The University Of Sheffield.

The Role of Values in Science: Queer Feminist Values and Theories of Sexual Orientation

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A thesis submitted in partial fulfilment of the requirements for the degree of Doctor of Philosophy

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October 2019

Abstract

This thesis is about the role that values play in science. I argue that science can benefit from what I call 'Queer Feminist Values'. I begin by considering feminist approaches that appeal to underdetermination of theory by data in order to argue that feminist values can contribute to good science. I argue that this is an undesirable move for feminist philosophers not only because this sets additional obstacles to furthering the feminist normative claim that feminist values can contribute to good science, but also because this limits the role that feminist values are able to play in science. I then move on to consider two proposals for the role that values can play in science that do not appeal to underdetermination. I argue that while these proposals are certainly more desirable than proposals that appeal to underdetermination, there is room for expanding the role that feminist values can play in science. In order to explore this proposal, I develop a case study that focuses on genetic explanations of sexual orientation. I argue that we should push for legislation that ensures that topics that are beneficial and of interest to marginalised groups get the funding they need and that this legislation should ensure that these groups are included in the research. I also argue that one of the most beneficial roles that values can play in science resides in the choice of concepts that are embedded in the methodology and that this choice will be determined by the goals that one has. To demonstrate this, I develop two different concepts of sexual orientation that are needed for two different goals: carrying out genetic studies and addressing social injustice issues.

Word Count: 61,701

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Acknowledgements

I would like to start by thanking my primary supervisor, Jenny Saul. I owe most of this work to her. I am incredibly thankful to her for reading so many drafts and for providing me with invaluable feedback throughout the years. I thank her for the many supervisions we had and for all of her mentorship. Her mentorship, support, allyship, encouragement, and all around awesomeness has shaped much of this work. I also thank Jenny for working so tirelessly to make philosophy a better place. If it wasn't for her, I would have left philosophy a long time ago.

I would also like to thank my secondary supervisor, Steve Laurence. I thank him for reading so carefully through my work and for providing me with very insightful feedback. I am very grateful for all of his encouragement. I thank him for challenging my ideas during our supervisions, I learned a lot from these meetings. I also thank him for his teaching mentorship.

Thanks to everyone at the philosophy department at Sheffield for making the department such a lovely place to work. Thanks to Andrea Blomqvist, Emma Bolton, Matthew Cull, Alex Duval, Felicity Fu, Trystan Goetze, Jules Holroyd, Will Hornett, Jingbo Hu, Rosanna Keefe, Anna Klieber, Nadia Mehdi, Robbie Morgan, Ashley Pennington, Phil Rau, Martina Rosola, Rosa Vince, and Rory Wilson. I am very grateful for our friendship and collaborations.

A very special thank you to my dear friends who have made Sheffield a home. I am indebted to you for all of your love and support. Without you, this work would not have been possible. Thanks to Giulia Casini, Adriana Clavel-

Vázquez, Adela Diaz Gándara, Kat Hopkins, Sarah Notman, Gonzalo Nuñez Erices, María Jose Pietrini Sánchez, Cristina Roadevin, Robin Scaife, and Sergio Vidal.

I thank the Hang Seng Centre for Cognitive Studies for providing me with such a lovely working space. A special thank you to Kerry L. McMahon for all of her support and encouragement.

Thanks to CONACyT for their financial support during my MA and PhD.

I would also like to thank the many friends I made with the people that were involved in the tree campaign in Sheffield. I learned a lot from you. I also read and wrote a lot of PhD work whilst sitting and standing under trees. I am very grateful to Jenny for the many philosophical conversations (including reading groups and supervisions!) we had whilst standing under trees or sitting nearby to protect them.

Finally, to my family. None of this would have been possible without all of your unconditional love and support. I am forever grateful to all of you. A very special thank you to my mother, Modesta Vázquez González, I thank her for all of the emotional and financial support. I would not have been able to embark on this journey without her. To my grandmother, Carmen Ramírez González. I thank her for being home, for loving me unconditionally, and for providing me with a safe space in which to grow.

Introduction

This thesis is about the role that values play in science. I argue that science can benefit from what I call 'queer feminist values'. I follow in the footsteps of a rich tradition of feminist philosophers of science who have developed case studies to 1) showcase the role that values play in science and 2) argue that feminist values can contribute to good science. Many of these case studies have focused on scientific research to do with sex and gender. I explore a new area of research that has received very little attention in the philosophy of science literature: sexual orientation. I focus on genetic studies that aim to explain the causes of sexual orientation.

It is important to identify the stages of the scientific research process where values are legitimately able to play a role in order to be in a better position to challenge illegitimate appeals to values that often play a role in reinforcing harmful stereotypes about women and other subordinated groups. It is also important to identify the stages of the scientific process where values can play a legitimate role in order to be in a better position to advocate for the interests of these groups. This is what motivates this thesis.

In the first chapter, I consider feminist proposals that appeal to underdetermination of theory by data in order to argue that feminist values can contribute to good science. These proposals are important to consider because proposals that appeal to underdetermination remain popular choices amongst feminist philosophers when it comes to making a case for values in science. I divide this chapter into two sections. In the first section, I introduce underdetermination and the 'Duhem-Quine thesis'. 'Underdetermination' and

the ‘Duhem-Quine thesis’ sometimes get used synonymously. Some feminist philosophers have appealed to the ‘Duhem-Quine thesis’ in order to argue that feminist values can contribute to good science. I show that Duhem’s and Quine’s proposals are actually quite different from each other and that because of this, appealing to the ‘Duhem-Quine thesis’ in order to argue that feminist values can contribute to good science is problematic. This is because it is not clear what idea they are actually appealing to. In the second section, I move on to review three feminist proposals that appeal to some version of underdetermination. Lynn Hankinson Nelson’s *Who Knows: From Quine to a Feminist Empiricism* (1990), Elizabeth Potter’s *Modeling the Gender Politics in Science* (1988), and Janet Kourany’s *A Philosophy of Science for the Twenty-First Century* 2003). In this second section, I outline individual problems with each of these accounts. I argue that even if we ignore some of the problems that arise from these individual accounts, the alleged role for feminist values suggested by underdetermination is quite limiting because these considerations only come into play after all empirical considerations have been exhausted.

In the second chapter, I explore proposals that do not appeal to underdetermination in order to argue that feminist values can contribute to good science. I engage with two accounts. The first is a proposal put forth by Janet A. Kourany in *Philosophy of Science after Feminism* (2010) and the second one is a proposal put forth by Heather E. Douglas in *Science, Policy, and the Value-Free Ideal* (2009). I argue that while these proposals are certainly more desirable than proposals that appeal to underdetermination, there is room for expanding the role that feminist values can play in science. Kourany proposes that egalitarian

social values as well as epistemic values should control all aspects of the scientific research process (2010). While I am sympathetic to her proposal, I argue that as it stands, it raises many questions that pose serious problems. The first of these is that it is unclear whether Kourany is claiming that values should play an indirect role throughout all of the scientific research process or whether she is claiming that values should play a direct role throughout all of the scientific research process. I argue that this distinction is important because it helps us set up important restrictions that allow us to ensure that science is producing reliable knowledge. Douglas' proposal is much more detailed. She proposes basic criteria that every scientific theory must meet: internal consistency and predictive competence and three value categories: ethical, social, and cognitive. She argues that all of these value categories can either play a direct or indirect role in the scientific research process. The direct role is limited to the first two stages of the scientific research process: when deciding what scientific research projects to pursue and when deciding what methodology to use. The indirect role is reserved for cases of uncertainty and when consequences of error must be considered. This applies when making methodological choices, in the collection and characterisation of data, and in the interpretation of the final results. I am very sympathetic to Douglas' proposal. Her proposal provides a more detailed guide about the role that values play throughout the scientific research process. Additionally, I think it is a good option that does not require appealing to underdetermination in order to argue that contextual values (that are important to feminist philosophers) can contribute to good science. I do, however, think that there is room improvement. I propose that more needs to be said about the role

that values play in the problem selection and the methodology selection stages. I argue that one of the most important roles that feminist values can play in the scientific research process is precisely during these stages. I propose that values should be playing a more active role in the first stage and that one of the most important role for values in the second stage resides in the choice of concepts embedded in the chosen methodology.

In the third chapter, I develop a case study that allows me to explore this proposal. The case study focuses on genetic explanations of sexual orientation. This research area allows me to explore my proposal for the direct role that values can play in the first two stages of the scientific process (problem selection and methodology selection). In the problem selection stage, I argue that we should push for legislation that ensures that topics that are beneficial and of interest to marginalised groups get the funding they need and that this legislation should also ensure that these groups are included in the research. Furthermore, I argue that one of the most beneficial roles that values can play in the second stage (methodology section) resides in the choice of concepts and that this choice will be determined by the goals that one has. In order to carry out this task I begin by providing an introduction to the scientific research that studies sexual orientation. This includes looking into the historical and political context in which current sexual orientation categories such as heterosexual and homosexual were developed. After providing some historical and political context, I analyse the role that values play in the problem selection stage, where I argue that we should push for legislation that would encourage scientists to pursue scientific research that is beneficial and of interest to the LGBTQI+ community. Following on from this, I

analyse the role that values play when it comes to making methodological choices. I begin with an introduction to the genetic research that looks into the underpinnings of sexual orientation. I then take up a specific genetic study: *A Linkage Between DNA Markers on the X Chromosome and Male Sexual Orientation*, by Hamer et al. (1993). After reviewing this study, I point to the specific instances where values can play a role in concept choice. The first has to do with the relationship that one's concept of sexual orientation refers to. Sexual orientation is usually understood to refer to some kind of attraction, desire, or fantasy toward a person at least partly on the basis of their sex and/or gender. In this sense, there are important decisions to be made about whether sexual orientation refers to sex, gender, or both. I argue that these decisions will be based on the aims that one has. The second instance in which values can shape concept choice is when making choices about what the concept of sexual orientation describes. Does it describe sexual attraction? Sexual desire? Sexual behaviour? Again, I argue that values can shape one's choices and that these will be determined by the goals that one has. In order to demonstrate this, in the last two chapters I develop two different concepts of sexual orientation that are needed for two different goals: carrying out genetic studies and helping asylum seekers.

In the case of genetic studies, I argue that geneticists should move away from behaviour-based understandings of sexual orientation and that they should prioritise internal sexual orientation markers such as sexual desire, attraction, and fantasies. I also argue that they should take into account both the sex and gender of the person one is ascribing sexual orientation to and the sex[es] and gender[s]

this person desires, fantasises, and is attracted to. This chapter begins with a detailed analysis of the relationship between sex, gender, and sexual orientation. I then move on to survey four different genetic understandings of sexual orientation. Within this section, I analyse each of the studies and point to critical problems with their understanding of sexual orientation. After this, I dedicate a section that points to the problems associated with behaviour-based understandings of sexual orientation (which many of these studies use as a marker of a person's sexual orientation). I conclude by arguing that geneticists should adopt an internally focussed understanding of sexual orientation that includes self-identification as an important marker of a person's sexual orientation.

If one's aim is to address social injustice issues, such as the difficulties that LGBTQI+ people face when seeking asylum, then a different understanding of sexual orientation is needed. I propose a political cluster approach. According to my proposal, sexual orientation relies heavily on a person's social and political context and consists of three main sexual orientation markers. These markers are self-identification, behaviour, and internal manifestations. Furthermore, I propose that we should take into account both the sex and gender of the person we are ascribing sexual orientation to as well as the sex[es] and gender[s] this person desires, fantasises, and is attracted to. Note that an importance difference here is the inclusion of behaviour. I begin this chapter by providing some context to the 1951 Refugee Convention and the impact that this has had on people that seek asylum on the basis of sexual orientation. I then move on to think about the relationship between sex, gender, and sexual orientation. The aim is that this

discussion will provide us with conceptual tools that will aid us in thinking about the kind of sexual orientation concept that we need in order to be in a better position to address some of social injustice issues that LGBTQI+ people face on the basis of sexual orientation. Following this, I review four metaphysical accounts of sexual orientation: self-identification, behaviourism, ideal dispositionalism, and bidimensional dispositionalism. Drawing from Haslanger's method of ameliorative analysis (2012), I argue that if we centre the concerns of some of the most marginalised groups in the LGBTQI+ community, these four sexual orientation accounts fail at being able to address these concerns. I conclude by arguing that what we need in order be in a better position to address social injustice issues on the basis of sexual orientation is a political cluster concept approach.

1. Why Feminists Should Abandon Underdetermination Arguments

In this chapter I argue that relying on underdetermination does not help advance the feminist normative claim that science would benefit from adopting feminist values. In fact, it seems that relying on underdetermination serves as an obstacle to proving the *epistemic* legitimacy of feminist values in scientific inquiry.

Underdetermination, very generally speaking, is the idea that empirical evidence alone is not enough to determine theory choice. That is, theory choice is underdetermined by empirical evidence. Feminist philosophers such as Lynn Hankinson Nelson, Elizabeth Potter, and Janet Kourany have relied on some form of underdetermination in order to a) point out how contextual values (the personal, social, cultural, political, etc., values that belong to the social context in which science is done (Longino, 1990, p. 4)) influence scientific inquiry and b) to advance the feminist normative claim that science would benefit from adopting feminist values.

In the feminist philosophy of science literature, there are two main projects: a descriptive one, which demonstrates how contextual values influence scientific inquiry and a normative one, which argues for the importance of feminist values in science. The first project has to do with exposing how scientific practice is vulnerable to the influence of contextual values. This project has been a successful one. There have been many feminist philosophers who have written countless articles on how science seems to be influenced by contextual values. Some examples of this type of work are: *Reflections on Gender and Science* (1995) by Evelyn Fox Keller, *The Egg and the Sperm: How Science has constructed a Romance Based on stereotypical Male-Female Roles* (1991) by Emily Martin, and

Pre-Theoretical Assumptions in Evolutionary Explanations of Female Sexuality (1993) by Elisabeth A. Lloyd. The second project has to do with advancing the feminist normative claim that science would benefit from adopting feminist values.

In this chapter, I will look at some of the underdetermination accounts that feminist philosophers have appealed to in order to justify the claim that science would benefit from adopting feminist values. While I am convinced that science would benefit from adopting feminist values, relying on underdetermination in order to claim that science would benefit from adopting feminist values is not going to help advance the project. Relying on underdetermination will only set additional obstacles to fulfilling this goal. It is my goal in this chapter to show just how problematic it can be to rely on underdetermination as a means to further the feminist normative claim.

In order to carry out this task, I begin by introducing the topic of underdetermination. I then take a closer look at Duhem's and Quine's accounts, separately. With this, I aim to draw some important distinctions between Duhem's rendition of underdetermination and Quine's rendition of underdetermination. I argue that it is problematic for feminist philosophers of science to appeal to the 'Duhem-Quine thesis', because the two accounts are quite different. Secondly, I argue that even if feminist philosophers appeal to these accounts separately, the point feminist philosophers want to make (i.e. that science is value-laden) does not follow from Duhem's or Quine's account of underdetermination.

The second part of this chapter begins by asking how science is influenced by contextual values. After we have a clear idea of how science is influenced by contextual values, I take a detailed look at the work of Lynn Hankinson Nelson, Elizabeth Potter, and Janet Kourany in order to see the role that underdetermination plays in their respective proposals. I argue that it is undesirable for feminist philosophers to appeal to underdetermination not only because this sets additional obstacles to furthering the normative feminist claim, but also because this limits the role that feminist values are able to play in science.

1.1 An Introduction to Underdetermination of Scientific Theory

Put simply, underdetermination of scientific theory is the idea that empirical evidence is not enough to determine theory choice. If scientists test a hypothesis and the results are not favourable, scientists then have to make a decision about whether they want to hold on the hypothesis and adjust some of their auxiliary hypotheses or whether they want to abandon the hypothesis and leave their auxiliary hypotheses untouched. This idea is what is usually referred to as the 'Duhem-Quine thesis'. The idea that we do not test hypotheses in isolation.

The 'Duhem-Quine thesis' is usually extracted from two historical and celebrated works, *The Aim and Structure of Physical Theory*, originally published in 1914 by the French physicist, historian and philosopher Pierre Duhem and *Two Dogmas of Empiricism* published in 1951 by the American philosopher W.V.O. Quine.

Together, these two historical pieces of work, were, and continue to be, important groundwork for feminist philosophers of science wanting to make the

case that science is value-laden. The idea generally extracted from both Duhem's and Quine's work is that theory choice is underdetermined by empirical evidence. The consequences of this thesis, according to some feminist philosophers, is that if empirical evidence is not the only factor that determines our beliefs, then there must be other non-accounted for factors that also have an influence. Some of these non-accounted for factors, according to some feminist philosophers, are cultural, political, and social values.

However, while Duhem and Quine seem to be saying similar things regarding underdetermination, their accounts differ in ways that might have important consequences for feminist philosophers who appeal to 'the Duhem-Quine thesis'. To help with this part of my analysis, I draw from the work of Vuillemin on *On Duhem's and Quine's Theses* (1998). Vuillemin identifies several distinctions between Duhem and Quine, including:

> '[…] 1) the methodological foundations of "the" thesis, 2) the width of its scope, 3) the kind of articulation it introduces into the body of scientific laws, and 4) the nature of the resulting ontic commitments, which dictate in turn the relation between philosophy and science' (Vuillemin, 1998, p. 598).

In this chapter, I focus on 1 & 2, which, as I will argue, have significant consequences for feminist analysis.

To begin, it might be useful to introduce a distinction which might be helpful in thinking about underdetermination throughout the rest of this chapter.

This distinction is between holist underdetermination and contrastive underdetermination. “Holist underdetermination […] arises whenever our inability to test hypotheses in isolation leaves us underdetermined in our response to a failed prediction or some other piece of disconfirming evidence” (Stanford, 2017). Contrastive underdetermination, on the other hand, “[...] involves the quite different possibility that for any body of evidence confirming a theory, there might well be other theories that are also well confirmed by that very same body of evidence” (Stanford, 2017). According to this distinction, holist underdetermination supports the idea that evidence alone is not enough to determine our response to a failed prediction. In this sense, holist underdetermination helps support the idea that if evidence is not the only factor that determines how we respond to a failed prediction, then there must be other non-accounted for factors that do. Contrastive underdetermination is the idea that one body of evidence cannot be used to confirm one scientific theory over another; this is because there is a possibility that this same body of evidence can be used to confirm other rival theories just as well. In this sense, contrastive underdetermination helps support the idea that if evidence is not the only factor which determines theory choice, then there must be other non-accounted for factors that do.

It is important to mention that these distinctions were not created by Duhem or Quine. There is no mention of holist or contrastive underdetermination in their respective accounts. These distinctions were created after and have been helpful in teasing apart problems in the underdetermination literature. In this chapter, these distinctions will be helpful when we move on to analyse feminist

accounts and their appeal to underdetermination. It will help identify which specific underdetermination accounts feminist philosophers are appealing to.

1.1.1. Duhem's Aim and Structure of Physical Theory

Duhem argued that there is a difference between sciences like physics and physiology. According to Duhem, in sciences like physiology, '[…] the comparison between the deductions of a theory and the facts of experiment is subject to very simple rules'(Duhem, 1954, p. 180). To develop this idea he quotes Claude Bernard: 'The first condition that has to be fulfilled by a scientist who is devoted to the investigation of natural phenomena is to preserve a complete freedom of mind based on philosophical doubt' (as cited in Duhem, 1954, p. 180). According to Duhem, in sciences like physiology, experiments are a good guide for checking ideas. This is because when there is an experiment involved, the scientist is always able to test their ideas through that experiment. The experiment will dictate whether it is a correct idea (hypothesis) or an incorrect one. In the meantime, though, the theory should '[…] stay outside the door of the laboratory […]' (Duhem, 1954, p. 180). This will allow the scientist to impartially carry out the experiment and assess the results. Duhem, along with Bernard, seem to think that the scientist (in this case the physiologist), is able to completely separate the experiments from the theory) and assess the facts 'objectively'. This process, however, seems to work very differently for the physicist.

In the case of physics, '[…] it is impossible to leave outside the laboratory door the theory that we wish to test, for without the theory it is impossible to regulate a single instrument or to interpret a single reading' (Duhem, 1954, p.

182). This is because, according to Duhem, the physicist is unable to disassociate their theory from physical tools. He labels the first the *schematic and abstract apparatus* and the second *the concrete apparatus*. This inability to disassociate has important consequences for the physicist carrying out experiments. This is because the inability to disassociate prevents the physicist from carrying out experiments without thinking about theory at the same time. They are unable to do this because they are unable to dissociate the schematic and abstract apparatus from the concrete apparatus.

It is true, of course, that other scientists, such as the physiologist, also appeal to (or rely on) theory when conducting experiments. The physiologist, for example, might rely on instruments like the thermometer to deliver and assess results (Duhem, 1954). When using instruments like this, the physiologist implicitly admits '[…] the accuracy of the theories justifying the use of these pieces of apparatus as well as of the theories giving meaning to the abstract ideas of temperature, pressure, quantity of heat, intensity of current, and polarized light, by means of which the concrete indications of these instruments are translated' (Duhem, 1954, p. 183). The difference between the physiologist and the physicist though, is that the instruments the physiologist uses to carry out experiments belong to the domain of physics (Duhem, 1954). Without these instruments, the experiments carried out by the physicist wouldn't have any meaning. In this sense, the relationship between the physiologist and the physicist seems to be an asymmetrical one: the physiologist must trust the work of the physicist in order to carry out their experiments, but not the other way around. The physicist must trust their own ideas in order to carry out experiments. It is in this way that the

schematic and abstract apparatus fails to disassociate with the concrete apparatus in physics.

Duhem argues that 'The physicist who carries out an experiment, or gives a report of one, implicitly recognizes the accuracy of a whole group of theories' (Duhem, 1954, p. 183). This means that the experiment and experiment results only make sense if the physicist is willing to accept the theories that give meaning and validity to the experiment. Duhem distinguishes between two different types of experiments: experiments of application and experiments of testing. Experiments of application are experiments intended to solve a practical problem. Duhem gives the example of lighting an incandescent bulb. If one were tasked with lighting the bulb, one would draw from accepted theories that would tell us how to light an incandescent bulb. The intent of an experiment like this, however, is not to tell us about the status of any of our scientific theories. Its intent is to help us solve a more practical problem (in this case to help us light the incandescent bulb) (Duhem, 1954).

Experiments of testing, on the other hand, call into question the status of theories. 'A physicist disputes a certain law; he calls into doubt a certain theoretical point' (Duhem, 1954, p. 184). F. E. Neumann, for example, '[…] assumed that in a ray of polarized light the vibration is parallel to the plane of polarization […]' (Duhem, 1954, p. 184). Many physicists, however, called this into question. Duhem argues that there isn't an experiment that can prove F. E. Neumann's proposition to be accurate or inaccurate. This is because physics doesn't work like maths, where reduction to absurdity is common. It's a bit more complicated in physics (Duhem, 1954). This is because at the moment that the

physicist carries out an experiment, they are not only using the proposition in question in their quest to prove the accuracy or inaccuracy of said proposition. They are also making use '[…] of a whole group of theories accepted by him [sic] as beyond dispute' (Duhem, 1954, p. 185). For example, anyone wanting to prove that in a ray of polarized light the vibration is not parallel to the plane of polarization would need to accept theories about optics way beyond the scope of the initial proposition (Duhem, 1954). The only thing the experiment would teach us '[…] is that among the propositions used to predict the phenomenon and to establish whether it would be produced, there is at least one error; but where that error lies is just what it does not tell us' (Duhem, 1954, p. 185). This is because when the physicist performs the experiment, they are relying on the accuracy of other theories (in this case, other optic theories). Therefore, if the experiment yields negative results, it is difficult to say whether the proposition in question is the one in error, or whether one of the many theories they are relying on in order to carry out the experiment is the one in error. Duhem's idea here is that we can never test an isolated hypothesis. We can only test groups of theories.

