup> on the differential role of physical attractiveness in marriage. Margolin and White note that men generally prefer mates who are younger and that this preferred age difference increases as men grow older. Their report provides considerable evidence from previous research that "beautiful women ... trade their looks for economic status in cross-gender relationships" and that "as couples age, husbands are more likely than wives to lose sexual interest in their spouses." Margolin and White conclude that the "declining physical attractiveness of their partners affects marital sexuality more for men than women." Their explanation lies with "the cultural prescriptions and meanings associated with gender role behavior." People's sexual preferences "result from an elaborate normative

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<sup>69</sup> The practice of secluding women from the sight of men except for the head of the family, by curtains in the home or by veils outside it.

<sup>70</sup> Margolin, Leslie and Lynn White (1987). The Continuing Role of Physical Attractiveness in Marriage. *Journal of Marriage and the Family* 49:21-27.

superstructure that informs perceptions and gives meaning to the things we do" (Margolin and White 1987, as cited in Lopreato and Crippen 1999:178-179).

Another correct observation is made by Valerie Bryson (1999), who points out that women are on average significantly less interested and active in formal politics than men are. Their involvement in less institutionalized forms of collective activity, such as community groups and voluntary organizations may, however, be greater than men's. She further notes that feminists have found it extremely difficult to eliminate hierarchies, and that the role of leaders may actually be greater in nonhierarchical forms of organization than in more structured groups, because it cannot formally be checked.

Men have been found to be more violently aggressive than women (Hyde 1996). They are more likely than women to misperceive mere friendliness as a sign of sexual interest (Abbey et al. 1996). Almost half of all women scientists are concentrated in psychology or the life and social sciences. In contrast, a majority of men are in the field of engineering (Rosser 1992). All labor markets are highly segregated on gender lines, with women concentrated in caring, service and clerical work and in the public sector, and men in manufacturing and industry and in the private sector (Bryson 1999).

The list of powerful feminist data continues. Brownmiller (1975) provides an overview of the prevalence of rape throughout history and indicts the unequal treatment of men and women before the law in rape cases. Correctly rejecting the then-predominating view of rape as a psychopathology, she substitutes it with the view of rape as an attempt to control women. In her notorious words, rape "is nothing more or less than a conscious process of intimidation by which *all* men keep *all* women in a state of fear" (1975:15, emphasis in original). Brownmiller's view of "rape as power, not sex" has since then been the reigning explanation within feminism (e.g., Abbey et al. 1996; Blackman 1985; Denmark and Friedman 1985; Dworkin 1997; French 1992; Hall 2000; Rich 2000<sup>71</sup>; Sanday 1986, 2003; Schwendinger and Schwendinger 1985; Travis 2003b; Watson-Brown 2000), although it is disputed by some other feminists (Hoff Sommers 1994; Roiphe 1993; Young 1999).

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<sup>71</sup> Madeline Rich, director of the YWCA Chicago, wrote in her review of *A Natural History of Rape* (Thornhill and Palmer 2000): "Rape is no more about sex than hitting someone over the head with a frying pan is about cooking." Many misunderstandings arise, however, from the multiple possible meanings of each word in the phrase "Rape is about violence, not sex," as legal scholar Owen Jones (2000) explains. Does the phrase refer to violence as the cause of rape, or as its meaning to the victim, for instance? Does it mean that rape is not at all about sex, or not primarily, or not on average? And so on. The ambiguity of the question "Is rape sex or violence?" is also laid out by the feminist researcher Charlene Muehlenhard and her colleagues (1996).

In an evaluation of some feminist claims regarding prostitution, philosopher Igor Primoratz (1999) acknowledges that a woman's history of sexual activity is not generally appreciated as an indicator of experience and expertise, analogously to other activities. He does not know the explanation for this, but "one is certainly needed" (1999:107). When analyzing the question whether the sexual sphere has a specific moral significance that sets it apart from other spheres of human behavior, Primoratz thinks the answer is negative. "What does apply to choices, acts, and practices in the field of sex are the same moral rules and principles that apply in non-sexual matters" (1999:173). In sex, just as in non-sexual matters, we can hurt, deceive, or exploit others, and we are morally required not to do so, he continues. This seems fair enough. His next statement, however, seems to be in need of qualification: "When we go against any of these requirements, the sexual nature of our conduct makes it neither more nor less wrong than it otherwise would be" (1999:173). Thus rape "is not wrong as *sexual* battery, but as sexual *battery*" (1999:174, emphasis in original). To sustain his argument, Primoratz refers to the feminist claim that rape is essentially a crime of violence, not of sex.

Intuitively there seems something wrong with Primoratz's evaluation of rape as being analogous to physical battery. We know that the psychological pain following rape is much greater than the psychological pain following physical battery (Thornhill and Thornhill 1990). Why should that be, if the sexual nature of the act does not make it any different? Primoratz recognizes that something does not fit here, and suggests that it might be the intimate nature of the sexual act that makes it distinctive in some weaker sense. But, as he argues, that cannot be it, because sexual relationships are not the only ones that are experienced as intimate, nor are they always experienced as such. Thus his conclusion remains the same, and the reader is left wondering what it is, indeed, that makes rape such an undeniably horrible crime to women.

Another frequent complaint is that, although there is some increase in men's efforts in the household and in childcare, "studies in every country consistently find that 'new man' is more of a myth than a reality, and that the traditional domestic division of labor remains remarkably unchanged, even when women are in paid employment" (Bryson 1999:124). Many women like staying at home and taking care of the children. Even in the Scandinavian countries, where both sexes can enjoy family friendly working arrangements, men are much slower to make use of them than women (Bryson 1999).

Men are also much more interested in visual sexual stimuli than women and are the main consumers of pornography and prostitution (Angier 1999). According to

radical feminists, pornography has this appeal to men because it mediates and helps maintain the sexual subordination of women, through its eroticization of male power and female submission. By presenting women as objects to be bought and used, pornography shapes people's worldviews and cultivates a view about sexual relationships as power relationships (Dines, Jensen, and Russo 1998; Dworkin 1997; French 1992; MacKinnon 1994).

There is a long list of systematic, well-established feminist and sociological observations about male-female relations, as well as an accompanying list of less well-established and often contradictory explanations of these observations. Other examples include typical courtship rituals, age difference at first marriage, differential rates of marriage and remarriage, differential maternal and paternal relations to children, and differential rates of infidelity (Lopreato and Crippen 1999). There is not, however, within feminism nor within the social sciences, a powerful, coherent, and well-founded theory which can explain these patterns. Referring to cultural prescriptions is no exhaustive explanation, since that leaves the existence of those prescriptions unexplained. Moreover, as we have seen, social learning explanations fail to account for these observations even if one just takes the existence of cultural rules for granted.

### **8.3. The Seeds of Adulthood**

As discussed in the preceding chapter, the evidence indicates that human infants are born prewired and genetically disposed to attend to specific components of the environment, to act in certain ways, and to have some specific preferences. The further examples I offer in this section are particularly interesting in that some of them show unexpected sex differences. That is, unexpected – and unexplainable – from an environmentalist framework, not from an evolutionary one.

Infants stare at human faces intently. Less than ten minutes after birth their eyes will follow facial patterns. On the second day they can distinguish their mother's face from a face they have never seen before. Soon they start mimicking facial expressions. They gaze almost as long at a person's eyes as at the face as a whole. When they see somebody looking at them, babies typically look back and smile (Etcoff 1999). New-born infants automatically focus themselves on the things they need to survive. They are born to attach themselves passionately to their primary caregiver - typically the mother - and to manipulate her into taking care of them by displaying evolved characteristics such as crying and being cute. They are no blank slates, but possess a

range of dispositions that are structured to be activated by certain environmental stimuli. This goes from simple actions such as gripping and sucking, over more complex behaviors such as looking for facelike patterns, preferring melodic, high-pitched voices, and, around six months of age worldwide, acquiring fear of strangers, to very complex cognitive capabilities such as discerning the content of speech sounds (Hrdy 1999b).

Another partially prewired design appears to be our sense of physical beauty. Contrary to traditional psychological theories of attraction, which assume that standards of attractiveness are learned gradually through cultural transmission and hence will not emerge before three years of age, standards of beauty have been proven to emerge very early in life. When three-month-old infants were shown slides of white and colored faces that had been evaluated for their attractiveness by adults, they gazed significantly longer at the more attractive faces. Universally infants have other sensual preferences as well. They prefer symmetric patterns to asymmetric ones and soft surfaces to hard ones. At the age of four months they prefer consonant melodies to dissonant music (Etcoff 1999).

Simon Baron-Cohen (2003) describes a series of intriguing experiments that reveal that from birth, girls are more people centered than boys, whereas boys are more object centered. One-year-old infants were filmed while they were playing on the floor and their mothers sat nearby in a chair. The girls looked up significantly more at their mother's face than the boys did. When given two films to watch, one of a face and one of cars, the girls looked longer at the face, whereas the boys looked longer at the cars. These differential preferences were also found in babies who were just one day old. They were filmed while a girl came smiling over their crib, and while a mobile came hovering over it. The mobile was made from a ball the size of a head, with the face of the girl projected onto it; only, its features were rearranged so that it no longer looked like a face. Some material was attached to it which moved everytime the mobile moved. The researchers, who did not know the babies' sex, found that girls looked longer at the face, whereas boys looked longer at the mechanical object. Also, at the age of twelve months, girls respond more empathically to other people's distress, through sad looks, sympathetic sounds, and comforting behavior. By the age of three, girls are ahead of boys in judging what other people might be feeling or intending, that is, in using a theory of mind (Baron-Cohen 2003).

This sex difference in social interest, with girls and women on average being more empathic and communal than boys and men, is well-known in the psychological

literature (Eagly 1995). Socialization cannot account for the finding that this difference already shows on the first day of life.

Moreover, as we saw in section 6.11, in contemporary Western nations child-rearing practices have been found to be very similar for both sexes. The few exceptions are that parents tend to give their children sex-appropriate toys, with boys being discouraged from playing with dolls, especially by their fathers, that boys receive more punishment and physical discipline, that they are more allowed to horse around, and that mothers talk more and provide more emotional speech to their daughters than to their sons (Lytton and Romney 1991). Rather than parents' sex-typed reactions creating differences in the child's preferences and inclinations, however, they might actually *stem* from differences that are already present, as the researchers themselves suggest. Remember from chapter 6 that sex-typical toy preferences emerge very early in life, even without specific encouragement. Boys are generally far more attracted to playing with mechanical objects than to playing with dolls. When they do prefer dolls and other typical girls' toys, chances are high that as adolescents they will develop a homosexual orientation (Bailey 2003). This correlation appears to be at the basis of fathers' negative response to feminine playing preferences in a son. From as early as two years old, boys are more dominant, more aggressive, and more physically active than girls, which might account for their greater freedom of movement as well as for their more frequent disciplining. Infant girls' better empathizing, in turn, might cause mothers to attune their speech to this emotional capability (Baron-Cohen 2003; Geary 1998).

Again, this is not to say that parenting and socialization are not important. They are crucially important, but not in the way that many people think they are. Psychologist Judith Rich Harris (2006) demonstrated that culture and parenting mainly seem to provide the conditions that allow for normal development and happiness. They do not determine personality, nor do they create the differences between girls and boys. They merely mediate the expression of these features. They provide a newborn baby with the necessary stimuli and opportunities for the skeletal competencies of its evolved modules to develop themselves in ways that make the child fine-tuned to the local ecology. The often-found correlations between the personality of parents and children do not attest to the moulding influence of child-rearing, as has often been uncritically assumed, but are due mainly to genetic influences.

Conclusive evidence that biology plays a part in girls' and women's relatively greater focus on people and in boys' and men's relatively greater focus on objects came when Baron-Cohen (2003) and his students found a relationship between

prenatal testosterone levels and the development of these characteristics. During the prenatal period, from approximately eight to twenty-four weeks, the levels of testosterone are much higher in males than in females.<sup>72</sup> Differential amounts of exposure to sex hormones have been shown to have different organizational effects on the brain, with typical cognitive sex differences as a result (Kimura 1999, 2002, 2004). For the first time now, prenatal hormonal exposure has also been linked to sex differences of a deeply *social* nature. After correcting for all social variables, Baron-Cohen (2003) found that the lower a baby's prenatal testosterone, the more eye contact it will make as a toddler, and the larger its vocabulary will be. At four years of age, lower levels of prenatal testosterone will have led to better levels of language, better social skills, more eye contact, and better empathizing skills. The higher its prenatal testosterone, the more restricted its interests will be and the more focused and better it will be at systemizing, such as playing with technical objects, building Lego castles, throwing and intercepting balls, and collecting and classifying items.

The typical and cross-cultural patterns of children's play, with boys engaging more in rough-and-tumble play and group-level competition, and girls engaging more in play parenting, have also been found to be influenced by prenatal hormone levels (Geary 1998). Again this implies that socialization explanations will not suffice to explain behavioral sex differences. Rather, socialization and parenting practices seem to amplify or attenuate the innate dispositions of girls and boys. In an analysis of ninety-three cultures, Low (1989) has shown that cross-cultural differences in the way both sexes are reared depend in predictable ways on group size, marriage system, and degree of stratification. Predictable, that is, again, from an evolutionary perspective: Boys and girls are reared in ways that enhance their social, economic, and reproductive success in that specific social system. Thus, the more polygynous the society, the more sons are taught to display aggression and industriousness, because of the big variance in reproductive success: A very few men will be able to acquire many wives, whereas many men will find no wife at all. In stratified polygynous societies where women can 'marry upward', daughters will be trained more strongly to show sexual restraint and obedience, because this increases a girl's mate value to prospective high-status husbands. The more control women have over resources, on the other hand, such as in matrilineal societies, the less daughters will be taught to be submissive and obedient.

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<sup>72</sup> Peak periods with testosterone levels being much higher in males than in females are found in humans as well as in other mammals. In humans, testosterone peaks again in males in the period from right after birth until about five months of age, and at the time of puberty.

Childhood differences between the sexes thus appear to result from a complex interplay between genetic, hormonal, developmental, and social factors. The long time that human children take to mature corresponds to the high level of social and cognitive sophistication of our species. This extended period of immaturity, made possible by prolonged parental care, allows them to develop their evolved competencies in accordance with the local environment. In this way they can acquire the knowledge and experiences necessary for successful survival and reproduction. Hence we can expect girls and boys to be differentially oriented to developing the competencies that are associated with intrasexual competition in adulthood, such as risky behavior and dominance-striving in boys and physical enhancement and the verbal derogation of competitors in girls. We can also expect girls to be much more oriented toward parenting behavior than boys (Geary 1998).

#### **8.4. Sexual Selection as an Origin Theory**

Consistent with a sexual selection framework, the sex differences found in childhood become more pronounced at puberty, when a new surge of sex hormones modifies the physiology, cognition, and behavior of both sexes. Secondary sexual characteristics emerge. Males develop larger hearts and lungs, greater upper-body strength, longer legs, higher running speeds, and better throwing skills – all features that would have been important for the tasks of hunting and fighting. The male advantage in throwing skills is already found at two years of age and is related to a difference in the skeletal structure of boys that emerges in the womb (Geary 1998). Hence it cannot result merely from boys' greater practice at throwing, as Fausto-Sterling (1992) has suggested. Moreover, in chimpanzees as well, males are much more likely to throw (unfashioned) missiles, such as stones or clumps of earth, than females. This does not necessarily imply that cultural influences compete with evolutionary forces: Cultural norms may well have arisen in conjunction with, and in support of, biological imperatives (Kimura 2004).

Girls enter puberty two years earlier than boys. Their hips widen and their body fat increases relatively more, with a typically feminine distribution pattern. They show greater physical flexibility and develop a finer motor dexterity. The physical size difference between the sexes and the faster sexual maturation of females are typical of polygynous primates. Comparative studies have revealed a dependable relation between the degree of physical dimorphism and that of male-male competition in these primate species. The harder males have to compete for sexual access, the higher



the selection pressures for size and strength, because it will often be the larger and stronger males who are preferred by females and are able to spread their genes and, hence, their traits (Geary 1998).

Men's and women's minds differ, too. This difference is one of degree, not of kind. As Alice Eagly (1995) describes, feminists have long tried to deny or minimize these differences, but they can no longer look past "the onslaught of contemporary research documenting sex-differentiated behavior" (1995:150), although this continues to be done in most contemporary psychology textbooks. The fairly intuitive methods that were typically used for synthesizing psychological studies on gender a few decades ago have now been replaced by statistically justified procedures. The results they yield are solid and unanimous: Instead of being negligible, there are moderate-to-large sex differences in some aspects of cognitive abilities, personality and social behavior, sexual behavior, and physical abilities (Eagly 1995). Females typically score higher on verbal fluency, spatial location memory (remembering the location of objects), and mathematical calculation, for instance. Males typically score higher on mental rotation tests (trying to imagine what a given figure will look like in a new orientation) and mathematical reasoning (Eagly 1995; Kimura 1999, 2002). The fact that girls and boys outstrip each other in different aspects of mathematical and spatial ability suggests that teachers' expectations cannot account for these findings, since most teachers are not even aware of these differences. Moreover, these differential abilities are found cross-culturally. The difference is not necessarily greater in more traditional societies, such as Japan, again suggesting that socialization fails as an exhaustive explanation (Kimura 1999). In addition, sex differences in cognition have not declined over the last three decades (Kimura 2004).

When it comes to personality and social behavior, women are typically more tenderminded, nurturing, and socially sensitive, whereas men are more dominant, controlling, and independent. These descriptions fit the stereotypes, but then again, gender stereotypes have been found to be an *underestimation* of real gender differences, rather than an exaggeration (Swim 1994). A large body of scientific research further shows that men's and women's sexuality differs in four important respects. First, men have more interest in sex than women, as exemplified by such facts as that they think about it more often, that they report more frequent sexual fantasies and more frequent feelings of sexual desire, that they rate the strength of their own sex drive higher, masturbate more often, and are more interested in visual sexual stimuli. Second, aggression is more strongly linked to sexuality for men than for women, with rape as an extreme manifestation of this difference. Third, women tend

to place greater emphasis on committed relationships as a context for sexuality. Fourth, women's sexuality is more plastic than men's: It is more easily influenced by environmental factors and more likely to change over time (see, e.g., Peplau 2003; Peplau and Garnets 2000; Schmitt et al. 2003a, 2003b).

Many feminist researchers "have worked energetically to preserve the 1970s scientific consensus that sex-related differences are null or small," Eagly (1995:150) writes. Their research "was (and is) intended to shatter stereotypes about women's characteristics and change people's attitudes by proving that women and men are essentially equivalent in their personalities, behavioral tendencies, and intellectual abilities" (Eagly 1995:149). It is this attitude that characterizes the work of critics like Anne Fausto-Sterling and Ruth Hubbard. Their attempts were in vain, however. Instead of being false constructions, gender stereotypes have turned out to be fairly accurate representations of typically male and female traits – something that should not surprise us, as Eagly (1995) notes, since we all interact with members of both sexes on a daily basis. So the question now no longer is *whether* women and men differ, but where these differences come from.

As elaborated in chapter 6, no single theory of socialization succeeds in providing a basic or ultimate explanation of gender difference. Some prior knowledge about the existing social structure is always needed in order to be able to make predictions about male and female psychology and behavior.

At first sight, one seeming exception might be social role theory, as proposed by Alice Eagly and Wendy Wood (Eagly and Wood 1999; Wood and Eagly 2000). Social role theory is different from other socialization theories in that it is, like evolutionary theory, a 'theory of origins' (Archer 1996): It searches for a basic cause of sex-differentiated behavior. Social role theorists trace gender difference back to biology, but not in the sense of heritable, evolved psychological dispositions, as evolutionary psychologists do. Rather, they suggest that physical sex differences, in particular men's greater size and strength and women's childbearing and lactation, lead to a predictable pattern of sexual division of labor, because certain activities are more efficiently accomplished by one sex. This in turn creates a sex-typical psychology and sex-typical competencies, as men and women try to accommodate to the gender roles that society has created for them. "Sex differences in behavior thus reflect contemporaneous social conditions" (Eagly and Wood 1999:414).

How probable is social role theory *as an origin theory*? Extremely improbable, as should be clear by now. The finding that prenatal testosterone levels are a crucial determinant of social behavior (Baron-Cohen 2003) suffices to refute the theory.

Formulated more generally, social roles cannot account for the finding that variations in the sex-differentiated organizing influence of prenatal androgen levels on the brain results in corresponding variations in sex-typical inclinations and competencies. They cannot account for the finding that in men and women, natural changes in hormonal levels (across the menstrual cycle for women; across the seasons and within the course of the day for men) are associated with predictable changes in cognitive and physical strengths, such as verbal fluency, spatial abilities, and motor dexterity either (Kimura 1999). Social role theory cannot explain that the pattern of sex differences that characterizes humans is typically found in other mammals as well. Its presupposition that human behavior has not been (partially) sculpted by sexual selection is contradicted by the earlier-mentioned relation between a species' degree of physical dimorphism and its degree of intrasexual competition between males. As a matter of fact, social role theory does not at all fit in with the broader framework of all that is known in the biological and life sciences.

