

**English translation of the Introduction of the book:**

MAKING SEX REVISITED:

DECONSTRUCTING SEX/GENDER FROM A BIOLOGICAL AND MEDICAL POINT OF VIEW

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Short description: Judith Butler once critiqued binary approaches to biological sex on the level of the interpretation of signs, thus avoiding a discussion of actually existing organic structures and their possible binarity. By contrast, the following contribution is concerned with historical and contemporary biological theories about such structures. Tracing theories of preformation and epigenetics, "Making Sex Revisited" demonstrates that a focus on processes of evolution and differentiation leads to pluri-sexual approaches to biological sex. Organic structures develop individually and vary when various individuals are compared. The predominance of binary interpretations results from the distinction between two sexes and their unequal treatment, still prevalent in society.

German full text version:

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*Dekonstruktion des Geschlechts aus biologisch-medizinischer Perspektive*

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# INTRODUCTION

## I. Contextualization of Research on Sex

The social orders of modern western societies take the existence of two exclusive human sexes for granted. Every human being is supposed to be either a woman or a man. The division is drawing on physical and physiological characteristics, and with this emphasis on the corporeal, it is viewed as natural - 'natural' being the metaphor used for what is perceived as predetermined and unchangeable. The work at present takes as its starting point the significance of physical and physiological characteristics in the foundation of dichotomous sexes in modern western societies. For, the biological and medical sciences on which the work is focusing often contemplate these characteristics.

Physical and physiological characteristics that are seen as markers of sex are accentuated by differently gendered first names and clothing, with the registration of one or the other sex at birth and in identity papers. From the first years of life on, and rather incidentally, every human being learns to differentiate people by gender according to external characteristics such as clothing, names, professional occupations, gestures, etc. The uncertainties that children still exhibit in doing so during their early years are quickly corrected by caregivers or a person whose gender has been 'falsely' classified. In later years these uncertainties in classifying sex in general no longer happen, or occur only rarely. Nonetheless, the externally represented gender might not at all match a person's self-defined gender or the gender that person was socialized in.

The classification of somebody as 'woman' or 'man' has a profound social impact, because it influences the possibilities made available to a person in society. It is still considerably easier for men to reach lucrative and prestigious positions in society - in economics, science and politics - while few women are seen in such well-paid positions. At this point it becomes most noticeable, and tangible for very many people, how the significance of gender is interwoven in the constitution of society. But there are many other social areas in which one is always confronted with the relevance of gender: be it in media

reports, in sports, in department stores, in ads, or on toilet doors - 'men' and 'women', 'boys' and 'girls' are addressed according to their respective target group.

There has been vehement opposition to the gender-dependent inequality of opportunity. Dedicated women - supported by a few men - challenged the social limitations from which women were, and still are, affected. They demanded equal rights and equal opportunities for 'woman' and 'man' and fought hard to get access to some areas of social life, such as scholarship and the right to vote and be elected. Subsequently, discrimination against women and violent circumstances to which women were and are subject have been exposed and people have demanded an end to this. It was also pointed out that in the two-sex structure men, too, are being confronted with exigencies that limit their possibilities.

Since the end of the 1980s, the debates about and struggles against unequal opportunities of women and men were joined by discussions that express a fundamental critique of the dichotomous gender order. Taken together, they constitute queer theory today. One of the questions raised by queer theory is why sexual classification as 'female' or 'male' should be necessary at all. It has been made clear that not all human beings can be unambiguously classified at birth into one of the two sexes 'female' or 'male', because some are of ambiguous sex, 'intersexuals', who can only be assigned in the dichotomous order after thorough medical examinations and treatments - procedures often described later as violent and traumatic by those who had to undergo them (cf. chapter two). It is clear as well that people who want to document their divestment of the gender roles in which they were socialized by changing their first names and the entries in birth registries and identity papers were, and still are, confronted with difficult legal hurdles. The institution of marriage has been criticized for catering exclusively to two partners of the opposite sex (which often still is the case), privileging them over same-sex couples who want to register their partnership. Such far-ranging questions of queer theory, challenging the dichotomous gender order by focusing instead on the individuality of each person and the diversity of identities and life paths, are increasingly taken up in the social sciences and cultural studies. Discrimination based on dichotomous gender classification is being uncovered, and there are debates going on about how to overcome such discrimination when found.

Queer theory in the social sciences and cultural studies has also been striving to transcend the division of sex into *gender*, a sexual identity that can be demonstrated to be socially constructed, and *sex* as assumed to be a biological fact given at birth. Based on this

division, earlier feminist theories had shown that gender identity in society is independent of biological determination and that sex can therefore not be used in order to deduce role behavior, privileges and disadvantages. Through the differentiation of gender and sex, it became possible to confront the social disadvantages of women without considering primarily the supposedly solid biological sex. On the other hand, such feminist theories were still adhering to the view of biological sex as something 'naturally' predetermined. Queer theory - which is also feminist - overcomes this boundary, holding that both sex and gender are being produced socially. It takes language, discourses, socially formed interpretations, to construe characteristics of bodies sexually, as sex, which is stabilized through established rituals of everyday life. Queer theory also views natural-philosophical and biological-medical theories of sex against the backdrop of the socially established gender order.