In addition to this, Duhem argues that the physicist cannot rely on induction from direct observation. He refers to this as the Newtonian method. This is because in his *Principia,* Newton argued that in '[…] physics every proposition had to be drawn from phenomena and generalized by induction' (Duhem, 1954, p. 191).

To illustrate this, Duhem develops the example of Universal Gravity. Newton claims that Universal Gravity is derivable by generalisation and induction from Kepler's laws of planetary motion. Duhem argues that not only is universal

gravity not derivable by generalisation and induction, it also contradicts Kepler's laws of planetary motion (which Universal Gravitation relies on). If one takes the sun as the reference point and calculates the magnitude and direction of forces between the planets and the sun, one will find a contradiction between the principle of universal gravity and Kepler's first law (Duhem, 1954). Secondly, if one sets out to 'determine the magnitude and direction of each of the forces between Jupiter and its satellites when we refer all the motions to the planet, assumed to be fixed, […] one will notice that these forces are not what our second statement would require' (Duhem, 1954, p. 193) (Kepler's second law of planetary motion). In this way, Duhem claims not only that Newton's law of Universal Gravitation does not derive entirely from Kepler's laws of planetary motion (which are supposed to be based on observation), it also contradicts them (Duhem, 1954).

According to Duhem, in order to justify the law of Universal Gravitation, the physicist will need to resort to other resources, aside from Kepler's laws of Planetary Motion. This includes different theories and considerations. In this sense,

> 'It is no longer a matter of taking, one by one, laws justified by observation, and raising each of them by induction and generalization to the rank of a principle; it is a matter of comparing the corollaries of a whole group of hypotheses to a whole group of facts' (Duhem, 1954, p. 194).

With this, Duhem wants to make a more general claim. He takes Newton's law of Universal Gravitation to be an example of how, in *physics*, the Newtonian method

fails (Duhem, 1954). According to Duhem, physical laws cannot be inductively deduced from empirical phenomena.

If this is right and laws and theories do not follow an inductive method, then it is unclear how physicists should discriminate between hypotheses. One way, according to Duhem, is through 'good sense'. 'When certain consequences of a theory are struck by experimental contradiction, we learn that this theory should be modified but we are not told by the experiment what must be changed' (Duhem, 1954, p. 216). So how should the physicist go about figuring this out? According to Duhem, there is no 'one way' of going about this. Physicists are free to go about this differently, as long as the methods followed are experimentally justifiable (Duhem, 1954).

> 'Pure logic is not the only rule for our judgements; certain opinions which do not fall under the hammer of the principle of contradiction are in any case perfectly unreasonable. These motives which do not proceed from logic and yet direct our choices, these "reasons which reasons does not know" and which speak to the ample "mind of finesse" but do not to the "geometric mind", constitute what is appropriately called good sense' (Duhem, 1954, p. 217).

It is Duhem's notion of 'good sense' that allows the physicists to discriminate between hypotheses. This, however, has the consequence that physicists might disagree about what hypotheses to hold on to and which to let go of, but this disagreement won't last forever (Duhem, 1954). According to Duhem, there

comes a day when good sense manifests itself so clearly '[…] that the other side gives up the struggle even though pure logic would not forbid its continuation' (Duhem, 1954, p. 218). This 'good sense', however, must be kept completely separate from 'passions and interests', according to Duhem. As this will only serve to cloud judgement and delay any scientific progress.

To be clear, Duhem's proposal is a holistic form of underdetermination. He proposes that in physics, we can never test an isolated hypothesis. He proposes that if the results for such a hypothesis were to come back as negative, the scientist might have no other choice but to resort to their 'good sense' in order to discriminate between hypotheses.

Up to here, I have (very briefly) outlined some of Duhem's claims that might help make clear why his account is not very relevant to feminist claims about underdetermination. For one, his focus is on physics. Duhem insists that this branch of science is different from other sciences. He is interested in problems that arise in physics and how the physicists can address these. In contrast, feminist philosophers are concerned not just with physics, but with all of science, especially with areas like biology. Second, Duhem claims that in the case that theories are underdetermined by evidence, the physicist should use 'good sense' to discriminate between hypotheses. This might, at a first glance, seem like it would be useful for feminist philosophers (if one ignores the fact that Duhem is only talking about physics), but upon closer examination, it turns out not to be so helpful. This is because Duhem also thinks that a scientists' 'passions and interests' should not interfere with their good sense. It is not exactly clear what Duhem means by 'passions and interests', but it is clear that he thinks there

is a difference between extra scientific interests and scientific interests, and he thinks that the former shouldn't interfere with the latter. In contrast, some feminist philosophers of science who appeal to underdetermination claim that in cases of underdetermination, the scientist should be justified in appealing to extra scientific interests, including social, cultural, and political values.

As we will see in the next section, Quine is a bit more flexible regarding the first claim. He extends his account to cover all knowledge claims, including areas like psychology. However, even in that case, Quine's account might prove to be problematic for feminist philosophers.

1.1.2. Quine's Two Dogmas of Empiricism

In *Two Dogmas of Empiricism* (1951), Quine argues for two claims. The first has to do with the analytic/synthetic distinction, and the second has to do with reductionism. Quine argues against an analytic/synthetic distinction and against reductionism. He argues that there is no clear boundary between analytic and synthetic statements. 'That there is such a distinction to be drawn at all is an unempirical dogma of empiricists, a metaphysical article of faith' (Quine, 1951, p. 34).This claim has consequences for knowledge claims. One consequence is that there are no 'purely' analytical statements. That is, there are no statements that are true independent of the world. There are only statements which are dependent on the world and thus, subject to revision.

Furthermore, when it comes to revising statements, this can only be done in connection with other statements, or part of other interconnected theories. '[…] our statements about the external world face the tribunal of sense

experience not individually but only as a corporate body' (Quine, 1951, p. 38). This means that a statement can't be tested in isolation. This can be illustrated by Duhem's example of polarization. Let us recall the example. According to Duhem, there is no way of proving or disproving that in a ray of polarized light the vibration is not parallel to the plane of polarization without relying on a whole lot of other theories. The idea here is that we can't test this statement in isolation. We also have to test all other theories it is interconnected with. This means that when an experiment comes back with negative results, the only thing we know for sure is that there is an error somewhere in the interconnected web of theories, but the experiment doesn't tell us exactly where.

Additionally, '[…] total science is like a field of force whose boundary conditions are experience. A conflict with experience at the periphery occasions readjustments in the interior of the field' (Quine, 1951, p. 39). This means that if we conduct an experiment to test theory 'x', and this experiment does not come back with positive results, we might need to revise or readjust other theories which theory 'x' possibly relies on or is associated with (these theories might not be as directly associated with experience). Furthermore:

> 'Having re-evaluated one statement we must re-evaluate some others, whether they be statements logically connected with the first or whether they be the statements of logical connections themselves. But the total field is so undetermined by its boundary conditions, experience, that there is much latitude of choice as to what statements to re-evaluate in the light of any single contrary experience' (Quine, 1951, p. 40).

This means that in light of a 'contrary experience', scientists might be faced with a great number of possibilities for revision and it may not be so clear where to start. For example, if a physicist tests the following: in a ray of polarized light the vibration is parallel to the plane of polarization, and they come back with negative results, they might need to revise other aspects of polarization, for example. This is because the answer may not lie with the experiment itself. They may need to question other interconnected beliefs that are associated with the initial statement.

Furthermore, Quine claims that 'No particular experiences are linked with any particular statements in the interior of the field, except indirectly through considerations of equilibrium affecting the field as a whole' (Quine, 1951, p. 40). According to this, it is not a question of whether one experience is linked or directly related to a particular statement, it is a question of whether experience fits well with the *whole* of our theories.

Quine, like Duhem, is concerned with the relationship between experience and statements. One thing they both agree on is that we can't test hypotheses in isolation; we can only test the whole body of a theory. One obvious difference between them is that Quine is extending his analysis to cover all knowledge claims. 'Total science, mathematical and natural and human, is similarly but more extremely underdetermined by experience' (Quine, 1951, p. 42). Quine thinks that all knowledge claims are underdetermined by experience.

In this sense, Quine's account seems to be more useful to feminist philosophers than Duhem's account. This is because he extends his account to

cover all knowledge claims. This would cover sciences like biology, which is of central importance to feminist philosophers. However, appealing to Quine's account is not without its problems. This is because Quine's account of underdetermination is neatly tied in with some of Quine's other views. This includes his idea that there is a sharp boundary between science and the role of such things like political values.

1.1.3. Duhem's and Quine's Theses

In *On Duhem's and Quine's Theses* (1998), Vuillemin begins by noting the agreement between both accounts. Duhem, like Quine, agree that '[…] scientific experiments are so much theory-laden that is it impossible, even in principle, to isolate which part in them belongs to theoretical constructions and which to empirical findings' (Vuillemin, 1998, pp. 595-596). Both of them agree that it is impossible to locate which statements belong to theory and which belong to empirical findings.

However, Vuillemin argues that there are also some very important differences. The first has to do with the 'methodological foundations of 'the' thesis'. Duhem wants to separate science from metaphysics, while Quine does not. 'According to Quine, science starts from perception, which the logical operators and the constructs of our natural languages give form to, and gradually emerges into the more abstract constructs of physics' (Vuillemin, 1998, p. 599). Quine argues that there is no clear division between perception and language and science. He welcomes an interconnected web of statements, from the most simple to the most complex. Duhem, on the other hand, argues that there is such

a division and as a result believes that science can be kept separate from metaphysics (Vuillemin, 1998).

According to Vuillemin, 'This methodological opposition entails a dissent concerning the scope of the thesis' (Vuillemin, 1998, p. 599). Duhem's thesis is limited to physics, while Quine's thesis covers all knowledge claims. I would like to zero in on the consequences for Duhem's thesis. 'Being limited to physics, the D-thesis involves a strict demarcation between science using mathematical language and the domain of common language (including physiology) which does not fall under the thesis' (Vuillemin, 1998, p. 599). This highlights an important difference between Duhem's account and Quine's account for feminist philosophers of science. This is because the myth of 'the Duhem-Quine thesis' starts to fall apart. This is one important instance in which the two accounts differ. With this distinction in place, even if feminist philosophers only appealed to Duhem's account, the thesis wouldn't be very useful unless feminist philosophers want to limit their focus to sciences using mathematical language. Quine's account, on the other hand '[…] fuses the analytic with the synthetic as it fuses theory with experience' (Vuillemin, 1998, p. 600). In his account, there are no sharp distinctions.

Vuillemin notes that Duhem and Quine also differ in regards to the relationship between science and ontology. 'Duhem's science conquered its autonomy with respect to common sense in the same way that the French State did with the "lois de séparation" as regards the Church' (Vuillemin, 1998, p. 600). Science, for Duhem, became neutral and totally disconnected from metaphysics as far as he was concerned. 'Quine would recognize in Duhem's dualism some

remnant of the first positivist dogma' (Vuillemin, 1998, p. 601). Namely, that there is a clear distinction between analytic and synthetic statements. For Quine, any distinction was just a convention that experience would eventually decide (Vuillemin, 1998). Vuillemin argues that Quine's ontology differs from Duhem's, as his does not support an opposition between science and metaphysics (Vuillemin, 1998).

1.1.4. Vuillemin's Analysis and Feminism

I would now like to turn our attention to Vuillemin's analysis and underdetermination's usefulness for feminist philosophy. As noted above, Duhem and Quine seem to agree on some things, and if we join some statements together, we end up with a very general 'thesis'. Namely, that '[…] isolated hypotheses are not severally verifiable by experience, only the whole body of a theory being able to be subjected to the test of experiment' (Vuillemin, 1998, p. 595).

However, Vuillemin points out some fundamental differences. These are differences which I would like to propose have important consequences for feminist philosophers. Feminist philosophers rely on 'the Duhem-Quine thesis' in order to claim that there are other factors, aside from empirical evidence, which also influence theory choice. Feminist philosophers also rely on 'the Duhem-Quine thesis' in order to claim that in cases of underdetermination, scientists should favour feminist options. However, what feminist philosophers need in an account of underdetermination is an account which supports underdetermination cases made in *all* sciences, especially in disciplines like biology. Secondly, feminist

philosophers need an account of underdetermination that supports the use of contextual values (i.e. social, cultural, and political values) in cases of underdetermination. Taking this into consideration, 'the Duhem-Quine thesis' is not up to the job. It might seem like it is at a first glance, but upon closer examination, we realise that it is not.

Feminist philosophers need an account that supports underdetermination cases made in all sciences, especially in disciplines like biology. However, 'the Duhem-Quine thesis' falls apart on this point. This is because Duhem restricts his analysis to physics only, while Quine extends his account to cover all knowledge claims. This is a problem for feminist philosophers. If 'the Duhem-Quine thesis' is not clear on this point, then they need to abandon it and search for an alternative account that does. Duhem, however, won't be of much help, unless feminist philosophers want to restrict their analysis to physics only. However, this doesn't seem like a viable option because feminist philosophers are also interested in other areas, especially in areas like biology. If feminist philosophers opt for Quine, they will find that his account favours a 'clear' distinction between science and social values. In this sense, Quine might not be a viable option either.

I suggest that feminist philosophers don't need underdetermination in order to pursue the idea that science would benefit from adopting feminist values. In fact, I propose that feminist philosophers would be better off by abandoning any appeal to underdetermination. I will come back to elaborate on this claim in the next chapter. In this section, my aim was just to introduce the concept of underdetermination and point out some difficulties with appealing to the very

general concept of 'the Duhem-Quine thesis'. In the next section, I review specific feminist accounts that appeal to underdetermination.

1.2. Feminism and Underdetermination

Feminist philosophers such as Lynn Hankinson Nelson, Elizabeth Potter, and Janet Kourany have all argued that science would benefit from adopting feminist values by appealing to some form of underdetermination. In the following section, I analyse their proposals.

1.2.1. Towards a Feminist Empiricism (Nelson)

In *Who Knows: From Quine to a Feminist Empiricism* (1990), Lynn Hankinson Nelson makes an interesting case for moving towards a feminist empiricism. To do this, Nelson draws heavily from Quine, especially from his account of science. One of the things that Nelson wants to do in her book is to reconcile feminist science criticism with empiricism. To do this, she appeals to some interesting ideas from Quine, but challenges others, like individualism, for example (she argues that it is communities which know). In this chapter, I zero in on one of these ideas. That idea is underdetermination. However, before moving on to discuss this idea, I briefly outline and provide some context to her discussion. I then bring attention to her discussion of underdetermination.

In a section titled 'Common Sense, A Coherence Theory Of Evidence, And The Underdetermination Of Science', Nelson begins by saying that 'We have two general reasons to doubt that "culturally determined" beliefs are not subject to empirical control [content that is able to be empirically tested by experiment or

observation], and, thus, to doubt that if science has anything to do with "common sense", the connection between science and evidence is fundamentally compromised' (Nelson, 1990, p. 244). In other words, Nelson wants to make the case that culturally determined beliefs are able to be empirically tested and consequently, that if science is influenced by common sense, then it also follows that our understanding of the connection between science and evidence will change.

The two reasons which Nelson gives to support the claim that culturally determined beliefs *are* subject to empirical control are 1) feminist arguments (which have been supported by feminist science criticism) that science is influenced by cultural beliefs and 2) Quine's argument that common sense and science are interdependent. Briefly, feminist science criticism is the collection of feminist criticism that has shown that science is influenced by cultural (or also common sense) beliefs (e.g. the unfounded assumption that women's sexuality is necessarily tied to reproduction). The second reason is based on Quine's claim that common sense is just a continuation of science. In Quine's words:

> 'Science is not a substitute for commonsense, but an extension of it. The quest for knowledge is properly an effort to broaden and deepen the knowledge which the man in the street already enjoys, in moderation, in relation to the commonplace things around him' (Quine, 1957, p. 2).

The idea here is that science is not separate from common sense, but that the two are linked. Nelson also draws attention to Quine's claim that science systematises

common sense. The idea behind this is that (as opposed to the layman) the scientist introduces a 'system' which then allows them to make sense of the available evidence. And in this way, science is able to systematise common sense.

One thing that Quine does not address, however, and which is central to feminist science criticism, is whether common sense can affect science:

> '[…] whether, given a holistic account of empirical content and a coherence account of evidence, it follows that changes in beliefs and theories outside of science communities can affect scientific theory—whether they can (at least for those whose beliefs have changed) lead to differences in the evaluation of scientific theories and have a bearing on scientific theorizing' (Nelson, 1990, p. 245).

The answer to this question would determine whether common sense can legitimately serve as evidence for scientific theories. Nelson argues that it can. She argues that this is an obvious consequence of Quine's holism and the interdependency between common sense and science (which he argues for).

Secondly, and most importantly (for the purposes of this chapter), Nelson argues that Quine's account of underdetermination '[…] commits us to the view that there is room for changes in all our theories—both those of common sense and science' (Nelson, 1990, p. 245). The thought is that if scientific theories are *fundamentally* underdetermined, this then leaves room for change in theory, and, if we buy into the idea that common sense affects science and can therefore serve

as legitimate evidence for theory evaluation, then this leaves room for common sense to legitimately play a role in scientific theories.

This, Nelson argues, is important for feminist science criticism since '[…] at least part of what will propel the evolution in scientific theories can be changes in common-sense beliefs and theories' (Nelson, 1990, p. 245). So for Nelson, part of the change begins with common sense. And in this way, it is important that common sense be able to play an epistemologically relevant role in science, so that if we change our common sense beliefs, these changes will be reflected in our scientific theories.

Nelson also appeals to Quine's account of why some theories are better 'insulated' than others. 'The special position of such theories (our larger ontological commitments, logic, and mathematics, for example) is due to the fact that they do not face sensory experience directly, but do so indirectly "via" more "low-level theories"' (Nelson, 1990, p. 246). But this, however, does not mean that such theories are exempt from common sense. It just means that some theories are better insulated than others, according to Nelson.

Nelson takes feminist science criticism to be common sense evidence that can and should play a role in scientific theories. As an example, she points to the 'man, the hunter theory'. According to Nelson, in this case:

> '[…] we saw that some members of our science communities and our larger community have come to question the assumption, and all of the models and theories that incorporated it, that males' activities are central and of fundamental importance in social groups and would have been in

> human evolution, and that females' activities are natural and exhausted by reproductive activities' (Nelson, 1990, p. 246).

This common-sense criticism, according to Nelson, is part of the evidence that is used for evaluating scientific theories (as shown by the 'man, the hunter' example). And that consequently, changes in these kinds of common sense beliefs will generate changes in science (Nelson, 1990).

But, as Nelson acknowledges, there is a problem here. Namely, that Quine seems to think about common sense theorising in terms of physical objects, and not in terms of 'sex/gender and politics', like Nelson argues. And not only this, Quine also maintains that politics have no place in science (Nelson, 1990).

So the issue here is whether Quine's account can be extended to cover things other than physical objects. Nelson argues that it should:

> 'If Quine does not recognize that the network of our connected and interdependent theories contains beliefs and theories beyond those concerned with physical objects and that common-sense theory is not static, then feminist criticism indicates that we must expand on his views—and only later worry about the consequences for the constraints experiences can impose on our theories' (Nelson, 1990, p. 247).

For Nelson, feminist science criticism shows that sex/gender and politics are related and connected to science. For her, this is a good reason why we must

expand Quine's discussion of common sense theorizing to cover not only physical objects, but also such things as sex/gender and politics.

According to Nelson, even if we choose to ignore all of the evidence afforded by feminist science critics, Quine maintains that science and common sense are interdependent, and this, according to Nelson, is important to note because we also have common sense beliefs about sex/gender and politics. In this sense, common sense beliefs about sex/gender and politics are relevant to science, provided that we buy into Quine's account of the relationship between science and common sense (and Nelson's interpretation of it).

To briefly sum up, in order to support her claim that common sense beliefs can be subject to empirical control, Nelson appeals to Quine's account of the relationship between common sense and science as well as feminist science criticism. In doing so, she challenges Quine's claim that there is a clear boundary between science and other common sense beliefs such as those influenced by political values. And, in order to support this claim, Nelson appeals to feminist science criticism as evidence that there is no such division. And lastly, Nelson appeals to Quine's account of underdetermination in order to say that:

> 'There is "room" for alternatives to our going theories—alternative ways of describing the order we have found in nature, including our current laws of nature—and our adoption of such alternatives in one area of science or in our common-sense dealing with the world will eventually reverberate through others of our theories' (Nelson, 1990, p. 248).

Based on all of this, Nelson claims that common sense beliefs, such as political views, *can and should be* subject to empirical control (Nelson, 1990, p. 248). This seems to be Nelson's first premise: that political views should be treated as testable hypotheses. If we accept this, then feminist hypotheses become another option that scientists can appeal to amongst the range of other available options (this is where underdetermination comes in). Nelson argues that feminist science criticism has produced *evidence;* evidence that has revealed hidden assumptions in science; for example the idea that women's sexuality is necessarily tied to reproduction.

Nelson's idea is that feminist science criticism questions theories based on evidence, including evidence about the underpinnings of the theories. The evidence are things like the detection of value-laden assumptions. For example, in the case of women's sexuality necessarily being tied to reproduction, the evidence produced by feminist science criticism has revealed that, based on empirical evidence, it is not the case that women's sexuality is necessarily tied to reproduction. It is this evidence which Nelson thinks can be subject to empirical testing. Nelson argues that feminist science criticism challenges the idea that science is an isolated enterprise and instead adopts and promotes the idea that things like political values are not only very much a part of science, but are also able to be subject to empirical control (Nelson, 1990).

We can break down Nelson's proposal in the following way. Nelson wants to make the claim that common sense beliefs (such as those influenced by political values) can be subject to empirical control. In order to argue for this, she appeals to Quine. First, she appeals to Quine's idea that science is an extension of common

sense theorizing. Secondly, she appeals to his account of underdetermination. In addition, she also appeals to feminist science criticism. And in doing this, she is forced to challenge Quine's account of common sense theorizing. And all of these things put together, according to Nelson, support the claim that common sense beliefs can and should be subject to empirical control. Values are playing an indirect role here. The idea is that common sense beliefs are influenced by such things as political values. In this sense, by allowing feminist common sense beliefs, we would also be allowing feminist values to play role in science.