Apart from this devastating finding, the theory can be tested by comparing the predictions that it generates with those generated by evolutionary psychology. As Eagly herself says, "[a]ll theories of sex differences have the task of explaining not just overall differences in various behaviors but also the patterning of these differences across studies and therefore across social settings" (1995:149). In the next sections on mate preferences we will see that an evolutionary perspective does a far better job at explaining the findings than social role theory does.

The only theory of origins that does not run into trouble when confronted with the scientific evidence about gender difference is sexual selection theory. From a natural selection perspective, the sexes are expected to be more or less alike, since they were confronted with the same problems of survival, such as finding food, keeping warm, and avoiding predators.<sup>73</sup> Their problems of reproduction, however, were disparate. Because of their unequal extent of parental investment, women and men could enhance their reproductive success in different ways. As a result they are expected to

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<sup>73</sup> They are, however, not expected to be completely similar, because even in these domains the sexes did probably not experience *exactly* the same selection pressures. It is very unlikely, for instance, that ancestral men and women typically ate the same things and that they consequently evolved identical gustatory adaptations (Donald Symons, personal communication). Furthermore, although most physical sex differences in humans seem to result from sexual selection, some physical dimorphisms, such as women's wider hips, have likely evolved through natural selection. Neonates' bigger brains required a wider pelvic region to pass through. Once this characteristic evolved, however, males apparently started to consider it sexually attractive. The result is that the size of women's hips began to influence mate choice and is thus affected by sexual selection as well. Another dimorphism that might be largely due to natural selection is women's finer manual dexterity, which might be related to the hunter-gatherer lifestyle of our ancestors, with women doing most of the gathering (Geary 1998).

show predictable psychosexual differences. This does not imply that they, consciously or unconsciously, *wanted* to reproduce as much as possible. As Tooby and Cosmides say, “[i]ndividual organisms are best thought of as adaptation-executers rather than as fitness-maximizers” (1992:54). It just means that individuals with characteristics and mate preferences that made them outreproduce others, would have spread those traits within the next generations. As the offspring of ancestors who managed to reproduce successfully, men and women today are expected to have inherited their traits and preferences.

From a reproductive perspective, not everybody is equally valuable as a sexual partner. In evolutionary jargon individuals whose characteristics make them potentially have a large and healthy progeny are said to be high in mate value. From this perspective, young women have a higher mate value than older women, since older women’s fertility and reproductive potential are much lower and after a certain age even decline to zero. Men’s mate value, on the other hand, will not be as much affected by age as women’s, since men’s fertility declines much less steeply with age. Ancestral men who had psychological mechanisms that made them feel more sexually attracted to older than to younger women would not have left as much progeny as individuals with opposite preferences. The latter would have outreproduced them, with the male preference for youthful mates ultimately becoming species-typical. This evolutionary logic leads us to expect that feelings of sexual and romantic attraction will be typically associated with traits in the other sex that entailed high reproductive success in the world in which our ancestors evolved (Ellis 1992).

The sexual choices exerted by members of the opposite sex are called sexual selection pressures: The partner preferences of men help direct the course of the evolution of female physiology and psychology, since they influence which female characteristics will be able to spread over the next generations. The same holds for women’s partner choices. Apart from this *intersexual* selection, there is also *intrasexual* selection, but both are linked. Intrasexual selection, or intrasexual competition, means that males should evolve over time to compete with each other to obtain those resources and display those qualities that females prefer. The more they do this, the more they will be able to satisfy their own evolved mate preferences – sometimes to the detriment of women, as we will see. Females as well should evolve to compete with each other to display those cues that males find attractive, since for them, too, the degree to which they can get what they want depends on their own mate value (Buss 1992). This may sound cynical, but, in the words of psychologist

Nigel Barber, "[o]ur romantic psychology was designed by natural selection to promote reproductive success, not happiness. That is why love can seem cruel" (2002:104).

The following sections sketch how the qualities that women and men typically desire in a mate are differentiated by sex, and how the patterns of difference that are found between male and female psychology fit a Darwinian framework. A critical distinction that will be made in analyzing women's and men's mate preferences is whether they are seeking brief affairs or long-term mating partners, because typically both sexes are expected to adjust their standards accordingly (Buss and Schmitt 1993). When reading this account of male and female psychology, it is important to keep in mind that it concerns a *continuum* of difference, not a dichotomy, and that cultures can and do mediate the expression of these evolved inclinations to varying degrees. Gender ideology obviously influences individual behavior; it is only the initial direction of these traits which is given. As Smuts (1996) says, gender ideology itself can be viewed as a reflection of the reproductive interests of the most powerful individuals in a given society. When women resist patriarchy and get more power, they will bend gender ideology toward ways that empowers the female half of the population, as we have seen happening in the West. Hence Hilary Rose's (1997) conclusion that if evolutionary psychology were true then there is no point in feminists working for a society which accepts diversity but resists domination is clearly false.

### **8.5. An Evolved Male Psychology**

For men more than women, reproductive success is constrained by sexual access to fertile mates. Women are, as Trivers (1972) called it, a 'limiting resource' for men: As a result of their greater parental investment there will always be a smaller number of reproductively available women around than there are reproductively available men, and as a result of women's smaller reproductive potential they will be more picky than men about whom to mate with.

There is thus an initial asymmetry between women and men on the sexual playing field. Given this, plus the observation that human males provide substantial parental care, plus the observation that concealed ovulation and internal fertilization make paternity uncertain for men but not for women, a wealth of predictions about male (and female) mating psychology can be generated.

Men should, for instance, have evolved psychological mechanisms that make them feel sexually attracted to features that signal youth and health and hence fertility or

future reproductive capability in the other sex.<sup>74</sup> These features are hypothesized to constitute what we call physical beauty. Men should also value virginity and sexual fidelity in a potential long-term mate more than women do, because this increases the probability that her offspring are also his. They should have psychological adaptations that help guarantee their paternity (Buss 1992). They can furthermore be expected to compete vigorously among themselves for sexual access to the more investing sex. They should be more risk-taking, more violently aggressive, and less empathic than women, since more is at stake for them in the intrasexual struggle. Whereas every woman, being a member of the high-investing sex, can likely find a man willing to mate with her, not all men will be in that luxurious position. They will have to compete for female attention, particularly in those domains that women find important, otherwise they might not find a mate at all (Trivers 1972). They should also typically pursue a mixed sexual strategy, longing for a long-term relationship as well as having a relatively greater desire for casual sex and brief affairs than women, since both strategies are reliable ways of enhancing male reproductive success (Buss and Schmitt 1993; Trivers 1972).

Major studies for assessing these predictions are Buss's (1989) cross-cultural study on mate preferences, and the International Sexuality Description Project (Schmitt et al. 2003a, 2003b, 2004). Furthermore there are many psychological, sociological, and evolutionarily inspired studies on these subjects. In general they provide support for the evolutionary approach. We zoom in on a number of findings.

The male preference for beautiful and young women is so blatant that it is well-known to everybody. It is a cross-cultural phenomenon, too: Everywhere men more than women rate beauty as important in a potential mate, and they typically desire someone younger than themselves (Buss 1989). The structural constituents of what we experience as female beauty are consistent across cultures as well and have been established as a reliable cue to fertility. Female physical attractiveness amounts to signs of youth and health. A smooth and clear skin, full lips, lustrous hair, white teeth, a graceful gait, firm breasts: All are cues to high fecundity. Beauty is also constituted by symmetry and by having average features relative to the rest of the population.

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<sup>74</sup> Hrdy (1999b) objects that in other primates no such male preference for youthful features in females is found. Primate males generally prefer older females, because these are more experienced mothers and therefore have more surviving offspring. She suggests that in humans this male preference for youth and beauty may be due to patriarchy. Primate females, however, do not experience menopause; women do. We might therefore expect men to be much more sensitive to age than other male primates. Furthermore, since humans are a species forming long-term romantic bonds, men should prefer mates that have the highest fecundity (moderated by issues of compatibility) (Geary 1998).

Both symmetry and being average are positively linked with health and a good genetical constitution in the whole of nature. Furthermore, attractive female faces have proportions that signal a combination of sexual maturity and relative youth. As a result of sexual selection, we also experience as beautiful those characteristics that magnify indications of femininity: large eyes, high cheekbones, full lips, and a small chin. Women worldwide use makeup to accentuate these feminine features and to make themselves look younger (Buss 1992; Cunningham et al. 1995; Etcoff 1999; Symons 1995). Another (near-)universal standard of female beauty appears to be a 0,7 waist-to-hip-ratio (WHR), which is positively linked with health and fertility.<sup>75</sup> The findings are complicated, however, because WHR interacts with Body Mass Index: Whenever body weight becomes very high or very low, it seems to affect men's ratings of female attractiveness more than does WHR (Singh 1993, 2002). More research on the precise interaction between the many variables affecting perceptions of female beauty is needed.

The cultural expression of standards of beauty may vary. In cultures where food is scarce, plumpness signals wealth and health, and thus indicates high social status. In cultures where food is abundant, the wealthy distinguish themselves by being thin, and as a result thinness becomes the cultural ideal. The cultural variation in ideals of female body weight is thus not arbitrary and is not likely to be greatly affected by exposure to Western media. African American men, for instance, continue to express greater attraction to a heavier build in women than white American men, a preference that, according to social psychologist Michael Cunningham and his colleagues, likely reflects enduring uncertainty concerning resource availability (Cunningham et al. 1995). What remains stable across time and across cultures, however, is the male preference for a low WHR. From the upper Paleolithic over ancient Greek, Indian, and Egyptian cultures until today, female WHR is depicted most frequently in the range of 0,6 to 0,7 (Singh 2002). The fact that most Upper Paleolithic Venus figurines have a 0,7 WHR but are very fat suggests that early humans recognized the link between a critical amount of body fat and fertility (Hrdy 1999b).

Of course men need not be, and indeed are not, aware that their experience of sexual attraction has an evolutionary rationale. They do not have to know why a smooth skin and a narrow waist appeal more to them than wrinkles and other signs of

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<sup>75</sup> Near-universal, because other variables may influence the nature of male preferences, such as population-typical variations in the size of WHR, or harsh ecological conditions, which may make men prefer women with a greater amount of fat to women with low WHR (Singh 2002).

old age in order to typically find the first traits more attractive than the latter. Underpinning this taste, however, are psychological adaptations.

Buss (1989) found that cross-culturally, the characteristics most desired in a long-term mate are similar for both sexes: kindness and intelligence. Men as well as women prefer as a long-term mate an intelligent and understanding individual who is compatible with them. As expected, however, youth and beauty occupy a much more central place in male than in female mate preferences.<sup>76</sup> The results of this survey in thirty-seven cultures differing widely in ecology, location, ethnic composition, religious and political system, and mating system show other persistent and predictable sex differences as well. Men indeed value virginity in women more than women do in men, although cultures vary tremendously in the value placed on it. Factors explaining this variability are, among others, the economic independence of women, the prevailing incidence of premarital sex, and the reliability with which chastity can be evaluated. The first two factors interact: When women control their economic fate and hence are less dependent on men, they are freer to disregard men's preferences. This causes the average amount of premarital sex to go up (Buss 1989).

The valuation of female chastity fits in the worldwide pattern of men's typical obsession with female sexual fidelity. The universality of male sexual proprietariness, which has engaged feminists for long, is not surprising from an evolutionary point of view: It is likely to evolve in any species with internal fertilization and paternal care, and the parental investment made by human males is quite significant. By monopolizing a woman they minimize her opportunity to cuckold them. They thus reduce the risk of investing time and energy into children not their own while at the same time they could have been procreating elsewhere. Men do not consciously think that way, of course, nor do all men exhibit this tendency. The point is that ancestral males who did not care about a mate's promiscuity or about seizing other sexual opportunities themselves, only had a small chance of transmitting their genes and, thus, of actually becoming our ancestors. They were outreproduced by males who regarded their sexual partners as a kind of property and who were able to make a trade-off between time invested in mate guarding, in parenting offspring, and in trying

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<sup>76</sup> Youth and beauty are central features of homosexual men's mate preferences as well. This suggests that not even variations in sexual orientation alter these deeply rooted psychological mechanisms (Buss 1994). The fact that most men in modern Western societies wear less colorful clothing than women can be explained by women's preference for this kind of attire. Drabness connotes a responsible, hard-working family man, whereas flamboyance is often perceived as a sign of promiscuous tendencies. Homosexual men, who are less likely than women to be put off by signs of promiscuity in a potential partner, are freer than heterosexual men to use clothes as sexual advertising (Symons 1979).



to sire more offspring elsewhere. As a result a sexually proprietary psychology became typical of many human males (Wilson and Daly 1992, 1993).

Psychological adaptations to reduce the risk of cuckoldry have been found in other paternally investing male animals as well. In male birds, for instance, copulation frequency, intensity of mate guarding, and provisioning of young have been shown to vary adaptively in relation to cues to possible extrapair copulations by the female, such as her period of fertility, the mating strategies of rivals, the degree of coloniality, his attractiveness relative to rivals, and lapses of his surveillance of the female (Wilson and Daly 1992). Human males' tactics of mate guarding and their degree of sexual jealousy, too, have been shown to vary according to cues to their partner's mate value, their own perceived mate value, and possible signs of the partner's unfaithfulness – since, as we will see in the next section, females have evolved to look for short-term mates as well. As expected, sexual jealousy in women has been found to be qualitatively different, triggered more by cues to a mate's emotional infidelity than by his sheer sexual infidelity. Maternity is certain for her, but when her mate becomes emotionally involved with another woman, he may channel part of his resources and attentions to that other person instead of to her and her children (Buss 2000). As said before, this does not imply that all men experience sexual jealousy, only that many men will, and that on average they will experience it more intensely than women do. It is just as with body size: The fact that some women are larger than some men does not detract from the observation that men are, on average, the larger sex.

The combination of male proprietariness, a female tendency for promiscuity (see next section), and greater male aggressiveness gives rise to a dangerous cocktail. Indeed, worldwide male acts of violence against women have been shown to be mainly inspired by sexual jealousy. Men sometimes assault their partners in response to actual or suspected sexual infidelity or as a way of deterring them from desertion. The risk of physical abuse and even lethal violence is proportionate to a woman's mate value: Young and attractive women run a much higher risk of being assaulted by their mate than elderly or unattractive women. This is particularly the case when the woman is much younger than her partner, since, being young, she is in a good position of finding a more desirable mate. Stalking as well is mainly done by men, and most stalkers have had a relationship with their victim, a relationship that she ended (Buss 2000; Wilson, Daly, and Scheib 1997). The patterning of these acts of violence, as well as the general fact that worldwide it is *young* men who are most aggressive and commit most of the violent crimes, is hard to explain in terms of social role theory, but

it fits sexual selection theory like a glove: In ancestral environments young males wanting to find a mate had to prove their mate value by displaying their physical prowess and the ability to defend their interests. In this way they could impress women as well as rival males, cultivating a reputation of bravery (Archer 1996; Daly and Wilson 1988; Wilson and Daly 1985).

Male sexual proprietariness has more unsavory manifestations, such as the development of a gender ideology and social customs and structures that are meant to control female sexuality. The degree to which men succeed in doing this will depend on many factors, such as their control of resources (see section 8.9). This core male mind-set results in well-known phenomena that are, to use the words of Margo Wilson and Martin Daly, "culturally diverse in their details but monotonously alike in the abstract" (1992:291): phenomena like veiling, purdah, claustration, infibulation, clitoridectomy, chaperoning, the valuation of female chastity, the concept of women as property and of adultery and rape as a property violation, the denigration of prostitutes, the equation of the protection of women with protection from sexual contact, and laws that excuse male violence that was provoked by 'loose' behavior of a wife, daughter, or sister. It is women of reproductive age who are most restricted in their freedom, not children or postmenopausal women. The rationale for this pattern is, again, hard to identify from a social role perspective, but obvious from a Darwinian point of view. This does not mean that women are doomed to having their sexualities suppressed by men, since male coercive control is conditional. If female resistance becomes too organized and hence too costly to fight, men will be forced to tune down (Smuts 1996).

Because they are the less-investing sex, men are predicted to have evolved a greater desire for sexual variety than women. "[T]he typical male is at least slightly sexually attracted to most females, whereas the typical female is not sexually attracted to most males," Symons (1979:267) writes. They are also predicted to direct their short-time mating effort most intensely toward women who are sexually accessible, to let less time elapse before seeking sexual intercourse, to relax their standards in short-term mating, and to avoid commitment when pursuing brief sexual encounters (Buss and Schmitt 1993). Indeed, men have been found to be less exacting than women when it comes to casual sex. This seems to be a psychological adaptation to securing a large number of casual sex partners. Age, intelligence, kindness, personality, and marital status become much less important. Beauty, however, becomes even more desirable in a short-term context. In contrast to their long-term preferences, men like cues to promiscuity and sexual experience in a potential

temporary mate, probably because these characteristics increase the likelihood that they can gain sexual access. In contrast to the tremendous positive value that men place on commitment when looking for a marriage partner, for casual sex they strongly dislike women seeking a commitment. They rate only four negative characteristics as significantly more undesirable than women do: a low sex drive, physical unattractiveness, a need for commitment, and hairiness (Buss 2003; Buss and Schmitt 1993).

Numerous other studies have confirmed the above predictions about male desires and male behavior. In the International Sexuality Description Project, a recent extensive survey across fifty-two nations and ten major world regions by psychologist David Schmitt and colleagues, for instance, sex differences in the desire for casual sex turned out to be culturally universal (Schmitt et al. 2003a). The survey provided support for the theory that both sexes have evolved to pursue long-term relationships as well as brief affairs, depending on the circumstances, but that men will look for casual sex more often and more intensively than women. This theory is known as sexual strategies theory (Buss and Schmitt 1993). Across every time interval, ranging from "in the next month" to "in the next thirty years", men were found to desire significantly more sex partners than women within every world region. Moreover, even when women reported to be strongly seeking a short-term mate, they typically did not want more than one sex partner in the next month. Men who were strongly seeking a short-term relationship, on the other hand, tended to desire more than one sex partner in the next month, with the number of desired partners strongly increasing over time. For women the increase was only marginal over time. Women were found to be slower in consenting to sex than men, and to be less actively seeking for casual sex (Schmitt et al. 2003a).

Of course, self-reports have their limits. Women and men may bias their answers in directions that they experience as socially desirable. Thus, men may exaggerate the number of sex partners they have had, whereas women may tend to present themselves as more chaste than they really are. Indeed, even after controlling for visits to prostitutes and for homosexual orientation<sup>77</sup>, men turn out to on average report larger numbers of past sexual partners than women do (Volscho and Pietrzak 2002). This is statistically improbable; the total number of sex partners should be equivalent for both sexes (but not necessarily for each individual man and woman;

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<sup>77</sup> Homosexual men tend to have a much higher promiscuity level than heterosexual men, probably because they are not thwarted in fulfilling their evolved desires by the differential sexual psychology of the opposite sex (Symons 1979).

many men may have had more sex partners than many women if a number of women are highly promiscuous). This finding suggests that some of the sex differences in self-reports of sexuality result from differential reporting rather than actual differences in behavior. In a recent experiment, psychologists Michele Alexander and Terri Fisher garnered evidence that in sexual self-reports women feel compelled by social mores to distort the true level of their sexual experience, a pressure not so much felt by men (Alexander and Fisher 2003). Participants were asked to complete a questionnaire under three different conditions: a bogus pipeline condition in which they thought lying could be detected (because they were attached to a – nonfunctioning – polygraph), an anonymous condition, and a nonanonymous condition. When anonymity was not guaranteed, women reported a smaller number of past sexual partners. It was this part of the survey that received a lot of media attention (“women lie about sex”), but the essential point of the study was more than this, as Terri Fisher herself noted (personal communication). Women’s self-reports about *some* aspects of their sexual *behavior* indeed turned out to be false accommodation to gender norms. Their sexual *attitudes*, however, did not seem to be really influenced by social expectations. The finding about biased self-reports of behavior seems to redress the statistical anomaly of a differential number of sex partners for both sexes, as well as the previous finding of an earlier age of first intercourse for boys than for girls – a finding that, if it were true, would mean that adolescent girls have first intercourse with a boy younger than themselves, whereas they typically prefer older boys. There is yet another reason for the statistical anomaly: It turns out that women prostitutes, who typically have sex with lots of men (and who may also sexually initiate adolescent boys), are underrepresented in most sex surveys (Buss 2003).

In Alexander and Fisher’s study no significant sex differences were found in sexual permissivity across all three testing conditions. Other sex differences remained significant across the testing conditions: differences in erotophilia (positive emotions toward sex), in frequency of masturbation, and in exposure to pornography. Moreover, the size of the sex difference across the anonymous and bogus pipeline conditions was very small, suggesting that anonymous testing conditions may be as valid as bogus pipeline conditions. As Alexander and Fisher note, however, most sex surveys are conducted in settings where participants’ identities risk to be revealed.