The feminist interventions are increasingly creating reverberations in the biological-medical sciences as well; revisions are appearing in theories of sex there, too. For example, in current genetic theories of sex development, the formation of a female embryo is described in terms of active developmental stages. Prior to the 1980s-90s, this was – at least generally – not the case. Until this period female development in genetic theory was described as happening without active developmental stages and preceding male development. Male development was supposed to represent an active stage of development bound to the further development of the female (cf. chapter three). Here it is significant how social presuppositions of the primacy of man over woman shapes the focus of biological-medical science and how perspectives can change, in particular through feminist critique of the natural sciences.

T. Laqueur (1986; 1990), C. Honegger (1991) and L. Schiebinger (1986; 1989) produced remarkable works in the social sciences and cultural studies, elaborating on the social formation of historical natural-philosophical and biological-medical theories of sex. Laqueur argued that a 'one-sex model' was operative from antiquity into the Renaissance and differentiates it from a 'two-sex model' of modern biological-medical sciences.

### **The 'One-Sex Model'**

Laqueur claimed that the natural-philosophical gender theories of antiquity were following a social gender classification. He said that according to these theories the woman was not

fundamentally differentiated from the man, but was considered to be an imperfect version of the human being, while the man was the complete version. Differences were only seen in terms of more or less, but not in a way that conceived of fundamentally different 'natures'.

Laqueur found this view in particular in the works of Galenos of Pergamon, a physician who lived in the second century BCE. For instance, Galenos held that the sex organs of man and woman were identical and differed only in where they were found in the body. Accordingly, the female sex organs - he named vagina, cervix, (female) testes, ducts and uterus - were equivalent to the male sex organs, identified as foreskin, penis, (male) testes, ducts and scrotum; the only difference was that in the female they were turned inward and in the male they were turned outward. The outward orientation of the sex organs was a process dependent on heat whereby the man had enough heat for this process and the woman did not. Following Aristotle (fourth century BCE) in linking heat to perfection, Galenos regarded nonetheless both man and woman as having semen, while Aristotle had claimed that the woman failed to produce semen due to a lack of heat (cf. chapter one).

From these observations, Laqueur deduced that in antiquity only the degree of perfection was differentiated. Woman and man were qualitatively identical, physiological only different in their wholeness dependent on heat, with the man representing the complete version of a human being, and the woman in contrast the incomplete version. Laqueur interpreted this in the sense that in antiquity a gender-differentiating social order was not founded in natural-philosophical (e. g. biological, medical) theory. According to him this changed in the course of the 18th century.

### **The 'Two-Sex Model'**

Laqueur introduced the term 'two-sex model' for biological-medical theories since the 18th century. He argued that from then on these theories were no longer restricted to describing gradual distinctions but were postulating essential physical and physiological differences. With this, a shift in the justification of social inequalities owing to gender took place - away from social reasons to biological and medical ones. In contrast to the 'one-sex model' from before, physical and physiological characteristics were now used as arguments for limiting the social position of women.

On closer examination of the gender descriptions produced by the modern western sciences, including the biological-medical ones, in their constitutive period, C. Honegger was able to substantiate the thesis of an increasing emphasis on the difference between the two sexes. She ascertained "the genesis of a special female anthropology" beginning in the 18th century. According to her, since the end of that century a particular way of observing gender differences was developing in a variety of special theories, with only rare resistance to the general trend (she named K. A. Erb as an exception).

L. Schiebinger also observed such an increase of descriptions of gender difference and was able to demonstrate it in particular for theories of the human skeleton. She showed that in the 16th century only isolated instances of representations of skeletons marked as 'female' or 'male' are to be found, whereas this occurred regularly from the 17th and 18th centuries on. Previously, there had been no differentiating representations regarding the skeleton proper; sexed representations, if they occurred at all, would have been laid out by way of skin, muscle and flesh. In contrast to Honegger, Schiebinger explicitly referenced Laqueur's reflections about an assumed 'one-sex model' prior to the 18th century.

The scholars named above have shown that since the 18th century the inequality of bodies of men and women has been established by way of biological and medical evidence and that social gender inequality was derived from that. They made clear that natural-philosophical, or rather biological-medical reflections on gender are to be understood against the backdrop of the social conditions of the period in question. They also deserve credit for bringing historical natural-philosophical and biological-medical works to the attention of gender research in the social sciences and cultural studies.