1.2.1.1. Taking a Closer Look at the Role of Underdetermination in Nelson's Proposal

At the beginning of this chapter, I said I was interested in analysing some proposals put forth by feminist philosophers about the role of contextual values in science. The reason for this is that I want to advance the claim that science would benefit from adopting feminist values. However, while I endorse this claim, the way in which Nelson argues for this claim seems quite problematic. This is because the role of contextual values in her account (which is the key to developing an account of how science would benefit from adopting contextual values), when joined with Quine's account of underdetermination, seems to be restricted to political motivations, which seem to have no epistemological relevance in science.

As we saw in the previous section, Nelson wants to make the case that common sense beliefs such as those influenced by political values can and should be subject to empirical control. And I agree with her, partly. If political values are

part of a scientific project, then it seems like they can and should be subject to empirical control. In this case, it seems like social values would have an epistemologically relevant and justified role within science (because they already form part of the scientific project). But, if political values are not part of a scientific project, then it is hard to see why they should be subject to empirical control. This is because political values, if not already part of a scientific project, would lack any epistemologically relevant role within the scientific project (other than a politically motivated one). Many philosophers often use the example of physics to ask how contextual values are or could have any relevance to the internal practices of this area of science. By asking this question, philosophers are challenging the idea that science and contextual values are interdependent in the strong sense that Nelson is arguing for. Nelson has responded to this objection by appealing to the idea that

> '[…] it is possible, however unlikely it seems now, that changes in others of our theories will reverberate with sufficient resonance through the network of our going theories, to carry with them a need for a different logic, a different mathematics, or a different physics' (Nelson, 1990, p. 252).

The idea is that contextual values do influence all of our scientific theories, even those which don't appear to be influenced at first sight. This includes areas like physics, logic and maths. So the fundamental claim here seems to be the idea that science and common sense are interdependent, in a strong sense.

This is a problem because this is not how many areas of science appear to work. There seems to be a weak sense in which this is true: science is done in a social context. But this is not the same as claiming that contextual values are somehow interdependent with all of our sciences. It is true that feminist science criticism has provided us with valuable evidence about how contextual values have played a role in certain areas of science. But this evidence in no way allows us to extend the claim to cover *all* areas of science. In other words, we have no evidence or good reasons to think that the stronger claim is true.

But even if we ignore this problem and we agree with Nelson, her strategy is still a problematic one. This is due to her further appeal to underdetermination. Nelson's idea is that Quine's account of underdetermination allows for options and possible changes in science and also in our common sense beliefs (Nelson, 1990). This is possible because according to Nelson: 'Everything we say about how things are, Quine argues, is fundamentally underdetermined by the evidence we have –and could ever have—for saying it' (Nelson, 1990, p. 245). I would like to zero in on the role that such an account plays in Nelson's more general claim and on the consequences of adopting underdetermination.

1.2.1.2. Problems with Underdetermination in Nelson's Proposal

Nelson appears to be appealing to both holistic and contrastive forms of underdetermination. On the one hand, she argues that underdetermination allows for changes in all of our theories (holistic underdetermination): '[…] commits us to the view that there is room for changes in all our theories—both those of common sense and science' (Nelson, 1990, p. 245). On the other hand,

she also argues that underdetermination allows for alternatives to our going theories (contrastive underdetermination): 'There is "room" for alternatives to our going theories—alternative ways of describing the order we have found in nature, including our current laws of nature—[…]' (Nelson, 1990, p. 248). In a clearer passage, she argues that 'We can imagine alternative theories commensurate with most of our experiences, and incompatible with a going theory, for each of the theories we now maintain-including our most esoteric theories in subatomic physics and our common-sense theory about physical objects' (Nelson, 1990, p. 245). This raises important problems.

In both of these cases (holistic and contrastive underdetermination), there is a problem about how scientists are supposed to decide which theories to keep and which to reject (in the case of holistic underdetermination) and which theory to choose (in the case of contrastive underdetermination). In the case of holistic underdetermination, Nelson appeals to Quine's idea that we are not able to test an isolated hypothesis. This means that when a scientist is faced with negative results, they have two options. The first option is that they can choose to keep the hypothesis being tested and change some of the other theories sustaining that hypothesis in order to make the hypothesis work or, alternatively, they could choose to reject the hypothesis being tested and keep the theories that were sustaining the hypothesis. In either case, the idea is that this choice is underdetermined by evidence. Two of the main problems for feminists are that 1) feminist values are restricted to cases in which evidence can no longer inform how a scientist chooses a theory and 2) it is not clear when scientists are supposed to decide to keep a hypothesis and when they are supposed to reject it. For

example, if a scientist decides to keep a hypothesis in the face of disconfirming evidence, how far should they go in changing the other theories in order to sustain that hypothesis? It is equally unclear what role, other than a political role, feminist values should play in these kinds of situations.

In the case of contrastive underdetermination, Nelson appeals to the idea that underdetermination allows for alternative options to our going theories, *in principle*. This allows for possible changes in *all* of our going theories. This is because according to Nelson's interpretation of underdetermination, there will always be alternative theories available which are able to account for the same empirical evidence. What Nelson doesn't address, however, is how we are supposed to decide between competing theories in these cases. That is, supposing that we have theory 1 and theory 2, and that they are both able to account for the empirical evidence we have (and will even have), Nelson offers no proposal on how to decide between the two or what epistemological tools we should draw on to make this decision.

This is an important issue that should be addressed because we want to be able to have good epistemological reasons for choosing theories, not just good political reasons. While there are a number of problematic theories, we want to be able to say that they don't work because they are flawed in some fundamental way; maybe the theory is rooted in a false fundamental assumption, like the case of women's sexuality. Or maybe the theory has been disproven, like the geocentric model. In both of these examples the theories have been replaced, not because they are underdetermined, but because they were wrong.

Under Nelson's account, it is unclear what role contextual values have in cases of underdetermination, other than a political one (which has historically not been a good strategy). My worry here (if we accept Nelson's arguments so far) is that it is not clear what conceptual tools we would use (or have available) for choosing (and preferring) some theories over others. This raises the following problem: it is not clear what reasons we'd use for preferring certain contextual values over others in cases of underdetermination. For example, it is not clear what reasons we'd have for choosing theories which endorse feminist values over patriarchal values.

While I agree with Nelson that we should definitely be choosing feminist values over patriarchal ones, I do not agree that we should appeal to underdetermination to make the case that science should adopt feminist values. This is because it is not clear that underdetermination provides us with a clear solution on how to settle disputes between conflicting values. This is a problem not only for Nelson's proposal, but it is also a problem for other feminist proposals which draw on underdetermination in order to argue for the idea that science would benefit from adopting feminist values.

1.2.2. Underdetermination and the Network Model (Potter)

Another philosopher that appeals to underdetermination is Elizabeth Potter. In 'Modeling the Gender Politics in Science' (1988), Potter's overall project is to put forward a proposal that will collapse the internal/external distinction[1] in our

[1] The internal here seems to be limited to scientific methodology, while the external seems to be concerned with everything else outside of scientific methodology such as the social and the political.

understanding of science in order that feminist scholars can be in a better position to argue that feminist considerations can contribute to good science. Potter argues that feminist concerns have historically been understood as 'external' to science. For example, anytime that sexist assumptions have been found to have played a role in science, scientists and philosophers have been quick to argue that this happened because 'external' factors somehow made their way into scientific 'internal' practices. This same line of reasoning, according to Potter, prevents feminist scholars from being able to argue that gender, class, and race factors can contribute to good science. This is because these factors are considered 'external' factors. Potter's proposal is a revised version of Mary Hesse's 'Network Model'. The Network Model can be understood as '[…] a scientific theory as a system of laws which has a very complex relation to nature' (Potter, 1988, p. 29). Potter draws from both Mary Hesse and Quine in order to argue that non-cognitive values are compatible with good science. Potter argues that if we extend Hesse's Network Model, it can be useful to feminist philosophers of science. More precisely, she suggests that we amend the coherence conditions to include gender, class, and race considerations so that scientists can be justified in appealing to them: 'At least in those cases in which a particular generalization in underdetermined by the data […]' (Potter, 1988, p. 30).

In this section, I will provide a brief overview of Potter's account and work my way through to the discussion of underdetermination. While I agree with Potter that in cases in which scientific theories are *for the time being* underdetermined by the data, scientists should be justified in appealing to other considerations –including (but not limited to) gender, class, and race –I think more

needs to be said about how scientists are to go about deciding which considerations to include and when to include them. Furthermore, I disagree with the normative claim that feminist scholars should appeal to the stronger and more traditional understanding of underdetermination which says that scientific theories will *always* be underdetermined by the evidence. Finally, I argue, as I have been doing throughout this chapter, that appealing to underdetermination (in the strong sense) as a means to argue that feminist values can contribute to good science is a bad idea. This is because doing so comes with many undesirable problems and because it limits the ways in which feminist values can contribute to good science to cases in which theories are underdetermined by the evidence.

1.2.2.1. The Network Model

'When the scientist establishes a law, Hesse argues, she classifies phenomena on the basis of resemblance among them' (Potter, 1988, p. 29). This is the idea that scientists classify according to similarity or differences found in the phenomena that they encounter. Potter gives the example of a red dwarf and says that the astronomer might encounter a star and then have to decide whether it is similar enough to other red dwarfs to classify it as a red dwarf or different enough not to. According to her, scientists are constantly faced with these kinds of decisions. Are a group of stars (to follow the same example), similar enough to be classified as red dwarfs? What characteristics define a red dwarf? How many of these characteristics does a star need to meet in order to be classed as a red dwarf? And so on. Many of these questions, according to Potter, bring up a further important question: namely, what characteristics are more important when it comes to

classifying phenomena, the ones that are similar, or the ones that are dissimilar? This is important because once all of the data about a particular phenomenon are in, the scientist must make a decision. And this, according to Potter, is a case of the scientist 'interpreting the data' (Potter, 1988, p. 29). This is where underdetermination begins to make its way in. According to Potter,

> 'Data alone, observations alone, do not determine a law or generalization; for example, we observe that whales swim in the water and so are like fish; but we also observe that they are live-bearing like mammals. Are they fish or are they mammals?' (Potter, 1988, p. 29).

The idea here is that the observations that we derive from phenomena are not enough to make a generalization about them. One of the reasons that scientists are not able to make a generalization based on similarity, according to Potter, is because similarity is not transitive. That is, $star_2$ might resemble $star_1$ and $star_2$ might resemble $star_3$, but that does not mean that $star_1$ and $star_3$ necessarily resemble each other. This creates a problem. How should the scientist classify $star_2$? Should they classify it as they would classify $star_1$ or should they classify it they would classify $star_3$? According to Potter, '[…] any decision here is underdetermined by the data […] and so […] has to be determined on other grounds' (Potter, 1988, pp. 29–30).

One way of determining this, according to Potter, might be by appealing to logical coherence. This is the idea that scientists base their decision on the logical relationship between conflicting generalizations. That is, they choose a

hypothesis (or generalisation) that provides the most coherence with other theories. The problem with this, according to Potter, is that that same hypothesis can also be taken as a reason to reject theories already in place in cases where evidence alone is not able to determine theory choice. The idea here, according to Potter, is that scientists cannot always appeal to logical coherence as a criterion to make a decision.

Philosophers who adopt a network model argue that scientists *should* appeal to cognitive virtues in situations in which evidence alone is not able to inform their decisions. 'Scientists hold or should hold certain assumptions about what constitutes good systems of laws or "good theories"' (Potter, 1988, p. 30). These assumptions include cognitive virtues such as 'simplicity' (that a good theory should be simple), 'accuracy' (that a good theory should be accurate), 'empirical adequacy' (that a good theory should be empirically adequate), etc. To make this point, Potter appeals to Quine's idea that '[…] the assumptions that good theories are "conservative" or are "simple" guide the scientist to make the decision that conserves most of what has been held true in the past , or the one that makes the system simpler (Quine 1978)' (Potter, 1988, p. 30). In other words, when scientists are faced with a situation of underdetermination, according to philosophers who subscribe to the network model, they *should* look to cognitive virtues, because it is these which will guide the scientist to make a decision that is very much on board with what has been held true before or one that will lead to a simpler scientific system. Hesse refers to these cognitive virtues (simplicity, accuracy, and so on) as 'coherence conditions' (Potter, 1988).

Potter's objection to the coherence conditions, as proposed by Hesse, is that these coherence conditions do not account for gender, class, and race assumptions that, according to her, also seem to inform scientific choices. Potter's proposal is that we extend the Network Model so that we are able to account for these kinds of assumptions.

> 'Unless we extend the Network Model by recognizing gender, class and race assumptions as "coherence conditions," the model will not be useful to feminists because it will not really collapse the internal/external distinction or other distinctions hindering a feminist understanding of science' (Potter, 1988, p. 30).

That is, unless androcentric, sexists, classist, and racist assumptions are accounted for, there will be room for continuing to think that these kinds of assumptions do not operate in the internal practices of science, which is exactly what Potter is trying to argue against. Potter's suggestion here is that '[…] we crack the Network Model open by looking with feminist eyes at actual cases in order to discover coherence conditions […]' (Potter, 1988, p. 30).

According to Potter, we should do this:

> 'At least for those cases in which a particular generalization is underdetermined by the data, as the generalization that matter is dead was when Boyle considered it, the decision as to which generalization to

> adopt must be based on other grounds than simple observation' (Potter, 1988, p. 30).

The idea here is that when presented with a case of underdetermination, the scientist will adopt a generalization (or hypothesis) which is based on non-observational factors. Potter's proposal is that instead of only having the traditional cognitive virtues available for the scientist to appeal to, we should extend these in order to include assumptions that recognize gender, class, and race.

These assumptions would have a similar role to that of cognitive virtues. The scientist would still be able to weigh out their options and identify the consequences that the adoption of certain assumptions would have for the rest of their theory, as well as to other working theories. Furthermore, on a Network Model,

> '[…] each generalization in the system is—at any given time, though not at all times—corrigible, so there is nothing theoretically to prevent us from discovering that even the most innocent choice is constrained ultimately by an androcentric or sexist assumption' (Potter, 1988, p. 31).

This flexibility means that the scientist is able to change or alter assumptions while still allowing some degree of the more traditional coherence conditions. A consequence, according to Potter, is that we can have good theories (according to traditional criteria), which are also androcentric or sexist.

> ‘Thus, the model makes it clear that even good scientific theories, by all of the traditional criteria, can be androcentric or sexist in the sense that a sexist or androcentric assumption constrains the distribution of truth values throughout the system’ (Potter, 1988, p. 31).

This, according to Potter, is supposed to leave room for altering or changing assumptions that are sexist or androcentric in nature. Furthermore, Potter claims that this theoretical move will also allow for the possibility of ‘[…] new and different theory constructions’ (Potter, 1988, p. 31). That is, new scientific theories that are born out of different assumptions. This would allow for the possibility of creating new theories based on feminist assumptions (because these would now be part of the coherence conditions); while not taking away from the other, more traditional cognitive virtues. Under this model, scientific theories would still be able to enjoy the distribution of more traditional cognitive virtues such as simplicity, accuracy, empirical adequacy, and so on.

To briefly sum up, Potter proposes that if we amend the Network Model, it might prove useful for feminist philosophers of science. To do this, she proposes that we extend the coherence conditions in order that these are able to account for gender, class, and race. This is because, according to her, in some cases in which theories are underdetermined by evidence, scientists also seem to appeal to assumptions about gender, class, and race, except that when they do, this is usually considered as bad science because these kind of considerations are considered as extra-scientific. According to Potter, if this is how scientists actually

decide between conflicting generalisations, then philosophers need to account for the work that these assumptions are doing in the internal practices of science. One way of accomplishing this, according to Potter, is by extending the coherence conditions in order to include these kinds of assumptions.

In 'Modeling the Gender Politics in Science' (1988), the kind of underdetermination being appealed to by Potter seems to be holistic underdetermination. This is the idea that no one hypothesis (generalisation) can be tested in isolation. This then leaves the scientists underdetermined in their response to a failed prediction. Situations like this leave open two possibilities, both underdetermined by the evidence: 1) reject the hypothesis in light of the disconfirming evidence or 2) adopt the hypothesis but reject some of their currently accepted theories.

1.2.2.2. Problems with Potter's Proposal

I agree with Potter that assumptions about gender, class, and race should be accounted for in science. However, I disagree that the best way of accomplishing this is by appealing to underdetermination. While Potter makes a successful case for the idea that 'external' factors sometimes influence the 'internal' practices of science, she does not make a case for the idea that we should appeal to these external factors in cases of underdetermination. Appealing to more traditional cognitive virtues such as simplicity is a contentious issue in the philosophy of science. One of the reasons this is a contentious issue is because it is not clear why scientists should prefer theories that are simpler over more complex theories, for example. The problem is that many of these more traditional

cognitive virtues are not widely accepted as considerations that scientists should appeal to. It is one thing to argue that scientists usually appeal to simplicity and another quite different thing to argue that scientists should be justified in appealing to simplicity. This applies to Potter. It is one thing to argue that scientists usually appeal to gender, class, and race considerations and another thing to argue that scientists should be justified in appealing to these considerations, which Potter hasn't done.

Second, assuming that Potter does make a case for the above, it is unclear how scientists should decide between competing assumptions in the absence of empirical evidence. It is unclear how these assumptions are supposed to aid specific research projects. Potter doesn't provide any guidance on these issues.

Another important issue is that appealing to underdetermination is limiting in terms of the work that feminist considerations are able to play in science. It is limiting because feminist concerns come into play here only after all empirical evidence has been exhausted. However, I think that a more successful proposal is one that allows feminist considerations to play a role in the formulations of the hypothesis, the study design, etc., when relevant to the research project's aims. I will expand on this idea over the next couple of chapters, for now it is only important to make clear that appealing to underdetermination as a way to further the feminist normative claim that feminist considerations should play a role in science is, at best, very limiting in terms of the role they are able to play.

1.2.3. Towards a Socially Responsible Philosophy of Science (Kourany)

In 'A Philosophy of Science for the Twenty-First Century' (2003), Kourany proposes a new program for philosophy of science, a socially responsible philosophy of science. As with other sections in this chapter, what I am particularly interested in is the role that underdetermination plays in her account. With this in mind, I will give an overview of her account, with a focus on underdetermination.

According to Kourany, 'A major reason feminists are concerned with science is that science can be a powerful ally in the struggle for equality for women' (2003, p. 3). It can address societal injustices and rectify these with more accurate information. But as Kourany points out, it seems that instead, science has served as an active participant in the perpetuation of these injustices, which is another reason that feminists are concerned with science. She offers some historical examples:

> 'In the seventeenth century, women's brains were claimed to be too "cold" and "soft" to sustain rigorous thought. In the late eighteenth century, the female cranial cavity was claimed to be too small to hold a powerful brain. In the late nineteenth century, the exercise of women's brains was claimed to be damaging to women's reproductive health—was claimed, in fact, to shrivel women's ovaries. In the twentieth century, the lesser "lateralization" (hemispheric specialization) of women's brains compared to men's was claimed to make women inferior in visuospatial

skills (including mathematical skills) (Schiebinger 1989)' (Kourany, 2003, p. 4).

According to Kourany, this is problematic, not just in the context of science, but in the more general social context as well. This is because claims like these serve to perpetuate women's inferior status in society.

With this, Kourany aims to make a contrast between the interests that most twentieth century philosophers have in science with that of feminists. According to Kourany, while most twentieth century philosophers have a purely epistemic interest in science, feminists have a social one. The reason for this is that science can serve as an ally, and this is beneficial for women. It is also of interest to feminists due to the influence that science has had on women's struggle for equality (as the above examples illustrate). Feminist political theorists, for example, have been invested in developing an egalitarian ideal of human flourishing, which Kourany thinks serves as an excellent guide for a socially responsible philosophy of science.

Adopting an egalitarian ideal of human flourishing can be useful in both the context of discovery and in the evaluation process, according to Kourany. The context of discovery here has to do with decisions about what research should be pursued, which should be funded, which should be given priority, etc. The evaluation process has to do with how we evaluate scientific theories, including the criteria that are used to evaluate scientific theories.

In the context of discovery, according to Kourany, an egalitarian ideal of human flourishing would prioritise research programs that aim to fulfil this ideal.

Kourany suggests advocating for: '[…] a national science policy that prioritizes the funding of research of interest and benefit to women […]' (2003, p. 7). This would serve as an incentive for scientists to pursue research that is beneficial for women. Secondly, this national science policy would '[…] deny funding for research that neglects women's interests and needs […]' (2003, p. 7). According to Kourany, this is already taking place in U.S. law with the National Institutes of Health Revitalization Act of 1993, for example. Thirdly, the national policy would prioritise '[…] the funding of research that promises support for egalitarian views and programs […]' and '[…] initiatives that *deprioritize* the funding of research that *threatens* egalitarian views and programs […]' (2003, p. 8). This, however, does not mean that Kourany would support the prohibition of such programs; she would just give them a lower priority.

One possible objection to this, according to Kourany, is that deprioritising such projects is incompatible with science's aim to pursue *all* truth. However, Kourany points out that choices must be made about what research projects to pursue, we can't pursue *all* research. This is because there are only so many resources available (e.g. funding). However, for those that argue that scientific research should be pursued on more 'neutral' grounds, Kourany argues that it is not clear that this is how research programs *are* pursued. She points out that most of our current research is financed by institutions that have a direct interest in the research that is being pursued. This includes institutions such as pharmaceutical companies, which often have a financial interest in the research. As a result, Kourany argues that research programs are not chosen for purely epistemic

reasons. So, if we agree with this, then research that stems from an egalitarian ideal should not pose a problem.

The second part of Kourany's proposal has to do with the modes of evaluation. In this section, she begins by addressing the objection that the feminist project is antithetical to the pursuit of truth. To those that argue that science pursues truth and that '[…] the feminist project is *antithetical* to such a pursuit of truth since it offers as a mode of evaluating scientific research something—support for egalitarian views—that is *not* a criterion or indicator of truth' (2003, p. 9), Kourany replies that so far no criterion has proven to be an indicator of truth (i.e. not simplicity, not fruitfulness, not scope, etc.). In this sense, she argues that the feminist project may not be as problematic as some might think.

Still, there might be some that object that even if we were to accept that science has other aims, the feminist project still does not seem to follow any other scientific aim: '[…] the feminist project's mode of evaluating science is antithetical to the pursuit of any other scientific aim as well […]' (2003, p. 10). One example is Bas C. van Fraassen's proposal that the aim of science is empirical adequacy (anti-realist proposal). On Bas C. van Fraassen's proposal, a belief that the scientific theory is empirically adequate is required for accepting a scientific theory (contrary to realist proposals that argue that the aim of science is truth and that in order to accept a theory there has to be a belief that the theory is a true story about what the world is actually like). Kourany argues that the objection that the feminist project is antithetical to the pursuit of *any* scientific aim is confused. She argues that what any of these scientific aims requires is a system of scientific

knowledge that fits our observations (2003). For example, the realist that claims that the aim of science is truth still requires that theories being put forth fit our observations, the same as the anti-realist such as Bas C. van Fraassen who claims that the aim of science is not truth but empirical adequacy. This is the idea that independently of the metaphysical commitments one might have for accepting a theory, what all of these aims have in common is that they all require that the knowledge fit our observations. In this sense, Kourany seems to think that the feminist project can be compatible with many scientific aims because the feminist project also requires that the scientific knowledge fit our observations.