The results of the experiment lead them to suggest that

sexual behaviors may be more susceptible to social desirability responding and self-presentation strategies than are sexual attitudes. If this is the case, findings on

sex differences in self-reported sexual attitudes may indicate real differences between the sexes whereas the typical patterns found in self-reported sexual behavior may not accurately reflect true sex differences. (Alexander and Fisher 2003:33)

The complexity of Alexander and Fisher's findings was not only overlooked in the press. An example of selective reading can be found in a reaction from liberal feminist Cathy Young, who picks the finding about the lying women and contrasts it with Schmitt et al.'s (2003a) findings about the greater male desire for sexual variety worldwide (Young 2003). Caricaturing evolutionary psychology as "the notion that men are 'hard-wired' by evolution to spread their seed while women are predisposed to seek monogamous relationships," Young paints a misleading picture of both studies. Her selective way of presenting them makes their respective results look as if they were incompatible, with Schmitt et al. being exposed as fabricating "sex stereotypes that are the stuff of late-night comedy routines." People who read both studies carefully will have to acknowledge that Young renders their results in a highly biased and selective way.

Back to male psychology. Social role theory, as presented by Eagly and Wood (1999), predicts that when women gain socioeconomic equality with men, their sexuality will become similar to men's.<sup>78</sup> This prediction is refuted by Schmitt and colleagues' findings. Since this survey tried to maximize anonymity as best as possible, and since Alexander and Fisher's (2003) bogus pipeline research showed that answers given in anonymous conditions differ only slightly than under bogus pipeline conditions, we may consider its results reasonably trustworthy.

Moreover, these results converge with many other findings about a distinct male and female sexual psychology, such as the finding on sex differences in quantity and quality of sexual fantasies. Men's sexual fantasies are twice as frequent as women's, and they involve more anonymous and multiple partners. They specify many more sexual acts and a greater variety of visual content, and are more sexually explicit than women's (Ellis and Symons 1990). The study by Ellis and Symons reports no sex difference in the (high) degree of enjoyment of sexual fantasies, nor in the experiencing of sexual desire for and the fantasizing about tabooed partners (such as

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<sup>78</sup> Donald Symons (1979) objects to what he finds to be the unquestioned, and perhaps unconscious, assumption in the writings of defenders of an environmentalist view of gender difference that male sexuality is superior to female sexuality. The desire for sexual variety dooms most human males to a lifetime of unfulfilled longing, he says. When the desire can be satisfied easily, such as among many homosexual men, it is often to the detriment of the fulfillment of other desires, such as those for intimacy and security.

one's best friend's lover or one's in-law). This suggests that sex-typical fantasy patterns are not a mere product of gender ideology. If they were, women would experience more guilt about fantasizing than men, since girls' sexual activities are typically circumscribed more than boys'. Moreover, as Ellis and Symons write, if they were, women would not be as likely as men to violate social conventions by admitting experiencing and enjoying forbidden desires and fantasies.

Pornography provides another illustration to the case. Male-oriented pornography is a combination of all that titillates male sexual psychology in the context of short-term relationships. The story is straightforward, directed at sex as sheer physical gratification, and women are willing sex objects, making no emotional demands (Ellis and Symons 1990; Symons, Salmon, and Ellis 1997). The fact that it is videos and the internet that dominate male-oriented erotica testifies to the deeply visual nature of male sexuality. Cross-cultural evidence suggests, Symons (1979) writes, that the tendency of men to be sexually aroused by the sight of women, especially their genitals and other body parts that are typically concealed, and to make great efforts to see them, simply has no parallel among women, and is often intuitively incomprehensible to women.<sup>79</sup> Men's desire to look at female genitals, especially genitals they have not seen before, seems part of the motivational process that maximizes their reproductive opportunities. There is no corresponding benefit for women in wanting to look at male genitals, hence selection has not favored these impulses in them. The deliberate male display of genitals to unfamiliar women is generally understood to be a kind of threat, whereas a similar display by women is understood to be a sexual invitation. Although the practice of covering the genitals with clothing is almost universal, the underlying reasons for concealing male and female genitals probably are different, Symons concludes.

'Pornotopia', as Symons calls it, is and always has been a male fantasy realm, reflecting basic male wishes of easy, unencumbered sex with an endless variety of lustful, beautiful, orgasmic women. He attributes the finding that porn has changed very little in the last century, compared with other aspects of social life and relationships between the sexes, to the fact that it is about sexual emotions, and these are closer to the genes than sexual behaviors. Due to female choosiness, however, few men are able to realize the desires they harbor.

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<sup>79</sup> Anthropological data indicate that concealment of women's genitals with clothing is much more widespread than concealment of men's genitals. In the few instances where women do go naked, men are forbidden to stare at women's genitals, and women always sit so that their vaginas are not exposed (Symons 1979).

Porn is said by some feminists (e.g., Brownmiller 1975; Dworkin 1997; French 1992; MacKinnon 1994) to evidence male contempt for women. There is a test case for this claim: male homosexuals. If these feminists had it right, we would expect gay male porn not to exist, or to be utterly different from straight porn. This, however, is not the case. Gay and straight porn are essentially identical, with a main focus on genitals and on impersonal sex. The same goes for prostitution: There are millions of prostitutes worldwide, female as well as male, and they overwhelmingly service men. Prostitution, like porn, is not a window into men's attitudes toward women, but a window into the nature of male sexuality, Catherine Salmon and Donald Symons (2001) conclude. They add that, when a man purchases a prostitute's services, he is not just paying for sex. Usually he is paying for *just* sex: for sex without wooing, courtship, commitment, or obligation.

Unlike questionnaires and survey data about sexual desires and inclinations, pornography and prostitution are two 'real world' manifestations of human sexual psychology. In this real world men and women appear to differ profoundly on a psychosexual level. A similar manifestation, called "the acid test for hypotheses about sex differences in sexuality" by Symons (1979:292), is the sex life of homosexual men and women. There is no reason to suppose that homosexuals differ systematically from heterosexuals in any way other than sexual object choice, according to Symons. As they need not compromise sexually with members of the opposite sex, we might find male and female sexuality in their undiluted state here. Some findings: There is a substantial gay male porn industry, but no porn is produced for a lesbian audience. There is simply no market for it. The most frequent form of sexual activity between gay males is the one-night stand. Sexual partners are found by cruising bars, street corners, parks, and public restrooms, and sex occurs almost immediately, without preliminaries. More enduring relationships may develop from such encounters, but relationships nonetheless start with sex. A massive research project on homosexual men and women in the San Francisco Bay area found that almost all males in this study had cruised in the previous year, and most of their sexual partners were strangers. More than a quarter of them had had more than fifty partners in that previous year, and another quarter had had between twenty and fifty. Only about a fifth had had fewer than six partners. Seventy-five percent had had over 100 lifetime partners, and 27 percent had had over 1000. In contrast, less than 20 percent of the lesbians had cruised even once. The majority of them had had one or two partners in the previous year, and fewer than ten lifetime partners. Indeed, lesbians form stable,

intimate, lasting relationships far more easily than male homosexuals do. Monogamy is their ideal (Salmon and Symons 2001; Symons 1979).

These data imply that male and female sexuality differ much more profoundly than might be inferred from observing only the heterosexual world. Socialization pressures as an explanation of the data seems implausible, for several reasons. First, people are exposed to conflicting messages about how to behave. Second, although it is true that men are commonly believed to desire sexual variety, it is also true that most prescriptive messages concerning this desire are intended to suppress it. Third, males are usually not taught that having furtive sex in parks and public restrooms is a sign of manliness. Fourth, the fact that gay males are as interested in pornography and in youth and beauty in a partner as heterosexual males makes it unlikely that these interests result from cultural factors such as advertising and men's magazines (Symons 1979).

A last question has to be addressed. It is the objection voiced by Natalie Angier (1999): In prehistoric times people were living in small groups and most women would have been in a relationship. Where, then, would men have encountered all these women to have sex with? It suffices, however, that ancestral men occasionally found themselves in a situation where they could satisfy their desire for variety, for this desire to be favored by selection, because it raised their fitness. "All available evidence points to the conclusion that everywhere the complexities of human social life provide scope for the occasional satisfaction of desires, hence selection can be expected to favor the existence of desires, though they may rarely be translated into behavior" (Symons 1979:167).

## **8.6. An Evolved Female Psychology**

Women are the more-investing sex and men provide a relatively high level of paternal investment. As a result, we can expect humans to be characterized by female-female competition and male choice, in addition to male-male competition and female choice. A Darwinian point of view generally predicts women to have psychological adaptations that give rise to sexual and romantic attraction to those traits in men that would have helped their children to survive in the evolutionary past: traits that provide cues to health, resources, protection, and his willingness to engage in parenting. Because paternal investment is reproductively beneficial for women, they can be expected to compete among themselves for men exhibiting these traits (Ellis 1992; Trivers 1972). Having a father around generally means more food and protection, reduced mortality



risk, higher social competence and competitiveness, and higher future social and cultural success for a child. Male investment is thus important, but not absolutely necessary for child survival. This observation, together with the fact that men can never be sure of paternity, implies that evolutionarily it would have benefited men more than women to shift between parenting and mating effort. Men and women today can still be expected to differ in this respect, with women more than men investing time and energy in parenting relative to looking for short-term affairs. This relative difference in preferences is expected to be a source of conflict between the sexes, since women will typically try to obtain more paternal investment than men prefer to give. Variability between men will be high, however, with some men investing most of their time in parenting effort and others in mating effort, since both strategies are reproductively viable. Variability between women will be lower, since because of their greater initial parental investment they have less to gain in pursuing additional mates (Buss and Schmitt 1993; Geary 2000).

People are, of course, not consciously calculating the possible reproductive benefits of the choices they make in life. They just act on their preferences. It is instructive to remember the example of sugar: We do not have to know that foods rich in sugar helped our ancestors to survive and reproduce in order to like its sweet taste.

The finding that worldwide, across subsistence activities and social ideologies, mothers do the bulk of childcare and are far more frequently involved in spontaneous interaction with their children than fathers, attests to their differential priorities. The same pattern is even present in the Israeli kibbutzim, in liberal Sweden, and in nontraditional Western families, suggesting that it may be something hard to change (Campbell 2002).

Why girls and women should extend their caring attitude to their social relationships in general, stressing intimacy, sensitivity, and interdependency more than boys and men do, is not completely clear. It may follow indirectly from their maternal investment, in the sense that it is important for child survival to create a stable and nonhostile social atmosphere, as Geary (1998) suggests. Certainly in the face of patrilocality, when women had to immigrate into a community of strangers at adolescence, it was crucial for them to establish friendly relationships. Campbell (2002) thinks it more likely that creating bonds of trust might have helped to protect women from male abuse. Both hypotheses are compatible, and so is the proposition that male-male competition and the importance of social dominance for male reproductive success would have prevented the evolution of high empathizing and of the need for emotional self-disclosure in men (Baron-Cohen 2003).

Female mothering has long been taken for granted by male evolutionary biologists, Hrdy (1999b) writes. They viewed motherhood as an uncomplicated task and consequently supposed that our prehistoric female ancestors produced as many children as their reproductive span would allow. Since a hunter-gatherer way of life allows for approximately one child every four years, each woman would have sired and raised her maximum of five or six children. Due to this presumed scarcity of selection pressures on women, they were not thought to benefit from competition, hierarchical striving, or promiscuity. What would they compete for, if they reached their maximum of reproductive success anyhow? We now know, however, that among hunter-gatherers women show considerable differences in their ability to produce children *and* to keep them alive. Many women die without leaving even one surviving child behind.

This variability in the reproductive success of female animals in general, as well as the impressive variation in mothering strategies that they display, was only discovered in the last decades of the twentieth century. It is now acknowledged that keeping her offspring alive requires intense planning and strategizing on the part of the female. Depending on the species, she will have to make a lot of choices: whom to select as a mate, how to disguise promiscuity, whether or not to abort, how to space births, when to stop weaning, how to prevent infanticide by a hostile male, how best to divide her time and energy between her offspring, how to balance between protecting them and stimulating their independency, how to combine taking care of her own needs and of theirs, or how to find alloparents - that is, other individuals who will help her look after her offspring. Many species of bird, fish, reptile, and mammal even reveal the baffling sophistication of facultatively investing differentially in sons and daughters, favoring the sex that will probably have most reproductive success in that particular context. They can do this by influencing the sex ratio before fertilization, by selective abortion, or by treating male and female offspring differently. When the circumstances change, their pattern of sex-biased investment shifts accordingly (Hrdy 1999b).

Some of these strategies will sound familiar. Humans are, of course, not just like any other animal species, but, as Hrdy (1999b) says, the fact that sex-biased parental investment pervades the animal world suggests that in the human case we cannot just attribute this phenomenon to gender ideology without simultaneously looking for the roots of this ideology (see also chapter 9).

From a Darwinian point of view women, and female primates in general, are not expected to be as violently aggressive and risk taking as males (except when defending their offspring), since they do not have to compete for copulations per se, and since their death considerably raises the hazards of their offspring dying. This does

not mean, however, that they should have evolved to be passive and noncompetitive. Dominance pays for females, too, albeit not to the same degree as for males. Not in the way of sex, but in the way of access to food. In most social mammals, female reproductive success increases with female social status. High-ranking mothers introduce their daughters in their social networks, with their daughters inheriting the benefits of their mothers' rank: access to the best food, earlier sexual maturity, higher chances of offspring survival, and less harassment of herself and her offspring by other females. In primates the intensity of female-female competition depends on the abundance and spacing of the food. This appears to be the reason why female bonobos can establish close bonds: They do not have to compete, because food is so plentiful (Campbell 2002).

Nonhuman female primates compete directly for the resources they need to survive and reproduce. In humans these resources have often been monopolized by males, and consequently women will have to compete for them indirectly: by competing for men possessing resources. Moreover, since human males provide a high degree of parental investment, women will also compete for men exhibiting traits that promise paternal involvement. We will see that among evolutionists there is disagreement on the origins of the female preference for wealthy men, as well as on the nature of women's sexuality.

When considering women's mate choices, I again distinguish between long-term and short-term mating contexts. Although, as elaborated in chapter 7, females have long been considered the monogamous sex, we now know that in many species, including humans, this is not the case. Women as well as men have mixed sexual strategies within their repertoire, be it that women are hypothesized to have evolved a lesser desire for sexual variety than men and to impose higher standards for short-term mates than their male counterparts (Buss and Schmitt 1993).

When it comes to long-term relationships, women as well as men regard love as an indispensable ingredient, although women value this cue to commitment still a bit higher than men do. With love thus being a prerequisite for a long-term relationship for both sexes, and kindness and intelligence as the most valued traits in a long-term mate for both sexes, women and men are very similar with regard to their major priorities in this context. The order of the items next on their list of qualities desired in a prospective long-term partner, however, differs significantly.

Dozens of studies document that American women value good financial prospects in a mate roughly twice as highly as men do, a difference that has remained constant over the last seventy years. In this preference for resources they follow the females of

many other species. As David Buss writes, “[t]he evolution of the female preference for males offering resources may be the most ancient and pervasive basis for female choice in the animal kingdom” (1999:104). Hundreds of studies worldwide, ranging from cross-cultural surveys to analyses of personal ads in newspapers and magazines, have shown that women care a lot about a man's provisioning ability. Universally women also prefer high social status and ambition in a mate, probably because these are cues to his present or future control of resources (Buss 1989, 2003; Ellis 1992; Low 2000; Mealey 2000).

An obvious objection is that, since women lack socioeconomic power, they are forced to seek men with money (Angier 1999). This explanation implies, however, that whenever women get access to power and wealth, they should lay less stress on a man's earning capacity, across and within cultures, and that men who have less socioeconomic power should value financial resources more in a prospective mate. The hypothesis is thus testable and it is contradicted by nearly all available data. Across and within cultures, women's mate preferences become *more*, rather than less, discriminatory as their wealth, power, and social status increases, a finding that fits evolutionary theory, since the higher a woman's mate value, the more she can demand in a mate. Powerful women want superpowerful men. Women want partners whose socioeconomic level at least equals theirs, regardless of how high that level is (as a result, highly successful women today have more difficulty finding a long-term partner than less successful members of their sex, because their wish to find a partner equally wealthy or wealthier than themselves considerably reduces the pool of men they are willing to consider). The preferences of men with fewer resources are, moreover, indistinguishable from those of wealthy men (Buss 1989, 2003; Buss and Schmitt 1993; Ellis 1992).

However, when Alice Eagly and Wendy Wood reanalyzed Buss's data on mate preferences in thirty-seven cultures by combining them with measures of gender equality in these cultures, they found a weak trend in the opposite direction. Cross-culturally women indeed emphasize a mate's earning potential more than men do, but they tend to decrease this emphasis as gender equality increases. Nonetheless they keep ranking it as highly important (Eagly and Wood 1999). Holding feminist values has also been found to attenuate this preference to some extent, although women with feminist values keep adhering to the pattern of wanting wealth and status in a mate (Koyama, McGain, and Hill 2003).

It cannot just be that women may feel they have less job security than men, as Angier (1999) suggests. Among the Bakweri in Cameroon, the women are wealthier

and more powerful than the men, because women are in much scarcer supply – an imbalance that results from the continual influx of men from other areas to work on the plantations. Still they insist on men with money or resources (Buss 2003). In hunter-gatherer societies, where resources are not easily accumulated and where women's gathering is as vital as men's hunting, the social status of men is an important consideration in women's mate choices. In societies like these, a man's status is defined by his sociopolitical activities, his hunting skills, his athletic prowess, or his knowledge. A high social status substantially contributes to his reproductive success: High-status men have more wives, more extramarital affairs, and more children, with their children having a higher chance of survival (Campbell 20002; Geary 1998). This female predilection for male status even in societies where women are not disadvantaged socioeconomically suggests that it might have very deep roots, but it might be too early to know that for sure (see also section 8.9).

The finding that cross-culturally women prefer as long-term partners men who are older than they are (three and a half years on average) is probably related to this female preference for status and wealth in a male. Typically a man's age provides a cue to his access to resources, since worldwide social status and wealth tend to accumulate with age (Buss 1989, 2003). Other important determinants of women's mate choice are a man's height, strength, and athletic ability. Some have suggested that these traits are of importance to women not only because they contribute to a man's status – they would have made him a proficient hunter, for instance – but also because they imply that he will be able to protect them against physical and sexual domination by other men (Smuts 1995, 1996; Mesnick 1997; Wilson and Mesnick 1997). Tall and athletic men indeed have more dates than short, average, or less athletic men (Etcoff 1999), which in times predating birth control would have implied more offspring.

For women physical attractiveness in a long-term mate should be important as well, but not to the same degree as for men, because of the significance of cues to paternal investment. Indeed, as in many species of the animal world, people of *both* sexes place high value on indicators of a mate's good health, such as bodily and facial symmetry (Etcoff 1999; Symons 1995), but women do so to a lesser extent than men (Buss 1989). Moreover, the components of male physical attractiveness are more complex, since women typically perceive cues to a man's social dominance as contributing to his attractiveness. A somewhat taller than average body size, personality characteristics such as self-confidence, independency, and assertiveness, and physiognomic traits stressing masculinity, such as prominent eyebrows, deep-set

eyes, and a broad jaw, are all linked to social dominance and social status in men and, consequently, perceived as sexually attractive by women (Ellis 1992; Etcoff 1999).

Women are, however, not only looking for socially dominant men, but also for men willing to invest in children. As documented by Buss (1989), they most of all want a mate who is kind and understanding. Since personality traits enhancing social dominance do not always contribute to a man's kindness, we may expect this female preference for cues to dominance to be moderated by signs of a nice character. Indeed, when traits signaling dominance behavior and masculinity become too outspoken, such as having a very square jaw, their perceived sexual attractiveness diminishes. Women's sexual preferences, however, shift across the cycle. At midcycle women rate the sexual attractiveness of masculine facial features at its highest, and during that phase their preference for the scent of symmetry is at its strongest. This finding implies that women are looking for genetic quality when they are most likely to conceive. Moreover, their libido increases, as well as the probability of their having extra-pair copulations – the best father might not always be the one having the best genetic constitution (Thornhill and Palmer 2000).

Men do not show a specific preference for female willingness to invest in children: Experiments have revealed that, whereas women's ratings of the attractiveness of men as long-term mates are affected by cues to their affection or indifference toward a child, men's judgements are not. This is apparently because other than men, women do not vary widely in their affection toward children, so men did not 'have to' evolve a specific predilection for these qualities in a long-term mate (Buss 1999).

A person's mate choice will thus depend on an intricate mixture of variables. Its precise manifestation will moreover be influenced by many other factors, including her or his personality, age, and life history, and, in many cultures, pressures from kin (who are, in turn, pursuing their own reproductive benefits). This interaction of variables explains why Darwinians do not generally expect young women to be drawn to substantially older men. A man's status may typically accumulate with age, but many women are also looking for strength, athletic skills, health, physical attractiveness, and compatibility. Nevertheless, the combination of male and female preferences sometimes leads to the familiar phenomenon of a fifty-five-year-old male rock star or captain of industry having a relationship with a twenty-two-year-old fashion model. Both have attributes that are highly valuable to the opposite sex; hence, they are in a position to actualize their mate preferences. She has traded her youth and beauty – typical weapons of intrasexual female competition – for a high-status male, whereas he has used his social status and resources – typical weapons of intrasexual male

competition - for getting a highly desirable young woman. Both have employed their high mate value for acquiring a trophy mate.