## **II. Structure and Thematic Focus**

In the work at present interdisciplinary investigations of natural-philosophical and biological-medical theories will be undertaken from the perspective of gender research. Blanks will be pointed out in the research that has been done up until now, new perspectives will be shown and interpretations offered. I hope to generate discussion and to stimulate further research.

In the first two chapters, natural-philosophical and biological-medical theories of sex in various cultural contexts will be introduced. First, I will discuss ancient natural-philosophical theories of sex and their differentiation. Following this, I will give an overview of theories of sex according to the modern biological-medical sciences in their constitutive period. It will become clear that the terms 'one-sex model' and 'two-sex model' are inappropriate to classify the theories of sex produced by the natural philosophy of antiquity and the modern biological-medical sciences, because elements of equivalence as well as elements of difference are always to be found in the characteristics that are viewed as being 'sexed'. It will be evident that we should depart from the view of radical ruptures in the development of natural-philosophical and biological-medical theories of sex in order not to lose sight of the continuities and changes in the concepts 'equivalences' and 'differences' in the sexes within the individual theories.

For the modern biological-medical sciences, I will show that the search for the sex-determining factors has increasingly shifted from the externally visible sex characteristics to the germ cells, the locale of their development and their molecular components: a transition from the macroscopic to the microscopic. It means that for the negotiation of equivalence and difference of the sexes, the visible characteristics no longer play the decisive role in biological-medical research, rather, structures that are 'invisible' to the eye are made visible and interpreted only by experts using the microscope. The implications arising from these observations of the second chapter will be taken up in the third chapter, where I will turn to the contemporary theories of sex development during the transition from the 20th to the 21st century. After an analysis of the current publications, particularly those from genetics, I will point out that future biological-medical studies should depart from approaches considering a simple sequence of genes having effects on each other and instead embrace a complexity that reaches beyond the idea of 'networking'; it will be especially important to ponder the processuality of the factors involved. The interdisciplinary cooperation of various biological-medical sub-disciplines is crucial here. In the final conclusion, I will summarize the results of chapters one, two and three in their inner coherence and introduce ideas for further research in the humanities and in biology and medicine.

In the following section, the terms and fundamental points that are relevant for the whole book will be briefly introduced.

## **The division of a 'one-sex model' and a 'two-sex model' is inaccurate**

The works of Laqueur, Schiebinger and Honegger were received almost euphorically, but have only to a small extent stimulated continuous scientific debate about the theses presented, and this has been mostly limited to historical scholarship. The criticism by historians has not disputed the social influence on natural-philosophical and biological-medical theories of sex, and after a thorough and careful evaluation of the question, I concluded not to dispute it either. The critics are much more concerned with the strict separation of a 'one-sex model', transmitted from antiquity, from a 'two-sex model' that has supposedly taken shape since the Enlightenment.

For example, K. Park and R. A. Nye (1991) as well as M. Stolberg (2003) have shown that already in the 16th century there were clearly dichotomous differentiations in natural-philosophical theories of sex. Park and Nye also criticized the homogenizing approach of Laqueur who had established a consistent sex model for a very long period of history marked by significant changes. They pointed out that on closer examination of the sources, Laqueur could have discovered that neither in the writings of Aristotle nor in those of Galenos a 'one-sex model' in the sense claimed by him was to be found.

In order to enable further research, it is important to scrutinize the relevance of a 'one-sex model' and a 'two-sex model' as well as their temporal scopes. Conceptually pointed terminology and rigid demarcations hinder without warrant the free examination of continuity and change in natural-philosophical and biological-medical theories of sex and the theories' role in the specific social production of sex. In other words (and this is also useful regarding the natural-philosophical and biological-medical theories of sex): "Neither the naïve acceptance of a linear improvement of the gender order nor the opposing thesis of an intensification or even an 'invention' of the hierarchy of the sexes in the modern period provide inspiration for a more detailed examination of this historical change. It is widely accepted that the reigning structure of the gender order is either only valid for the pre-modern epoch or exclusively for the modern era. In both interpretations, it is assumed that there is one rupture between the modern and the pre-modern past, so that the question of coherence and transformation, of continuity and change, does not really appear." (C. Klinger [2000])



Undoubtedly, constructivism and queer theory offer new ways of reading historical texts. They pose further questions, one of which is if the historical texts on natural-philosophical and biological-medical theories of sex even allow interpretations in the direction of dichotomous sex or if particular assumptions of contemporary scholars are reflected in such interpretations, which come to be due to the contemporary significance of dichotomous sex.