The next question then might be how and when egalitarian views are able to play a role in the feminist project. This is where underdetermination comes in. Kourany appeals to underdetermination to argue that there will always be a system of knowledge which is able to account for our observations (data). According to 'the Duhem/Quine underdetermination thesis', '[…] there will always in principle be more than one such system that can do this, and according to what the history of science discloses, there is frequently in practice more than one such system as well' (2003, p. 10). The idea is that there will always be more than one theory to choose from. According to Kourany, this ties in nicely with the feminist project because it allows for the possibility of choosing a theory that best supports egalitarian goals. This is the idea that, if we have two conflicting theories, which are equally well-supported by all of the empirical evidence (data), then we should choose the theory that best supports the egalitarian ideal.

Kourany argues that this project should be pursued due to social reasons, including the fact that both women and men finance science. She argues that we

should also pursue this project because society is affected by science, and ultimately because science shapes lives and consciousness, so science should address the needs of society (2003).One of these needs, according to Kourany, is justice and equality for women. In this sense, the reasons for opting for theories that support that egalitarian ideal are socially motivated.

1.2.3.1 Problems with Kourany's Proposal

Underdetermination plays a key role in Kourany's proposal of the feminist project. Although she argues that the feminist project can be compatible with many scientific aims, feminist concerns do not make their way in unless we buy into the idea of a strong form of contrastive underdetermination. Again, this is the idea that for any body of evidence (data) there will be alternative theories that will be able to account for this same body of evidence.

Kourany does not explicitly appeal to 'contrastive underdetermination'. Instead, she appeals to a rather strange version of the 'Duhem/Quine underdetermination thesis'. I say rather strange because, as I have argued earlier on in this chapter, strictly speaking, there is no 'Duhem/Quine underdetermination thesis', their accounts are quite different. Additionally, Kourany does not justify the appeal to social and political motivations and this is important because neither Quine nor Duhem (the people she is appealing to) think that it is acceptable to appeal to extra-scientific factors in cases of underdetermination. Because Duhem and Quine do not think that extra-scientific factors should play a role in cases of underdetermination, an argument from

Kourany is required to explain why scientists should be justified in appealing to extra-scientific factors.

Secondly, Kourany offers no details about the contrastive form of underdetermination that she is appealing to in this paper (i.e. a model that shows how alternative theories are generated). This is a problem because contrastive underdetermination is a contentious issue in the philosophy of science. For example, Laudan and Leplin (1991) have argued that no such thing is possible. I think that this problem is relevant for the feminist project because, it is not immediately clear that there will a) be any alternative theories b) that any of these theories will be sympathetic to the egalitarian ideal which is of central importance to Kourany's project.

I think that Kourany makes an excellent case for the idea that external factors such as sexist assumptions play a role in science. However, I think that the solution to the kinds of problems she brings up in this paper cannot be solved by appealing to underdetermination. For example, the generalisation from the seventeenth century that women's brains were too cold and soft for rigorous thought was eventually considered wrong for many other reasons that had nothing to do with having alternative theories that were able to account for that same data collected by scientists. As is the case in other research areas that are also of interest to feminist philosophers, these scientists got many things wrong: study question, study design, metaphysical assumptions, etc. The data was collected under very problematic assumptions. The problem here are the study questions, the concepts being used, the metaphysical assumptions being used, etc. For this reason, I think that underdetermination (leaving all other problems

aside) is not very helpful for feminists committed to advancing the feminist normative claim that science would benefit from feminist values.

1.3. Conclusions

The aim of this chapter, above all else, has been to make a convincing case that feminist scholars should not appeal to underdetermination (whatever the version) in order to make the case that science would benefit from feminist values.

Appealing to underdetermination setts additional obstacles for feminist scholars because proponents of underdetermination argue that in cases of underdetermination, scientists should not appeal to social and political considerations, which are precisely the kinds of things that feminist scholars are interested in appealing to.

Leaving this issue aside, feminist scholars are often unclear about the kind of underdetermination they are appealing to in order to make their case. For example, many appeal to the 'Duhem/Quine thesis', when Duhem's and Quine's accounts are actually quite different from each other. In cases where we are able to identify the kind of underdetermination being appealed to, I found that crucial questions for feminist scholars remain unanswered. These questions include how scientists are supposed to choose between competing theories (in cases of contrastive underdetermination) and how they are supposed to decide what considerations to include and when to include them (in cases of holist underdetermination).

Importantly, appealing to underdetermination limits the role that feminist values can play in science. This is because feminist values are only able to come into play after all empirical considerations have been exhausted. I think that this is undesirable because feminist values can also inform other aspects of scientific research including the study design, the concepts beings used, etc. I will expand on these ideas in the next chapter, where I will explore feminist proposals that do not appeal to underdetermination.

2. Upgrading the Role of Contextual Values without Appealing to Underdetermination

In the previous chapter, I argued that accounts that buy into underdetermination in order to argue for an epistemically justifiable role for contextual values are undesirable. In doing this, I considered three accounts: Lynn Hankinson Nelson (1990), Elizabeth Potter (1988), and Janet Kourany (2003). In this chapter, I engage with value literature that, unlike the previous group, does not appeal to underdetermination in order to make the case for an epistemically justifiable role for contextual values in scientific research. I engage with two proposals: Kourany's Socially Responsible Science proposal and Douglas' Inductive Risk argument. I argue that while these approaches are more desirable than the underdetermination proposals we looked at in the previous chapter, some crucial aspects of these proposals remain unclear. In light of this, I propose some changes.

2.1. Introduction

In the previous chapter, we engaged with Kourany's *A Philosophy for the Twenty-First Century* (2003), where she appeals to underdetermination. The book I will be discussing in this section, also by Kourany, does not seem to appeal to underdetermination. It is unclear, however, if, in light of her new proposal, she now rejects underdetermination, or whether she thinks that appealing to underdetermination can still work alongside her new proposal. I leave this difficulty aside and start by jumping straight into her new proposal: an Ideal of Socially Responsible Science.

In Philosophy of Science After Feminism (2010), Kourany proposes that in order for her SRS ideal to succeed, it must be judged by two standards: (1) a moral/political standard and (2) an epistemic standard. Here, the first standard is on a par with the second. This is radically different from ideals that appeal to underdetermination, which would have moral/political considerations come into play only after all other (epistemic) considerations have been exhausted. In this sense, what Kourany is doing is putting moral/political considerations at the same level as epistemic considerations (not first and not after). This is a defining feature of her proposal and this makes the SRS ideal a prime candidate for the non-underdetermination group of proposals that aim to make a case for contextual values in science.

As Kourany notes, one of the earliest strategies from feminist scholars addressing sexism and androcentrism in science in the twentieth century was to appeal to the value-free ideal (roughly, an ideal which insists that there is a distinction between 'epistemic values' (sometimes also called cognitive values) and 'other values' such as social, political, and ethical values, and claims that only the former but not the latter values should play a role in science). Many feminist scholars working in the twentieth century thought that the presence of sexism and androcentrism in science were due to bad science and that these patriarchal values ('other values') could be eliminated (or greatly reduced) by appealing to the value-free ideal. The thought was that if scientists followed standards that were more rigorous, sexist and androcentric assumptions, biases, etc. would be eliminated and, in this way, bad science would be replaced with good science.

The idea was that this would benefit women socially. It would do so by disproving awful scientific ideas, such as the idea that women were biologically inferior. This supposed biological inferiority was taken to cause women's lesser intelligence and this placed women at a significant social disadvantage (compared to men who were thought to be the superior, more intelligent being). The hope was that by disproving these sexist and androcentric ideas, women would be able to enjoy a more equitable social space. And, one way of disproving these ideas, was to appeal to the value-free ideal. In this sense, the value-free ideal would help address moral/political considerations as well, but it would do so only as a result of being more epistemically rigorous. In other words, the thought was that the value-free ideal was capable of addressing moral/political concerns, but only indirectly. Moral/political considerations were to never enter the evaluative process, since this is what had allowed values such as sexism and androcentrism into the scientific context in the first place.

This approach, however, didn't work out so well for a number of reasons. One of the most relevant and important reasons to note here (for the purposes of this chapter), is that in rightfully criticising sexist and androcentric science and calling for change, feminist scholars seemed to be shaping that very science with feminist values. They did this through the questions they asked, and through the things that they proposed should be included when designing, constructing, and evaluating experiments. The thought was that even if all of these questions and proposals led to better science, these proposals were nonetheless being informed by feminist values.

One way out of this problem was to argue that their questions, criticisms, and proposals were objective. However, this would have been a bad strategy because feminists were in a special position to know that there was no such thing as purely objective science (in the sense of 'the view from nowhere'). They were in a special position to know this because this is the story that sexist and androcentric science had been trying to sell them all along (that there was 'a view from nowhere').

The alternative to this was to agree that science was in fact informed by values. The problem they faced with this strategy, however, was that feminist values are social values ('other values'), which, according to the value-free ideal, have no legitimate place in science. If the strategy was to keep social values out by advocating for more rigorous scientific methodology, then feminist scholars had to explain why feminist values were acceptable but sexist and androcentric values were unacceptable. Again, this was hard to respond to given that feminists scholars appealing to the value-free ideal supported the idea that social values in the context of science amounted to bad science and should therefore be kept out of the scientific context. As Kourany notes, some feminist scholars responded to this challenge by saying that feminist values merely played a motivational role, claimed that feminist values were operating as a methodological control for bad social values, while others said that the problem had to do objectivity. In the end, however, many feminist scholars decided that what was needed was a new understanding of scientific objectivity (Kourany, 2010).

In this regard, the value-free ideal, as a candidate, failed to meet the needs of feminist scholars. According to Kourany:

> ‘The ideal of value-free science promised to play for feminist scientists both an epistemic role and a political role—promised to provide both a way to achieve objective knowledge and (by ridding science of sexism, androcentrism, and other inegalitarian values) a way to achieve social reform’ (Kourany, 2010).

What is needed, then, is an ideal capable of addressing both political and epistemic concerns. Kourany thinks that no clear replacement for the value-free ideal (which is capable of addressing both of these concerns) has emerged, up until now. This is where her ideal for SRS comes in. She proposes the SRS ideal as a replacement for the value-free ideal. In what follows, I will lay out her proposal.

2.2. The Ideal of Socially Responsible Science (SRS) (Kourany)

The SRS ideal, like the value-free ideal, is committed to ridding science of sexism and androcentrism. The SRS ideal, however, is committed to ‘[…] implanting egalitarian social values into science’ (Kourany, 2010, p. 68). This means that, unlike the value-free ideal, the SRS ideal is prepared to bring social values (‘other values’) to the forefront, alongside epistemic values (and not after, like the value-free ideal would have it). According to the SRS approach, ‘[…] sound social values as well as sound epistemic values must control every aspect of the scientific research process from the choice of research questions to the communication and application of results, this to be enforced by such political means as funding requirements on research’ (Kourany, 2010, p. 49). This would, in part, solve the

problem that feminist scholars appealing to the value-free ideal were faced with when trying to figure out how to account for feminist values. With the Ideal for Socially Responsible Science, we have an ideal that is unafraid to endorse feminist values. Kourany's account is committed to the idea that '[…] social values inevitably enter into science […]' (Kourany, 2010, p. 68), but that ultimately, society has a definite say on what these social values will be (Kourany, 2010). These values, according to her, will be chosen according to the needs of society and guided by an egalitarian ideal. As far as scientific rationality goes, the SRS ideal is committed to the idea that it must be defined in terms of scientific success, but that this must, in turn, be defined in terms of both social success and empirical success. This means that scientific rationality must be reconceptualised in a way which allows it to account for what happens in the social context, which has traditionally been ignored by science. This, according to Kourany, will ensure that science:

> '[…] would no longer be plagued by sexism and androcentrism (as well as racism and other inegalitarian values) simply because those would be the morally justified political conditions under which scientific research would be pursued' (Kourany, 2010, p. 68).

The idea here, then, is that the SRS ideal, unlike the value-free ideal, will be able to fulfil both the moral/political role and the epistemic role that will allow feminist scholars to address injustices faced by women in the social context. It will do this, according to Kourany, by appealing to egalitarian values.

What Kourany is doing here is bold. It's one of the few value accounts that have been unafraid of bringing contextual values to the forefront. For a long time, philosophers of science have wanted nothing to do with social (contextual values). Some of the more mainstream philosophical literature that gave contextual values a role, gave them a role at the margins of scientific inquiry. That is, they gave them a role only after all epistemic considerations had been exhausted (think of underdetermination, for example). This was the idea that contextual values should not play a role unless there was some kind of uncertainty or gap between the evidence and the theory. If there was uncertainty, then it was OK to appeal to values. But not *all* values. Some philosophers like Laudan (1990), argued that the only kind of values scientists should be appealing to were epistemic values (cognitive values). In this sense, Kourany is going against this idea and arguing that contextual values should be just as important as epistemic considerations in the context of science.

Her proposal, however, is not without its problems. Many things require clarification and that might be important to keep in mind as we dive into her proposal. (1) First, it is unclear if Kourany is arguing that moral/political considerations should play a role alongside epistemic considerations throughout *all* stages of science. If we idealise the scientific process to consist of roughly four stages: 1) problem selection, 2) making methodological choices (what methods scientists are going to employ to collect data, etc.), 3) the collection and characterisation of data (based on the methods that they choose), and 4) the interpretation of the results, it is unclear if what Kourany is arguing here is that moral/political considerations should play a role alongside epistemic

considerations throughout *all* of these stages of the scientific process. While it seems uncontroversial that political/moral considerations play a role alongside epistemic considerations in the case of stage 1 and possibly stage 2, it's worrying that political/moral considerations should play a role alongside epistemic considerations in stages 3 and 4. It is unclear if Kourany is arguing that these considerations should be on par in principle, or whether political/moral considerations should play a role only after all empirical considerations have been exhausted (in cases of uncertainty). (2) Furthermore, it is also unclear what relationship each of these scientific stages have to each other. For example, to what extent should political/moral considerations in the selection of research affect the chosen methodology? I will return to these questions following a detailed overview of Kourany's proposal.

2.2.1. A Model for Scientists to Follow

Through an example of current research, Kourany guides us through how the SRS ideal might be implemented in practice. To do this, Kourany engages with the work of Carolyn West. Her research focuses on intimate partner violence and sexual assault in the United States. The aim of her research program is:

> '[…] to uncover the similarities in intimate-partner violence within the black and white communities of the United States without negating the experiences of black women and simultaneously to highlight the differences within the black and white communities without perpetuating

> the stereotype that black Americans are inherently more violent than other ethnic groups' (Kourany, 2010, p. 69).

As Kourany notes, in order to carry out this research aim successfully, many changes had to be made to the research project; including changing the focus, changing concepts & measurements, and integrating participants. For one, the definition of 'partner violence' was broadened in order to be able to account for the 'psychological, emotional, verbal, and sexual abuse, as well as physical abuse' (Kourany, 2010, p. 69). Changes were also made to the way that violence was measured, which, for the most part, was male focused. By male focused, Kourany means that what was previously taken into account was only male violent behaviour. This had to be changed in order to include and account for the experiences of women. This was done by including the context in which that violent behaviour took place, by taking into account the motives, and by accounting for the outcome that those behaviours had (2010). In addition to this, measurement scales were also revised in order to avoid taking white European American as the norm, and also to aid in avoiding a simplistic account of racial differences as the explanation for group differences within the black and white communities. This was done by looking into differences that might exists *within* groups (e.g. differences between subgroups within the black community), to help determine whether the differences usually attributed to race (e.g. between black and white communities), instead had to do with social inequalities. And finally, the research programme also required that the study participants be integrated into all stages of the research programme. This included integrating the study

participants '[…] from planning to implementing, interpreting, and disseminating results, in order to reduce one-sided research interpretations' (Kourany, 2010, p. 25-26). This approach is different from more traditional research. The research subjects are not only being studied, but their feedback is also being integrated in significant ways. After giving an overview, Kourany asks:

> '[…] what are the effects of the egalitarian social values that operate within West's research program? Do they compromise the justifiability of the knowledge the program provides? First, what are these values?' (Kourany, 2010, p. 70).

These are all great questions, indeed. In response to the question of what these values are, Kourany responds by saying that they seem to be that '[…] "Women deserve to live without fear of violence from domestic partners" and [that] "Black women deserve the same opportunities as white women to live in such partnerships."' (Kourany, 2010, p. 70). Kourany takes these values to be uncontroversial, and so do I. Secondly, Kourany takes these values to be playing a central role in West's research programme. This means that values like these aid West's research in avoiding the perpetuation of 'the stereotype that black Americans are inherently more violent than other ethnic groups' and instead motivates her team to explain differences (as far as empirically possible) in terms of social differences (Kourany, 2010). In other words, egalitarian values seem to be driving the focus away from research roads that will lead towards the perpetuation of the stereotype and instead re-shifting this focus towards new

roads that will lead towards new ways of explaining and accounting for the similarities and differences in intimate-partner violence within the black and white communities in the US. When the focus shifts, the study design changes. This is, in part, why West finds herself in need of changing the concepts, measurements, and why she chooses to integrate the study participants into the research process. In this sense, these values are indeed playing a central role in terms of controlling the direction of the research project. But what of the epistemic values? Kourany is not as clear as to what these actually are (as she is with the egalitarian values), but one epistemic value we might be able to highlight is: providing genuine knowledge of the context which West aims to reform. Kourany tells us that social values and epistemic values are interrelated. This means that West cannot expect to create social change without meeting the research programme's epistemic objectives. That is, if West wants to improve things for women, she must successfully account for the context which she aims to reform, and she cannot do this without adhering to strict epistemic standards (although, she does not make clear what these epistemic standards are). In this sense, West's research programme, according to Kourany, should be judged by two standards: (1) a moral/political standard and (2) an epistemic standard.

Kourany anticipates two objections here. The first is that the way she paints the picture makes it seem as though social and epistemic values cannot conflict in research programmes such as West's. She anticipates her objector asking: 'After all, what if the stereotype that black Americans are inherently more violent than other ethnic groups were true?' (Kourany, 2010, p. 71). What the objector is trying to get at here is the idea that if the stereotype were in fact true,

West's research programme would not be able to discover this truth, but not only this, West's research programme would also stand in the way of discovering such truth. Consequently, West would be sacrificing epistemic considerations for the sake of social ones.

Kourany replies by claiming that if the stereotype were true, West's research programme *would* be able to uncover this knowledge. What would make this possible is the fact that West's research programme is not committed to explaining differences between the black and white communities in terms of social differences *no matter what*, but only *as far as empirically possible*. This means that if the stereotype were true, the social differences explanation would not be very successful, but this doesn't mean that West's programme wouldn't be able to contribute towards proving that the stereotype was true. It would contribute, it would just take a bit longer to arrive at that knowledge since the core of her research programme is committed to the egalitarian values described above. Kourany also claims that none of this would 'contaminate' the knowledge produced since what West's research would be doing is directing research in a particular direction, guided by the needs of society (Kourany, 2010).

The second objection that Kourany anticipates is perhaps one of the most hotly debated in the philosophy of science literature. The objection that if the stereotype were true, not only would West's programme be affected by looking for answers in the wrong places, its internal practices would also be affected. These include:

> '[…] concepts (e.g., the concept of 'partner violence' itself); measurement scales and techniques; methods of subject selection; strategies of data collection, analysis, and interpretation; and even methods of publishing and disseminating results. It may even affect other central (p.73) aspects of the research process, such as consideration of the consequences of error and setting acceptable levels of risk (see, e.g., Douglas 2000)' (Kourany, 2010, pp. 72–73).

The idea is that these concepts, measurement scales, techniques, etc. are affected by changing the focus of the research project. As we saw earlier, West's focus on egalitarian values led to changes in the study design, including broadening the concept of partner violence, changing the way in which violence is measured, etc. The charge is that the egalitarian ideal guiding West's research programme would be contaminating the inner workings of science and thus slowing down the process towards the acquisition of truth. This is because, if it turns out that the similarities and differences in domestic violence within the black and white communities cannot be explained in terms of social differences, then West's research programme would be slowing down the process towards the acquisition of truth (the true explanation, if there was one), or so the charge goes.

Kourany responds by accepting that the SRS ideal cannot be *guaranteed* to produce truth, but that this is no different from other ideals, which also cannot *guarantee* that they will produce truth. As concerns West's research programme, Kourany claims that if researchers had chosen to follow a more direct way of investigating whether the stereotype was true, they would not get a whole lot of

cooperation from the black community, thus slowing the whole process down anyway. This is supposed to show that either way, the processes towards the acquisition of truth could be delayed. This means that the SRS ideal is not slowing the process down in a different way, compared to other ideals.

But even if we were to agree the SRS ideal does in fact slow down the process towards the acquisition of truth, Kourany argues that science has other responsibilities and goals that it must meet and that sometimes these are more important than the acquisition of truth and must be prioritised:

> 'It might be far more efficient for searching out the truth, for example, if scientists simply ignored the risks to human subjects or society or the environment posed by various lines of research and ethics committees and publishers and funders and the public at large allowed them to do so' (Kourany, 2010, p. 74).

But, according to Kourany, these social values are obviously far more important than efficiency. The idea here is that social values sometimes take precedence over epistemic ones, but that this is standard practice. And that what the SRS ideal is doing, is no different. An example of this is animal cosmetic testing. Animal cosmetic testing has severely hurt and killed many animals. Perhaps, for the cosmetic companies involved, using animals to test their products was an efficient way of testing their cosmetic products, but this doesn't mean that it wasn't ethically abhorrent to society. In fact, this is why most cosmetic companies have been forced to develop new testing methods.

Leaving the previous worry aside, Kourany considers another objection. This is the claim that even if we were to accept the SRS, feminists are far from agreeing on what their egalitarian values amount to and how they can best be employed. Kourany, however, does not think that these disagreements are an obstacle for the SRS ideal. She thinks that although there might be disagreement amongst feminist scientists and feminist scholars, there is also plenty of agreement that they can build on. As evidence, she cites West's underlying egalitarian values and adds that:

> '[…] it is equally uncontroversial that women deserve to live without fear of rape, sexual harassment, incest, and other forms of violence directed at women and that women deserve equal educational opportunities with men, equal employment opportunities with men, equal opportunities with health care, and so on' (Kourany, 2010, p. 76).

She takes these values to be uncontroversial and shared by feminists. Kourany argues that this is a good start. As a result, she thinks that the real question here should be: to what extent is the SRS ideal applicable? And not: is the SRS ideal applicable? This is because she thinks that there are enough values that feminists agree on and can work with. To answer the extent question, Kourany is optimistic and points to the adoption of feminist considerations in some scientific fields. Some of these include primatology, cultural anthropology, and paleontology. In the case of primatology, Kourany points to how the field has moved on from

gender stereotypes and has embraced new conceptual tools which have allowed them to explore new research questions such as the male parenting role and the evolution of female sexuality (Kourany, 2010).