In evolutionary biology men have long been considered the promiscuous sex, whereas women were assumed to be tending toward monogamy. This is rather unlogical; men could hardly have been selected for promiscuity without polyandrous women around, except in the context of rape. But because of societal prejudice, and because the possible adaptive benefits of female promiscuity were not obvious, this female tendency has long been overlooked. Meanwhile several possible benefits have been advanced, but they have not yet been subjected to many empirical tests. An ancestral woman might engage in casual sex in exchange for meat, goods, or services. In addition, by obscuring paternity, she might elicit resources from several men (Hrdy 1999a, 1999b). Another possible resource is protection (Smuts 1995, 1996). She might also engage in a short-term affair because of its genetic benefits: if her regular mate is infertile or impotent, in order to get different genes, or in order to get better genes. Among other possible benefits we find manipulating her regular mate into increasing his commitment and the possibility of finding a better mate (Buss 1999).

The costs of promiscuity are, however, predicted to be higher for a woman than for a man. She risks physical and sexual abuse, as well as reputational damage. This damage will likely be more severe than for men, ultimately because of paternity uncertainty: Men will not favor cues to promiscuity in a prospective long-term mate, since chances are that she will cuckold them. Another reason is that people may interpret a woman's promiscuity as a sign of her low mate value, since women of high mate value are generally discriminating: They know that they can afford to be choosy, because they are desired by many men. This trend occurs even in relatively promiscuous cultures such as the Ache, a foraging people in Paraguay (Buss and Schmitt 1993).

Sexual strategies theory proposes that women will not lower their standards as much as men do when seeking short-term mates. Whereas men can be expected to sometimes seek sexual variety per se, since this would have been of reproductive benefit to our male ancestors, women are not predicted to gain from an indiscriminate strategy. Just mating around with any willing man would likely have entailed too many costs for our female ancestors. They should have focused on those males who were likely to provide them with some benefits, be it resources, protection, good genes, or the prospect of a (better) long-term relationship. Indeed, Buss and Schmitt (1993) have tested these predictions and found them confirmed by their own research as well as by many other studies. Women frequently expect and obtain resources in exchange

for short-term sex, with voluntary prostitution as an obvious example. The authors cite from an extensive cross-cultural analysis of prostitution, conducted by Nancy Burley and Richard Symanski (1981), who concluded that "the motives expressed by many sorts of women in numerous societies are, at their core, clearly economic: men create a demand and women find an economic advantage meeting it" (cited in Buss and Schmitt 1993:220). Buss and Schmitt also found that women place greater value on cues to immediate resource extraction in short-term than in long-term mates, despite the fact that they are generally less demanding in a short-term than in a long-term mating context. These findings support the resource hypothesis about women's short-term mating. Next, women more than men dislike characteristics in a short-term mate that indicate bad long-term prospects: when that person already has a relationship or is promiscuous. Moreover, they keep looking for love and emotional intimacy in short-term relationships - both findings that support the mate switching or long-term mate finding hypothesis. Women also place greater value on a man's strength and physical attractiveness in a short-term than in a long-term context, which backs up the good genes hypothesis, since attractive features generally connote a history of healthy development (Buss 1999; Buss and Schmitt 1993).

Sexual strategies theory further predicts that these differential strategies and preferences of both sexes will often be a cause of conflict. Men will be more likely to complain about women's sexual withholding, whereas women will be more likely to feel disturbed by men's sexual aggressiveness. Many studies have documented this effect (Buss 1999; Buss and Schmitt 1993).

That women keep up high standards in many contexts is reflected in their sexual fantasies, as well as in female-oriented erotic literature. Women's sexual fantasies are built up slowly and are more elaborate than men's. Women, more than men, emphasize touching, feeling, and the responses of their imagined partner. They are more likely to fantasize about someone they are involved with, and to focus on personal characteristics of that person. They are much less likely than men to switch partners during the course of a fantasy, and more often imagine themselves as recipients of sexual activity (Ellis and Symons 1990).

Erotic romance novels, which are almost exclusively written by and for women, provide another window to female psychosexuality. This immensely popular product differs profoundly from male-oriented pornography. Here the love story is the central action. Sex is important, but it does not dominate the plot. Romance novels are about a woman's desire to find the one right, passionate man who will remain hers for the rest of her life, not about her pursuit of sexual variety. Sexual activity is described



primarily through her emotions rather than through descriptions of her physical responses or through visual imagery (Ellis and Symons 1990).

Hoff Sommers (1994) presents a typical example of this genre:

Townfolk called him devil. For dark and enigmatic Juan, Earl of Ravenwood, was a man with a legendary temper and a first wife whose mysterious death was not forgotten... Now countrybred Sophy Dorrington is about to become Ravenwood's new bride. Drawn to his masculine strength and the glitter of desire that burned in his emerald eyes, the tawny-haired lass had her own reasons for agreeing to a marriage of convenience... Sophy Dorrington intended to teach the devil to love.<sup>80</sup>

Are romance novels an attempt to indoctrinate women? It seems not. The free market is mainly driven by consumer choice, and sales are a measure of public preference. Romance novels, in which almost every hero is handsome, strong, and socially dominant, amount to almost 40 percent of all mass-market paperback sales. Attempts by feminists to have this literature replaced by a new one have failed. The readers' resistance to politically correct romances featuring sensitive, unaggressive heroes and sexually experienced, right-thinking heroines was too strong (Hoff Sommers 1994).

We might conclude that, whereas in men's sexual fantasies the goal is sexual gratification, women's fantasies tend to be related to mate choice, something that again supports the mate switching or mate finding hypothesis. It is not, though, as if women are not sexually aroused by explicit pornography. They are less motivated to seek it out, but when confronted with it, such as in an experimental setting, they may respond to it with the same intensity as men. The psychological mechanisms, however, seem to differ. Men subjectively identify with the male character and imagine that they are copulating with the woman in the picture, whereas women seem to identify with the female character and imagine themselves to be the object to which men respond sexually. The finding that both sexes are aroused most strongly by descriptions that emphasize the woman's body supports the hypothesis that there is a basic sex difference in the psychology of sexual arousal. That women enjoy looking at other women's bodies is also clear from commercial periodicals: Highly desirable women figure widely in women's magazines. This ought not to be interpreted as evidence for lesbian inclinations. Heterosexual women do not look at attractive women in pictures as sex objects; rather, they identify with them. They also try to learn, from comparing

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<sup>80</sup> Synopsis on back cover of *Seduction* by Jayne Ann Krentz.

themselves to other women, how to stimulate male desire and use it to their advantage. Hence it is female intrasexual competition that we see at work here – competition that apparently does not hinder learning through identification (Symons 1979, 1987b).

Three of the four afore-mentioned gender differences in sexuality turn out to be predictable from an evolutionary perspective: men's greater interest in sex, the stronger link between aggression and sexuality for men than for women, and women's greater emphasis on committed relationships as a context for sexuality. The fourth difference, women's greater sexual plasticity (Peplau 2003; Peplau and Garnets 2000), is harder to explain. Women's sexuality is more malleable and capable of change over time. It is more responsive to social contexts, and women are more likely than men to have bisexual feelings or to change their sexual orientation across the lifespan. Men are more likely to be either heterosexual or homosexual and to stay that way (Bailey 2003). Anthropologist Helen Fisher (1999) thinks that women's sexual flexibility results from an evolutionary history where it was crucial for a woman to secure the help of whoever was present and willing to be an alloparent to her children. Their greater sensitivity to environmental circumstances might also have served their reproductive interests – until patriarchal coercive techniques put a spoke in their wheels. It seems that currently we know too little about this aspect of female sexuality to say much about it. As psychologists Linda Garnets and Anne Letitia Peplau (2000) contend, women's sexuality and orientation has too long been conceptualized in terms of male experiences, resulting in ignorance about the complexity of this aspect of women's lives.

An indication that women's sexuality is more associated with environmental circumstances than men's was also documented by Schmitt and colleagues in their International Sexuality Description Project (2003b). They found that worldwide both sexes shift their styles of romantic attachment depending on several sociocultural characteristics, but that women do so more than men. Particularly, women tend to adopt the more typically male style of avoiding close personal relationships in environments with higher mortality rates, fewer resources, and higher fertility rates. This makes evolutionary sense. When resources are scarce and mortality is high, a woman might do better by shifting from a primary long-term strategy to a more short-term mating strategy with lower levels of emotional commitment. Early reproduction allows family members to help raise offspring, she may get resources and protection from more than one putative father, and she may get sexual access to men with good genes that can make her children withstand the harsh environment.

The perplexing result, however, is that gender differences in degree of emotional attachment are *most* marked in Europe and America, cultures with the most progressive gender ideologies and the highest degree of socioeconomic equality between the sexes. In Africa and Asia, cultures with the most traditional gender roles, women and men are very alike in their avoidance of emotionally close romantic relationships. The degree of this gender difference was found to be unrelated to cultural masculinity levels. These findings run directly counter to Eagly and Wood's (1999) social role hypothesis, which predicts that gender differences should decrease as women gain socioeconomic equality. With respect to attachment styles they *increase* instead: Women become more nurturing and more in need of emotional closeness (Schmitt et al. 2003b).

What should we infer from this finding about women's sexuality? It gives more weight to Barbara Smuts's and Sarah Hrdy's suggestion that patriarchal arrangements might have mutilated an originally assertive female sexuality, whether in the course of evolution (Hrdy 1997) or in the course of individual women's lives (Smuts 1996). As Smuts points out, women still grow up in a sociocultural context that represses the development and expression of their sexuality. This context may foster a female sexuality that responds to male needs and desires rather than having desires of its own. She thinks it is premature to attribute the relative lack of female interest in sexual variety to women's inherent sexual nature in the face of this repression, and calls for suspension of judgement until we have more evidence.

Both are right in calling for caution, but we must not forget that there are a number of factors that unambiguously point to evolved differences in psychosexuality either. The finding that the magnitude of sex differences in attachment style is more strongly linked to evolutionary pressures such as a harsh ecological environment, mortality rates, and local sex ratio<sup>81</sup>, than it is to measures of gender equality, for instance. Or the finding that there are no sex differences in feelings of guilt over sexual fantasies, although the content of these fantasies differs considerably. Or the finding that testosterone administration to postmenopausal women increases their sexual fantasy and sexual activity, and that estrogen and antiandrogen administration to male-to-female transsexuals decreases their sex drive (Bailey 2003). The link between

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<sup>81</sup> The ratio of sexually active males to sexually active females in any given population at a given point in time. When the sex ratio is female biased, that is, when there are more sexually active women than men, liberal sexual attitudes tend to prevail, presumably because then men are more in a position to impose their wishes upon women, since they are in scarcer supply than women (Schmitt et al. 2003a).

sex differences in sexual behavior, attitudes, and fantasies, and the sex differences in exposure to sex hormones, does not just result from social roles and expectations.

Another indication that the typical female brain is not designed to enjoy uncommitted sex comes from interviews with young women who reported casual sex with dozens of partners. While on the surface their behavior was indistinguishable from men's, it turned out that their motivations and emotional responses were very different from those of their sexual partners. They did not engage in one-night stands for the purpose of sheer physical gratification, but almost always reported some ulterior motive. They wanted to establish their own desirability as dates, or wanted to take revenge for their boyfriend's betrayal, for instance. Their emotional response to their casual affairs was much stronger, and much more negative, than men's, despite the fact that most of them rejected traditional feminine roles and had no ethical problem with sex without commitment. A similar motivational sex difference is seen in the reasons for having extramarital affairs. For women dissatisfaction with their spouse and the need for love are common motives. Men's primary motive is sexual pleasure with no strings attached. Men who cheat on their wives are just as likely to describe themselves as happily married as men who remain faithful (Barber 2002). The same goes for the reasons why young teenage girls engage in sex: Sexual pleasure is usually not the motivating factor. They want to please their boyfriend, they feel pressured by him or by other girls who are having sex, or they hope that having sex will make them more popular (Sax 2005).

### **8.7. Benefits of an Evolutionary Framework**

Evolutionary psychology does not want to usurp other disciplines. It only wants to *and can* provide an overarching theoretical framework that can organize and explain the observations done by feminists and social scientists. It is no competing theory to psychological and sociological theories; it is a metatheory. It provides us with a much-needed underlying scientific view of human nature. Women researchers are involved in it to nearly the same extent as are men, so any inkling of male bias will be severely scrutinized. Evolutionists do not at all deny that socialization affects human behavior and the expression of sex differences, but they argue that it informs only part of the story. They offer a broader, and complementary, explanation.

Evolutionary psychology does not imply genetic determinism. It is not reductionist in the negative sense, nor is it unscientific, inherently sexist, or any of the other things it has been charged of being. It fits in with what we know about the world and how it

works. The preponderance of evidence speaks for it. It accounts for as many phenomena as those described by social scientists, and for many more. It is true that some of its hypotheses are at the moment not much more than this: just plausible hypotheses (e.g., Geoffrey Miller's 2000b account of the role of sexual selection in shaping the human mind). But they just await further research.

So what are feminists waiting for? Why not seize this powerful theory to sustain feminist claims? Feminist sociologist Amanda Rees acknowledges that "a self-aware, or reflexive, evolutionary psychology could have an interesting role to play in feminist theory" (2000:368). She summons her fellow feminists to start paying more attention to what evolutionary psychology has to say. Indeed, many of the phenomena mentioned in the section on feminist observations are not only explained by evolutionary theory, but actually *predicted* by it. The existence of conflict between the sexes, as well as the specific factors that provoke it, are to be expected given the differential sexual psychology of women and men. Some might object that this reveals evolutionary psychology to be determinist after all, but that is a misconception. As said before, the theory holds that the particulars of the manifestation of psychological adaptations will depend on the context. Our evolved dispositions are triggered by environmental cues, and changes in the environment will lead to changes in the way they express themselves.

If you are never thwarted in your objectives, you may never get angry. If your mate never flirts with others, you may never get jealous. If you grow up in complete isolation, you will never learn how to talk and even your sexual appetite may not quite develop. When confronted with the evolutionarily expected stimuli (stimuli that reliably manifested themselves in the course of evolution), however, such as a linguistic and socially complex environment, or, later in life, a mate who may be contemplating to leave you for someone else, we will respond in a species-typical way that is at the same time tailored to the specific context. If you are born in France, your language module will get you to spontaneously and effortlessly acquire French; in Germany it will be German. If you are having a romantic relationship, the probability that jealousy will manifest itself will depend on many factors, including your gender, your partner's behavior, your partner's mate value, your own mate value, the quality of your relationship, and your experiences earlier in life. Because of our evolved modules we can react in ways that come naturally and spontaneously to us, but that actually involve very complex computations. The more we get to know about these underlying mechanisms of behavior, the more we can learn about how to control it.

People who would never think about questioning the legitimacy of psychological or sociological research sometimes ask me what evolutionary insights are good for. I continue to be amazed by this. Is it not tremendously important to try to understand human nature? I suspect that the main reason is the false dichotomy between nature and nurture that is still preeminent in people's minds: it is good to study "nurture," since that implies we can find ways of remedying human behavior, but why should we study "nature," that fixed entity we cannot change? And aren't we cultural beings who have left the constraints of nature behind us? As I hope to have shown, things are more complex than that.

There are more possible answers to give. Many people do not seem to realize that the recognition of a human nature is a prerequisite for the foundation of firm ethical standards. As Steven Pinker (1997:48) asserts, "[i]f people's stated desires were just some kind of erasable inscription or reprogrammable brainwashing, any atrocity could be justified." A denial of human nature, no less than an emphasis on it, can be used for harmful ends.

Pinker describes a 1974 documentary about the war in Vietnam, where an American officer explains that we cannot apply our moral standards to the Vietnamese. Their culture, he says, does not place a value on individual lives, so that they do not suffer as we do when family members are killed. The director plays the quote over pictures of wailing mourners at the funeral of a Vietnamese casualty, thus refuting the officer's rationalization. Individual rights, Pinker points out, can only be founded by assuming that people have intrinsic wants and needs and are authorities on what those wants and needs are. I would add that the same holds for women's rights. Evolutionary insights can thus serve us with some guidelines in, for instance, the debate on multiculturalism and gender equality.

Evolutionary psychology is also an explicit refutation of the suggestion that one sex might be superior to the other. As David Buss (1996) explains, any notion of superiority is logically incoherent from an evolutionary point of view. A bird's wings cannot be considered inferior or superior to a fish's fins, and in the same way neither sex can be considered inferior or superior. Each sex possesses mechanisms designed to deal with its own adaptive problems. Most of these mechanisms are similar for women and men; some, specifically in those domains having to do directly or indirectly with reproduction, are different. Evolutionary theory carries no normative values; it is descriptive.

Moreover, evolutionary psychology does not consider women any less capable than men of being rational, of reasoning in an abstract way, or of using general moral

principles, as some difference feminists and ecofeminists do - a feminist claim that is, in fact, rather insulting to women.

Indeed, it is actually environmentalist accounts that might be considered quite sexist, since women are regarded as weak and willingness, as helpless victims in the hands of men. An evolutionary perspective focuses on female choice as one of the primary mechanisms driving gender difference. It highlights a female mind that has an identity of its own, instead of merely being the product of patriarchal oppression. Consequently it offers a more affirmative view of women. As Douglas Kenrick, Melanie Trost, and Virgil Sheets (1996) point out, for instance, the phenomenon of trophy wives, in which younger, attractive females have a relationship with older, powerful males, has often been explained by social scientists as a product of cultural pressures. In this view women are passive victims manipulated and traded by all-powerful men. As the authors argue, however, the very name "trophy wives" illustrates an unwitting sexist bias common in environmental accounts of gender difference: the tendency to ignore the role of female choice in mating relationships. Similar patterns of age difference and of women trading their youth and attractiveness for power in a mate are found throughout the world and throughout history and are very likely due to sexual selection. As explained before, it makes evolutionary sense that older males should seek relatively younger females, whereas the trophies that females seek consist of social status and resources in a mate, both factors that typically accumulate with a man's age. Following evolutionary insights a much more complex picture emerges. It is one where males and females are active players in the game and where their different mate preferences and reproductive strategies have ultimately led to the rise of patriarchy (see section on the origins of patriarchy).

As I argued in chapter 3, I do not think that scientific theories should be accepted or rejected on ideological grounds. We should not defend an evolutionary approach to the sexes simply because it puts women in a better light than men (the latter emerging as the more violently aggressive, more sexually proprietary, more status-striving, and less nurturing sex). The elegant truth is, however, that evolutionary psychology both accounts better for the available data and gets much more empirical support than does environmentalism. Feminists may have trouble interpreting this view of female psychology as positive, since women's lesser extent of status striving and dominance behavior does not promise for their rapid advancing to the higher regions of power. I would retort that we finally have a theoretical framework showing us that typically female traits and abilities are as important as typically male ones. I would add that feminists should not get trapped by what so many male theorists have

done before them: to take the male mind and male behavior as our standard. Moreover, if we can formulate good reasons for why we think there should be an equal number of women and men at the top, such as the proposition that a government ought to represent the whole of the population, we might choose to introduce policies to achieve that goal. Evolution does not dictate us how to live our lives.

Evolutionary psychology empowers women on a theoretical level, but on a more personal level as well: It shows them that they can be as feminine or as nonfeminine as they feel like. They do not have to fear that their 'wanting to feel like a woman' betrays their weakness of character. They can be just whoever they are: feminine or not, heterosexual or not, nurturing or not. While evolutionary psychology is about the universal design of the human mind (and of that of the sexes), it is also about variation. Without variation, after all, there can be no evolution.

Taking an evolutionary approach can further help us identify and illuminate adaptive problems faced by women. Evolutionary theorists have looked into, among others, the evolutionary basis of patriarchy (see section 8.9), polygyny (Hrdy 1999b; Low 1992, 2000), the relationship between social stratification and the status and treatment of women (Low 1992, 2000), femicide (Daly and Wilson 1988; Wilson, Daly, and Scheib 1997), male sexual proprietariness (Buss 2000; Smuts 1995, 1996; Wilson and Daly 1992, 1993), and male sexual coercion (Gottschall and Gottschall 2003; Malamuth 1996; Mesnick 1997; Shields and Shields 1983; Thornhill and Palmer 2000; Thornhill and Thornhill 1983, 1990; Thornhill, Thornhill, and Dizinno 1986).

Their findings can heighten awareness of the risks women face, such as harassment, battering, rape, and exploitation, as well as of the contributing risk factors. Wife abuse, for instance, has been found to be much more frequent in patrilocal societies, where women leave at marriage to live with their husband's kin. The presence of kin apparently protects a woman from male violence (Smuts 1996). The presence of children sired by a former partner has also been identified as a risk factor for violence against wives. This factor was overlooked by traditional researchers, but a Darwinian perspective led to its identification (Daly and Wilson 1996). Likewise, having a stepparent has turned out to be the most powerful predictor of child abuse risk, something that was only discovered after evolutionists started looking (Daly and Wilson 1985, 1988, 1995). Evolutionary findings can also highlight possible sources of patriarchal bias in legal codes, such as in the rape laws of the past when the blame for rape was put on the victim (Thornhill and Palmer 2000).

Evolutionary theory can assist us in specifying what social variables influence individual development in what ways, so that fruitless hypotheses can be identified



and selected away. The proposition that the viewing of violent pornography inspires imitative behavior, for example, has no sound theoretical foundation. It is refuted by everything we know about human motivation and development, and it has a logical flaw as well, since it cannot explain why men should want to imitate violent pornography but not the many other human activities depicted in videos, such as having a loving and respectful relationship. Although violent pornography may be a factor in the explanation of raping behavior in some men, it is highly improbable to be a cause of rape in itself (Thornhill and Palmer 2000). This argumentation holds for violence in general: Postulating media violence as a source of mindless imitation is – besides being no explanation at all, but a labeling – a naive and most doubtful view that is not based on any sound psychological theory (Daly and Wilson 1988).