J. F. Ackermann had already noted the wide range of descriptions of difference in his dissertation (1787) which is according to Honegger one of the primary works that laid the foundations of biological-medical theories of sex of modern scholarship. He limited himself to the ideal typical female person and in no way did he mean to refer to all women. In another writing, he formulated the correspondence of female and male sex genitalia, thus making a case for what Laqueur would call the 'one-sex model' rather than for one that would allow for an emphasis on difference between female and male sex (cf. chapter two). The intervention of K. A. Erb (1824), viewed by Honegger as an individual case, was, at closer inspection, not an individual case at all, but embedded in a whole direction that took commonalities of physical and physiological characteristics into view, including the correspondence - or at least the common origins - of the genitalia. In developmental biology, the acceptance of a common sex embryonic plant was dominant in the 19th century and has been favored up until the present day. Around 1900 many similar notions appeared that described different *female and male powers* (in the sense of typical characteristics) but emphasized that each person had female and male powers in different compositions, or at least the incidence of people that had both female and male powers was quite common.

### **Physiology and Anatomy**

As shown in previous works of the newer sex research, the difference between physiology and anatomy and the value of both have been proven to be significant for the elaboration of theories of sex. Following Laqueur, characteristics that would have only described quantitative differences between two sexes were often seen as essential for ancient natural-philosophical theories of sex, while modern biological-medical theories of sex would have focused on anatomy and more fundamental differences between two sexes. The sexually varying characteristics that had been hypothesized were looked for in all parts of the body since the 18th century, whereas macroscopic structures had been in the focal point of the

research on sex until that point in time, according to Laqueur, Schiebinger and Honegger. It was also said that modern biological-medical scholarship hypothesized organs and flesh, muscle, fat, and the skeleton as being sexually different.

In the work at present, I will pose a thesis that diverges from that of the alleged focus on macroscopic structures: *for theories of sex in modern biological-medical science, changing notions of reproduction have been particularly meaningful*. In these theories, epigenesis and process of development are emphasized; woman and man are described as having equal contributions to reproduction and heredity transmission. M. Hagner (1995) and U. Zürcher (2004) showed the importance of epigenesis already for the establishment of the theory of 'malformation'. The implementation of epigenesis was the real starting point for the search for sex differences in the entire body. At the same time, the germ cells and the locales of their formation came into the focus of interest and began to be microscopically examined. It was above all small structures that were seen as being *extremely influential* for the development of sexual characteristics; currently, biology sees them as the most important factors in the sex development. Simultaneously, these small structures are accessible only by experts with the necessary equipment for observation, which means they are to a large extent removed from public critique. Therefore, activists of emancipatory social movements, who had vehemently contested arguments about women's muscle mass or skull capacity being beneath that of men, could only pick out a few points here and there regarding these small structures. In addition, their arguments were easier to reject as being 'unscientific' by scholars arguing against the equal status of women and men, because most of the activists were not able to prove their arguments on the same level with the corresponding (microscopic) equipment required for examination

### **'Sameness' and 'Difference'**

'Difference' and 'sameness' have proven to be central concepts in the argumentation up to this point. They are significant for this book because they have often been referenced in the history of modern western societies in order to legitimate either social inequality or equal treatment. Therefore, it is necessary to present several points regarding these concepts.

It should be anticipated that the mathematical-logical perspective on the description of 'sameness' or 'difference' is not sufficient here because in public debates 'sameness' and

`difference' have not necessarily occurred as oppositional pairs. Also, through constructivism and queer theory these concepts and categories have undergone further challenges which have not been sufficiently clarified in the social sciences.

`Difference' refers to distinctions that describe at least two carriers of characteristics or groups that carry characteristics. In social practice, the necessity of different treatment *on grounds* of difference or equal treatment *in spite of* difference is derived from `difference.'

`Sameness' is - again, in the social perspective - not to be understood primarily as the opposite of `difference', exclusively privileging the commonness of the characteristic and demanding practically the `same' treatment in view of this background. Instead, emancipatory movements in practical social debates often understand the demand for sameness or `equality' as the demand not to treat something different differently. Or, in regard to sex, there is a demand that social areas and corporeal characteristics, which are ascribed as being `different', should be evaluated in the social realm as being `on the same level.'

`Sameness' can also be understood in a descriptive sense in so far as there is no variation present or that it is not significant enough in order to presume an actual `difference.' Instead, other connecting or common characteristics can be emphasized. In this way, the `sameness' of carriers of characteristics or groups that carry characteristics can be legitimized. For all practical purposes, this makes invalid the differentiation of carriers of characteristics and the division into groups according to these characteristics.

This book refers to `sex differences' and `sex equality' at various occasions. Authors will be cited who tend to use the term `sex equality' in the descriptive sense just outlined. These authors refer to something that connects, to commonalities, and they emphasize the common humanness. They tend to marginalize occasional `differences' they observe between women and men and often view them as a result of socialization - and therefore removed from a supposed `naturalness' and irreversibility. If there had been a different socialization, the `differences' would show less often or would even no longer be noticeable.