2.2.2 Critical Analysis of the SRS

I would like to start by saying that I am very sympathetic to Kourany's proposal. I agree with her that feminist values can contribute to good science and that they can do so without sacrificing epistemic considerations. Kourany's proposal is a good starting point from which to start thinking about how values can play a role in science without appealing to underdetermination. However, there are some crucial problems with the SRS ideal as it stands. According to the SRS ideal, '[…] sound social values as well as sound epistemic values must control every aspect of the scientific research process from the choice of research questions to the communication and application of results, this to be enforced by such political means as funding requirements on research.'(Kourany, 2010, p. 49). This sums up the SRS ideal, but also raises many questions. In this section I argue that these questions pose significant problems for the SRS proposal and that for this reason, we should reject the proposal, at least until more has been said on the issues that these questions raise. First, Kourany claims that both social values and epistemic values should control every aspect of the scientific research project. This is a strong claim. One that has not been backed up with sufficient detail and argument. Second, it is unclear what the relationship is supposed to be between the different scientific stages and what role values are and are not allowed to play in each of these stages.

It is not entirely clear what Kourany means when she says that egalitarian values should control every aspect of the scientific research process. From the example she offered (West's study), we can infer that what Kourany means by this is that egalitarian values should mostly play some kind of guiding role. This guiding role is meant to influence the changes of concepts, measurements, etc. However, this is a bit vague and different from what she claims at the onset.

Again, if we imagine (for the sake of this discussion) that there are four key stages in the scientific process: 1) problem selection, 2) making methodological choices (what methods scientists are going to employ to collect data, etc.), 3) the collection and characterisation of data (based on the methods they chose), and finally, 4) the interpretation of the results, it is unclear how we should envision Kourany's suggestion playing out in actual scientific practice. It is not clear if her proposal is that scientists should set up the problem (stage 1) such that this requires making changes to all of the other stages, in which case egalitarian values would mostly be playing an indirect role or if she means that egalitarian values should play a direct role at every stage. This distinction is important.

In the indirect role, egalitarian values would arguably be playing a background role. In the direct role, egalitarian values would be playing a front and centre role. In the West example, egalitarian roles seem to be playing a direct role in problem selection (stage 1) and in making methodological choices (stage 2). In stage 1, egalitarian values seem to be acting as reasons in themselves, which allow the scientists to make decisions about the kind of problem that they are going to research, and in stage 2, egalitarian values also seem to act as reasons in themselves that allow scientists to make methodological choices. However, it is

unclear if Kourany is also claiming that egalitarian values should be acting as reasons in themselves when it comes to the collection and characterisation of the data (stage 3) and in the interpretation of the results (stage 4). For example, should scientists be able to appeal to egalitarian values as reasons in themselves to reject results? Should egalitarian values be able to take precedence over epistemic values such as explanatory power or scope? Furthermore, it is equally unclear what Kourany considers epistemic values to be and (just as egalitarian values) what their role is throughout the scientific process. These questions raise important issues for the SRS ideal. This is because, in not exploring these questions, Kourany is unable to weigh up the possible consequences that come with endorsing (or rejecting) a direct role for egalitarian values throughout the entire scientific process and, because she does not explore these issues, the SRS ideal is unable to provide answers to scientists about what it is exactly that they should be doing in practice.

Additionally, another problem is that Kourany implicitly seems to be committed to the idea that there is a distinction between epistemic values and nonepistemic values, without giving an account of the distinction. Kourany makes an important step in arguing that social values should be considered alongside epistemic considerations. However, the role of epistemic values is also a hotly contested topic, and Kourany is not clear about the role that epistemic values should be playing throughout the scientific process. If the goal is that scientists should be able to easily appeal to Kourany's SRS ideal, then Kourany must be clear and a bit more precise about the difference and the role that epistemic values should be playing throughout the scientific process.

The last problem that I would like to discuss before moving on to discuss Douglas' account is Kourany's lack of discussion about the complex relationship between the different stages of the scientific process, such as problem selection and methodology. Douglas discusses this problem and I will dive into this problem in more detail in the next section, when we get to her account. For now, I would just like to highlight the problem as regards Kourany's proposal. As mentioned in the previous paragraphs, Kourany is not clear about what precise role values (egalitarian and epistemic) should be playing throughout the scientific process. Because of this, it is difficult to unpack the problem I want to point to that might arise between the different scientific stages, but here it goes. If we assume that Kourany is in fact arguing that egalitarian values should play a direct role in problem selection and methodology (stages 1 and 2), then there is an urgent question about how scientists are supposed to avoid selecting these two things (guided by egalitarian values) in a way that doesn't predetermine the outcome of their research. The problem I want to highlight is that Kourany does not establish or discuss the limits or parameters that values should have in relation to the various scientific stages. It is unclear, for example, to what extent egalitarian values should be guiding decisions about methodology. This is a problem for the SRS ideal because it is unable to offer guidance on important issues like this. While I agree that values such as egalitarian values should have a more direct and active role throughout the scientific stages, I also think that there should be certain restrictions placed on these kind of values in order that science is still able to produce reliable knowledge. I will come back to treat this issue in the next section.

For now, I aim to highlight the vagueness of Kourany's proposal and why I think the SRS is not a desirable ideal to adopt.

In the next section, I look at Douglas' proposal (Inductive Risk Account) and see whether that account fares better than the SRS ideal.

2.3. An Inductive Risk Account (Douglas)

Heather Douglas' Inductive Risk argument is also an excellent candidate for the non-underdetermination group. What Kourany did, was propose a new scientific ideal; the SRS ideal. Within this ideal, she also created a new role for contextual values. Douglas' proposal is much more technical and narrow. She is concerned with uncertainty and the consequences of error, and what these mean for scientists. Very generally, Douglas thinks that contextual values should come in to aid scientists in weighing up the potential social and ethical consequences of error in their research as well as in guiding scientists through situations of uncertainty. However, in Douglas' account, the role of contextual values is not a par with epistemic values, as we shall see. The role of contextual values is highly constrained and controlled (although, in different ways from the value-free ideal). I argue that Douglas' account is a more desirable proposal, to a certain extent. I begin by giving an overview of her account and then move on to a critical analysis.

Douglas argues that, contrary to the value-free ideal, there is no distinction between what we might call epistemic values and nonepistemic values. As Douglas notes, according to the value-free ideal, epistemic values are values that were thought to be associated with knowledge and were therefore thought of as acceptable in the context of scientific inquiry. Nonepistemic values

were those that were thought of as values that were not related to knowledge and were therefore thought of as unacceptable. Which, if we recall, this was precisely the problem that feminist scholars were facing when appealing to the value-free ideal; contextual values were unacceptable under this ideal.

Douglas appeals to several philosophers who have made a similar point, which is that it is often the case that epistemic values end up reflecting contextual values in the scientific process. The idea is that if the selection or the preferability of certain epistemic values end up reflecting non-epistemic values, then it is hard to argue that we can make a clear demarcation between epistemic and non-epistemic values. An example of this, as Douglas notes, can be found in scientific studies of gender: '[…] where socially desired biological determinism appears within scientific research in the form of simplicity […]' (Douglas, 2009, p. 90). The idea is that theories like biological determinism are oftentimes not defended because they are simple, they are defended due to social motivations. For example, a biological theory of gender dimorphism has undeniable links to the social context (e.g., people appealing to this kind of theory in order argue that the natural place of women is in a heterosexual relationship looking after the home and a bunch of babies). What's interesting here is that these supposed biological differences conveniently match socially desired gender roles (e.g. the idea that women are biologically wired to be more nurturing than men and that because of this, women are better suited for certain kinds of jobs (jobs that include caring for others, for example). The thought here is that traditional epistemic values such as simplicity often operate as a kind of cover for contextual values, when in reality there are many social motivations involved. The thought is that oftentimes

scientists do not defend biological determinism because it is a simple theory, or because it is able to explain a greater number of other theories, such as gender dimorphism. While it may be the case that it is a simple theory and that it is able to explain other theories, the point here is that values such as 'simplicity' might just be an excuse to keep on choosing and defending scientific theories that are really being chosen on the basis of contextual values. The main idea here is that epistemic values might not be as easy to demarcate from non-epistemic values as commonly thought. Because of this, Douglas, along with others, argue that a clear demarcation between epistemic and non-epistemic values is not tenable (Lacey, 1999; Longino, 1996; Rooney, 1992). And because this distinction is not tenable, Douglas thinks that there is a need for a new topography of values. With this, Douglas means to give a new account of the kinds of values available and the boundaries involving these values in the context of scientific inquiry.

As stated earlier, Douglas proposes that, contrary to what the value-free ideal proposed, there is not a clear demarcation between epistemic values and non-epistemic values. Instead, she proposes three categories for thinking about values: ethical, social, and cognitive. These categories, according to Douglas, are continuous as opposed to discrete (or strictly demarcated) categories. This is different from the value-free ideal that insisted on two discrete categories for thinking about values: epistemic values and non-epistemic values.

Before we get into what each of these three value categories entails, it might be worth pointing out a crucial feature of Douglas' account. Under the value-free ideal, all acceptable values were clustered together under the label of epistemic values. Contrary to this, Douglas argues that some of these values (i.e.

internal consistency and predictive competence) are not values at all but basic criteria that every scientific theory should meet (we can think of this as a kind of upgrade). In this sense, it might be helpful to distinguish between four categories in Douglas' account: basic criteria, ethical values, social values, and cognitive values. Cognitive values, as we shall see, will house the old epistemic values from the value-free ideal. I will address each one of these in turn.

Ethical values, according to Douglas, have to do with what is good or right. Douglas thinks that these kind of values '[…] help us weigh whether potential benefits are worth potential harms, whether some harms are worth no price, and whether some harms are more egregious than others' (2009, p. 92). Here, Douglas is referring to instances in which scientists might have to think about the potential impact of their research. An example of an ethical value, according to Douglas, is the right of a human being not to be used for experimentation without fully informed consent (Douglas, 2009). The idea, I take it, is that scientists should ask whether it would be ethically acceptable to carry out a research project in which human beings were being used for experimentation without their fully informed consent and to weigh the potential benefits and harms that such a decision might come with.

Social values, on the other hand, are values which '[…] arise from what a particular society values, such as justice, privacy, freedom, social stability, or innovation' (2009, p. 92). As Douglas points out, these are related to what she calls ethical values and will thus sometimes overlap. For example, someone might want to pursue a research programme because doing so would benefit a great number of people (and this benefit is a good thing); ethical value, but also want

to pursue the research programme because of some underlying social value; such as justice: 'For example, the social concern one might express over poverty can be tied to issues of justice [social concern] or to concern over the increased health risks [ethical concern] borne by impoverished individuals' (Douglas, 2009, p. 92). Social and ethical values, however, can also be opposed to each other, where certain social values run contrary to certain ethical values. 'For example, the social value of stability was antithetical to the ethical values underlying the push for desegregation and the civil rights movement' (2009, p. 92). The social value in this example would be stability (to keep things the way they are) and one of the ethical values underlying the push for desegregation and the civil rights movement might be an ethical concern for the death and suffering of others (to use an example already provided by Douglas).

The last group of values are cognitive values. Douglas takes this group of values to be distinct from what we may traditionally understand as epistemic values (values that contribute towards the attainment of truth). Douglas explains: 'Rather, I mean those aspects of scientific work that help one think through the evidential and inferential aspects of one's theories and data. Taking the label "cognitive" seriously, cognitive values embody the goal of assisting scientists with their cognition in science' (2009, p. 93). She takes cognitive values to be: simplicity, explanatory power, scope, consistency, predictive precision, and fruitfulness. These are the values that were once considered epistemic values under the old value-free ideal, values that were considered to be directly related to knowledge and therefore acceptable in the context of scientific inquiry. However, Douglas insists on drawing a distinction between epistemic and

cognitive values. In her proposal, Douglas renames epistemic values to 'basic criteria'. According to her, basic criteria have more to do with truth. That is, basic criteria are appealed to in a journey towards the acquisition of truth, where cognitive values aid in creating better science in a way that secures new possibilities of research.

Following this line of thought, Douglas limits the basic criteria to two: internal consistency and predictive competence. A scientific theory is internally consistent if it does not have any contradictions within it. Having an internally inconsistent theory leads to contradiction and these contradictions can lead to unreliable conclusions; which are undesirable in a scientific theory (Douglas, 2009). Predictive competence has to do with the extent to which scientific theories are equipped to make predictions. These predictions do not have to be one-hundred percent precise, but rather, they have to have a good approximation. If a theory fails to make predictions, this is a clear indicator that something is wrong with the theory. Predictive competence, however, is different from predictive precision. Predictive precision is as its name suggests: making precise predictions. In the case of predictive competence, it is not required that the theory in question is perfectly precise in its predictions, only that the theory makes approximately correct predictions (Douglas, 2009). According to Douglas, internal consistency and predictive competence are basic criteria that every scientific theory should meet. If they fail to meet these basic criteria, this signals that there is something seriously wrong with the theory. These two criteria make up the basic criteria category (distinct from ethical, social, and cognitive categories).

Basic criteria are, according to Douglas, '[…] about the ultimate goal of research, which is true (or at least reliable) knowledge' (Douglas, 2009, p. 93). That is, basic criteria should help in deciding whether a statement is true or false. Douglas appeals to Laudan's (2004) earlier work, where he argues that many epistemic values actually have little to do with reaching this goal. For example, a value such as explanatory power (which is usually thought of as an epistemic value), does not have a 'necessary connection' to truth (Douglas, 2009). Explanatory power cannot tell us if a statement is true or false. If statement 1 can explain more than statement 2, this does not mean that statement 1 is true. There is no necessary connection between explanatory power and truth. If we follow this line of thought, according to Douglas, we end up with very few epistemic values (what she renames 'basic criteria') that actually aid in the attainment of truth, two actually, which are internal consistency and predictive competence.

According to Douglas, basic criteria (i.e. internal consistency and predictive competence) '[…] operate in a negative way, excluding claims or theories that do not embody them, rather than as values, which are aspects of science for which to strive, but which need not be fully present in all cases' (Douglas, 2009, p. 94). The idea here is that basic criteria are doing different types of work. Basic criteria seem to 1) aid in the attainment of truth (or at least reliable knowledge) and 2) work as a kind of arbiter between acceptable and unacceptable scientific theories. While values seem to 1) be things to strive towards (but which won't necessarily lead us to the attainment of truth or reliable knowledge) and 2) which will not necessarily rule out scientific theories.

This move makes Douglas' account somewhat similar to the value-free ideal. The value-free ideal insisted on drawing a clear distinction between epistemic values (what Douglas calls basic criteria) and non-epistemic values. Epistemic values were knowledge-conducive and non-epistemic values were not. In Douglas' account, basic criteria are, in a sense, the new epistemic values, although with a new role. Internal consistency and predictive competency are the knowledge-conducing criteria (that all theories must have) and values (cognitive, social, and ethical values) are not knowledge-conducive and will therefore play a more restricted role in her account.

To recap, under Douglas' account we have: basic criteria (this category is made up of two old epistemic values: internal consistency and predictive competence) and values which include the ethical, social, and cognitive value categories. All scientific theories are required to be internally consistent and predictively competent but not all scientific theories are required to embody ethical, social, and cognitive values. This means that internal consistency and predictive competence have been rerouted out of Douglas' values discussion. The focus now shifts from this demarcation to the role that ethical, social, and cognitive values *should* have in science.

2.3.1. Role of the Ethical, Social, and Cognitive Values

In thinking about the role of the ethical, social, and cognitive values, Douglas claims that these values can play a direct or indirect role in science. In the direct role, '[…] values can act as reasons in themselves to accept a claim, providing direct motivation for the adoption of a theory' (2009, p., 96). In the indirect role, '[…] values can act to weigh the importance of uncertainty about the claim,

helping to decide what should count as *sufficient* evidence for the claim' (2009, p. 96). In this indirect role, as uncertainty goes down, so does the use or power of values and, as uncertainty goes up, so does the use and power of values. This means that if there is no uncertainty, there is no indirect role for values. In thinking about direct and indirect roles, Douglas argues that direct values, if used inappropriately, can threaten the integrity of science. Indirect values pose no such threat to the integrity of science (because of their built-in restrictions).

2.3.1.1. Direct Role

When thinking about a direct role for values, all values are considered (ethical, social, and cognitive). It might be helpful to think of these values as 'available options' for this role. But where can these values play a role? According to Douglas, these roles are limited to the very early stages of scientific research. Namely, when deciding what scientific projects to pursue and when deciding what methodology to use. This means that, under Douglas' account, it is appropriate to appeal to ethical, social, and cognitive values when trying to decide whether or not to pursue a research project. One might, for example, be in favour of supporting or pursuing a particular research project because of one's deeply held social values. Presumably, this also means that one might be legitimately allowed to oppose pursuing a certain line of research because doing so would go against one's deeply held social values (Douglas doesn't discuss this). In addition to utilising values to help make a decision about what research projects to pursue, Douglas argues that values can also help make decisions about what research projects to fund. That is, values can play a direct role in helping decide what kind

of research projects governments and other funding institutions should fund. Douglas claims that 'We choose to fund areas of research about which we care to know more' (2009, P. 99). And she follows this up with an example: 'The government may fund a project studying the possibility of increased photovoltaic cell efficiency because the grant administrators consider any increase in efficiency to be important to the country's future energy security and economic development' (Douglas, 2009, p. 99). This, I think, is a very important stage in the scientific process that is currently discussed very little in the philosophical literature, but one that requires a much more detailed discussion including the process that research proposals need to go through in order to even be considered for funding. It is not obvious that there is a clear and neat relationship between what a society values, for example, and what research actually gets funded. There are many studies which have shown that the relationship and the factors involved might be a bit more complicated (Coulter et al., 2014) I will come back to this in the next chapter.

The second way in which values are able to play a legitimate direct role, according to Douglas, is when it comes to deciding what methodology to use. Douglas points out that during the selection of methodology there might be questions about the ethical acceptability of such methodology. For example, cases in which the methodology exposes human subjects to harm. Douglas doesn't mention non-human subjects, but it is easy to see how this can be extended to non-human subjects as well. Animal testing in cosmetic products is a fitting example. Many cosmetic companies test their cosmetic products on animals, which has resulted in many animals being hurt and killed during the process.

Under Douglas' account, values would be able to play a legitimate role in choosing the method to be (or not be) used. The values in this case would act as reasons for choosing (or presumably rejecting) a particular method. According to Douglas, '[...] a more ethical methodology, a socially desired research program, a cognitively interesting project, will be selected because of the value placed on those options' (Douglas, 2009, p. 100).

These are the two ways in which values are able to play a direct role: deciding which research programmes to pursue and what methodology to use. However, Douglas warns against the danger in using these two to predetermine the outcome of a study (something which Kourany does not): 'One cannot use values to direct the selection of a problem and a formulation of the methodology that in combination predetermines (or substantially restricts) the outcome of a study' (Douglas, 2009, p., 100). Predetermining the outcome of a study goes against the core value of science, which for Douglas is producing reliable knowledge. When a scientist selects a problem and methodology to predetermine the outcome of a study, they are in danger of producing unreliable knowledge because this approach does not allow for the possibility that the evidence may contradict the predetermined outcome (2009). This is an important point. Douglas gives the example of hormonal influences on behaviour in children. According to her, 'It is already known that (a) there are hormonal differences in children, and (b) there are behavioural differences in children. A study that simply measures these two differences to find a correlation would be inadequate for several reasons' (Douglas, 2009, p. 100). The first reason, according to Douglas, is that this correlation tells us little about causation. This is because behaviour can

also change hormone levels (just as hormones can influence behaviour). A second reason, according to Douglas, is that this does not take into account other factors that also influence behaviour, such as social expectations. Not taking these factors into account reinforces the assumption that hormones somehow determine behaviour (Douglas, 2009). It does this by excluding, by design, other possible explanations.

Just as Douglas acknowledges that utilising problem selection and methodology together in a way in which predetermines the outcome of a study is a problem, she also acknowledges that '[…] there are no sure-fire ways to guarantee that we are not subtly presuming the very thing we wish to test' (Douglas, 2009, p. 101). She continues: 'The best we can do is to acknowledge that values should not direct our choices in the early stages of science in such a pernicious way' (Douglas, 2009, p. 101). She goes on to acknowledge that there is a lot more work needed in this area of research to spell out, in greater detail, the relationship between problem selection and methodology. But that for now, what she does want to make clear, is that the direct role for values that she is proposing in the early stages of science should not be understood as one which allows those involved to undermine the value of science (to produce reliable knowledge).

2.3.1.2. Indirect Role

As far as the indirect role for values in science, Douglas argues that 'The indirect role for values in science concerns the sufficiency of evidence, the weighing of uncertainty, and the consequences of error [...]' (2009, p. 103). This means that in the indirect role, values only come in when there are decisions to be made about

the available evidence, in cases of uncertainty, and in cases where the consequences of error must be considered. In this case, as in the case of the early stages of science, all values are considered (social, ethical, and cognitive).

According to Douglas, there are different stages of the scientific process at which a scientist might need to make decisions about what empirical claims to make. These stages are, roughly 1) when making methodological choices, 2) in the collection and characterisation of data, and 3) in the interpretation of the final results. Perhaps one thing to note here is the difference between her proposal and the value-free ideal. What Douglas is proposing is that *all* values are able to play a legitimate indirect role at these stages of the scientific process. Under the value-free ideal, only cognitive (epistemic) values were allowed to play a role, although, contrary to Douglas' account, they were allowed to play a more direct role. The reason values are *only* able to play an indirect role under Douglas' account is because evidence is front and centre in these stages and values only come in to help deal with cases of uncertainty and the consequences of error. This means that as uncertainty decreases, so does the role of values. That is, if there is no uncertainty, then there is no need for values.

When making methodological choices, Douglas argues that there is an indirect role available for values. This role involves appealing to values in order to weigh up the available options. Douglas gives the example of setting the level of statistical significance. As Douglas explains, setting the level of statistical significance is setting a standard for the amount of evidence that is needed before a claim is taken to be 'significant'. This means that there is a choice to be made about where exactly to set the level of statistical significance.

Deciding where to set the level of statistical significance has consequences for the balance between false positives and false negatives. As Douglas explains, if a scientist lowers the level of statistical significance, they will end up with more false positives. If they decide to raise the level of statistical significance, they will end up with more false negatives. Finding a balance between the two is a tricky job that is oftentimes not possible. This is because sometimes finding a balance requires resources that are simply not available at the time of the test. One might, for example, require more study participants, but due to time constraints or budget constraints, that might not be possible. So, as Douglas points out, choices must be made based on what the scientists do have at that moment.

Scientists must weigh up their options: should they accept more false positives or more false negatives? Douglas argues that this is exactly where values should come in: to help weigh up the costs of these options. This involves taking into account the social and ethical costs. In other words, when scientists are not able to design a more accurate test which will allow them to balance out the false positives and the false negatives, then they should appeal to ethical, social, and cognitive values. Douglas discusses the example of an epidemiological study that studies the effects of an air pollutant on a population. In this example, the consequences of false positives would mean that the air pollutant in question would be considered a health hazard, when it is not. According to Douglas, this alarm would lead to unnecessary and costly regulations that would not benefit anyone. Furthermore, the belief that the air pollutant in question is hazardous might also have a negative impact of future research. On the other hand, the consequences of a false negative would mean that the pollutant in question is

considered safe, when it is not. According to Douglas, this could lead to people being harmed by the pollutant. In the scientific context, this also means that scientists would be likely to accept the result and not follow up the research any further (Douglas, 2009). This is where values come in to do some work. 'The social and ethical costs are the costs of the alarm and the regulation on the one hand, and the human health damage and resulting effects on society on the other. The cognitive costs include the mistaken beliefs among scientists that shape their future research' (Douglas, 2009, p. 105). According to Douglas, some weighing (she doesn't provide a method for doing this) of these values must take place, as these values are relevant to setting the level of statistical significance.