Evolutionary insights can thus be a valuable aid not only to psychological science, but also to sociology and the political sciences, since they can illuminate how individual actors will be affected by social, economic, and political variables. They can also resolve psychology's puzzlement about the fact that humans are intentional beings, having inbuilt perceptual and cognitive biases, drives, and goals (Daly and Wilson 1996).

An evolutionary framework can elucidate why certain arrangements might not be in women's best interests. It is predictable, for instance, that the 1950s model of the nuclear family, with the male as provider and the female staying home all day looking after the children, should have been frustrating to many women. In contrast to what feminist critic Hilary Rose purports, evolutionary psychology does not at all produce a construction of the family looking "embarrassingly like the Flintstones" (2000:118). As Robert Wright (1995) and Sarah Hrdy (1999b) argue, we can expect that many women will feel the need to actively participate in socioeconomic life. In hunter-gatherer societies women are workers as well as mothers, taking their children with them while gathering, or entrusting them temporarily to the care of relatives. Female primates in general have always been dual-career mothers, forced to compromise between maternal and infant needs, Hrdy writes. For this reason primate mothers, including human foragers, have always shared care of offspring with others.

Evolutionary psychology makes statistical observations and predictions; it says nothing about what people should do nor about what particular individuals will do. If some people feel happy in a Flintstones-family, there is nothing wrong with that. Whether a woman wants to stay home with the children, prefers to remain childless, or aspires both a career and children, she should in each case have that possibility. An evolutionary perspective informs us that acknowledging infant needs does not

necessarily enslave mothers: Mothers are important, but they are not the only ones who can provide the caring, nurturing relationship that children need to survive.

Thus feminists need not be afraid that evolutionary insights will dictate any particular way to go for women. In the 1970s a number of feminists dismissed the findings of an infant's need of security and attachment as just another attempt to validate patriarchal interests. They feared that this meant their role as mothers was laid down for years to come. In 1980 the French philosopher Elisabeth Badinter argued that maternal love is merely the product of cultural conditioning (Hrdy 1999b). Such escape routes are not necessary; women do not have to choose between being a mother and making a career. Or at least they should not have to. In practice structural disadvantages in some areas, such as the late-hour meetings in politics, still complicate this choice.

"By political action against femicide and other costs that men impose on women, feminism has made a substantial contribution to reducing the costs of being a woman," Wilson, Daly, and Scheib write. This agenda, they continue, "can be further advanced by scientific understanding of evolved psychological mechanisms, including those masculine sexual and coercive psychological adaptations whose normal and abnormal manifestations conflict with women's evolved psychological adaptations for mate choice and personal autonomy" (1997:458). A feminist agenda need not conflict with knowledge of our evolved human nature. We decide how to apply this knowledge:

The biological reality is there; its interpretation and implication is what humans may make of it. To deny or ignore biology for fear of it being used against gender, race, and so forth, is to lose the power and freedom of understanding. (Waage 1997:548)

### **8.8. The Essentialism-Constructionism Debate**

"[O]ne of the central tenets of [queer theory] is that identity is not an innate essence, but a discursive construction," Gert Buelens (2006:129, my translation) writes. The way Buelens, and queer theorists with him, phrases this proposition, reveals a fundamental mistake made in much of feminist thinking. As in the nature-nurture debate, the question whether essentialism or constructionism reigns is a misguided one.<sup>82</sup> In fact both questions, "nature or nurture?" and "essentialism or

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<sup>82</sup> I use 'constructionism' instead of 'environmentalism' here, because this is the way the debate is always phrased.

constructionism?"', more or less amount to the same, but the scope of the latter is more narrowly defined and it is posed within a specifically feminist context. It comes down to the question whether there is an 'essential' male and female nature, or whether these are 'social constructions'.

The debate provides an excellent example of the problems that may arise if one refuses to take biological findings into account when grappling with questions concerning identity and subjectivity. The refusal already presupposes that identity and subjectivity float free from biology, whereas this is precisely one of the questions that have to be answered. The environmentalist stance adopted by many feminists renders itself foolproof by assuming beforehand that the biological sciences are flawed and biased and, hence, that their results can easily be ignored. In that way environmentalism is always right and one can safely have sophisticated discussions about the multiple constructions that constitute our ever-changing, fractured identities, such as gender, race, and class, while at the same time struggling with the puzzle of women's oppression in a world where universalizing gender claims are no longer legitimate.

Biological ignorance leads to a host of misconceptions.<sup>83</sup> The concept of essentialism is one of them. Feminist philosopher Elizabeth Grosz, before she took an interest in Darwinian theory, defined essentialism as follows:

Essentialism, a term that is rarely defined or explained explicitly in feminist texts, refers to the attribution of a fixed essence to women ... Essentialism usually entails biologism and naturalism, but there are cases in which women's essence is seen to reside not in nature or biology but in certain given psychological characteristics - nurturance, empathy, supportiveness, noncompetitiveness, and so on ... Essentialism entails the belief that those characteristics defined as women's essence are shared in common by all women at all times ... Essentialism thus refers to the existence of fixed characteristics, given attributes, and ahistorical functions ... (Grosz 1994:84)

This definition makes abundantly clear why feminists shy away from essentialism. In an essentialist world differences between women would seem to be nonexistent, and personal or social change hardly seems possible. Luckily it is a monster that feminists

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<sup>83</sup> Sometimes biological ignorance leads to funny claims. The Flemish philosopher Guy Quintelier, for instance, writes, in a psychoanalytic vein: "In love the desire for security, warmth, protection, and care play a necessary role. This is the 'longing for the womb'. This 'longing for the womb' is necessary for romantic relationships: I do not see how else to explain the attraction between the sexes" (1999:37, my translation).

themselves have created. To their own detriment, as I argue. They are wasting energy fighting a phantom. As we have seen in this dissertation, ontogeny is always the result of an enormously intricate cascade of interactions between genes and environment, with each being, on every moment, as important as the other. When it comes to individual differences in personality characteristics, these come down to differences in genes for about 50 percent. Apart from these questions of ontogeny and heritability, however, there is also the question of adaptation, and this may be the one most relevant for the essentialism debate, because it touches on human nature. I suspect that this is what the essentialism debate is about: about human nature, and more specifically about the question whether there is a male and a female nature. As we have seen, this question can be answered in the affirmative, but the answer has little to do with the rigid conception of nature feminists and other environmentalists typically adhere to. It is a human nature that consists of hundreds or thousands of contingent, context-sensitive psychological adaptations. These adaptations enable us to feel and act like humans and to adjust our behavior to the circumstances we find ourselves in, in ways that would have served our reproductive interests in ancestral times. They enable us to change, to learn, to be flexible, to acquire and transmit culture, and to do all the magnificent and horrendous things humans typically do. Some of these adaptations, such as speech and mind-reading, will develop themselves in a broad array of environmental conditions; others, such as sexual jealousy, will only be activated in highly specific conditions. Due to sexual selection some of them will be gender-typical, which means that they typically manifest themselves more strongly in one sex than in the other. This, however, is not essentialism in any sense. Human nature, the psychic unity of our species, refers to a cluster of traits rather than a universal essence, as Barkow (2006) points out. No single one of these traits is necessarily crucial, and each individual will have his or her unique mixture of components, with some of these components being more typical of one sex than of the other. In this sense it is easy to understand how both sameness and difference can exist among women – another puzzle preoccupying feminists.

In 1994 Elizabeth Grosz asked: "Are these the only choices available to feminist theory – an adherence to essentialist doctrines, or the dissolution of feminist struggles into localized, regional, specific struggles representing the interests of particular women or groups of women?" (p. 93). In 1999 she has been reading Darwin and investigates a possible alliance between Darwin and feminism. One of the possible ramifications of Darwin's understanding of evolution for feminism as she sees it, is an acknowledgement of the importance of continuous change. Just like organisms are

always changing, feminism must undergo a continuous self-transformation of its basic presumptions, methods and values, she argues. Whereas one hardly needs Darwin to come to that conclusion, a more profound insight is that "Darwin's work offers a complex and subtle critique of both essentialism and teleology. It provides a dynamic and open-ended understanding of the intermingling of history and biology ... and a complex account of the movements of difference, bifurcation, and becoming that characterise all forms of life" (1999:33-34). Indeed, as pointed out above, a Darwinian framework shows us the way out of the essentialism debate. Grosz, for the rest, keeps interpreting Darwin in a highly politicized way, claiming that there is much of significance in his writings that may be of value for developing a more politicized, radical, and far-reaching feminism. It is unclear to what extent she considers his work as anything more than a 'discourse' to be used, comparing a feminist exploration of it to similar explorations of the work of Freud, Derrida, Lacan, and Deleuze. Nevertheless, the fact that she is open to exploring Darwin is, in my mind, already a huge step forward.

### **8.9. The Evolutionary Origins of Patriarchy**

Evolutionary psychology can add a new dimension to the feminist analysis of patriarchy. Many feminists tend to interpret male dominance as a cultural construction and as an end in itself. Evolutionary psychologists, in contrast, assume the roots of patriarchy to lie far back in time, predating the emergence of the human species. Male dominance is, after all, a widespread phenomenon among mammals. From an evolutionary point of view the moving spirit behind it is not male desire for power, but sexual selection. On this account male desire to control females and female sexuality ultimately goes back to the reproductive value of females as the more-investing sex.

It does not follow that patriarchy is inevitable; biological difference does not map directly onto political arrangements. Evolutionists agree that the historical origins of patriarchy cannot be pinned down to one factor, but that it concerns a series of mutually reinforcing evolutionary, social, and cultural developments.<sup>84</sup> This means that to dismantle patriarchy several simultaneous social changes will have to be implemented. Any reconstruction of how patriarchal arrangements may have unfolded over evolutionary time, as well as of human social evolution in general, remains hypothetical, but we can make some educated guesses. Thus far evolutionary attempts

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<sup>84</sup> Buss 1994, 1996, 1999; Buss and Duntley 1999; Fisher 1999; Gowaty 1992; Hrdy 1997, 1999a, 1999b; Pratto 1996; Smuts 1995; Wilson 1978.

at reconstructing the historical development of patriarchy have focused on the same number of key factors, with male and sometimes female reproductive interests as the underlying evolutionary rationale: patrilocality (when females disperse from their kin at marriage, whereas males stay in their natal community), male coalition-forming, male control over resources, female complicity, and gender ideology. I present the views of three evolutionists in particular: Barbara Smuts, David Buss, and Sarah Hrdy. Although they concur on most accounts, their assessment of the relative importance of some variables varies.

Both Smuts and Hrdy consider our ancestors' presumptive custom of patrilocal residence as the starting point of a series of related practices that allowed males to increase their control over female sexuality and that eventually gave rise to patriarchy. This custom, Smuts (1995) suggests, had its roots in our prehomimid forebears.

She reaches this conclusion after examining variations in the patterns of male coercion and female resistance in nonhuman primates. In many primate species, as well as in many other mammals, males use coercive tactics to increase their sexual access to sexually receptive females, such as the threat of violence, aggressive assault, disruption of her copulation attempts with rivals, and infanticide – the latter to bring her back into estrus sooner. Female primates resist this interference with their own sexual goals in a variety of ways. In some species they form coalitions with their female kin to chase off males who threaten or attack a female or her infant. In these female-bonded species male aggression is constrained by the cooperation of females, and by the fact that in these species males need the support of high-ranking females to achieve and maintain a high dominance position. As a result they cannot afford to provoke a high-ranking female's anger. Another way in which females may reduce their vulnerability to male harassment is by forming friendships with one or two particular males. These friends protect her and her infant, and in turn she often cooperates when they try to mate with her.

So the fact that male primates typically are larger than females does not imply that they come off best when conflicts emerge; physical size is no automatic determinant of control. Then what factors mediate the degree of male violence and female resistance? Smuts (1995) finds one variable to be of particular importance: social support from relatives and friends. When this is lacking, males get the upper hand. Two combined factors decide on the presence of this support: matrilocality (when the males, not the females, disperse away from their natal group at adolescence) and female bonding. If the females can stay with their kin, they can form

female-female coalitions. If they have to integrate into a new group, on the other hand, bonding will be far more difficult.

What makes Smuts think that patrilocality characterized our hominid forebears? Well, most primates and, in fact, mammals in general, are *matrilocal*, and they are able to thwart the frequent manifestation of male aggression. In contrast to most mammals and primates, however, our closest living relatives - the orangutan, the gorilla, the common chimpanzee, and the bonobo - are patrilocal, apparently because of ecological factors.<sup>85</sup> And also in contrast to most primates, our closest relatives do not seem to be able to prevent or thwart male coercion, with the exception of bonobos. Gorillas are vulnerable to infanticide when "their" male dies, in orangutans forced copulation appears to be the rule, and chimpanzee females as well are frequently sexually assaulted. Only in bonobos the rate of male aggression against females is extremely low, maybe because they have time for bonding: They can spend most of their time in the company of other females due to a different pattern of food distribution. Bonds between bonobo females are maintained through frequent homosexual activity, and the resulting female-female coalitions against males appear to be so strong that males hardly dare to provoke females (Smuts 1995).

These findings suggest that if there are no relatives around that can offer protection, and if, moreover, females have little opportunity for bonding, the stage is set for male coercion. Most of today's traditional societies show patrilocal residence too, so Smuts's inference is that this practice was probably customary with our hominid ancestors as well. However, as Hrdy (1999a) writes, hunter-gatherers typically have flexible residence patterns. They tend to be patrilocal when intergroup raids are frequent - patrilocality favors male bonding. If they are patrilocal, a system often combined with patrilineal descent, they are typically polygynous and more coercive concerning female sexuality. Hrdy believes it must have been agriculture that gave rise to patrilocal residence patterns. Whatever the time span, both Smuts and Hrdy agree that in the course of history the rise of patrilocal residence, in addition to the fact that for reasons unknown human females do not typically form strong coalitions, was the first step in the disempowerment of females.<sup>86</sup>

As a result of patrilocality, males were able to form long-term alliances with each other, presumably to increase their chances of success in competing against males

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<sup>85</sup> The same holds for hamadryas baboons, who are very vulnerable to infanticide by males (Smuts 1995; Hrdy 1999a).

<sup>86</sup> Matrilocal and matrilineal societies, in which women have much more freedom, are typically hunter-gatherer or horticultural societies, not societies that know animal husbandry or that are acquainted with the plow (Hrdy 1999b).

from other groups and to protect defensible resources, whether women or, once agriculture was established, land and eventually cities. In addition to protecting females from abduction by males from other communities, these alliances could also be used to control them. Intensive agriculture must have increased male power over women, since the latter lost their subsistence role and independency as gatherers. With their movements confined to a small piece of land, they were easier to coerce (Smuts 1995).

Indeed, a case study of the !Kung San in the Kalahari desert, presented in Wilson (1978), provides a dramatic illustration of this. This hunter-gatherer community is characterized by egalitarian sex roles. Women gather while men hunt (although the tasks are often shared), and both sex roles are respected by all. Girls and boys are apparently not differentially socialized, but small average differences still appear. A few !Kung San bands, however, have settled into villages and taken up farming. The work is heavier, and, other than in the hunter-gatherer groups, younger children are expected to significantly partake in it. The girls stay at home to look after smaller children and to do the household, whereas the boys take care of the gardens and the cattle. By maturity there are marked sex differences in lifestyle and status: Women are domestic and are continuously supervised, whereas men can freely wander around. Women's status has plummeted considerably.

When resources became accruable it became important for men to try to ascertain that the children in which they were investing were really their own, Smuts (1995) continues. Male support of offspring in turn made it costly for women to stand up against male domination.

The agricultural revolution in combination with increasingly well-developed male political alliances resulted in inequalities in male wealth and power. Powerful males became more able to impose their will upon females, since they also dominated other males, who now no longer had the power to intervene. Males at the top could increasingly use their power to monopolize females (eventually leading to harems) and so reduce the mating opportunities of other males. According to Smuts, this hypothesis fits in with the observation that cross-culturally the extent of male domination of women is positively associated with the degree of hierarchy among men. Female complicity must have been another critical factor in the evolution of patriarchy: Often females could better pursue their material and reproductive interests by competing with other females and allying with males than by allying with other females. A final crucial factor must have been the evolution of language, which led to the development of gender ideologies (Smuts 1995).



Female complicity in patriarchy is accepted as a fact by all three theorists. They defend different points of view, however, when trying to identify the causal forces producing this complicity. According to Smuts (1995), male coercive behavior eventually led to male resource control, with women more or less being forced to participate in this system if they wanted to get something out of it for themselves and their children. Buss's (1996) analysis focuses on male resource control as largely a product of the coevolution of women's mate preferences and men's competitive strategies. In this view women's preferences for a mate with status and resources established the ground rules for men in their competition with one another. Men started controlling resources in order to attract women, and women's preferences followed, in turn selecting for more ambition, competitiveness, and risk-taking in men. The intertwining of these psychological mechanisms in women and men created the conditions for male domination in the domain of resources (Buss 1996).

Buss's theory receives support from the finding that, as mentioned in the section on female psychology, in hunter-gatherer societies, where no resources are accrued, high-status males have most success in attracting many females, which suggests psychological adaptations in women that generate sexual attraction to traits associated with social status, and from the finding that women worldwide continue to express a preference for marrying men with more resources. Hrdy (1997, 1999a, 1999b) objects to this interpretation. She agrees with Marxist theorists that male control over productive resources that women need to reproduce was forced upon women, and that this control led to the development of full-fledged patriarchy. It was not female choice that led to male resource accumulation, she argues, since among primates, male control of resources (territories) *preceded* female choice for males with resources. Males just happen to control territories due to differential male and female migration patterns, patrilocality, male-male coalitions, and greater male strength. In such a system we may expect females to choose mates on the basis of the resources they control, but this does not mean that female choice *was responsible* for male competition or male control of resources. Because male competition and male resource control were already present in the hominid line, we may almost be certain that they preceded the development of female preferences for resource-holding males in humans, she concludes. Women's continuing preference for men with resources is a facultative response to their more unsure economic position than men's (Hrdy 1997).

The problem with this view is that women who themselves have access to resources do not tend to value status and resources in a mate less, but *more*, as we have seen. Nevertheless, there is no need to see Hrdy's and Buss's hypotheses as

mutually exclusive. Hrdy presents it that way, though: "Choices that evolutionary psychologists studying mate choices interpret as natural outcomes of women's own innate preferences are to others, including me, the outcome of 'patriarchal constraints' on female reproductive options" (1999a:xxvi). Buss (1996), however, writes that evolutionary psychologists expect context sensitivity of behavior and that, therefore, if women were to shift their mate preferences when they gain full economic equality, this would not be incompatible with evolutionary models. It would, however, require a more complex depiction of our evolved desires.

To conclude, the evolutionary perspective holds that patriarchy ultimately revolves around the control of female sexuality, and it explains why this is so: because women are the more-investing, limiting sex. Thus the radical feminist observation that sexual control lies at the heart of patriarchy (Brownmiller 1975; Dworkin 1997; French 1992) is basically correct. Men are, however, not likely to be united in their interests. They want to control reproductively valuable women, but they also compete among each other for women and for status and resources, because these assets help them to attract the other sex. Men form coalitions, but they do this primarily in order to out-compete other men. Women are not united in their interests with members of their own sex either. They compete among each other for high-status males. Their weapons are the evolved mate preferences of men, such as youth and beauty (Buss 1996; Buss and Duntley 1999).

This does not mean that women are to blame for the rise of patriarchy. As Buss (1996) explains, the notion of blame is senseless when describing a process that unfolded over the course of evolutionary time. It does imply, however, that the forces producing patriarchy are still at work in the present. Both sexes contribute to its perpetuation, not only men. Women do so by, for instance, continuing to want status and resources in a male, by competing with other women or allying with males (Campbell 2002; Hrdy 1999b), by sometimes socializing their sons and daughters in ways that perpetuate male dominance (Low 1989), and by guarding their domestic power and displaying possessiveness toward their children (Lopreato and Crippen 1999).

This complex scheme of things does not undermine the legitimacy of many feminist claims, but it reminds us that women are not puppets on a string; they have their own sources of power and influence. If women want to fight patriarchy successfully, they will have to renounce the behaviors that contribute to its perpetuation. Following Smuts's analysis of patriarchy, other directions to take are the further development of female political solidarity and of laws and institutions that

protect women from male coercion, the creation of economic opportunities for women, female support of policies that reduce inequality among men, and feminist consciousness-raising. As she acknowledges, these measures are of course already part of the feminist agenda. This shows again that feminist and evolutionary perspectives can be integrated. An evolutionary perspective can strengthen feminism by identifying the ultimate causes of the male desire to control women. Furthermore it helps to guide analysis of systems of gender inequality, by suggesting that we need to ask "how it affects female sexuality and reproduction in ways that benefit some men at the expense of women (and other men)" (Smuts 1995:22). With the evolutionary analysis of patriarchy still being in its infancy, it can use the help of feminist theorists in order to mature.