Because the different treatment of people on grounds of their gender in antiquity was significant and still is in modern western societies, it was necessary and easy to refer to `sameness' in the descriptive sense and to demand an end to different social treatment. Therefore one can justifiably use the concept `sameness' as describing something shared and connecting.

Constructivism and queer theory make new claims regarding the observation of 'difference' and 'sameness'. In queer theory, individual differences are emphasized. Queer theory holds that characteristics take shape according to each individual and are polymorphic compared among several individuals. In other words, while 'difference' is significant, it develops individually and with much variance and therefore defies simple grouping like in the dichotomous gender classification. At the same time, the 'sameness' of human beings is referred to as a connecting common humanity, and queer theory demands the same, non-discriminating treatment for all people.

The references to what is connecting human beings and to their commonalities, as well as to individuality and variance, render invalid any general definition of the term 'gender'. With the focus on 'equality', there is no more need to name it. If individuality and variance become the focus, the concept 'gender' is also basically 'empty' at first and can be filled by every individual. Here, too, the concept 'gender' is superfluous without such individual filling.

This constructivist and queer theoretical approach is relevant for the observations of biological-medical theories pertaining to sex development which I will give in chapter three. Because, if 'gender' turns out to be individual rather than different in a dichotomous way - i. e., female or male - from a biological-medical perspective based on current theories of sex development, then this perspective demands either a precise, individual naming of different characteristics or to leave 'empty' and eventually drop the concept 'gender.'

### **III. Methodological Framework**

This work is based on various methodological concepts that can be attributed to post-structuralism in the broadest sense. Theoretical constructivism, deconstructionism, discourse analysis, feminist critique of science and systems theory provide the theoretical and methodological backdrop for the examination and social evaluation of natural-philosophical and biological-medical works.

#### **Constructivism**

Constructivism in sociological theory refers to a way of looking at things assuming that perceivable phenomena are always socially produced, or constructed, by discursive and social practices. Phenomena, institutions and actions are described and the way in which they are socially produced is clarified. However, the purpose of constructivism is not to derive the causes of construction or courses of action in order to establish or change structures. Constructivism can be designated as a methodological presupposition with which an investigation can be taken into consideration.

In regard to the question of gender differences, constructivism describes them as a socio-cultural construct, as produced through discursive and social practices, as culturally and historically relative and variable. In particular, the women's movement and feminist theory have emphasized this for the social sex *gender*. The low, discriminated position of women in current social life is not an inevitable or 'natural' given, but rather is produced and ceaselessly re-produced through traditions, institutions and social action. (As oppositional to constructivism, essentialism assumes that with 'sex' there is a 'natural' predetermined, pre-social given that is universal and a-temporal.)

J. Butler and other representatives of queer theory have also called for overcoming the separation of social sex *gender* and biological *sex*, arguing that *sex*, like *gender*, is constructed. Sex, body and corporeal structures are not to be understood as preexisting basis or inscribable *tabula rasa* for social meanings, but were first produced discursively, through acts of language and culture. There is no organ describable and namable free of assumption, because its perception, naming, and description is always infused with already existing social description, naming and interpretation. The works of T. Laqueur, C. Honegger and L. Schiebinger support such a position from a historical perspective.

The research process must also be considered, as it has a constitutive part in constructions such as the findings about biological sex. The science of sociology has made it clear how research questions and processes are shaped by assumptions having to do with social life, the conditions of research in the laboratory and the social position of the researchers. It is in these circumstances that 'findings' and 'scientific facts' are formed. In view of this, various authors have called for a disengagement from the idea of a self-contained science that is supposedly not influenced by society, psychology, ideology or people, and to take a variety as broad as possible of these factors of influence into consideration.

Following these meanings of construction, this author assumes that cultural assumptions, the conditions of the research and the social position of the researcher have influence on the 'findings' generated. In order to verify this and take relevant observations into consideration in the work at present, I have incorporated social debates regarding the positions of women and men in society, with special attention to references made in these debates to natural-philosophical and biological-medical descriptions as well as to the positions scholars took. Moreover, the presumptions of today's interpretations of historical natural-philosophical and biological-medical theories of sex should be brought into the fore. This could be achieved by a fresh reading of a part of the primary literature used in these interpretations, while also consulting other historical primary writings.

### **Deconstructionism**

Due to the way the words are formed, 'construction' and 'deconstruction' could be understood as opposing concepts. This would be a misunderstanding. While constructivism assumes that all scientific knowledge is produced through discursive and social practices, and takes into account the specific variables of production, the supporting parts of the construction, deconstructionism describes an ongoing process. It dismantles the construction at hand, confronting it and the variables of production with other constructions, other possibilities of production that appear at first paradoxical, subversive, perhaps even illogical, and situating them in one context. Thus, diverse constructions appear here not as oppositional and mutually exclusive, but as simultaneous possibilities.