The same general idea applies during the collection and characterisation of data stage. This includes using values to decide whether or not to include experimental runs. It also includes using values to weigh up uncertainties to do with data characterisation. Douglas notes that oftentimes it is not entirely clear whether scientists should include all experimental runs or not. There seems to be a degree of uncertainty and this is where values should aid; in helping to make these kinds of decisions. Douglas gives the example of Nobel Laureate Robert Millikan and his Oil Drop Experiment, which was used to measure the charge of an electron. In this case, when Millikan was running the experiments, there were some experimental runs that did not duplicate the results that other experimental runs confirmed. Because of this, Millikan had to decide which experimental runs to keep and which to disregard (Douglas, 2009). Characterising data is also far from always being crystal clear and oftentimes involves dealing with borderline cases. This is especially the case when experts might have different opinions as to

what they are looking at. For example, if scientists are looking at a rat liver slide and this appears abnormal, they might have to make a judgment about whether what they are looking at is cancerous, and if it is, make a decision about what kind of cancer it is (Douglas, 2009). In these cases, Douglas argues that scientists must take into account the consequences of error that their decisions might have; and values have a very important role in making a judgement call in situations like this.

The next stage is interpreting results. This involves the choice of accepting or rejecting a theory based on the available evidence. Douglas notes that: 'Often, the set of evidence leaves room for interpretation; there are competing theories and views, and thus some uncertainty in the choice' (Douglas, 2009, p. 106). Consider the case of scientists studying a rare disease and its links to genetics. If their pool of study participants was low due to the resources that were available to them at the time, should they accept or reject their results? Douglas argues that in situations like this, scientists should consider the consequences of error that their choices might have. Douglas notes that these consequences will be different, depending on the research project. But she argues that values are needed to weigh up the consequences of error.

Douglas points out that 'Such actions entail social consequences, many of which are ethically important to us' (Douglas, 2009, p. 106). For this reason, social and ethical values are needed to weigh up the possible consequences of error. The important detail to highlight here though, is that as uncertainty decreases regarding the interpretation of evidence, so does the role of values. So values are only able to play a role in so far as there are instances of uncertainty. If there is

no uncertainty, then values do not have a legitimate role to play, according to Douglas.

A similar rule applies to scientific theories that embody cognitive values such as simplicity, scope, fruitfulness, and precision. According to Douglas, these values should not serve as reasons in themselves to accept scientific theories because these values do not necessarily aid in the search for truth. Instead, according to Douglas, '[…] the presence of cognitive values aids scientists in thinking with a theory that exemplifies cognitive values' (Douglas, 2009, p. 107). This means that scientific theories that embody cognitive values such as simplicity, aid scientists in working with the theory more easily, in so far as there is uncertainty regarding the available evidence (for example, it might be easier to work with a simple theory). But, should the uncertainty decrease, so should the reliance on cognitive values. In this sense, cognitive values are able to play a legitimate indirect role in so far as there is uncertainty regarding the available evidence.

2.3.2. Critical Analysis of the Inductive Risk Account

I take Douglas' proposal to be an important departure from the value-free ideal. In addition to the very early stages of problem and method selection, Douglas' proposal makes room for the idea that contextual values can play a legitimate role throughout *all* stages of the scientific process. It also gives feminist philosophers of science a value account option that doesn't require appealing to underdetermination in order to say that contextual values can play a legitimate role throughout the scientific process. Under Douglas' account, scientists don't

have to appeal and be committed to underdetermination in order to appeal to social and ethical values. They only have to have the evidence be underdetermined by the theory *at that moment*. This means that there only has to be uncertainty at the time of the decision-making-process. This is different from committing to an underdetermination thesis which holds that *in principle*, evidence is underdetermined by theory choice.

Contrary to the SRS ideal, Douglas offers a lot more detail about what kind of values she has in mind, the distinctions between these values, and the role that these values should play throughout the scientific process. Douglas proposes a reshuffling of values where what we end up with is a distinction between basic criteria and values. The two basic criteria that all scientific theories must meet are internal consistency and predictive competence. The rest are values and these include social, ethical, and cognitive values, where, depending on the scientific stage, they will play different roles. They will play either a direct role or an indirect role, depending on the stage.

I think these distinctions are important because they allow us to ensure that science is able to keep on producing reliable knowledge. I agree with Douglas that we should set some kind of standard about the minimal requirements that a scientific theory should meet (internal consistency and predictive competence). Kourany, on the other hand, is not clear on this point and this raises a problem for her proposal. Epistemic/cognitive values have traditionally been considered to set this standard. Depending on what philosopher we ask, we will come across different arguments about why certain epistemic/cognitive values are more conducive to truth than others are. Kourany does not seem to be convinced that

any epistemic/cognitive values contribute to truth and I am not going to argue that she should. What I do want to argue is that we don't have to buy into the realist argument that science aims for truth in order to make a case that scientific theories should, at the very minimum, be internally consistent and have predictive competence. Having internally consistent theories decreases the possibility that the theory will be false, thus allowing science to keep on producing reliable knowledge. Predictive competence, as Douglas argues, ensures that we are able to rule out scientific theories whose predictions fail. It would be a serious worry to want to keep on holding on to a theory that fails at predicting every single time. In this sense, I agree with Douglas that internal consistency and predictive competence should play the role of basic criteria that all scientific theories should meet.

Furthermore, Douglas argues that social, ethical, and cognitive values can either play a direct or indirect role, depending on the scientific stage. Kourany is not clear on what the distinction is between these values and what role or to what extent they should be playing a role throughout the scientific process. For this reason, I think that her account raises more questions than solutions. Douglas begins by describing a direct role for these values in the first two stages of the scientific process: problem selection and methodology selection.

Douglas argues that social, ethical, and cognitive values can play a direct role when it comes to deciding which research to fund. According to her, 'We choose to fund areas of research about which we care to know more' (Douglas, 2009, p. 99). For example, if governments, who oftentimes fund scientific research, care to know more about certain issues, then they will fund those

research programmes. Douglas doesn't spend a whole lot of time on spelling out the details of how this will work or how this might look in actual practice other than assuming a relationship between funders and the research that gets funded where some kind of discussion or weighing up of values takes place. I don't think this relationship is as neat as Douglas seems to suggest and for this reason I think that it is worth spending some time reviewing how funding actually gets allocated, to then be in a better position to propose what role values will play in this initial stage. In the next chapter, I develop a case study that looks into genetic explanations of sexual orientation and the role values seem to play when it comes to funding LGBTQI+ related research. I argue, along the same line that Kourany argued in 'A Philosophy of Science for the Twenty-First Century' (2003), that what we need are laws in place which require scientists to include minority groups in their research as a funding requirement. Additionally, we also need legislation that makes sure that research topics that are beneficial to minority groups get the funding they need.

Douglas also argues that social, ethical, and cognitive values can play a role in the selection of the methodology. On this point, however, Douglas only discusses the role that values should play in choosing an ethical methodology. That is, in the role that values should play so that scientists don't end up with ethically problematic methods. To illustrate this point earlier, I gave the example of cosmetic companies and the methods they choose for testing their products. Some, for example, test on animals. This has led to a lot of unnecessary animal suffering and animal deaths. On Douglas' suggestion, this is where values are supposed to come in, to help weigh up the costs. I agree with Douglas on this

point. However, what I think is missing, and especially important for feminists, is exploring the *additional* role that values have as far as the choice of concepts that are embedded in methodology. She does not discuss this. However, this is where I think feminist values might be able to do some of the most beneficial work. I will argue in future chapters that the choice of concepts will determined by the goals that one has. This is a big claim that I will spell out in greater detail throughout the last three chapters. For now, it is only important to point out that Douglas does not address this point.

When it comes to the last three stages of the scientific process (values can play a direct and indirect role in making methodological choices), Douglas argues that social, ethical, and cognitive values should only play an indirect role, and I agree. I am on board with the proposal that these values should only be appealed to in these stages in cases of uncertainty (except when it comes to choosing methodology, where values can also play a direct role). I think that this restriction also plays a good role in ensuring that science produces reliable knowledge. For example, this restriction prevents scientists from appealing to contextual values when there is no uncertainty about the characterisation of data but still allows scientists to appeal to these values if there is uncertainty about the characterisation of data.

2.4. Conclusions

I propose that Kourany's proposal (SRS ideal) is not a workable ideal for feminist scholars because of the many problems it faces. There is no discussion about what distinction there is between values or about what specific role these values are

supposed to play throughout the scientific stages. There are just very general claims that say that the SRS ideal is committed to '[…] implanting egalitarian social values into science' (Kourany, 2010, p. 68) and that '[…] sound social values as well as sound epistemic values must control every aspect of the scientific research process[…]' (Kourany, 2010, p. 49). However, it is not clear exactly how scientists are supposed to cash out these values. It is also worrying that Kourany does not propose basic criteria that all scientific theories must meet. This is important because while it is important that we be able to find a role for feminist values in science, it is also important that the knowledge being produced by scientists be reliable knowledge. However, we can't ensure that unless we set up limits about the role that values can and cannot play throughout the scientific stages.

Douglas' proposal provides us with distinctions between values and a more detailed guide about the role that these values are able to play throughout the scientific stages. In doing this, she proposes that we upgrade internal consistency and predictive competence to basic criteria that all scientific theories must meet in order to ensure that science is able to produce reliable knowledge. In this sense, Douglas' proposal is a more complete account. However, I think that in order for this account to be useful to feminist scholars, more needs to be said about the direct role that values are able to play in the problem selection and in the methodology selection stages. This is because I think that one of the most important roles that feminist values can play in science is precisely during these two stages. I think that more needs to be said about the role that values can play in terms of funding because, contrary to what Douglas argues, I do not think there is a neat relationship between what society values and what research actually gets

funded. It's a little messier than that and I think we should ensure that values are playing a more active role than what Douglas proposes. Furthermore, when it comes to selecting methodology, Douglas does not discuss the role that concepts play at this stage of the scientific process. However, I think that this is another area where feminist values could play a crucial role.

In order to explore these issues, I engage with a specific area of research in genetics: sexual orientation. In the next chapter, I introduce this literature and explore the role that values are playing throughout all of the scientific stages of this research area. I argue that one of the most important role for values lies in the choice of concepts and that this choice will be determined by the goals that one has.

3. Genes, Sexual Orientation, and Values: A Case for Queer Feminist Values

The plan for this chapter is to explore, through a case study, the *direct* role contextual values play in two scientific stages: problem and methodology selection. I argue that one of the most important roles that feminist values can play in science is during these two stages. In the last chapter, we looked at Douglas' proposal for the role that values could play in these two scientific stages. Douglas' discussion of values included social, ethical, and cognitive values. In the first half of this chapter, I argue for a more active role for values than Douglas proposes in the first stage (problem selection). Following Kourany (2003), I argue that we should push for legislation that ensures that minority groups[2] are included in scientific research and that we should push for legislation that ensures that research topics that are beneficial to minority groups get the funding they need. In the second half of this chapter, I argue that one of the most important roles that values can play in the methodology selection stage lies in the choice of concepts[3] and that this choice will be determined by the goals that one has. Douglas does not discuss this. My suspicion is that unless philosophers of science or scientists are actively thinking about politically charged concepts and the work that these are doing in the methodology selection stage, this will not be a topic that will be on their mind as one that needs to be discussed.

In order to carry out this work, I engage with research in genetics that aims to give an explanation of sexual orientation. I take scientific research that looks into sexual orientation to be a fitting example where the concepts used in its

[2] Members of groups, who, compared to dominant groups, experience several disadvantages.
[3] I am not attempting to argue for nor introduce a metaphysical distinction between concepts and values. I use the term 'concept' here as a tool with which to classify and define things.

methodological approaches are politically charged. I argue that, what I call *queer feminist values* should play a front and centre role in this area of research. I use the term 'queer' as an umbrella term that captures minority sexual orientations, an umbrella term for the LGBTQI+[4] community. My intention with placing the term 'queer' in front of 'feminist values' has to do with placing queer perspectives at the forefront of this research project.

Following on from this, there might be a question about what feminist values are. Feminist values vary. There is not one set of values that all feminist philosophers agree on. However, one thing that feminist philosophers might agree on is opposition to values associated with misogyny and patriarchy, this includes values such as sexism and discrimination. It is in this sense that I use 'queer feminist values' in this chapter. I do not aim to give an exhaustive list of feminist values, this would exceed the aims of this chapter.

It is equally important to note that most of the scientific work in this area of research was developed in a western context. As a result, so too are the assumptions about what a sexual orientation is. For this reason, my analysis in this chapter is limited to western understandings of sexual orientation. Including, for example, the relationship that the sexual orientation concept has with other concepts such as sex and gender. I do not engage with sexual orientation understandings outside of this western context because doing so would exceed the aims of this chapter and of this dissertation. However, in mapping out a new potential area for values, my hope is that this will then open up more space to talk

[4] Acronym for lesbian, gay, bisexual, transgender, queer, intersex +.

about how different understandings of sexual orientation might challenge genetic understandings of sexual orientation.

3.1. An Introduction to Scientific Research that Studies Sexual Orientation

Scientific research that looks into the origins of sexual orientation in the western context has been around since the mid 1800's. A key figure in the development of such research is Karl Heinrich Ulrich (Heinrich Ulrichs, 1994). In Ulrich's *The Riddle of the "Man-Manly" Love*, we begin to see the development of a theory of sexuality that had a great impact on the development of concepts such as heterosexual and homosexual, as we know them today (1994). One of the earliest recordings of the heterosexual and homosexual concepts was in 1869, by Károly Mária Kertbeny (Feray et al., 1990). In the context of the U.S., one of the earliest recordings in print was by Dr. James G. Kiernan in 1892 and again in that same year by Dr. Krafft-Ebing (Katz, 2007). It is then that discussion about what kind of thing homosexuality and heterosexuality are begins. With this claim, I do not aim to suggest that heterosexuals and homosexuals did not exist prior to this time. I aim to frame our current discussion and give an account of where some of the concepts that are *currently used* in the genetics literature originate. Following the next few years after these concepts first showed up, their meaning started changing. When Kiernan and Krafft-Ebing were writing, the norm was not heterosexuality. The norm was reproductive sex, full stop. In fact, Kiernan's concept of heterosexuality described a person who was attracted to both women and men (similar to our current bisexuality concept, in this sense) and was considered abnormal because heterosexuals sought sexual pleasure without an

aim for procreation (Katz, 2007). Homosexuality was also considered abnormal because it was thought that homosexuals 'deviated' from their own gender norm (Katz, 2007). In Krafft-Ebing's work, however, 'heterosexuality' described an erotic feeling toward members of the opposite-sex and homosexuality described an erotic feeling toward the same-sex. According to authors like Katz, Krafft-Ebing's work offered a new way of conceptualising sexuality. That is, it was a stepping stone from thinking about sexuality in terms of procreation to thinking about sexuality in terms of pleasure. It was only gradually that doctors started to accept heterosexuality as the new normal, and everything deviating from this, including homosexuality, as abnormal (Katz, 2007).

3.1.1. Homosexuality as a Mental Illness

About 60 years after these concepts first started to appear in print, and heterosexuality started to become the norm, homosexuality was classified as a mental disorder. In the U.S., homosexuality was considered a mental disorder by the American Psychiatric Association up until 1973 (this was less than 50 years ago) (1973). However, it wasn't *fully* removed from the (DSM) Diagnostic and Statistical Manual of Mental Disorders *in all of its forms* until 1987. This means that from 1952 to 1987, homosexuality lived in the DSM in some form or another. The history of homosexuality in this publication is a bit troubling. From 1952 to 1987, there were five publications of the DSM and homosexuality appeared in all five of them in one form or another.

The concept of homosexuality was first included in DSM-I back in 1952 under *sexual deviations,* as a *pathologic behaviour*. In 1968, in the second DSM

publication, homosexuality was included again as a sexual deviation. In 1973, in the third DSM publication, homosexuality was 'removed' and replaced by *sexual orientation disturbance*. I put quotation marks around the word removed because the only thing that changed was that homosexuality by itself was no longer considered a mental disorder. However, under the new sexual orientation disturbance category, homosexuality was still able to qualify as a treatable condition when accompanied by the right psychological state. Part of the sexual orientation disturbance definition read as follows:

> 'This category is for individuals whose sexual interests are directed primarily towards people of the same sex and who are either disturbed by, in conflict with, or wish to change their sexual orientation' (1973, p. 44).

In 1980, in the fourth DSM publication, homosexuality was included under *psychosexual disorders* as *ego-dystonic homosexuality*. This included:

> '[…] a desire to acquire or increase heterosexual arousal, so that heterosexual relationships can be initiated or maintained, and a sustained pattern of overt homosexual arousal that the individual explicitly states has been unwanted and a persistent source of distress' (1980, p. 281)

This definition is similar to that of the 1973 publication. It implies that homosexuality is a treatable condition (when combined with a desire for heterosexuality and distress about homosexuality). Finally, in 1987, explicit

reference to homosexuality was removed. However, a reference to homosexuality was still implied under *Sexual Disorder Not Otherwise Specified*, which included: 'persistent and marked distress about one's sexual orientation' (1987, p. 296). I say that homosexuality is implied because homosexual people are more likely than heterosexual people to experience distress about their sexual orientation due to societal pressures. This means that homosexual people are more likely to be diagnosed under this category. 1994 marked the first year that homosexuality did not figure (implicitly or explicitly) in the DSM.

The DSM is an important and highly influential handbook both in the U.S. and in other parts of the world, but it is not the only influential handbook. The ICD (International Statistical Classification of Diseases and Related Health Problems), which is published by WHO (World Health Organization), is also a highly influential publication (and considered by the APA as a companion to DSM). Homosexuality, in the latest ICD 2016 publication, is still classed as an ego-dystonic disorder (*ICD-10 Version: 2016*, 2016). This is extremely harmful for the LGBTQI+ community worldwide. This pathologisation, in many ways, has contributed to violent treatments aimed at 'curing people of homosexuality' and converting them to heterosexuality (think electroshock therapy, castration, psychologically harmful therapy sessions, etc.) (Dickinson, Cook, Playle, & Hallett, 2012), (King, Smith, & Bartlett, Treatments of homosexuality in Britain since the 1950s—an oral history: the experience of professionals, 2004), and (King, Smith, & Bartlett, 2004). This pathologisation contributed to the idea that homosexuality is a deviation from heterosexuality, one that must be corrected.

3.1.2. Homosexuality as a Criminal Act

In addition to homosexuality being considered a mental disorder during this time period, homosexuality was also criminalised. In fact, it continues to be in many parts of the world. The U.K. started to take the first step to decriminalise homosexuality in 1967 with the Sexual Offences Act. The U.S. started in 1962 (in the state of Illinois). This was 50 years ago in the first case and 55 years in the second. Just as with the case of homosexuality being considered a mental disorder, it was not that long ago that these countries started to decriminalise homosexuality. It is important to mention that homosexuality is still criminalised in other parts of the world. In some countries like Sudan, Saudi Arabia, Yemen, Iran, Somalia, and in Nigeria, homosexuality is punishable by death (Mendos, 2019a, pp. 15–16). In other countries, homosexuality is punishable by prison. Some countries like *Uganda, Zambia, Barbados, Guyana, Bangladesh, and Qatar have a life sentence (Mendos, 2019b, pp. 198–202). This criminalisation has and continues to contribute to the view that homosexuality is a deviation from the norm. This is the idea that heterosexuality is the norm and that any other sexual orientation is a deviation. Furthermore, that this deviation should be punished.

3.1.3. The Influence of the Pathologisation and Criminalisation of Homosexuality on Inquiries Regarding the Biological Origins of Homosexuality

I propose that the social context, beginning with the development of the concept in the late 1800's, and the history of the pathologisation and criminalisation of homosexuality has influenced the type of questions that get asked and funded in this area of research. This has to do with how contextual values influence the first

stage of the scientific process: problem selection (this includes making decisions about what research to pursue and what research to fund). This first stage has to do with the practices that determine how the scientific community decides what projects are worth researching and which ones are not, how scientific projects get funded, and who they get funded by.

3.2. How Contextual Values Influence the Problem Selection Stage

3.2.1. Making Decisions about What Research Projects to Pursue – Part 1

Many geneticists who have taken part in the research that looks into the genetic underpinnings of homosexuality claim that this research project is purely an intellectual endeavour that will contribute towards having a fuller understanding of human sexuality. It is, however, difficult to buy into this story given 1) the history of the concept and the pathologisation and criminalisation of homosexuality and 2) given that there is no comparable research on the genetic underpinnings of heterosexuality. This is worrisome for the LGBTQI+ community. Although I am sympathetic to the idea that genetic research that looks into sexual orientation might be able to give us a greater understanding of human sexuality, I think that ultimately, values should come in at this stage to weigh up the benefits and costs of this research to the LGBTQI+ community. Which, given the historical context, is the most vulnerable group in this situation. For this reason, I think that priority must be given the LGBTQI+ voices. I will not attempt to do the weighing up here, but as Douglas says, some weighing up must take place!

What I will do is offer a glimpse of the public reaction, including the reaction of several LGBTQI+ groups to one the first genetic studies to make news

headlines. The purpose of this is to outline some of the worries put forward by some LGBTQI+ organisations and individuals that should be taken into account, and to highlight the difference in public opinion as regards this topic of research.

To carry out this task, I will focus on the following study: 'A Linkage Between DNA markers on the X Chromosomes and Male Sexual Orientation', a study published in 1993 by Dean H. Hamer, Stella Hu, Victoria L. Magnuson, Nan Hu, and Angela M. L. Pattatucci. The goal of this study was to determine whether cis male sexual orientation was genetically determined or not. They concluded: 'Our data indicate a statistically significant correlation between the inheritance of genetic markers on chromosomal region Xq28 and sexual orientation in a selected group of homosexual males' (1993, p. 321). After the study was published, it produced great controversy, both in scientific circles and in the public in general. Most of the controversy, however, focused heavily on the ethical implications that these results might have, and not on the study itself.

That is, while the study focused on whether or not there was a significant correlation between genes and male sexual orientation, the media, including LGBTQI+ advocacy groups, and anyone else who cared to have an opinion, focused on the future. They focused on the implications that this study might have if it were proven true in the future. One controversial news headline read: 'Abortion hope after 'gay genes' findings' (Lewis, 1993). In the article, the author questioned whether 'Isolation of the genes means it could soon be possible to predict whether a baby will be gay and give the mother the option of an abortion' (Lewis, 1993). Some newspapers even cited the efforts of an MP: 'A Commons motion put down by David Alton, Liberal Democrat MP for Mossley Hill, Liverpool,

and signed by 30 MPs calls for a gene charter because of fears that mothers could try to have 'homosexual' foetuses aborted' (Hope, 1993).