### **8.10. Toward a Darwinian Left**

Modern Darwinian theory stresses cooperation as well as competition. Evolution may well have endowed us with selfish and greedy tendencies, but we have also evolved the capacity, even the need, to love, respect, and help others. Most of us empathize automatically when we see others in pain, even if they are only fictional characters in a book or television series. The fact that the ultimate roots of emotions like compassion and altruism are that they helped our ancestors to survive and reproduce, does not detract from the reality and authenticity of these feelings.

This is part of the reason why evolution can be invoked to argue for policies ranging from the right to the left: It just depends which evolved propensities you prefer to focus on in establishing your view of human nature. The other part is that the kind of society you choose to strive for will depend on your set of values: whether you value care over competition and communality over individual freedom, for instance. Darwinian theory cannot guide us here, since it is a scientific theory that tries to explain how things came to be. It does not advise us on what we should do. Although in the past it has been appropriated foremost by the political right, it has by itself no obvious political implications.

In *A Darwinian Left* (1999) philosopher Peter Singer argues for a political left that does not deny the existence of a human nature and that has replaced its utopian ideas by a more realistic view of what can be achieved. A Darwinian left would want policies to be grounded on the best available evidence of what human beings are like. It would acknowledge that "an understanding of human nature in the light of evolutionary theory can help us to identify the means by which we may achieve some of our social

and political goals, including various ideas of equality, as well as assessing the possible costs and benefits of doing so" (1999:15). Singer uses the metaphor of wood carvers having to make a bowl: Instead of simply beginning to carve, they will let their design be informed by the specific wood they are to work with in order to suit its grain. Political philosophers and revolutionaries, however, have typically designed their ideal society without taking into account the human beings who had to live with and carry out their plans. A better way, Singer says, would be to tailor your policy to the tendencies inherent in humans in order to get the best out of them.

This means that we should give up the dream of the perfectibility of humankind. Humans are malleable, but this malleability has its limits. Steven Pinker (2002) sums up some scientific findings that make the emergence of a utopian society highly unlikely. Among them are the primacy of family ties in all human societies, with their consequent appeal of nepotism and inheritance; the universality of dominance hierarchies and violence in all human societies, even in hunter-gatherer groups; the universal preference for kin and friends; the universality of group-against-group hostility, and the small effort it takes to arouse it; the partial heritability of many personality traits, including intelligence, conscientiousness, and antisocial inclinations, implying that even perfectly equal treatment will result in unequal outcomes; and the emergence of social loafing when chances are that it will go undetected.

A Darwinian left would take these discoveries into account. It would stand by traditional leftist values by being on the side of the weak, the poor and oppressed, and by prioritizing equality as a moral or political ideal, but, as Singer (1999) explains, it would think very carefully about what social and economic changes will really implement these goals. It would not expect to end all conflict between human beings, but it would believe that most people will react positively to genuine opportunities to cooperate in mutually beneficial relationships. It would thus build on the social and cooperative side of our nature without ignoring the individualistic and competitive side. It would also bear in mind the evolved psychology of the sexes. It would reject any inference from what is "natural" to what is "right," and work toward a less-anthropocentric view of animals and the whole of nature (Singer 1999).

Singer's outline of this new left is sure to be found objectionable by many traditional leftists. Whereas the latter assume that all inequalities are due to discrimination, prejudice, oppression, or social conditioning, Darwinian leftists would not automatically do so. They would recognize, for instance, that the underrepresentation of women in the upper regions of the political and economic hierarchies may partially result from men's greater eagerness and opportunism in

pursuing social status and political power. Men are much more ready than women to sacrifice their family and social relationships for the sake of getting to the top (Browne 1998). This does not imply that Darwinian leftists would defend the status quo, since it can safely be assumed that factors such as gender discrimination are still in play as well.

In an analysis of peer-reviewed scores for Swedish postdoctoral fellowship applications, for instance, Christine Wennerås and Agnes Wold (1997) revealed the academic world as being highly prejudiced against women. The fact that these results were found in Sweden, a leading country in the world with respect to equal opportunities for women and men, only makes the results of this study the more alarming. Wennerås and Wold found that female applicants had to produce two and a half times more scientific papers than male applicants to be conceived as equally competent. Lacking personal affiliations with one of the reviewers had an effect of the same magnitude: Applicants without these ties had to be two and a half times more productive than applicants having them. Personal affiliations were as frequent for male as for female applicants, but this means that a woman without connections had to be five times more productive than a man affiliated with one of the committee members.

Wanting to find out whether this was an isolated case, three scientists decided to scrutinize another funding program, the European Molecular Biology Organization Long Term Fellowship (Gannon, Quirk, and Guest 2001). They found that for the years 1996-2001, female applicants were on average twenty percent less successful than male applicants. When analyzing the cohort displaying the largest discrepancies more in detail, they found that for a woman to be successful, she needed to have published 7.1 papers; a man needed 5.8 papers. At face value blatant discrimination seemed to be at work here as well. It turned out, however, that the males had papers of a higher impact factor (15 versus 13.2), as well as slightly more first author papers (3.4 versus 3.1). Gannon, Quirk, and Guest (2001) infer that a tiny difference between female and male applicants appears to have been magnified in the selection process. Whether this is due to an anti-female bias, is unclear. Anyhow there is something wrong in a system that consistently results in a lower success rate for female scientists, the authors conclude. It is known, moreover, that sometimes female scientists automatically get smaller research budgets and salaries than their male colleagues (Breithaupt 2001).

Several other studies have shown that an academic paper said to be written by a man is rated more positively by both women and men than when attributed to a female author (Schiebinger 1999). Experiments in which subjects had to hire (fictitious) applicants for hierarchy-enhancing and hierarchy-attenuating jobs revealed

that they partially relied on sex stereotypes to decide what kinds of jobs women and men would do well (Pratto 1996). These are just a few examples to indicate the thriving of gender bias. A Darwinian left will have a difficult task in disentangling the many complex factors affecting the differential distribution of women and men in society.

Another delicate question to be addressed is what we mean exactly when we talk about "equality as a moral or political goal." As Janet Radcliffe Richards (1997) points out, the very fuzziness and elusiveness of the concept of equality may be the reason why so many people are in defense of it. People mean different things by the term, or they slip from one definition of equality into another without realizing it. Some think, for instance, that equality of opportunity automatically implies equality of outcome. As a result the debate about equality of opportunity gets very confused.

To some the term just implies impartiality of treatment. To others it means something qualitatively different: the right to move and rise in society according to one's abilities and inclinations. Whereas in the first definition nothing needs to be done except for the removal of arbitrary preferences, the second definition demands that you specify which policies you want to pursue to the detriment of other policies. You cannot equalize *all* opportunities over *all* people. Even in the simple example of equal opportunity for all children in a classroom, a teacher will have to choose between, for instance, making herself equally available to all, giving equal time to all, giving more to children of deprived backgrounds, or trying to make all children equally proficient in everything. In the last two cases she will have to treat individuals unequally in the name of equality.

Some have yet another interpretation of equality of opportunity. To them it means the equalizing of backgrounds, so that everybody has the same starting conditions. This definition moves us to yet another standard of opportunity. We slip from ideas about equality of opportunity as *something specific* that people *give*, such as admission to a school or admission to apply for a job, to opportunity as *something general and undirected* that people *have*, in the way of the ability to make their lives take whatever direction they want it to take. The way opportunity is interpreted here is thus completely different. It becomes a rough term for the ability to arrange your life whatever way you want it to, because of the good starting conditions that you find yourself in, rather than for the ability to achieve an end predetermined by others, such as getting to the top of the political hierarchy as a woman. Most people confuse these meanings. If we try to clarify exactly what we mean, we might see that the problem changes, Radcliffe Richards argues. If we realize that actually we regard "opportunity

in an undirected sense," that is, the opportunity to live your life the way you want it to, as a good in itself, the relevant question just becomes how to increase its overall amount. This means, however, that the concept of equality will become less important. If we have a fair distribution of "opportunity to live your life the way you want to," we cannot expect results to be equal, because people are different. Even if we equalize *all* starting conditions, we still would get differential outcomes, since people have different genetic endowments (Radcliffe Richards 1997).

These are powerful thoughts. It is primordial for the left to consider analyses like these, and even more crucial for a Darwinian left, since for Darwinians the subject is complicated by their recognition of the partial heritability of many personality characteristics and abilities, as well as of average differences between the sexes.





## **9. ENGINEERS HAVE MORE SONS, NURSES HAVE MORE DAUGHTERS: AN EVOLUTIONARY PSYCHOLOGICAL EXTENSION OF BARON-COHEN'S EXTREME MALE BRAIN THEORY OF AUTISM**

The female brain is predominantly hard-wired for empathy. The male brain is predominantly hard-wired for understanding and building systems.

Simon Baron-Cohen

Adapted from: Kanazawa, Satoshi and Griet Vandermassen (2005). Engineers Have More Sons, Nurses Have More Daughters: An Evolutionary Psychological Extension of Baron-Cohen's Extreme Male Brain Theory of Autism. *Journal of Theoretical Biology* 233:589-599.

### **Abstract**

In his extreme male brain theory of autism, Baron-Cohen postulates that having a typically male brain was adaptive for ancestral men and having a typically female brain was adaptive for ancestral women. He also suggests that brain types are substantially heritable. These postulates, combined with the insight from the Trivers-Willard hypothesis regarding parental ability to vary offspring sex ratio, lead to the prediction that people who have strong male brains should have more sons than daughters, and people who have strong female brains should have more daughters than sons. The analysis of the 1994 U.S. General Social Survey data provides support for this prediction. Our results suggest potentially fruitful extensions of both Baron-Cohen's theory and the Trivers-Willard hypothesis.

*Keywords:* Extreme male brain theory; Trivers-Willard hypothesis; Offspring Sex Ratio; Testosterone

## **9.1. Introduction**

In a series of scientific articles (Baron-Cohen 1999, 2002; Baron-Cohen and Hammer 1997) and, most recently, in the popular science book *The Essential Difference* (Baron-Cohen 2003), Simon Baron-Cohen advances the "extreme male brain" theory of autism. In the theory, Baron-Cohen posits the existence of the "male brain," which is particularly designed for "systemizing" (figuring things out), and the "female brain," which is especially suited for "empathizing" (dealing with people). Both men and women vary in the extent to which they possess the sex-typical brain; some men are more systemizing than others, and some women are more empathizing than others. Baron-Cohen hypothesizes, and amasses substantial evidence, that autism may be the result of some men (and women) possessing extreme male brains, which are especially good at systemizing but poor at empathizing. His theory can simultaneously account for all the peculiar clinical manifestations of autism (the severe deficits in interpersonal domains, such as theory of mind, while maintaining normal or even exceptional abilities in others) as well as the fact that an overwhelming majority of autistics are male.

In this chapter, we first present Baron-Cohen's extreme male brain theory of autism systematically (pardon the pun), by enumerating all the key postulates of the theory. We then extend it beyond the explanation of autism, by incorporating one principle from modern evolutionary psychology: the Trivers-Willard hypothesis regarding parents' ability to vary the sex ratio among their offspring. We suggest that the incorporation of the Trivers-Willard hypothesis into Baron-Cohen's theory leads to the prediction that men (and women) who possess more systemizing brains should have more sons than daughters, while women (and men) who possess more empathizing brains should have more daughters than sons. We present the analysis of the 1994 U.S. General Social Survey which empirically supports our prediction.

As mentioned in section 8.6, the finding that throughout the animal world parents can vary their offspring sex ratio as well as bias their parental investment according to sex in response to environmental conditions, suggests that in the human case similar evolutionary mechanisms might be at work. We might expect natural selection to have given rise to physiological or psychological mechanisms in humans that generate (a preference for) sons in conditions where males are expected to attain greater reproductive success than females. Conversely, we might expect natural selection to

have given rise to physiological or psychological mechanisms that generate (a preference for) daughters in conditions where females are expected to attain greater reproductive success than males. Evidence of the existence of such mechanisms implies that an explanation of a cultural preference for (typically, but not always) sons in terms of gender ideology only scratches the surface: We simultaneously need to dig for the ultimate roots of this ideology. The results of the research laid out in this chapter fit fundamental predictions of the Trivers-Willard hypothesis, as do other data from a wide variety of human societies. The Trivers-Willard hypothesis may provide an evolutionary biological answer to a troubling question: Why is it that in many (but not all)<sup>87</sup> societies gender ideology is such that the birth of a son is much more a cause for celebration than the birth of a daughter?

## **9.2. The Anatomy of the Theory**

Baron-Cohen's extreme male brain theory of autism consists of a few crucial theoretical statements, which together explain the etiology and symptomatology of autism. We will first present these postulates and discuss them briefly, before attempting to reformulate and generalize the theory by incorporating evolutionary psychological principles.

### **1. Postulates about the male and female brains and their particular strengths.**

Baron-Cohen's theory begins with the two crucial concepts of the male brain and the female brain. The male brain is primarily designed for systemizing, and the female brain is primarily designed for empathizing. What are systemizing and empathizing then?

"Systemizing is the drive to analyse, explore and construct a system. The systemizer intuitively figures out how things work, or extracts the underlying rules that govern the behaviour of a system. This is done in order to understand and predict the system, or to invent a new one" (Baron-Cohen 2003:3). Baron-Cohen (2003:63-69)

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<sup>87</sup> Societies in which daughters are favored are relatively rare, but they exist. The Mukogodo in Kenya are the most remarkable example. Because they are so poor and have low status in the region, Mukogodo men have trouble obtaining wives. Women, on the other hand, can always find a husband. If they are beautiful, they can 'marry up' to non-Mukogodo men and bring bridewealth. As a result, the reproductive success of Mukogodo females is significantly higher than that of males. According to the Trivers-Willard hypothesis, parents should favor daughters over sons, and that is precisely what they do. Furthermore, findings from, among others, the Ifalukese in Micronesia, the Cheyenne Indians in the nineteenth century, historical Germany, historical Portugal, and contemporary North America indicate that in these societies high-status parents tend(ed) to value sons over daughters, whereas low-status parents tend(ed) to value daughters over sons, which makes sense from a reproductive point of view (Cronk 1991).

enumerates six different types of systems: technical systems (artifacts, machines); natural systems (ecology, geography); abstract systems (logic, mathematics); social systems (law, economics); organizable systems (classifications, taxonomies); and motoric systems (physical movements such as playing musical instruments or throwing darts). His definition of what constitutes a system is therefore very comprehensive, and seems to include everything that has to do with things, rather than people. "I mean by a system anything which is governed by rules specifying input-operation-output relationships" (63).

In contrast, "empathizing is the drive to identify another person's emotions and thoughts, and to respond to them with an appropriate emotion. ... Empathizing occurs when we feel an appropriate emotional reaction, an emotion triggered by the other person's emotions, and it is done in order to understand another person, to predict their behaviour, and to connect or resonate with them emotionally" (Baron-Cohen 2003:2). "Empathizing is about spontaneously and naturally tuning into the other persons' thoughts and feelings, whatever these might be. ... A good empathizer can immediately sense when an emotional change has occurred in someone, what the causes of this might be, and what might make this particular person feel better or worse. A good empathizer responds intuitively to a change in another person's mood with concern, appreciation, understanding, comforting, or whatever the appropriate emotion might be. ... A natural empathizer not only notices others' feelings but also continually thinks about what the other person might be feeling, thinking or intending" (Baron-Cohen 2003:23-24). In short, "empathy is a defining feature of human relationships ... and also makes real communication possible" (24).

## 2. Postulates about the sex distributions of systemizing and empathizing skills.

Having defined what systemizing and empathizing are, Baron-Cohen then describes the distribution of systemizing and empathizing skills among men and women. He postulates that: 1) both systemizing and empathizing skills are distributed normally among the general populations of men and women; 2) men have a higher mean on systemizing skills than women; 3) women have a higher mean on empathizing skills than men; but 4) the sex distributions of systemizing and empathizing skills are substantially overlapping. The last postulate means that, while men on average are better at systemizing and women on average are better at empathizing, there are many men who are better empathizers than women and there are many women who are better systemizers than men (Baron-Cohen 2003, p. 60, Figure 5, p. 85, Figure 7).

An analogy to the sex distributions of height may be apt. Height is distributed normally among both men and women. Men have a higher mean height than women. However, the male distribution of height overlaps substantially with the female distribution, such that, while men on average are taller than women, there are many women who are taller than the average man. The sex distributions of height are therefore similar to the sex distributions of systemizing skills in that they both have a higher male mean.

Baron-Cohen (2003:6-8) defines the brain of someone who is better at systemizing than empathizing as the "Type S" brain or the male brain (even though not everyone who possesses the male brain is male), and the brain of someone who is better at empathizing than systemizing as the "Type E" brain or the female brain (even though not everyone who possesses the female brain is female). Baron-Cohen then explains autism (and other autism spectrum syndromes such as Asperger's Syndrome) as a result of possessing the "extreme male brain," which is exceedingly good at systemizing but correspondingly poor at empathizing. Not only does Baron-Cohen's conceptualization of autism as a manifestation of the extreme male brain explain all of the clinical features of autism, but it also explains why it is so much more prevalent among men than among women.

A return to the analogy of height may once again be helpful. Even though there are substantial overlaps between the male and female distribution of height, the sex difference is pronounced at the extremes. Thus, even though men on average are only slightly taller than women on average, by about four inches, almost everyone who is extremely tall (say, above 6' 5") is a man. Baron-Cohen contends that autism (and its prevalence among men) is a necessary statistical byproduct of the sex distributions of brain types, especially at the higher tails.

### 3. Postulates about the evolutionary adaptiveness of brain types.

Baron-Cohen (2003) devotes an entire chapter (Chapter 9) in his book to the discussion of the possible evolutionary origins of the male and female brains. He suggests that it might have been highly adaptive for ancestral men to possess the Type S brain, and for ancestral women to possess the Type E brain. The advantages of the Type S brain for ancestral men might have included using and making tools (including inventing new ones, even though women might also have invented and used tools); tolerating solitude during long hunting and tracking trips, during which the male hunter has very little human contact (which would have been intolerable for anyone with high need for human contact); aggression and pursuit of status in

dominance hierarchies (allowing ancestral men to eliminate their rivals physically and ruthlessly without regard to their pain and suffering); and exercising leadership (with the ability to make decisive, if impersonal, decisions for the sake of the collectivity without regard to consequences for individual members).

The advantages of the Type E brain for ancestral women might have included making friends in new environments (due to female exogamy, ancestral women often had to migrate to and marry into new groups upon reaching puberty, while ancestral men remained in their natal groups); mothering (anticipating and understanding the needs of infants who cannot yet communicate verbally); reading a (potential) partner's mind (so as not to make the wrong mating choice in light of the much higher reproductive costs of such mistakes for women); and gathering information through gossiping.

#### 4. Postulates about the heritability of brain types.

While Baron-Cohen devotes an entire chapter (Chapter 7) of his book on the cultural influences on the brain types such as gender socialization, to dispel any misconception that the individual brain types are entirely "genetically determined," it is nevertheless obvious from his subsequent chapter on biological influences that the brain types are substantially heritable. Perhaps the best evidence for the heritability of brain types is the large heritability of autism and Asperger's syndrome (Bailey et al.1995; Folstein and Rutter 1988); the concordance of autism among monozygotic twins in one British twin study is 60% whereas the concordance among dizygotic twins is 0% (Bailey et al. 1995). Another indication that the brain types (Type S versus Type E) might be heritable is the observation that families of autistics often contain a disproportionate number of physicists, engineers, and mathematicians, all of whom must possess very high systemizing skills (Baron-Cohen 2003, Chapter 11; Baron-Cohen et al. 1997; Baron-Cohen et al. 1998). The evidence presented by Baron-Cohen and his colleagues as well as other researchers therefore strongly suggests that the brain type might be heritable, such that individuals with Type S brains are more likely to have children with Type S brains, and individuals with Type E brains are more likely to have children with Type E brains.

To recap, Baron-Cohen's extreme male brain theory of autism consists of the following four assumptions:

1. There are Type S brains, good at systemizing, and Type E brains, good at empathizing.

2. Men on average are more likely to possess the Type S brains, and women on average are more likely to possess the Type E brain.
3. Possessing the Type S brain was highly adaptive for ancestral men, and possessing the Type E brain was highly adaptive for ancestral women.
4. Brain types are substantially heritable.

### **9.3. An Evolutionary Psychological Extension of the Theory: Enter the Trivers-Willard Hypothesis**

To these four postulates from Baron-Cohen's theory, we add another one, borrowed from modern evolutionary psychology: the Trivers-Willard hypothesis. In its original formulation, the Trivers-Willard hypothesis (TWH: Trivers and Willard 1973) states that, for all species for which male fitness variance exceeds female fitness variance, male offspring of parents in better material and nutritional conditions are expected to have greater reproductive success than their female siblings, because their greater size allows them to outcompete their intrasexual rivals and monopolize available reproductive opportunities. The converse is true of offspring of parents in poorer material and nutritional conditions, because the smaller males, who are not intrasexually competitive, are excluded from mating opportunities. Parental conditions affect the reproductive prospect of female offspring to a much lesser extent. Almost all females get to reproduce some offspring, even though no female can produce a large number due to their greater obligatory parental investment into each offspring (Trivers 1972).