Deconstructionism, as first formulated by J. Derrida, is evading clear definition. Most likely, it can be understood as a strategy with which one can expose all conditions, hypotheses, conventions and presumptions in the sense of a strict rationalism. It is a strategy of subversion and destabilization, applied to both traditional and critical theories, not even sparing its own critical idea. It is an ongoing process without end.

In this sense, in the work at present natural-philosophical and biological-medical theories of sex will be situated in their cultural context and represented in their differentiation and plurality. It should then be possible to show which theories are thinkable within a cultural context and how theories influence each other and are transformed in comparison with various cultural contexts. The cultural contextualization also allows understanding who, i.e.,

which groups of persons, can author scholarly works under which conditions. Through the observation of plurality and change of theories it should be possible to rethink present interpretations that are perhaps transmitted from a current cultural context to historical observations. At the same time, I hope to make a contribution in order to critically confront the current cultural and subjective assumptions and constructions concerning biological sex with other ways of observing and knowing and correspondingly to work on the deconstruction of current theories of sex.

In the course of the investigations, several of my own assumptions were also questioned and in part revised. Examples are 1) the examination of the supposed 'one-sex model' of antiquity was not planned from the beginning but proved to be both necessary and productive during the course of the work. 2) With the working on possibly marginalized (historical) positions in natural-philosophical and biological-medical theories of sex, it has proved that such positions appeared in no way isolated and as specific discontinuities. Rather, an ongoing struggle among more or less differentiated theories crystallized out of this. So the focus of my research shifted from the simple question of 'What was writeable and thought when?' to the question of 'Which different theories were there, and why - against which social backdrop - could some of them spread and become predominant while others were hardly considered and became obsolete?' 3) Regarding current theories of sex (or rather of sex development; this limitation is due to the results of the historical observations), I was surprised about the number and diverse argumentation of the objections raised. Given the representations in the popular media and in the post-secondary instruction in the field of biology, I had assumed that current biology would have one (or more) somewhat coherent theory(ies) of biological gender. After close examination, this assumption had to be revised; I found hints at, and could elaborate on, significantly more wide-ranging, complex biological models of individual (and therefore diverse) sex in regard to sex development than I had thought possible at the beginning of the research phase.

The results presented in this work are to be brought into conversation with other interpretations, with more historic and current material from different disciplines of the humanities and natural sciences, and should be purposely used to stimulate debate.

### **Elements of Discourse Analysis**

Discourse theory assumes in a 'constructivist manner' that 'findings' are produced. Its approach emphasizes the linguistic signs and the acts of speech and of writing. It assumes that it is first through the act of naming and describing and the discussion in society - in short, through discourse - that perceptions, interpretations of subjects and objects are produced. Nothing is pre-discursive, rather all perceptions and interpretations are predicated on discourse. Discourse analysis observes what is said and written within a delimited social field, which signifying codes are used, who - or rather, whose saying and doing - gets disseminated more or less and for which reason. It examines how a social field is bordered, how porous the borders are and in which way positions from other social fields find access and the ability to spread.

The work at present assumes a deconstructionist strategy and traces the strands of discourse in expert circles. It should expose which theories with which argumentation have been represented in natural-philosophical and biological-medical expert circles. In order to accomplish this, a significant corpus of material was taken into account and on this basis particular strands of discourse were examined. These strands of discourse were set in relationship to each other and situated in their own cultural contexts.

Having said this, I do not want to speak here of discourse analysis, but rather of elements of discourse analysis. A semiotics-oriented discourse analysis discussing - in addition to the cultural context - the subjective positioning, the research situation, the political limitations of the writeable and the sayable, the codes used, the role of forms of communication and transmission, should not be taken up here. Rather, the elements of discourse analysis here serve primarily to delimit the intellectual framework within which natural-philosophical and biological-medical theories of sex are situated, that is, to examine the delimitations that have been accepted up until now and possibly to revise them. In this sense, I will - especially in the conclusion - offer various suggestions for further research which are also aligned with discourse analysis.

For this book, I evaluated written material from male (and later also female) expert circles with a focus on descriptions of biological sex. It is relevant to emphasize that for the historical part of the analysis only transmitted material could be examined. Particularly for the antique period, this material is fragmentary. It can be assumed that significant amounts of material, especially that which represented a marginalized position, was not passed down. This means that only a preliminary framework for the historical natural-philosophical and



biological-medical positions can be offered. With regard to the contemporary positions of the 20th and 21st centuries, the wealth of material available makes the selection all important. It was based on review articles; additional works were considered in order to review individual positions in the expert discourse and at times were compared with one another.