The LGBTQI+ community was divided on the issue, as the news outlets reported. A spokesperson for the Campaign for Homosexual Equality was quoted by the Daily Mirror as saying: '"Once you start offering the facility to choose babies of a certain hair colour, skin colour, sexual orientation, etc, [sic] you are on a very slippery moral slope. "Gay people have as much right to be born as anyone else."' (Swain, 1993). Some, like the National Gay and Lesbian Task Force said that it was '"mixed in response to the findings… NGLTF supports scientific research into the complexities of human sexuality but is concerned with possible uses of such research"'(Rensberger, 1993, p. A1). Some, like Darrell Yates Rist, a co-founder of the Gay and Lesbian Alliance Against Defamation said: '"Intellectually, what do we gain by finding out there's a homosexual gene? Nothing, except an attempt to identify those people who have it and then open them up to all sorts of experimentation to change them"' (Angier, 1993a, p. A1). While other LGBTQI+ advocacy groups thought that the study would amount to greater equality: 'Gregory King of the Human Rights Campaign Fund, the largest LGBTQ civil rights organization in the US, said: "When people learn that homosexuality is not a choice, they will be more willing to treat us as equal members in society."' (Hawkes, 1993a, p. 3).

Some legal experts agreed. Richard Green, an MD and JD, then at the University of California at Los Angeles, was quoted as saying that '"If sexual orientation were demonstrated to be essentially inborn," he said, "most laws that

discriminate against gays and lesbians, including sodomy laws, housing and employment discrimination laws, all would fall."' (Angier, 1993b, p. 24).

Lord Jakobovits, on the other hand, thought that using this research to further the rights of the LGBTQI+ community was a bad idea: 'Homosexuality is a grave departure from the natural norm which we are charged to overcome like any other affliction, genetic or not. […] I hope ethically sensitive professional and lay people alike will join in defeating this further attempt to erode our transcendent moral values' (Hawkes, 1993b, p. 3).

What I want to highlight with all of this news coverage (which took place in the days following the publication of the study on 16 July 1993) are the worries put forward about the potential ethical consequences that this research could have and that opinion on this matter was divided. Importantly, there was also an optimistic appeal to the idea that if this study can prove that people are born gay, then certain rights and liberties will follow for the LGBTQI+ community.

Given not only the history of the pathologisation and criminalisation of homosexuality, but also the current political climate for the LGBTQI+ community, it is important to take into consideration the worries raised by the LGBTQI+ community and think about the gains and costs of this research. For those that buy into the idea that we should pursue this research because if it can prove that people are born gay, then rights and liberties will follow, it is important to highlight a few things. Many on the ultra-right disagree with the idea that if people are born gay then we should afford them certain rights and liberties. The ultra-right does not think that a genetic link to homosexuality should or will impact the rights and liberties of the LGBTQI+ community positively. In fact, many ultra-right

people think that if there is such a link, that we should use this information for eugenic anti-homosexuality purposes.

These worries, however, have not stopped the optimism. After the study was published, Hamer (one of the lead scientists on the project) was actively involved in promoting his and other scientific findings in order to further the rights and liberties of the LGBTQI+ community. Hamer showed up to Hawaii's testimony hearings for SB1 (same-sex marriage) in 2013 where he offered his testimony as a private citizen, in support of same sex-marriage. In the testimony hearings he said that 'Sexual orientation is a deeply ingrained innate trait with strong genetic & biological roots' (D. Hamer, 2013). He intended to influence the committee's deliberations on same-sex marriage. Since then, he has continued to push this narrative forward. In 2014, for example, Hamer wrote that

> 'Understanding the biological roots of sexual behavior goes beyond pure science, *helping to shape attitudes, laws, and, ultimately, the ability of people to live free and open lives*. It thus behooves scientists who conduct such research to be thoughtful participants in how their data are presented and play out in the public forum. This is why I continue to believe, as I stated in Science more than 20 years ago, that "scientists, educators, policy-makers, and the public should work together to ensure that such research is used to benefit all members of society."' (Hamer, Going Beyond the Lab, 2014) (Emphasis is mine).

Hamer no longer works in the laboratory. He has since turned to filmmaking (Qwaves). But his study 'A Linkage Between DNA Markers on the X Chromosome and Male Sexual Orientation' has since been taken up by other scientists.

While I am less sympathetic to the idea that we should pursue this line of research because doing so would help further the rights and liberties afforded to the LGBTQI+ community, I am not entirely opposed to it. While it seems to be a bad argument to make, it also seems to have great influence over how people view the LGBTQI+ community.

For example, some studies have found that people who think that homosexuality is something which somebody is born with tend to view homosexuality more favourably and people who think that homosexuality is something which is a choice, tend to view homosexuality more negatively. The Pew Research Center found that the 'Belief that homosexuality is immutable is strongly associated with positive opinions about gays and lesbians – even more strongly than education, personal acquaintance with a homosexual, or general ideological beliefs' (2003, p. 8). This is interesting, and matches up quite nicely with other data.

In the U.S., for example, where the majority of people think that people are born gay, the LGBTQI+ community tends to enjoy more civil rights and liberties (my claim here is not one of causation, but merely one of correlation. I aim to show that there might be interesting connections worth looking into here). In the U.S., where LGBTQI+ folks are entitled to such things as marriage recognition, some adoptions rights (these vary from state to state), and some (although limited) protection against hate crimes (this also varies from state to state); is a

country in which a majority of its citizens think that homosexuality is an in-born trait. According to the most recent Gallup poll, 50% of people in the U.S. think that people are born gay or lesbian, while 30% say that people are gay or lesbian due to upbringing and environment (Saad, 2018). If we compare these numbers in the U.S. just a few years ago (to for example, 1977), we find that in times where the LGBTQI+ community did not enjoy rights such as marriage, adoption, etc., the majority of people thought that being gay or lesbian was a choice (Saad, 2018). As far as I am aware, similar kinds of data are not available for other countries. Some countries, such as the UK, have carried out surveys with similar kinds of questions, but only recently. In the U.K., a country in which LGBTQI+ members are also entitled to such things as marriage recognition, adoption rights, and protection against (some) hate crimes (to name a few rights); 49% of people think that people are born gay or lesbian, 31% of people think that being gay or lesbian is a choice, 3% of people think that being gay or lesbian is the result of upbringing, and 17% don't know, according to a 2017 survey (Smith, 2017).

Studies like these, especially the ones carried out in the U.S., where there is available data since 1977, seem to suggest that public opinion might figure as an important factor when it comes to the distribution of rights and liberties to the LGBTQI+ community (again, my claim here is merely one of correlation). In this sense, perhaps there is an argument to be made for the idea that we should pursue this line of research because doing so would help further the rights and liberties afforded to the LGBTQI+ community. As I mentioned earlier, I am not opposed to this strategy. I just think that a conversation needs to happen in which

there is discussion of the gains and costs that such research would have for the LGBTQI+ community.

The next stage, after deciding whether a scientific research project is worth pursuing, is for the scientists themselves to think about the kind of research projects that they may want to pursue. That is, assuming that we think that the benefits of this research project are greater than the risks for the LGBTQI+ community, the next step is to look at the context in which scientists would be 'deciding' whether to pursue this kind of research.

3.2.2. Making Decisions about What Research Projects to Pursue – Part 2

As mentioned earlier, one of the assumptions guiding this area of research is the idea that by studying sexual orientation, we will be able to have a deeper understanding of human sexuality. However, the research questions that are getting asked and pursued in genetics as regards sexual orientation, tell a different story. These questions can be categorised into the following four different but overlapping and related areas: 1) questions about the mechanisms of *homosexuality,* 2) questions about the mechanisms of *male* homosexuality, 3) questions about the mechanisms of homosexuality understood under the lens of a *binary-gender model*, and 4) questions about the mechanisms of *cisgender*[5] homosexuality. A defining theme in all four areas is homosexuality. Another important feature is that male homosexuality stands out as the only area that prioritizes a specific sexual orientation. This is reflected in the available scientific

[5] Refers to people whose gender identity matches the gender and or sex they were assigned at birth.

studies: there is very little scientific literature in genetics about women and zero literature about non-binary or agender people. In this sense, the research is heavily focused on cisgender men, with a slight focus on cisgender women. This means that all non-binary genders (or people who might reject gender categories) are not included in this area of research. The focus, however, is even more limited, this is because the research only focuses on cis men and cis women. This means that trans men and trans women are not included as part of this research. In other words, this area of research is only looking into the underlying mechanisms of homosexuality in cis men with a small focus on the underlying mechanisms of homosexuality in cis women.

If scientists are trying to answer a general question about the underlying mechanisms of sexual orientation, then they are failing to do so by employing this narrow focus on cis men.

This narrow focus is also very telling of the historical context of this area of research and of our current social context. Historically, research areas in biology have been heavily focused on men. When women do figure, it's mostly to note their supposed inferiority as compared to men and to highlight their assumed reproductive role (Fausto-Sterling, 1992; Schiebinger, 1989). In this sense, it is no surprise that LGBTQIA+ research also follows suit in terms of their focus on men.

3.2.2.1. An Example: NIH (National Institutes of Health) Funding

According to a recent study, from 1989 to 2011 the NIH[6] funded 625 studies related to LGBT health, but only 13.5% studied sexual minority women compared to 86.1% that studied sexual minority men (Coulter, Kenst, Bowen, & Scout, 2014). This means that things are not very different when it comes to LGBTQIA+ research. The study also found that out of the 625 studies, only 6.8% studied transgender populations (2014). This area of research seems to be very overwhelmingly focused on cis men.

The numbers mentioned above are a general overview, but we can narrow those by content area. According to the same study, out of the 628 studies, only 39 were about genetics (2014, p. e108). If we exclude studies related to HIV/AIDS and other sexual health issues, the number falls down to 9 studies (2014, p. e108). This is in the span of 22 years and out of 127, 798 studies funded on any topic (2014, p. e106).

It just takes a glance at these numbers to notice two things: 1) LGBTQI+ research has not been a high priority for the NIH and 2) genetic related research about the LGBTQI+ population has been even less of a priority. But why is this? According to the authors, the political environment can have an effect on LGBT health research. They cite the case of the current U.S. Senator for Pennsylvania, Patrick Toomey. In 2003 he '[…] proposed an amendment to the NIH appropriations bill to rescind the funding of 5 research studies that concerned LGBT populations' (2014, p. e110). The Senator went on record saying:

[6] The NIH is one of the largest public funders of science in the world.

> '[…] who thinks this stuff up? And, worse, who decides to actually fund these sorts of things? Well, unfortunately, the NIH has done so. These are the exceptions, and not the rule. This is not a general criticism of the NIH. But the point is these are not applications that are worthy of taxpayer funds' (*CONGRESSIONAL RECORD — HOUSE*, 2003, p. H6574).

Ultimately, the proposed amendment failed but his proposal still had significant consequences. One of these was that the NIH found itself in a situation in which they had to justify around 198 NIH projects to a group of Republican Congress members. The NIH found itself in this situation because, after the 2003 proposed amendment failed, the then NIH director Elias A. Zerhouni, was asked to justify the original 5 studies in Toomey's proposed amendment plus an additional 5 research projects to a joint committee. The next day, Zerhouni was forwarded a list not of the 10 research projects, but a list of around 198 research projects. Zerhouni was forwarded the wrong list. Members of the joint committee later apologized for this error and asked Zerhouni to ignore the list, and only review the 10 original research projects, but Zerhouni went ahead and justified each of the research projects on the list: a list which the Traditional Values Coalition later took credit for. The Traditional Values Coalition is considered a hate group by the Southern Poverty Law Centre. This had a huge impact on the scientific community. Some scientists began to change words that might be considered controversial and others decided to abandon LGBT topics altogether (2014).

According to Coulter et al., this shows '[…] how political landscapes have institutionalized LGBT discrimination and influenced scientific research' (2014, p. e111). I agree. This is a good example in which the social context, in this case the political context, is influencing scientific research. More precisely, this is an example in which political values are influencing which research projects get funded and pursued and which don't. This is a case in which the social context is influencing decisions about what research projects to pursue and fund, in a rather pernicious way.

The Traditional Values Coalition is an American hate group (SPLW, n.d.). They pride themselves in upholding what they take to be traditional Christian values and have been known to lobby in defence of such values in the past. They oppose homosexuality, amongst many other things. According to them: '"Americans should understand that their attitudes about homosexuality have been deliberately and deceitfully changed by a masterful propaganda/marketing campaign that rivals that of Adolph [sic] Hitler' […] (SPLW, n.d.). Furthermore:

> '"The hate crimes language passed in the House is a threat to free speech, freedom of religion, and association. Homosexuality is a behavior, not a fixed identity. It is similar to smoking or drug use, not an immutable characteristic like race or ethnicity. There are no 'former' Blacks, but there are ex-homosexuals. The existence of ex-homosexuals is clear evidence that homosexuality is behavior-based, not an unchangeable characteristic. It should not receive special minority rights protections in federal law."

> —Rev. Louis Sheldon, "Prohomosexual Hate Crime Legislation is Back!," Traditional Values Coalition Report, 2005' (SPLW, n.d.)

This organisation is extremely homophobic, transphobic, islamophobic, and sexist (to name a few of their organization's values). According to a news article by Science, the studies on the hit list included studies related to HIV/AIDS prevention, risky behaviour, pregnancy prevention, mental health, among others (Kaiser, 2003). According to the same news article, 'A few notations hint at the listmaker's disapproval—for example, the observation: "endorses sexual behavior and condom use among teens." A project to prevent HIV among Russian drug users carries the note: "Gives credence to intravenous drug activity." ' (Kaiser, 2003, p. 758). The takeaway here is that the Traditional Values Coalition were certainly attempting to influence research agendas in science.

When a senator is questioning your research topic and says of it that '[…] these are not applications that are worthy of taxpayer funds'(*CONGRESSIONAL RECORD — HOUSE*, 2003, p. H6574), there is reason to worry. Even more so when one realises that an organisation like the Traditional Values Coalition was involved in selecting which research topics need to be further justified. A study which looked into scientists' responses to this political controversy, found that

> 'Half (51%), for example, said that they removed potential ''red flag'' words from titles and abstracts of their subsequent NIH grant submissions. Deleted words included: gay; lesbian; bisexual; sexual intercourse; anal

sex; homosexual; homophobia; AIDS; bare backing; bathhouses; sex workers; needle-exchange; and harm-reduction' (pg. 1575).

This was one way in which scientists responded to the controversy. A second way in which scientists responded was by reframing studies: 'For some (7%), studies were reframed in ways thought to be less politically sensitive, perhaps by avoiding research on marginalized or stigmatized populations' (pg. 1575) Another 17% of scientists '[…] dropped studies or chose not to renew studies that they (or their administrators) believed to be politically nonviable' (pg. 1575). Two out of the 82 PIs (principal investigators) that participated in the study said that they left their research positions '[…] in which they had to raise their own salaries by securing grant money for the security of research jobs with guaranteed salaries' (pg. 1576). One PI claimed to have '[…] left academic research altogether, declaring that ''This [controversy] ended my research career'' (S)' (pg.1576).

This is an example in which contextual values seem to have played a role in the problem selection stage of the scientific context. More specifically, this is an example in which contextual values seem to be playing a role in the future of LGBTQI+ related research. There are many other groups that share the Traditional Values Coalition's values and many of them have lobbied against research which they think goes against their values. These groups include groups like Alliance Defending Freedom and Focus on the Family, which are not only openly anti-LGBT; they are also very influential anti-LGBT organizations within the current White House administration.

The Toomey case is an example in which we can see the influence of anti-LGBTQI+ contextual values (such as homophobia) affecting the funding and the type of questions that get pursued. This case highlights the impact that these values had on LGBTQI+ research very generally. My focus in this chapter is mostly on genetic research, which as we can see, amounts to a very tiny percent of the research that was funded by NIH. First, if it is true that the aim of genetic sexual orientation research is to learn more about human sexuality, then this research project shouldn't be billed as an 'LGBTQI+ research project'. It should be billed as a research project that affects people of all sexual orientations, including heterosexual people. But alas, this is not how it is currently being billed, and for this reason I will focus my discussion on how this research topic is *actually* getting billed. This will also give me the opportunity to address some of the other research projects that were funded by the NIH and that I think are beneficial to the LGBTQI+ community, and therefore important to keep on funding.

Currently, genetic research that looks into sexual orientation is being billed as an LGBTQI+ research project and being questioned by the U.S. government and groups such as the Traditional Values Coalition on that basis. It is being treated as any other research project that is seen to be beneficial to the LGBQI+ community. This includes research into sexual health, mental health and substance issues within the LGBTQI+ community.

As you might remember, in the previous chapter, we reviewed Douglas' proposal for the role that values should have when deciding what scientific projects to pursue and which scientific projects to fund. According to her, one might be in favour of supporting or pursuing a particular research project because

of one's deeply held social values and values should be able to play a role when deciding what research project to pursue at this stage. Additionally, she argues that values should also play a role in helping governments and other funding institutions decide who to fund. I think that things are far more complicated in the actual world for this proposal to be able to work, especially when it comes to politically charged topics like the ones I've discussed.

While topics such as photovoltaic cell efficiency (example discussed by Douglas) might be able to be discussed in the ideal scenario that she proposes, LGBTQI+ research projects don't stand a chance. This is due to the current homophobic and transphobic climate that we live in. We live in a world where people in power (including the current U.S. administration) are trying to dismantle what little rights the LGBTQI+ community have won over the course of history. We live in a world where '[…] The Trump Administration offered to cut HIV and AIDS research funding under the National Institutes of Health (NIH)[…], they '[…] proposed slashes to programs and departments critical to the LGBTQ community, including Medicaid, Planned Parenthood, and the Center for Disease Control's HIV and AIDS programs[..] (GLAAD, n.d.). Furthermore, 'The Department of Health and Human Services erase[d][…] all mentions of the LGBTQ community and their health needs in its strategic plan for the fiscal year 2018-2022' (GLAAD, n.d.). This isn't just limited to the U.S., 'Reporting reveals that President's Emergency Plan for AIDS Relief gave a sizable grant to the anti-LGBTQ group Focus on the Family Africa on Sept. 18, 2017' (GLAAD, n.d.).

The list of the number of attacks to the LGBTQI+ community by the Trump administration is very long on the Trump Accountability Project webpage (GLAAD,

n.d.). I bring up these examples to help set the tone for what LGBTQI+ people are currently faced with. The current U.S. administration is not likely to want to discuss whether they should fund research that would benefit the LGBTQI+ community. This is because they are too busy striping away the small amount of protections and services that the LGBTQI+ community has fought for and won up until now.

Furthermore, as we saw above in the Toomey scandal (and given the current circumstances), scientists are less likely to apply for grants to do research that might benefit the LGBTQI+ community. This is because precedents like the one set with the Toomey case are likely to discourage them. This is in addition to the current political climate against the LGBTQI+ community set by the Trump administration.

Given these circumstances and this appalling social context in which the LGBTQI+ community is forced to live in, I argue (following on from Kourany (2003), that we should push for legislation that would encourage scientists to pursue research that would interest and be of benefit to the LGBTQI+ community. This includes making sure that LGBTQI+ people are included in that research. Kourany gives the example of the 1993 National Institutes of Health Revitalization Act, which '[…] mandated the inclusion of women and minorities in U.S. medical research, and made funding contingent on that inclusion' (Kourany, 2003, p. 8). I would favour this kind of direct approach when it comes to making decisions about what research projects to pursue and what kind of research projects to fund, especially when we are dealing with politically charged research projects.

3.3. How Contextual Values Influence Methodological Choices

In this section, I explore a new direct role that values could play on the second stage of the scientific process: methodology selection. In the previous chapter, we looked at Douglas' proposal. Her proposal had to do with the direct role that values could play when it came to assessing questions about the ethical acceptability of methodology. I argue that one of the most important roles for values that might be of interest to feminist philosophers lies in the choice of concepts embedded in the methodology and that these concepts will be determined by the goals that one has. In order to do this, I begin with an introduction to genetic research that looks into the underpinnings of sexual orientation. I then take up Hamer et al.'s study in order to illustrate my argument. In this section, I also assume that this is a research project worth researching.

3.3.1. Introduction to Genetic Studies

Behavioural genetic studies are usually divided into three areas: family studies, twin studies, and adoption studies. Family studies are used to determine whether a trait runs in families. This is done by comparing families of probands (subjects being studied) with families of controls. The idea is that if a trait runs in a family, there will be a clustering of the trait in families of probands compared to families of controls. Twin studies compare monozygotic twins and dizygotic twins. Monozygotic twins are 100% genetically identical while dizygotic twins are around 50% genetically identical. The assumptions are that both sets of twins share a prenatal and postnatal environment, and so, if monozygotic twins are more similar on a trait than dizygotic twins, then this is taken as evidence for a genetic

influence. Adoption studies compare a child who has been given up for adoption and their biological parents with a child who has been given up for adoption and their adoptive parents. This is meant to give the researcher an insight into both the genetic and environmental influences on the child.

These studies, family, twin, and adoption studies, are the studies that take place before looking into a genetic mechanism of a specific trait. If there is sufficient evidence that genetic factors seem to be influencing a trait, then the next step is usually molecular genetic studies. These are the studies that I will be focusing on. Molecular genetics is a branch of genetics which studies the chemical nature of genes and the ways in which genes affect traits. The two most widely used studies are linkage studies and association studies.

3.3.2. Genetic Study: Hamer et al.'s 1993 Study

I would like to begin my analysis with Hamer's 1993 study: *A Linkage Between DNA Markers on the X Chromosome and Male Sexual Orientation*. I would like to begin here for many reasons. First, this study has given rise to similar studies that have attempted to replicate its findings. As such, much of what I say here will apply to the other studies as well.

Hamer et al., begin their study by noting that homosexuality presents an opportunity to explore the underlying mechanisms of human sexual development and differentiation (Hamer, Hu, Magnuson, Hu, & Pattatucci, 1993). However general this claim might seem, it is important to remember that they are only researching cis male homosexuality. In this sense, their research is quite limited.

Hamer et al.'s study draws from previous work in behavioural genetics; work which has attempted to determine whether homosexuality is heritable. These studies suggest that homosexuality is heritable ((Richard C. Pillard & James D. Weinrich, 1986), (Bailey & Pillard, A Genetic Study of Male Sexual Orientation, 1991), (Bailey JM, 1993), (Bailey, Pillard, Neale, & Agyei, 1993)). Some of these studies also suggest that gay men are more likely to have more gay brothers than gay sisters and that the opposite seems to be true for lesbians; that they are more likely to have more gay sisters than they are to have gay brothers. This work has suggested to scientists like Hamer that the underlying mechanisms for sexual orientation might be different in women and men. This is some of the background knowledge from which Hamer's study is drawing.

Once scientists have reason to believe that a trait is heritable, one of the next steps is to try to figure out the mechanism through which these traits get passed on. This is where Hamer et al.'s work comes in.

Hamer's study uses pedigree analysis[7] and linkage analysis[8] to figure out whether or not male sexual orientation is genetically influenced. Hamer's interpretation of the results seems to vary in strength throughout the article. For now, I will stick to the more modest version. This version suggests that one form of male sexual orientation is genetically influenced.