Thus it pays parents in good conditions to bet on male rather than female offspring. Since females have much lower variance in reproductive success, parents in poor material and nutritional condition should prefer to produce females as a safe bet. Trivers and Willard (1973) thus hypothesize that parents in better conditions should produce more male than female offspring and those in poorer conditions should produce more female than male offspring. Their parental investment into male and female offspring should be similarly biased. These predictions have been supported by data from a large number of experiments with a wide array of species (Venezuelan opossum: Austad and Sunquist 1986; Red deer: Clutton-Brock, Albon, and Guinness 1986; Spider monkey: Symington 1987).

Evolutionary psychologists have since applied the original formulation of the TWH to modern humans and derived further hypotheses. Sons' expected reproductive success depends largely on the parents' wealth, so that sons from wealthy families are

expected to attain much greater reproductive success than sons from poor families. This is because sons from wealthy families typically inherit the wealth from their fathers, and can in turn invest the resources into their offspring. Women prefer men with greater resources, and thus wealthy men throughout human evolutionary history have been able to attract a large number of high-quality mates (Betzig 1986).

In contrast, daughters' expected reproductive success is largely orthogonal to parents' wealth, because it mostly depends on their youth and physical attractiveness. Men in general prefer younger and physically more attractive women, not wealthy women, for their mates (Buss 1989; Kanazawa 2003). The TWH in both of its specifications (offspring sex ratio and biased parental investment) has been supported with data from a wide variety of human societies, including the contemporary United States (Betzig and Weber 1995; Gaulin and Robbins 1991; Kanazawa 2001; Mueller 1993), while Koziel and Ulijaszek (2001) provide qualified support, and Freese and Powell (1999) and Keller, Nesse, and Hofferth (2001) offer counterevidence. Cronk (1991) provides a comprehensive review of the empirical evidence in support of the hypothesis, and Trivers (2002:120-122) adds a brief update.

While the TWH has specifically to do with material and economic conditions of parents and their ability to vary the sex ratio of their offspring in response to such conditions, the basic insight behind it is more general. The fundamental assumption underlying the TWH is that parents can vary the sex ratio of their offspring to maximize their total expected reproductive success in response to any variable environmental conditions. If males in a particular environment are expected to attain greater reproductive success than females, for whatever reason, then parents can produce more sons than daughters. In an environment where females are expected to attain greater reproductive success than males, for whatever reason, then parents can produce more daughters than sons.

This fundamental assumption behind the TWH, combined with Postulate 3 (adaptiveness of Type S brain for men and of Type E brain for women in the ancestral environment) and Postulate 4 (heritability of brain types) from Baron-Cohen's extreme male brain theory of autism leads us to the following novel prediction: Individuals who have Type S brains should have more sons than daughters, while individuals who have Type E brains should have more daughters than sons.

Because men are more likely to have Type S brains and women are more likely to have Type E brains, our prediction above appears to have a seemingly absurd logical implication that men are more likely to have sons and women are more likely to have daughters. This is part of our logic, however. A mateship between an average man



(with the average Type S brain) and an average woman (with the average Type E brain) is expected to produce a roughly equal number of sons and daughters (with the precise sex ratio of 1.05; Grant 1998). When one or the other or both parents between them have an excess of systemizing skills (by having a strong Type S brain), then the couple is expected to produce more sons than daughters; when one or the other or both parents between them have an excess of empathizing skills (by having a strong Type E brain), then the couple is expected to produce more daughters than sons. Unlike Grant (1998), we are agnostic about which parent (mother or father) determines the sex of the offspring (although our analysis below provides limited support for Grant's maternal hypothesis).

In the next section, we analyze data from the 1994 U.S. General Social Survey to test our prediction that parents who have Type S brains should have more sons than daughters, whereas parents who have Type E brains should have more daughters than sons.

#### **9.4. Empirical Analysis**

##### Data

The National Opinion Research Center at the University of Chicago has administered the General Social Surveys (GSS) either annually or biennially since 1972. Personal interviews are conducted with a nationally representative sample of non-institutionalized adults in the U.S. The sample size is about 1,500 for each annual survey, and about 3,000 for each biennial one. The exact questions asked in the survey vary by the year.

As is common with social science data sets, for which biological information about the respondents is assumed unimportant, however, the GSS normally do not make distinctions between biological and nonbiological (adopted, step, foster) children of the respondents. Further, they normally do not even measure the sex of their children, treating boys and girls interchangeably. In 1994 (and only in 1994), however, the GSS assesses the respondents' precise relationship with each of their children, and measures their sex.

In addition, the 1994 GSS measures the number of siblings that the respondents have, their precise biological relationship with each of their siblings (full, half, step), and the sibling's sex. From these variables, we can further determine how many biological sons and daughters the respondents' parents had. We use information on both generations from the 1994 GSS data to assess: 1) the effect of the GSS

respondents' brain types on the number of sons and daughters they have (Generations  $t$  and  $t+1$ ); and 2) the effect of the GSS respondents' parents' brain types on the number of sons and daughters that they had, one of whom is the GSS respondent (Generations  $t-1$  and  $t$ ).

#### Dependent Variables

We use the number of biological sons and daughters that the respondents have, and the number of biological sons and daughters that the respondents' parents had, as our dependent variables. The number of biological sons and daughters is measured as an interval variable up to nine.

We use this count measure of our dependent variable, rather than ratio measures

$\frac{\text{Number of s}}{\text{Number of d}}$  (such as  $\frac{\text{Number of s}}{\text{Number of d}}$ ) because ratio measures have a couple of undesirable features at the individual level. First, when the denominator is zero (for instance, if the individual has no daughters), the ratio is mathematically undefined. However, one can get around this problem by adding an epsilon to the denominator (so that the

dependent measure becomes  $\frac{\text{Number of s}}{\text{Number of d} + \epsilon}$ , for example). More importantly, however, ratio measures cannot distinguish between two sonless individuals with different numbers of daughters. If someone has no sons and one

daughter ( $\frac{0}{1}$ ), and someone else has no sons and five daughters ( $\frac{0}{5}$ ), both of them would have zero as a dependent measure, even though the latter individual is much more prone to producing daughters than the former individual. Because of these problems, we have chosen to use the number of sons or daughters as the dependent variable, while controlling for the number of children of the opposite sex. (See below.)

#### Independent Variables

Our primary independent variables of interest are the respondents' and their parents' brain types (Type S versus Type E). Baron-Cohen and his colleagues have developed a battery of tests precisely to measure an individual's systemizing quotient (SQ) and empathy quotient (EQ) (Baron-Cohen et al. 2003; Baron-Cohen and Wheelwright 2004). The individuals' SQ measures the extent to which they have the Type S brain, and their EQ measures the extent to which they have the Type E brain. However, these

tests have only been conducted in their own studies, and they have not been administered to a nationally representative sample of any population. We therefore need a proxy measure of brain types.

We assume that, in a free market economy like the United States, individuals more or less choose to have jobs that best suit their temperaments and natural inclinations. Those who have the Type S brains choose to have occupations that require systemizing skills, and those who have the Type E brains choose to have occupations that require empathizing skills. In the GSS data, we therefore measure the individuals' brain types by the occupations they hold. While this proxy measure is far less accurate and precise than Baron-Cohen's SQ and EQ tests, all the random measurement errors should cancel out, and a consistent pattern should emerge, at the aggregate in a large data set like the GSS.

Admittedly, however, our assumption of free occupational choice to suit individual temperaments and inclinations is probably truer today among the GSS respondents (in Generation t) than in the past among the respondents' parents (in Generation t-1). Sex-typing and sex segregation of occupations were stronger in the past than it is now, so that, for example, men felt less free to become a nurse and women felt less free to become an engineer (even though that's what best suited their temperaments) in the parents' generation. For this reason, we expect our measure of brain types to be more accurate in Generation t than in Generation t-1.

Baron-Cohen does not provide a list of occupations which attract Type S or Type E brains, other than that physicists, engineers, and mathematicians have predominantly Type S brains (Baron-Cohen 2003, Chapter 11; Baron-Cohen et al. 1997; Baron-Cohen et al. 1998). We have gone through the entire list of occupations in the 1980 U.S. Census Occupation Code (used by the 1994 GSS), and selected those occupations that we believe require particularly high systemizing skills and those that we believe require particularly high empathizing skills. These occupations are listed in the Appendix.

In our lists, the systemizing occupations mostly consist of scientists (including professors of science), engineers, mathematicians, statisticians, and other quantitative occupations. The empathizing occupations consist of nurses, therapists, and kindergarten, primary and secondary school teachers. Most occupations in the 1980 Census Occupation Code are neutral and are not on either the systemizing or empathizing list in the Appendix. For instance, we have chosen not to include doctors and physicians in either list. On the one hand, doctors require extensive training in the sciences, pushing them into the systemizing directions. On the other hand, unlike

medical researchers and scientists, they need good bedside manners and sensitivity to deal with patients, pushing them into the empathizing directions. Many female-dominated occupations, such as secretaries, sales clerks, and librarians, are also neutral in our classification. We do not claim that these are the definitive lists of Type S and Type E occupations, only that these are close enough approximations and thus possibly a good place to start. Future researchers can no doubt improve on our lists.

Each respondent has two dummy variables: Systemizing occupation = 1 if the respondent has one of the systemizing occupations in the Appendix, = 0 otherwise; Empathizing occupation = 1 if the respondent has one of the empathizing occupations in the Appendix, = 0 otherwise. Among the respondents (Generation t), 5.9% have one of the systemizing occupations (and are thus assumed to have Type S brains), and 6.1% have one of the empathizing occupations (and are thus assumed to have Type E brains). Among the respondents' parents (Generation t-1), 5.9% of the fathers have a systemizing occupation, and 1.2% of them have an empathizing occupation; 1.9% of the mothers have a systemizing occupation, and 13.1% of them have an empathizing occupation.

#### Control Variables

Trivers-Willard controls. Because the TWH in its original formulation explains the offspring sex ratio in terms of the material wealth of the parents, we need to control for parental social status, in order to estimate the partial effects of parent's brain types on the offspring sex ratio, net of the effects of parental social status. We therefore include controls for respondents' and respondents' parents' education (measured in years of formal education) and income (measured in 23 relatively equidistant ordinal scale). Controlling for education and income is also important because holders of both systemizing and empathizing occupations have significantly higher education and income than holders of other, neutral occupations (Education: systemizing versus nonsystemizing, 15.66 versus 13.10,  $t = 11.23$ ,  $p < .0001$ ; empathizing versus nonempathizing, 16.39 versus 13.05,  $t = 15.15$ ,  $p < .0001$ ; Income: systemizing versus nonsystemizing, 16.08 versus 12.10,  $t = 8.70$ ,  $p < .0001$ ; empathizing versus nonempathizing, 13.63 versus 12.29,  $t = 2.78$ ,  $p < .01$ ). We therefore control for education and income in both Generations t and t-1.

Risk factors. Our dependent variables are the numbers of sons and daughters. Besides the brain types, there are other factors that can increase the number of children that individuals have. First, since the number of biological children can only monotonically increase with age, we must control for the individual's age. Second, since marriage is a

particular risk factor for having children, we control for the individual's current marital status (1 if currently married, 0 otherwise) and the age at which the individual first got married. Third, because blacks in the US have significantly more children than nonblacks (2.34 vs. 1.79,  $t = 6.02$ ,  $p < .0001$ ), we control for the respondent's race (1 if black, 0 otherwise), which in Generation t-1 also indirectly measures the respondent's parent's race. Finally, because individuals can have more sons or daughters, not necessarily because they are more likely to have children of one sex or the other but because they have more children (both boys and girls), we control for the number of biological children of the opposite sex, to estimate whether the individual's brain types have an effect on the number of biological children of one sex net of the number of biological children of the opposite sex. Naturally, the bivariate correlation between the number of boys and the number of girls is significantly positive (Generation t:  $r = .4319$ ,  $p < .0001$ ; Generation t-1:  $r = .1707$ ,  $p < .0001$ ) (but see below for their partial correlations).

Controlling for religion as a potential risk factor, by including a set of four dummies (Catholic, Protestant, Jewish, and Other, with None as the reference category) does not alter the substantive results presented below. We do not include other risk factors in the equations for Generation t-1 because information about the respondents' parents' age at marriage and marital status are not available in the GSS. Entering the father's and the mother's year of birth in the equations does not alter the substantive conclusions.

## Results

The effects of brain types in Generation t on the offspring sex ratio in Generation t+1. Table 1 presents the results of the OLS regression of the number of boys and girls in Generation t+1 on the parental brain types in Generation t. The left column shows that, controlling for social status (education and income) and risk factors (age, age at first marriage, race, and current marital status), individuals who hold systemizing occupations (and are thus assumed to have Type S brains) have significantly ( $p < .01$ ) more biological sons than daughters. Conversely, the right column shows that, controlling for the same variables, individuals who hold empathizing occupations (and are thus assumed to have Type E brains) have significantly ( $p < .01$ ) more biological daughters than sons. The results presented in Table 1 therefore strongly support our prediction, derived from the combination of Baron-Cohen's extreme male brain theory of autism and the Trivers-Willard hypothesis, that parents who have Type S brains are

more likely to have sons than daughters and parents who have Type E brains are more likely to have daughters than sons.

Table 1

The Effects of Respondents' Brain Types on the Sex of Their Offspring  
(Generations t and t+1)

	Dependent variable Number of sons	Number of daughters
Main predictors		
Systemizing occupation	.3498** (.1326)	.1357 (.1341)
Empathizing occupation	.2684 (.1405)	.3981** (.1411)
Trivers-Willard controls		
Education	-.0375** (.0142)	-.0571**** (.0142)
Income	-.0187* (.0073)	.0063 (.0074)
Risk factors		
Age	.0325**** (.0031)	.0278**** (.0032)
Age at first marriage	-.0519**** (.0082)	-.0415**** (.0083)
Race (1 = black)	.2979** (.1150)	.4998**** (.1149)
Currently married (1 = yes)	.1688* (.0735)	.1363 (.0741)
Number of sons/daughters	-.1029** (.0366)	-.1044** (.0371)
Constant	1.4699 (.2633)	1.3036 (.2665)
R2	.1952	.1620
n	738	738

Note: Main entries are unstandardized regression coefficients. Numbers in parentheses are standard errors.

\*  $p < .05$     \*\*  $p < .01$     \*\*\*  $p < .001$     \*\*\*\*  $p < .0001$

Our results in Table 1 provide ambiguous support for the TWH, however. While the strongly significantly ( $p < .0001$ ) negative effect of education on the number of daughters (right column) supports the TWH, education and income also have significantly (albeit weaker) negative effect on the number of sons (left column), in contradiction to the prediction of the original formulation of the TWH. All the risk factors have the predicted effects. Older individuals, those who married at younger ages, and blacks all have more sons and daughters, while those who are currently married have more sons, but not daughters, possibly because the presence of sons decreases the likelihood of divorce (Morgan, Lye, and Condran 1988; Katzev, Warner, and Acock 1994).

Another unexpected finding in Table 1 is the effect of the number of biological children of the opposite sex. While, as noted above, the number of boys and the number of girls have a positive bivariate correlation ( $r = .4319$ ), both of these variables have significantly ( $ps < .01$ ) negative partial effect on the number of biological children of the opposite sex. In other words, when we control for all the variables included in our equations, those who have more biological daughters have fewer biological sons, and those who have more biological sons have fewer biological daughters. This seems to suggest that parents specialize in producing children of one sex or the other, some producing mostly or exclusive boys, and others producing mostly or exclusively girls. While the partial negative effects of these variables are unexpected from their positive bivariate correlation, they are nonetheless consistent with both the TWH and our prediction in this paper.

The effects of brain types in Generation  $t-1$  on the offspring sex ratio in Generation  $t$ . Table 2 presents the results of the OLS regression of the number of boys and girls in Generation  $t+1$  on the parental brain types in Generation  $t$ . Here the empirical results are more ambiguous. The left column shows that, controlling for father's education and occupational status (the information on respondent's parent's income is not available in the GSS), mother's education and occupational status, race, and the number of sisters, the brain types of the father and the mother, measured by their occupations,

do not seem to have any effect on the number of boys that they have in Generation t. In fact, the only significant effect found in this equation is the effect of race: Blacks have significantly more sons than nonblacks. The absence of clear effects of brain types on the offspring sex ratio in Table 2, compared to the results presented in Table 1, may be due to the fact, discussed above, that occupational choice was less free in the previous generation (t-1) than in the current generation (t), and thus occupations were less valid measures of respondents' parents' brain types.

Table 2

The Effects of Respondents' Parents' Brain Types  
on the Sex of Respondents' Siblings  
(Generations t-1 and t)

		Dependent variables	
		Number of brothers	Number of sisters
Main predictors			
Father's	systemizing	-.0148	-.0601
	occupation	(.1674)	(.1751)
Father's	empathizing	-.2093	.0626
	occupation	(.2874)	(.3006)
Mother's	systemizing	-.4912	.2201
	occupation	(.2554)	(.2675)
Mother's	empathizing	.0182	.6816****
	occupation	(.1630)	(.1692)
Trivers-Willard controls			
Father's education		-.0203	-.0379*
		(.0147)	(.0154)
Father's occupational status		.0014	-.0058
		(.0041)	(.0042)
Mother's education		-.0319	-.0383*
		(.0173)	(.0181)
Mother's occupational status		.0039	-.0071
		(.0041)	(.0043)
Risk factor			
Race (1 = black)		.5872****	.5118***
		(.1248)	(.1309)



Number of sisters/brothers	.0051 (.0289)	.0056 (.0316)
R <sup>2</sup>	.0396	.0745
n	1,108	1,108

Note: Main entries are unstandardized regression coefficients. Numbers in parentheses are standard errors.

\* p < .05    \*\* p < .01    \*\*\* p < .001    \*\*\*\* p < .0001

However, there is partial support for our hypothesis when the dependent variable is the number of daughters. The right column shows that, controlling for the same variables, mothers who have empathizing occupations are significantly ( $p < .0001$ ) more likely to have daughters than sons. So there is at least some support for our prediction among the parents in Generation t-1. Consistent with the TWH, the right column in Table 2 shows that both father's and mother's education have significantly ( $p_s < .05$ ) negative effect on the number of daughters. The results in Table 2, right column, showing that only the mother's empathizing skills matter for the number of daughters, are also consistent with Grant's (1998, 2003) maternal dominance hypothesis for sex determination.

## 9.5. Conclusions

If the Type S brain, particularly adept at systemizing, was adaptive for ancestral men, and if the Type E brain, especially designed for empathizing, was adaptive for ancestral women, as Baron-Cohen (2003, Chapter 9) argues, and if the brain types are substantially heritable, then, combined with the fundamental insight behind the Trivers-Willard hypothesis (TWH) regarding the parents' ability to vary the sex ratio of offspring in order to maximize inclusive fitness, it follows that people with strong Type S brains should have more sons than daughters and people with strong Type E brains should have more daughters and sons. Our analysis of the 1994 General Social Survey provides support for our prediction. The GSS respondents who have "systemizing" occupations, such as scientists, engineers, and mathematicians, are significantly more likely to have sons than daughters; those who have "empathizing" occupations, such as nurses, therapists, and school teachers, are more likely to have daughters than

sons. There is also some evidence for our prediction in the previous generation. Among the parents of the GSS respondents, mothers who had empathizing occupations are significantly more likely to have daughters than sons.

If our findings are robust, what possibly accounts for them? What mechanism is behind the process whereby individuals with strong Type S brains have higher offspring sex ratio (more sons than daughters) than those with strong Type E brains? There is emerging evidence that the biochemical foundation of this process may involve prenatal exposure to testosterone. The 2D:4D ratio (the ratio of the length of the index finger to the length of the ring finger) is an accurate (inverse) indicator of the prenatal exposure to testosterone (Manning 2002); men have lower 2D:4D ratio than women do. Autistics, who have extreme Type S brains, have lower 2D:4D ratios (Manning et al. 2001), and at the same time those with low 2D:4D ratios have more sons than daughters (Manning et al. 2002). Thus Grant (2003) may be correct to emphasize the role of maternal dominance and testosterone in determining the offspring sex ratio. However, while Grant's maternal dominance hypothesis can explicate the proximate mechanism for offspring sex ratio, it cannot elucidate its ultimate causes, why it might be adaptive for parents to vary offspring sex ratio, which the original TWH does.

We present our thesis and evidence very cautiously. Baron-Cohen's extreme male brain theory of autism, which has strong validity in the clinical and experimental settings, has never (to our knowledge) been interpreted in a strong evolutionary psychological framework, as we do here. (For instance, Baron-Cohen does not cite any of his voluminous work in his chapter "Evolution of the Male and Female Brain," probably because he has not extended his clinical theory of autism to evolutionary directions.) Further, the TWH has always been interpreted in terms of the effect of parental conditions (social status and dominance in modern human societies) on the offspring sex ratio; it has never (to our knowledge) been extended to other factors that may influence parents' reproductive success (such as brain types).

If we are right in our extension of the TWH, then other predictions are possible. For instance, there is some evidence that battered women, mated to aggressive and violent men, are more likely to have sons than daughters, because aggression and violence were adaptive for men, but not women, in the ancestral environment (Kanazawa 2004). Our empirical results presented here suggest that both the evolutionary psychological extension of Baron-Cohen's extreme male brain theory of autism, and reinterpretation of the TWH and its underlying assumption, may be fruitful for further research.