A general problem is that exclusively material that was transmitted through writing can be evaluated. Oral and pictorial traditions of transmission that might have been significant in historical cultural contexts do not come under the purview of the research carried out. Additionally, it proves problematic to consider exclusively the works of expert circles because numerous people and groups of people have and continue to be excluded from them. In order to consider other positions that are entertained in experts' discourse, the cultural contextualization was taken up for which works on biological sex from other social circles were used. On the other hand, works on biological-medical theories of sex are included that are often seen as 'literary' from the perspective of today's scholars. These works are especially writings by women. They are interesting for the work at present because for a long time women were almost completely excluded from institutionalized scholarship. It is further legitimate to draw on these 'literary' writings - that are, by the way, often well-founded - because they were referred to by the male (and later also female) expert circles in regard to questions of gender and sex.

It has to be considered that it was largely only possible for people from materially comfortable families to carry out research and to publish their own 'scholarly' and 'literary' writings. People of the poorer classes were excluded from this, on the one hand due to their insufficient education and on the other hand because they had to earn their living. This is historically valid and continues until today, where barriers to access to scholarly research due to the situation of education and the material position of the families are still significant.

### **Feminist Critique of Science and Systems Theory**

Feminist critique of science and works on systems theory were particularly important for shaping the current views on sex development. The work at present owes to feminist critique not only for demonstrating the male influence on the institution of science, with the emphasis on the long-lasting exclusion of women and the exposure of the androcentric

influence on structures, methods and contents. Feminist critique of science is also particularly relevant for referring both methodologically and with regard to content to the necessity of considering complexity. Feminist critics of science call for breaking away from reductionist approaches to research limited by discipline, and instead focusing on the interrelation of factors and their organismic integration. Works of systems theory also lead in this direction (here F. Mussman's dissertation [1995] was important in giving impetus to the observations in the natural sciences and in the work at present).

It has already been shown in the cursory introductory observations to chapters one and two of this book that an interdisciplinary approach is necessary. Complex explanations and discourses should be brought together, avoiding rigid boundaries. Deconstructionism as a methodological tool makes it possible to circumspectly shed light on multifaceted factors in the findings. To make these factors known and to consider them as part of the findings is congruent with a perspective that allows for this complexity.

The significance of interdisciplinarity and complexity to which feminist critique of science and systems theories have pointed in particular emerges with the observations of current biological-medical theories of sex development. In chapter three, I will elaborate on how models of individual or a few genes, or gene products, have been displaced for the benefit of genes, or gene products, organized in networks; also non-genetic factors are by now brought in to the analysis. In this book, I suggest to expand upon this complexity by examining additional molecular components and above all by shedding light on their processual agency.

#### **IV. Notes on Reading**

I would like to make a few points regarding linguistic and formal definitions to preface the work, which should make the reading easier.

##### **A Linguistic Decision: Situated Persons**

The sexed naming also has relevance with the observations of individual persons. In the work at present the first names are abbreviated in order to exclude quick, and especially gendered, associations. Mentioning the first names in the text would have led to a strong

presence of gender, with other characteristics, for example, the path of a professional career, receding into the background by contrast. In order to avoid such one-sidedness and to enable the reader a more exact orientation, there is an entry for each person mentioned in the main text (but not those mentioned in footnotes) in the appendix called *Detailed List of Persons*. Here, the socialized gender will be listed, but it will not be the only thing listed.

### **Linguistic classifications: Woman, Man, Gender – The situatedness of culture and the relevance of socio-economic class**

"Gender is a social category that develops in a specific cultural context with a goal or goals that can also only be understood in a given historical (cultural and chronological) context. Seen this way, gender is a changeable construction that finds itself in eternal renewal and is influenced by each social, economic, cultural or political change." (P. Schmitt Pantel [2007])

In regard to gender it is important to understand what is meant by this term and who is named 'woman' or 'man.' The choice seems clear from today's perspective but that is definitely not the case when we look at historical comparisons. Although gender was also differentiated both in ancient societies from which material has been transmitted and in modern ones, the social codes according to which the classification was organized changed as well as the requirements due to gender. I will examine this more closely in the coming chapters; in particular, I will examine what these changes meant for natural-philosophical and biological-medical theories of sex.

Socio-economic class was also of great import in understanding 'gender', because it had a different relevance for people in different classes. While in the poor classes women and men often worked to the same extent for their daily livelihood, in privileged classes there was a clearer separation of the spheres and particular demands which were mediated through gender. The extremes of the underprivileged classes - slaves in antiquity, day laborers (and many other workers) in modern societies - were, independent of gender, mostly in situations so dreadful that the consideration of gender could appear somewhat 'trivial' in this context. Slaves were, independent from gender, mainly without rights and at the hands of their masters. Day laborers and many other workers had to accept any work imaginable in order to be able to survive (even when this was often in a bad state of health and with low life expectancy). This work took up almost all of their day, and they got very little sleep.