**9.6. Appendix**

1980 Census Occupational Classification

Systemizing occupations	Census code	Empathizing occupations	Census code
Executive, administrative, and managerial occupations		Professional specialty occupations	
Financial managers	007	Registered nurses	095
Accountants and auditors	023	Dieticians	097
Underwriters	024	Inhalation therapists	098
Other financial officers	025	Occupational therapists	099
Management analysts	026	Physical therapists	103
Professional specialty occupations		Speech therapists	104
Architects	043	Therapists, n.e.c.	105
Aerospace engineers	044	Teachers, prekindergarten and kindergarten	155
Metallurgical and materials engineers	045	Teachers, elementary school	156
Mining engineers	046	Teachers, secondary school	157
Petroleum engineers	047	Teachers, special education	158
Chemical engineers	048	Teachers, n.e.c.	159
Nuclear engineers	049	Counselors, educational and vocational	163
Civil engineers	053		
Agricultural engineers	054		
Electrical and electronic engineers	055		
Industrial engineers	056		
Mechanical engineers	057		
Marine and naval architects	058		
Engineers, n.e.c.	059		
Surveyors and mapping scientists	063		
Computer systems analysts and scientists	064		
Operations and systems researchers and analysts	065		
Actuaries	066		
Statisticians	067		
Mathematical scientists, n.e.c.	068		
Physicists and astronomers	069		

Chemists, except biochemists	073		
Atmospheric and space scientists	074		
Geologists and geodesists	075		
Physical scientists, n.e.c.	076		
Agricultural and food scientists	077		
Biological and life scientists	078		
Forestry and conservation scientists	079		
Medical scientists	083		
Earth, environmental, and marine science teachers	113		
Biological science teachers	114		
Chemistry teachers	115		
Physics teachers	116		
Natural science teachers, n.e.c.	117		
Engineering teachers	127		
Mathematical science teachers	128		
Computer science teachers	129		
Medical science teachers	133		
Agriculture and forestry teachers	136		
Technicians and related support occupations			
Electrical and electronic technicians	213		
Industrial engineering technicians	214		
Mechanical engineering technicians	215		
Engineering technicians	216		

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## 10. CONCLUSION

The aim in science must be to find the truest explanation we can; that is, the explanation that best fits all the current facts, regardless of current dogma.

Doreen Kimura

### 10.1. Summary

Within much of academic feminism today, but also in much of the social sciences in general, references to biology in the explanation of human psychological traits tend to be dismissed as 'reductionist', 'biological determinist', and 'politically dangerous'. The intellectual framework typically used by scholars within these fields to organize findings goes under different names: social constructionism, environmentalism, or the name devised by John Tooby and Leda Cosmides: the Standard Social Science Model. This system holds, mainly implicitly, that in so far as there is a human nature, it consists of an unorganized set of drives, such as hunger, thirst, and sexual motivation, plus a general capacity to learn and to absorb culture. Mental organization is acquired from the social and cultural world, and it is this outside world that determines the contents of our minds, as well as our behavior. Thus the central concepts are learning, socialization, and culture, with general-purpose cognitive mechanisms lying at the basis of these instances. To the extent that there may be any evolved or biological components to the human mind, these are always given form and direction by culture and, hence, do not impart any substantial content to culture. In this vein, gender differences are also typically assumed to derive from the social and cultural world.

Throughout this dissertation I have chosen to use the word 'environmentalism' to denote this framework, because I specifically address feminist theorizing, not the social sciences in general, and in order not to cause confusion with epistemological social constructionism, also a subject of scrutiny in this work. As we have seen, however, environmentalist views of human nature and epistemological constructionism often go together. Many versions of both intellectual systems exist, with varying degrees of radicalness, carefulness of arguments, and intelligibility.

As feminism is not a scientific discipline but, first and foremost, a social and political program, it need not surprise us that there are many different strands of feminism. The movement is so heterogeneous due to differences in values, in political aims, in background beliefs, in the historical context at the moment of emergence, and in the experiences of women. All these factors influence feminist scholarship to a larger or lesser extent. We see a continuum from feminist empiricism, entailing a belief in the methods of standard science, over standpoint theory, holding that the knowledge claims of the oppressed are more objective than traditional knowledge claims, to postmodernism, rejecting the special epistemological status of scientific knowledge altogether. This continuum from the belief in an objective reality to a radical social constructionism more or less entails a continuum from a nature-nurture interactionism to a radical environmentalism. Two findings stand out here. First, even empiricist feminists tend to assume that gender differences are mainly due to socialization. Liberal philosopher Martha Nussbaum (1999), for instance, criticizes Judith Butler's view of newborns as blank slates as unsupported, while assessing Butler's account of masculinity and femininity as social fictions as plausible. Second, (radical) environmentalism is hugely overrepresented in feminist theorizing. Whereas Anglosaxon feminists appear to be more radical in this respect than continental feminists, the amazing finding remains that outside of the domain of evolutionary biology and evolutionary psychology I hardly encountered any feminists explicitly open to or embracing a nature-nurture interactionism with regard to gender. Those who are open to this view, such as philosopher Christina Hoff Sommers, philosopher of science Noretta Koertge, professor of Women's Studies Daphne Patai, and sociologist Alice Rossi, are harshly criticized or branded as antifeminist by many other feminists.

I have termed this feminist reluctance to consider well-established evidence from the biological and evolutionary sciences regarding the origins of gender difference 'biophobia'. The roots of this biophobia are manifold, but it seems to be driven to a large extent by the many instances of androcentrism in historical scientific theories, including evolutionary science. These theories have, in turn, often been used to justify women's subordinated position in society. Sadly enough women's history of oppression has prevented them from entering the academic world until a few decades ago. They found the social and the biological sciences to be sometimes thoroughly male biased. Female scientists have been systematically correcting this bias ever since; yet many feminist theorists remain distrustful of the biological sciences. In addition to the many historical instances of pseudoscience, bad science, and abuse of science, Darwinian theories in particular have been tainted by social Darwinism and eugenics. Many

feminists make the mistake of generalizing from these cases to the process of science in general, concluding that scientific theories cannot be but political in purpose and, hence, having no trouble with making their own theories overtly political in aim and design.

As I found, however, an equally important source of antibiological sentiments within feminism is a deep biological ignorance, feeding a host of misconceptions, such as the naturalistic fallacy, the myth of genetic determinism, and the false notion of a dichotomy between nature and nurture. A number of biologists working within Women's Studies, such as Anne Fausto-Sterling, Ruth Bleier, and Ruth Hubbard, bear a huge responsibility in perpetuating this ignorance and the many misconceptions regarding the biological and evolutionary sciences. Their critiques of sociobiology and evolutionary psychology consist virtually solely of political imputations, misunderstandings, selective reading, and misrepresentations, and are characterized by a lack of knowledge of the main principles of evolutionary biology and, with regard to Fausto-Sterling, of the theoretical developments of the 1990s. Their work, however, serves as an important reference to other feminists, who find in it a justification for not having to take biology and evolution into account. Another strategy of the critics is to nitpick at each biological study, to demand much higher standards of evidence than they would for socialization theories, to offer alternative and sometimes far-fetched explanations, and to ignore well-established, corroborating evidence from other disciplines.

Early sociobiology has been very responsive to feminist and other critiques that turned out to be sound, such as the charge of androcentrism and of a lack of scientific rigor when it came to humans. As I found, evolutionary psychology, the young discipline that followed sociobiology but that focuses on an evolved mind as a mediator of behavior rather than on behavior itself, can be considered a gender-balanced and sophisticated scientific discipline. I did not encounter one feminist critique that hit the mark. Indications that our minds indeed comprise a multitude of adaptations making up human nature and that, due to sexual selection, some of these adaptations are more typical of one sex than of the other, come from many sources, including evolutionary biology, cognitive psychology, cognitive neuroscience, ethology, neurolinguistics, artificial intelligence, anthropology, and developmental psychology. These adaptations strongly shape the nature of human social life and what is culturally transmitted across generations. Their precise manifestation is contingent on environmental inputs in a selective, organized way, enabling human behavioral

flexibility. Without this evolved mental architecture, there would not be any responsiveness to the environment.

The environmentalist view is predicated on a psychology (general-purpose, content-free) that could not have evolved, and for which no empirical support is found. Its assumption of the absence of any inherent gender differences in humans is at odds with well-validated findings and theories from other disciplines, such as evolutionary biology. Its observations, however, mesh with those made by evolutionary psychologists. Although its explanations of these observations may be compatible with evolutionary explanations (on a proximate level), as a theory of human nature, and of masculinity and femininity, environmentalism is hopelessly flawed. It is precisely this lack of an evolutionarily-informed theory of human nature, moreover, that is at the root of many theoretical problems feminism has been struggling with for decades, without arriving at a satisfactory answer, such as the origins of patriarchy, the nature of women's subordination, the nature of femininity, and the problem of 'essentialism'.

## **10.2. Discussion**

Keeping in mind the growth of Women's Studies and Gender Studies programs in universities worldwide, and the increasing success of the biological sciences at probing life's mysteries, the findings of epistemological constructionism, of (to a lesser extent) receptiveness to psychoanalysis and postmodernism, and of biophobia within many strands of feminism raise some serious concerns. I am convinced of the value of doing research on women's history, of using gender as a tool of inquiry, and of sensitizing people to gender issues. The attitudes mentioned above, however, are fed not only by a justified and measured scepticism toward science, but also by scientific ignorance and ideological prejudice. How is this to be reconciled with the academic ideals of open inquiry, of exposing students to a diversity of ideas, of expanding their mental horizons, and of teaching them to think independently? Should Women's Studies not primarily be about scholarship, not about pushing an ideological agenda?

The problem seems more pregnant in the United States than in Europe, because of the many American undergraduate and graduate Women's Studies programs, which, other than in Europe, are completely separated from the general curriculum. As feminists Daphne Patai and Noretta Koertge (1994), deeply frustrated about academic feminism, describe it in their book *Professing Feminism: Cautionary Tales from the Strange World of Women's Studies*, within these American programs the range of knowledge communicated to students is all-too-often narrow and tendentious, and

professional standards tend to be low. Based on my own experiences with Women's Studies courses at the University of California, Santa Barbara, I can only agree. "The failures of feminism are no different from the failures of all grand schemes that have set out to improve human society in one fell swoop, and they remind us of how important it is to have enlightened institutions and traditions that foster open discussion and critical debate," Patai and Koertge write (1994:xi).

The logical inconsistencies and the lack of openness toward or ignorance of other than environmentalist accounts of gender difference that typify many feminist theories not only can harm students' education. They can harm the intellectual credibility of the movement as well. If feminists continue to reject the mounting evidence from the biological sciences (e.g., genetics, behavioral genetics, neurophysiology, endocrinology, evolutionary biology) and the cognitive sciences (e.g., cognitive psychology, neurolinguistics, artificial intelligence) with regard to the biological underpinnings of human behavior, they back themselves into an embarrassingly uninformed corner. In order to understand human nature and human behavior, *all* possible sources of information should be taken into account, not just those that exert an ideological appeal to us.

"History has not been kind to ideologies that rested on patently false beliefs about human nature," science writer Robert Wright notes (1994a:34). He is referring to communism and Lysenkoism, but also to the notion of gender as a mere social construct. The tone of his article is rather chiding. On reading it carefully, however, it becomes clear that Wright is no antifeminist. He even looks for rationales for affirmative action based on our emerging knowledge of evolved sex differences. Thus, following a suggestion by Matt Ridley, he proposes that we might favor quotas for women because they are less ready than men to sacrifice an organization's welfare to personal advancement. Women's political priorities are also known to differ from men's: Women are more pacifistic and more concerned about reducing social inequalities (Fisher 1999), a finding that might be used as a rationale for affirmative action in politics. Many possibilities of applying evolutionary insights in ways that benefit women are open to exploration. An example is the argument proposed by Alexander Sanger, grandson of social reformer and founder of the American birth control movement Margaret Sanger, in his book *Beyond Choice* (2004). Sanger develops an evolutionary defense of reproductive freedom, showing that the use of methods to prevent pregnancy and childbirth is no modern aberration, but is profoundly human. Women have always done what was necessary to have their children survive, and one of their means to that end has always been the timing and

spacing of childbearing. An evolutionary perspective, according to Sanger, supports both reproductive freedom and respect for human life. Women and men have been successfully controlling their reproduction for a long time. To oppose the legalization of contraception and abortion is simply to "show an abysmal ignorance of biology and human nature" (Sanger 2004:138). It might be a point of debate, however, whether Sanger is not committing the naturalistic fallacy.

This is what there should be and what is all-too-often lacking now: debate. Informed, constructive debate, that is. Interdisciplinary debate, across the artificial boundaries of the biological sciences, the social sciences, and the humanities. All claims should be thrown into the arena, and openly and constructively scrutinized and discussed, in order to find out which ones are backed up by the evidence, which ones are not, and for which ones the evidence is as yet inconclusive. The claims and arguments should be clear and precise, so that one knows what one is discussing, in order to be able to evaluate it.

Even imprecise claims are, however, sometimes refutable, because on closer inspection they turn out to be internally inconsistent. The exceedingly vague statement that people's sexual preferences "result from an elaborate normative superstructure that informs perceptions and gives meaning to the things we do"<sup>88</sup>, for instance, is deficient on many accounts. Not only does the empirical evidence point in another direction, the statement also ignores that cultures are not uniform and that this 'normative superstructure' hence consists of a lot of contradictory messages; that many people appear to be magically resilient to the influence of this superstructure; and that supra-individual concepts like 'a normative superstructure', or 'society', or 'culture' do not have any interests of their own. They are made by or consist of *people* having interests. Moreover, these interests often conflict. Hence the 'explanation' that norms and values are produced by society and then somehow infused into individuals only raises more questions. Collective normative representations do exist, and they can and do influence individual behavior. To understand why and how this happens, however, we have to address the level of psychology. Collective representations cannot be but grounded in the psychology of individuals.

This is another deficiency of the sweeping claim above: It does not offer any plausible view of psychology. It just skips this level. Many environmentalists do this, or they represent individual psychology as some sort of 'black box' of general learning. They might agree with social psychologist Sue Wilkinson, who contends that psychology is perpetuating oppression, due to its individualism: "By locating 'causes'

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<sup>88</sup> Margolin and White 1987, as cited in Lopreato and Crippen 1999: 178-179.

and 'cures' within individuals, and by ignoring or minimizing the social context, psychology obscures the mechanisms of oppression" (1996:5). This attitude frees theorists from having to provide or start from a view of psychology that is scientifically sound.

Ideological fervor, I contend, has been one of the forces preventing many feminists from joining in with present-day scientific insights on human nature and on gender difference, and from profiting from these insights. At the moment feminists calling for an evolutionarily inspired feminism are voices crying in the wilderness. Apart from Elizabeth Grosz, psychologist Elizabeth Wilson is another one of these rare souls who argue that the biological sciences can actually sustain feminist claims and that feminists should be open-minded enough to try to *learn* from the data produced rather than just wanting to uncover sources of bias (Wilson 1999, 2002).

Robert Wright hits the mark in saying that, if feminists - rightfully - want laws that protect women against sexual harassment, they will have to admit that women are in some ways uniquely vulnerable. Men typically will not feel violated as soon and as deeply by unwanted sexual advances by the other sex, and for good evolutionary reasons. If you want to give women more protection than men, you will therefore have to acknowledge the specificities of the female mind (Wright 1994a). Now *this* is a truly feminist remark, I would say: in defense of women in the domain where the 'battle of the sexes' is fought most fiercely: that of sex.

Indeed, the observation that somebody rejects an environmentalist account of gender difference does not imply that he or she does not sympathize with the feminist cause. On the contrary, it is precisely as a feminist that one might worry most about the antiscientific tendencies and the biophobia within much of feminism. A lot of valuable energy that might be directed at fighting the real problems faced by women is now wasted on elaborate, far-fetched, and sometimes unintelligible accounts of the 'social construction' of scientific knowledge and of gender identity.

It is true, though, that evolutionary insights might be misused by political conservatives and that they are often described in uninformed, conservative ways in the popular press. That makes it all the more important for feminists to enlighten the public about the misconceptions that easily come with Darwinian theory, such as the naturalistic fallacy. The caricatures of evolutionary psychology sometimes found in feminist writings only reinforce these misconceptions, however, thus paradoxically enhancing their potential appeal to the political right. The resistance against biologically informed explanations of the human mind and human behavior indeed carries the implicit message that if these contested theories turn out to be irrefutable,

then it would be okay to discriminate against women (or gays, or...) after all. This, of course, is absurd. Biological facts do not, by themselves, dictate our values.

### **10.3. Conclusion**

Feminism and evolutionary science are not enemies, but allies. The history of the biological and evolutionary sciences attests to their liability to all kinds of bias, as does the history of the social and life sciences in general. Only the input of women researchers (and of people from differing ethnic, class, and sexual backgrounds) can guarantee our knowledge of human nature to become as value-free as possible. Whereas evolutionary psychology can provide scientific insights into the ultimate causes of the 'battle of the sexes', feminists can draw upon these conclusions for the construction of a realistic program of social reform and can at the same time act as a watchdog for male bias in evolutionary theories. Since science is always socially embedded, awareness of different forms of bias is constantly needed.

Evolutionary psychology is not normative. It only tries to describe how our minds evolved, and how the evolved architecture of our minds reacts in a highly context-sensitive way to the environment it finds itself in. By changing the environment one can change the behavioral outcome, as the huge differences between cultures show us. It is, however, highly implausible that men and women will ever become the same; most probably there will always be *statistical*, mean-group psychosexual differences between them, just as there will always be differences between people. We know, for instance, that women everywhere typically score higher than men on qualities such as nurturance and communality, whereas men typically outstrip women when it comes to qualities like agency and systemizing. We also know that these differences are not likely to stem merely from socialization and cultural influences. Why on earth should we want to deny or eradicate them, instead of acknowledging the difference and getting the best of it? We are no longer living in a pre-Darwinian world with its essentialist assumptions about a 'natural order' of the sexes, fixed in rigid structures such as the Great Chain of Being. Science has shown that women and men are more similar than they are different, thus shattering many old prejudices about 'the sex', as women were called in the nineteenth century. This finding, however, should not lead us to ignore the differences that exist. All people have more in common than they are different, yet as far as I know nobody is standing on the barricades to demand that all



people should be considered identical. There is nothing wrong with gender difference, it would seem, as long as people get equal chances to realize their potentialities.

Feminism is missing a unifying framework. What we have are multiple and often mutually exclusive accounts of human nature, as well as endless discussions on the problems of 'essentialism' and of equality 'versus' difference, problems that turn out to be pseudoproblems when considered from a biologically-informed perspective. Feminism, and the social sciences, might benefit greatly from what Jerome Barkow has termed 'vertical integration' (see section 7.11): the recognition that scientific theories at all levels of organization must be mutually compatible. This approach, which entails the unification of the life sciences with the social sciences, allows scholars to use knowledge developed in other disciplines to solve problems in their own, and it helps weeding out implausible or impossible theories (e.g., the overt or implicit assumption that men and women are psychologically identical) (Barkow 2006).

Darwinism can, however, do more than merely rule out certain views of the mind. It can also provide grounds for favoring certain views over others (e.g., whether the mechanisms of the mind are few, general, and simple, or numerous, specific, and complex), and it can guide hypothesis formation, helping us to decide which questions about the mind are likely to be scientifically fruitful (Symons 1987a). There is nothing imperialist about this endeavor; it has nothing whatsoever to do with "the fantastic dream of the scientist as God," as feminist theorist Joan Scott (2001) has called the project of the unity of knowledge. It "simply involves learning to accept with grace the irreplaceable intellectual gifts offered by other fields." Of course, "accepting these gifts is not always easy, because other fields may bring the unwelcome news that favored theories have problems that require reformulation" (Cosmides, Tooby, and Barkow 1992:12-13). Vertical integration also means that scholars will need to develop expertise in at least two scientific fields.

To conclude, I think that the time has come for feminists to leave their unreasonable hostility toward a Darwinian framework behind. We no longer live in the nineteenth century, when male scientists could develop unsubstantiated theories about female nature without even listening to women's experiences. We should not let ourselves be held hostage to the past. Science has grown up. At the same time it remains a human and therefore fallible enterprise. Keeping an eye open to gender bias in evolutionary theories will continue to be required, just as awareness of other possible sources of bias will always be needed. This should not keep us from acknowledging that the paradigm of evolutionary psychology is basically sound, although, as a young scientific discipline, it may still show some growing pains. We will

have to take its data and the data from other scientific disciplines into account if we want our gender politics to be attuned to what women and men find important in their relationships and in their lives.

I could not put it more aptly than Anne Campbell does in *A Mind of Her Own*:

If ... we accept that women and men are different, we can think about a society that breaks down the barriers between children and work, that allows women to see value in cooperation as well as competition and that allows women to capitalize on their linguistic advantages. If evolutionary theory is correct then we cannot design twenty-first century woman as if from scratch. Ideology, social policies, law and the media cannot in and of themselves make women into something they are not. What we can and should do is to give people choices that allow them the maximum freedom to be whatever they want. With that freedom, women's nature can take its own course. (Campbell 2002:32-33)

How we should do that still has to be worked out in detail. A major project is awaiting feminism.

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