Much research still needs to be done in order to understand the meaning of 'gender' in poor classes and to elaborate on the commonalities and differences between them and the privileged classes. One cannot limit oneself to looking at slaves in antiquity or day laborers in modern societies. Rather, one must also look at both free and poor citizens in antiquity, or be aware of families working as craftspeople in modern societies. However, these pursuits are more difficult when it comes to poor people instead of the privileged classes, because the poor - among whom again much differentiation is necessary - had fewer possibilities (such as knowledge, material resources, time, or prestige) to write, and as a result they have left hardly any information about their lives and world views. In the writings of the others, the privileged ones, poor people play a subordinate role and have been inaccurately portrayed with bias.

Because this research is focused on later expert discourses, it is inevitably oriented toward the privileged classes, and the terms 'woman' and 'man' are limited to the use transmitted from them. The social considerations laid out in the introducing remarks to the historical chapters one and two take account of the fact that the concepts 'woman' and 'man' had different meanings in the varied cultural contexts, and were not constant, but changed. Despite that, the concepts 'woman,' 'man,' 'gender' and the adjectives derived from them are consistently used in this book in order to keep it readable.

In contrast, in the work at present these changes become comprehensible on a biological-medical level, for instance in the section on the 'hermaphroditism' of modern biological-medical sciences (cf. chapter two). With regard to ambiguous sex it becomes clear here how different characteristics, female or male, are brought into play in the classification of sex, so that a person who at one point in time and according to a particular theory is seen as 'female' by a midwife or a doctor could be seen as 'male' at another point in time and according to another theory, or by another doctor.

### **Linguistic classification of meaning: the *living body* and the *body***

The difference between 'living body' (*Leib*) and 'body' (*Körper*) has been a topic of discussion within research on sex since the middle of the 1980s.

In the studies that take up this division, *Leib* signifies something materially self-experienced, something to be touched, felt or smelled by oneself. *Leib* is oriented toward

experience of the self according to the inner perceptions of each person. In contrast, *Körper*, departing from a constructivist perspective, is understood as something that underlies cultural production and is socially interpreted and objectified by the sciences.

With the concept of *Leib* it is not to be denied that personal experience is also influenced by cultural context and socialization. But the focus is directed on people who perceive themselves in their lived bodies (*Leiblichkeit*). In particular, the perception of pain and joy should remain describable. These self-perceptions are supposedly not sufficiently considered when using the concept of *Körper*.

Scientific and objectifying (natural-philosophical and biological-medical) studies dealing with biological sex constitute the focal point of this work. Theories are examined in which each determined characteristic can be sexed as the 'body.' Even if the self-perceptions of the scientists are reflected in these theories, the descriptions emerge objectified and represent findings made by the patients with meanings incorporated from the outside. Therefore, the work at present concerns itself with the 'body' (*Körper*), not the 'living body' (*Leib*), and makes use of the term 'body' in the classification and description of theories of sex.

### **Linguistic classification of meaning: concentration on theories**

The concentration on discourses of male (and later also female) experts means a limiting to ideas and ideologies. They are socially incorporated; nevertheless, they allow no direct conclusion as to the 'practical' meaning the characteristics that are elucidated as being sexed at one time or another have for human beings. With regard to observations of ambiguous sex in modern biological-medical sciences, the work at present emphasizes that theory had not at all an equivalent meaning with the practical classification of sex. Shame, the danger of operations, and the social problematic of changing one's sex were and still are decisive factors that influence the decisions of medical practitioners. Also, those (made) affected by this question were not necessarily consulting medical practitioners, or might, due to material or other reasons, even not have been able to do so (cf. chapter two).

In this regard, the book's scope is confined to an examination of the discourses of experts. I will only briefly refer to the discourses' practical effect on people. Research that is focused more on individual descriptions of those (made) affected is necessary.

## **Regional limits of significance**

In its historical sections, this book is limited to Greek and Roman antiquity in their spatial dimensions - to some extent even to a small selection of *poleis* from which material has been passed down - and to a so-called 'western world' that means Europe in particular. The work at present refers to natural-philosophical and biological-medical works from this region and takes it upon itself to classify them socially. Other traditions, such as Indian, Persian and Arabic, could only be generally referred to. The influence of Arabic-Islamic philosophy, including its Persian and Indian influences, on the Latin Middle Ages, the Renaissance and the Enlightenment in Europe was significant. Building on the study laid out here, future research should focus on natural-philosophical theories of sex that developed in these traditions and their influence on European theories of sex.

Also the third chapter, dealing with the current age, is to a disproportionately large extent based on works from the 'western world' (here including North America) - likewise the scope of the statements is regionally limited.