In order to carry out this research project, Hamer and his team designed a study and recruited participants. The participants included self-acknowledged homosexual men as well as some of their relatives. This included 76 indexed

[7] A pedigree analysis is a family tree that allows scientists to map phenotypes.
[8] Linkage analysis is a study that is used to locate a specific region of genes.

subjects as well as some of their families, 38 pairs of homosexual brothers for the sib-pair (siblings) pedigree study as well as some of their relatives, and two additional families were added to the linkage study (more details given below).

The participants were mostly white: 92% were white non-Hispanic, 4% were African American, 3% were Hispanic[9], and 1% were Asian, with an average age of 36 ± 9 (mean ±SD: mean and standard deviation).

The sexual orientation of the probands, for the most part, was assessed by the Kinsey scale. The Kinsey scale is a one-dimensional bipolar model. The Kinsey scale consists of a scale that ranges from 0 for exclusive heterosexuality to a 6 for exclusive homosexuality. Most of the study participants recruited by Hamer and his team were asked to rate themselves on four scales: self-identification, attraction, fantasy, and behaviour. This means that the study participants had to rate themselves on a 0 to 6 scale on all four of these scales. For example, if a study participant self-identified as extremely heterosexual, then they would rate themselves a 6, and so on for the other three categories. The participants were divided into two different classes: self-acknowledged homosexual men and their relatives.

These were the results: for the self-identification scale >90% of homosexual male subjects rated themselves as a Kinsey 5 or a 6 and >90% of their nonhomosexual[10] male relatives rated themselves as a 0 or a 1. The sexual

[9] This is a problematic colonialist term. For more on this subject, please see Latino vs. Hispanic, The Politics of Ethnic Names, by Linda Martín Alcoff (2005).

[10] This is a term used by Hamer et al. in their study. I am using it when engaging with their work for consistency. In their work, the term 'nonhomosexual' seems to refer to people who mostly score '0', '1', '2', and '3' on the scale. One way to think about the scale, which ranges from 0 to 5, is with '0' described as definitively heterosexual, '1' mostly heterosexual, '2' somewhat heterosexual, '3' bisexuality, '4' somewhat homosexual, '5' mostly homosexual, and '6' definitively homosexual.

attraction and fantasy scales were a bit similar: ≥95% of the participants rated themselves as either less than a 2 or more than a 4. The behaviour scale was a bit different: in this scale, the response of homosexual and nonhomosexual participants overlapped (Hamer, Hu, Magnuson, Hu, & Pattatucci, 1993). Hamer explained these results in terms of adolescent and early adult experiences (Hamer, Hu, Magnuson, Hu, & Pattatucci, 1993). And because of this, they decided that '[…] it was appropriate to treat sexual orientation as a dimorphic rather than as a continuously variable trait' (1993, p. 322) This means that Hamer and his team decided to ignore the overlap in the Kinsey behaviour scale and instead, focus on the more straightforward differences in the other 3 Kinsey scales (self-identification, attraction, and fantasy scales).

After recruiting study participants and assessing their sexual orientation, Hamer and his team conducted a pedigree analysis. As mentioned earlier, a pedigree analysis is a family tree that allows scientists to map phenotypes. These diagrams allow scientists to analyse the mode of inheritance (they oftentimes operate like a working hypothesis).

In order to carry out this part of the study, Hamer and his team collected family data from 114 homosexual male probands. These participants were then asked to rate their male relatives (fathers, sons, brothers, uncles, and cousins) on the Kinsey scale. Here, it is important to note that the authors are not counting bisexuality as a form of homosexuality, instead bisexuality was categorised as nonhomosexual. I will come back to this in my analysis. But for now, it is important to remember that the task here was for the participants to rate their male

relatives as homosexual or nonhomosexual. The reliability of their answers was tested by interviewing the 99 relatives. The results matched up:

> All (69/69) of the relatives identified as definitely homosexual verified the initial assessment, as did most (27/30) of the relatives considered to be nonhomosexual; the only possible discrepancies were one individual who considered himself to be asexual and two subjects who declined to answer all of the interview questions. (Hamer, Hu, Magnuson, Hu, & Pattatucci, 1993, p. 322)

This means that individuals were either categorised as homosexual or nonhomosexual.

The next step, after categorising participants, was to establish the population prevalence of male homosexuality. According to the authors, the popularly accepted figures are 4 to 10 percent. But they went with 2 percent which was based on a different study that they carried out. According to Hamer and his team, they went with this lower number in order to account for their study design, which includes a more narrow definition of male homosexuality (Hamer, Hu, Magnuson, Hu, & Pattatucci, 1993).

I won't go through all of the results, but you can see from the table below that the analysis for the random probands population shows that the highest rate of male homosexuality is in brothers and maternally related relatives (1993). The problem with these figures, though, according to Hamer and his team, were that 1) the rates of male homosexuality were lower than is usually expected for a

simple Mendelian trait and 2) there were some families in which some lesbians or paternally related homosexual men were present. Hamer and his team thought that 'This could be explained if some instances of homosexuality were male-limited and maternally inherited whereas others were either sporadic, not-sex limited, or not maternally transmitted' (1993, p. 322). To put this in very simple terms, Hamer decided to narrow down the concept of male homosexuality to instances where the mode of inheritance was male-specific (a mode of inheritance that was not shared by females, for example). This means that their understanding of homosexuality is very limited and is not able to account for male homosexuality that does not fit into this narrow understanding.

In order to test for this male-specific mode of inheritance idea, they deigned a new study, in which they recruited 38 families which had to meet the following requisites: they had to have two homosexual brothers each, one lesbian relative at the most, and homosexual brothers must not have a homosexual father or homosexual sons (to decrease the chances of paternal transmission). You can see the results in the table below, under the Sib-pairs probands heading. This study returned favourable results and supported their hypothesis that the selection of families with these characteristics would only increase the rate of male homosexuality in maternally derived relatives. The paternally derived relatives, as compared to the random proband study, remained unchanged or decreased in number. These results pointed to a maternal transmission of male homosexuality (and reaffirmed their idea of male-specific mode of inheritance).

Relationship	Homosexual/total	Percent
Random probands (n = 76)		
Father	0/76	0
Son	0/6	0
Brother	14/104	13.5**
Maternal uncle	7/96	7.3*
Paternal uncle	2/119	1.7
Maternal cousin, aunt's son	4/52	7.7*
Maternal cousin, uncle's son	2/51	3.9
Paternal cousin, aunt's son	3/84	3.6
Paternal cousin, uncle's son	3/56	5.4
Sib-pair probands (n = 38)		
Maternal uncle	6/58	10.3**
Paternal uncle	1/66	1.5
Maternal cousin, aunt's son	8/62	12.9**
Maternal cousin, uncle's son	0/43	0
Paternal cousin, aunt's son	0/69	0
Paternal cousin, uncle's son	5/93	5.4
Population frequency		
Uncles and cousins of female probands	14/717	2.0

(Hamer, Hu, Magnuson, Hu, & Pattatucci, 1993, p. 322)

The new insight that Hamer and his team offer with these pedigree studies combined with another unpublished study[11] that included lesbian cis women and their relatives is that gay men are more likely than gay women to have maternally-related gay uncles and gay nephews. This is a significant observation because the sib-pairs share genetic information with their uncles and nephews and, assuming that the uncles and nephews live separately, they do not share the same environment. This suggests that male homosexuality, at least as defined by Hamer and his team, might be a heritable trait that can be explained genetically.

According to Hamer and his team, one possible explanation might be that male homosexuality is transmitted through the X chromosome (sex-linked inheritance). The idea behind this is that males usually receive the X chromosome through their mother and the Y chromosome through their father. With this in

[11] See item number 16 on Hamer et al.'s References and Notes.

mind, if the trait is maternally transmitted, then one possibility is that it is transmitted through the X chromosome.

One way to test this is to carry out linkage analysis, which is what Hamer and his team did next. Linkage analyses are usually the next step in trying to identify the general region of the gene or genes that might be responsible for the trait that scientists are interested in locating. One thing that these studies are not going to do, however, is give scientists the location of an exact gene (s). They are going to give them an approximation of the region. It is important to remember that the human genome has an estimate of around 20,000 to 30,000 genes. And the X chromosome has an estimate of around 900 genes. But numbers of genes aside, linkage analyses are not designed to detect a specific gene; they are designed to locate a region that *might* house these genes (so to speak).

The underlying idea for the linkage analysis was that if the X chromosome contains a gene that is responsible for male homosexuality, then the genetically related gay men in the study should share X chromosome markers close to that area (Hamer, Hu, Magnuson, Hu, & Pattatucci, 1993). That is, they were proposing to look for genetic markers that were identical across all and only gay men. The participants in this analysis included the 38 participants from the sib-pair population and 2 from the random population, in addition to other relatives. This yielded a total of 40 participants.

The DNA of all participants was collected and typed for 22 markers on the X chromosome. The results were positive and suggested that there might be linkage between male homosexual orientation and the Xq28 region (see the last five markers on the table below). The LOD (log of ratio score) was 3.96 to 4.02

(Hamer, Hu, Magnuson, Hu, & Pattatucci, 1993). This is a significant score. Usually, LOD scores over three are considered to show close linkage.

Table 2. Summary of linkage results. Linkage analysis was performed on 40 male homosexual sib-pairs; 22 X chromosome markers were used (*30*). The five marker loci on distal Xq28 are in boldface.

Locus	Location	AL*	HET†	Sib-pairs‡			z_1§	$2\ln L(z_1)$‖	P¶
				[D]	[S]	[–]			
A. .KAL	p22	6	0.77	5	16	14	0.51	0.01	ns
B. .DXS996	p22	11	0.84	7	14	18	≤.5	≤0	ns
C. .DXS992	p	8	0.87	6	13	19	≤.5	≤0	ns
D. .DMD1	p21	9	0.78	3	10	23	≤.5	≤0	ns
E. .DXS993	p11	6	0.80	3	14	17	≤.5	≤0	ns
F. .DXS991	p	8	0.77	8	14	14	0.57	0.61	ns
G. .DXS986	q	10	0.71	7	20	10	0.65	2.11	ns
H. .DXS990	q	7	0.76	4	19	13	0.55	0.25	ns
I. .DXS1105	q	5	0.48	3	20	9	≤.5	≤0	ns
J. .DXS456	q21	10	0.85	8	20	8	0.75	7.95	0.00241
K. .DXS1001	q26	10	0.82	8	16	13	0.60	1.09	ns
L. .DXS994	q26	5	0.75	7	17	13	0.55	0.26	ns
M. .DXS297	q27	5	0.70	5	21	8	0.71	4.25	0.01963
N. .FMR	q27	17	0.79	6	17	14	0.56	0.45	ns
O. .FRAXA	q27	8	0.72	4	17	13	0.56	0.38	ns
P. .DXS548	q27	6	0.67	7	20	7	0.73	5.21	0.01123
Q. .GABRA3	q28	4	0.35	2	23	3	0.74	2.39	ns
R. .DXS52	**q28**	**12**	**0.79**	**9**	**22**	**6**	**0.81**	**11.83**	**0.00029**
S. .G6PD	**q28**	**2**	**0.36**	**4**	**24**	**2**	**0.85**	**6.38**	**0.00577**
T. .F8C	**q28**	**2**	**0.41**	**5**	**24**	**3**	**0.82**	**6.56**	**0.00522**
U. .DXS1108	**q28**	**6**	**0.71**	**8**	**22**	**4**	**0.85**	**12.87**	**0.00017**
V. .DXYS154#	**q28**	**10**	**0.71**	**8**	**22**	**5**	**0.83**	**12.84**	**0.00017**
R/S/T/U/V	**q28**		**0.99**	**12**	**21**	**7**	**0.82**	**18.14**	**0.00001**

*AL is the number of different alleles observed in 62 to 150 independent chromosomes. †HET is the calculated heterozygosity; HET = $1 - \Sigma f_i^2$, where f_i = frequency of the ith allele. ‡[D] is the observed number of concordant-by-descent pairs; [S] is the observed number of concordant-by-state pairs; [–] is the observed number of discordant pairs; noninformative pairs are not included in this analysis. §z_1 is the estimated probability that two homosexual brothers share the marker locus by-descent (*31*). ‖$L(z_1)$ is the ratio of the likelihoods of the observed data at z_1 versus the null hypothesis of $z_1 = 1/2$ (*31*). ¶P (one-sided) was calculated by taking $2\ln L(z_1)$ to be distributed as a chi-squared statistic at one degree of freedom; ns: $P > 0.05$. #Only the maternal, X-linked contribution was considered for this sex-linked locus (*23*).

(Hamer, Hu, Magnuson, Hu, & Pattatucci, 1993, p. 323)

Hamer and his team took the results as '[…] evidence that one form of male homosexuality is preferentially transmitted through the maternal side and is genetically linked to chromosomal region Xq28' (Hamer, Hu, Magnuson, Hu, & Pattatucci, 1993, p. 325).

3.3.3. Role of Values in Hamer et al.'s Methodology

In this section, I argue that one of the most important roles for values in science lies in the choice of concepts that is embedded in the methodology. Douglas, as we saw in the last chapter, discussed the role that values could have in assessing questions about the ethical acceptability of methodology. This is not what I am

interested in assessing here. I am interested in assessing the concepts that Hamer et al.'s study relies on to carry out their research.

3.3.3.1. The Pool of Study Participants

The first point that I would like to make has little to do with the role that concepts play in the methodology. However, it is important to address this point because it is still related to the method Hamer et al. used and plays a big role in the conclusions that scientists are able to draw. Additionally, I think that this point will be helpful in thinking about future research. This point has to do with the participants from whom they collected data.

In Hamer et al.'s study. 92% of the participants were white non-Hispanic, 4% were African American, 3% were Hispanic, and 1% were Asian. This means that the overwhelming majority of the participants in the study were white (92%). This is not an isolated case in the sciences (Dresser, 1992). In fact, instances like this highlight a much bigger structural problem. The problem being that white men are usually taken to be the neutral representation of human kind in scientific studies. This is exemplified in studies like this, where the majority of participants are white, but what we end up with is a generalisation that is meant to apply to men of all backgrounds.

In addition to the pool of participants being very white, it is also very cis[12]. If we take Hamer and his team to be seriously committed to the idea that their

[12] This study took place in 1993. While I acknowledge that it takes time for new concepts to make their way into the scientific literature and while I also want to make room for the fact that concepts can evolve, I also think that it is important to highlight instances in which trans, genderqueer, and non-binary folks (for example) are left out. With this, I do not mean to single out Hamer et al. or to accuse them of ill intention. I aim to call attention to the fact that trans,

research represents '[…] an opportunity to explore the mechanisms underlying human sexual development and differentiation' (D. H. Hamer et al., 1993, p. 321), then it is important that their pool of participants (as well as their sexual orientation concept – more on this in the next section) be able to reflect this. There are trans men who are homosexual and they should most definitely be included in research which aims study male homosexuality. Deciding what other participants to include will depend on what these scientists take their concept of sexual orientation to refer to. I now move on to spell this out in greater detail.

3.3.3.2. The Relationship between Sexual Orientation, Sex, and Gender

Hamer et al. do not address what their understanding of sexual orientation refers to. Sexual orientation is usually understood to refer to some kind of attraction, desire, or fantasy towards a person[s] at least partly on the basis of that person's sex and or gender. Hamer et al. do not distinguish between sex and gender and neither do they specify whether their understanding of sexual orientation refers to some kind of attraction, desire, or fantasy towards a person[s] (1) at least partly on the basis of that person's *sex*, (2) at least partly on the basis of that person's *gender*, or (3) at least partly on the basis of that person's *sex and gender*. Here we have the first instance in which values can shape concepts.

Depending on Hamer et al.'s values, which I think should be ones of inclusivity and of recognising LGBTQI+ experiences, one thing they should

genderqueer, and non-binary people are often not included. Recognising this is one of the first steps towards building a more inclusive theory.

consider is opting for a concept of sexual orientation whose relationship to sex and or gender is one that reflects the experiences of the LGBTQI+ community.

Not being clear about what the relationship between these concepts (sexual orientation, sex, and gender) is creates unnecessary confusion and leaves the researchers without the conceptual tools that they need in order to be able to clearly state what exactly it is that they are researching. Furthermore, if the aim of genetic researchers like Hamer is to understand homosexuality and not just cis homosexuality, then what they need is an account of sex and gender that allows them to account for the experiences of trans, genderqueer, and non-binary people. They also need a concept of sexual orientation that is able to account for both sex and or gender. I won't spend time developing this idea in detail here because in the next chapter I propose a new way of understanding sexual orientation when carrying out genetic research, and I fully develop this idea there. For now, it is only important to make clear that there is room for values to shape our concepts at this stage.

3.3.3.3. Sexual Orientation Concepts and the Kinsey Model

With the sex and gender relationship to sexual orientation out of the way, the next thing I want to talk about is the concept of sexual orientation itself. What I mean here is, independently of what the concept of sexual orientation refers to, what does sexual orientation describe? Does that concept describe attraction? Behaviour? Sexual fantasies? This is another place where I think values could play a role in shaping concepts. Namely, the sexual orientation concept that geneticists use.

Hamer et al. are not entirely clear about what they understand sexual orientation to be. However, based on the sexual orientation assessment they use, we can draw some conclusions. In order to assess sexual orientation, Hamer and his team appeal to the Kinsey scales:

> 'Sexual orientation was assessed by the Kinsey scales, which range from 0 for exclusive heterosexuality to 6 for exclusive homosexuality (13). Subjects rated themselves on four aspects of their sexuality: self-identification, attraction, fantasy, and behavior' (D. H. Hamer et al., 1993, p. 321).

The Kinsey model is a one-dimensional bipolar model. This model buys into a binary account of gender (two genders only: women and men) and says that a person's sexual orientation falls somewhere along a one-dimensional scale, which has two polar opposites: exclusive homosexuality on one end and exclusive heterosexuality on the other end.

First, this means that the only genders that this model is able to acknowledge and account for are two: women and men. This means that all other genders that fall outside of this binary, including people who reject gender categories altogether, are not built into the model and the model is therefore unable account for their experiences.

This model reflects the societal arrangements and structure of the genders that western society (in which this model was developed) deems as real and legitimate. Some trans, genderqueer, and non-binary people, for example, have had to constantly fight against the erasure of their identities throughout history

and in all aspects of life. They have had to fight against the idea that there are only two genders. In having to do this, they have faced an enormous amount of discrimination. The idea that there are only two genders is deeply rooted in misogyny and sexism and is reflective of western society. In this sense, the usage of the Kinsey model is reflective of implicit values such as sexism and cissexism, which are reflective of the social context in which the Kinsey model and the study were developed.

Again, if Hamer and his team (including other geneticists working on the topic) are interested in carrying out research on sexual orientation, not just cis sexual orientation, then the Kinsey model is not desirable because it reinforces the idea that only two genders exist. The Kinsey model does this by excluding the experiences of many people within the LGBTQI+ community who do not subscribe to a binary account of gender. This problem gives researchers an opportunity to opt for a more egalitarian model that is representative of our rich gender diversity (I develop this idea in the next chapter. For now, it is only important that we recognize the potential for values to influence the geneticist's choice of concepts).

Additionally, the Kinsey model seems to suggest that sexual orientation works by matter of degrees. This is the view that a person can be *moderately* attracted to women, while others can be *exclusively* attracted to women. In this sense, Kinsey's account, it would seem, is able to account for different kinds of sexual orientations, not just *exclusive* homosexuality and *exclusive* heterosexuality (unlike the binary account which says that there are only two sexual orientation categories: homosexuality and heterosexuality).

In *The Mismeasure of Desire: The Science, Theory, and Ethics of Sexual Orientation* (2001), Stein raises two further problems for the Kinsey model that might be relevant here: the first problem is that this account 'lumps' together people who have different kinds of sexual desires, including bisexuals. Consider these cases:

> 'a. Individuals who are *strongly* attracted to people of the same sex and *strongly* attracted to people of the other sex.
>
> b. Individuals who are *moderately* attracted to people of the same sex and *moderately* attracted to people of the other sex.
>
> c. Individuals who are *weakly* attracted to people of the same sex and *weakly* attracted to people of the other sex.' (Stein, 2001, pp. 53-54)

These three cases all seem to be different, yet they would all be classed as a 3 on the Kinsey scale. This is a problem for Hamer and his team as well as for any future genetic researchers who want to carryout research on the topic of sexual orientation. This is perhaps less of a direct problem for Hamer and his team because they are not researching bisexuality. However, they still have to ascribe a sexual orientation to all of their study participants and this might include bisexual people. For geneticist who are interested in researching bisexuality, this is a problem because if they appeal to the Kinsey model, they will not have the conceptual tools that they need to properly carryout their research and account for the various experiences of bisexual people within the LGBTQI+ community.

A second problem that Stein raises is that the Kinsey model assumes that sexual orientation has only one dimension. That is, the model assumes that a person's attraction to men varies inversely with the degree of attraction to women (Stein, 2001). But this might not be necessarily true. That is, someone who is strongly attracted to women will not necessarily be weakly attracted to men. Someone can be *strongly* attracted to women and also be *strongly* attracted to men. The problem here is that the Kinsey model is not able to account for cases like this.

In continuing to think about the concept of sexual orientation, Hamer and his team treat male homosexuality as a dimorphic rather than a continuous trait. According to them, 'Only the sexual behavior scale gave a small overlap between the two groups largely because of adolescent and early adult experiences. Therefore, for our study, it was appropriate to treat sexual orientation as a dimorphic rather than as a continuously variable trait' (1993, pp. 321-322). This means that study participants were classified either as homosexuals or nonhomosexuals.

The behaviour scale was one of the four scales that the study participants had to rate themselves on. The idea was that their sexual orientation would be assessed based on how they rated themselves on these scales. However, if we recall, one of the features of the Kinsey scales is that it is a bipolar model that assesses sexual orientation in matter of *degrees*. According to this model, an individual can be exclusively heterosexual or exclusively homosexual, but these are not the only options available. Under this model, an individual can also be classified as predominately heterosexual or predominately homosexual, for

example. In this sense, Hamer et al. opted out from this understanding and instead opted in for a dimorphic understanding of sexual orientation. They adopted the idea that there were only two sexual orientations: homosexuality or nonhomosexuality. Bisexual study participants, under this understanding of sexual orientation were considered as nonhomosexual (heterosexual). This dimorphic understanding of sexual orientation is problematic for two reasons. The first is that it is unable to account for the sexual orientations of those who do not identify as homosexual or heterosexual. Second, this understanding of sexual orientation is problematic because it fails the bisexual community. You cannot just lump in bisexual people with heterosexual people (or nonhomosexuals as Hamer et al. refer to this group), this is not how bisexuality works. Bisexuality is a sexual orientation in its own right. Geneticists need an understanding of sexual orientation that is able to adequately account for all sexual orientations, not just homosexuality and heterosexuality. This presents yet another opportunity for values to shape our concept of sexual orientation.

In addition to this, there is one more problem that I would like to draw attention to before I wrap up this section. This is Hamer et al. use of behaviour as an indicator of someone's sexual orientation. Although Hamer et al. collect information on sexual behaviour as an indicator of a person's sexual orientation, they later dismiss this information because it was inconsistent in terms of what the study participant's reported in the other scales used to assess their sexual orientation. If we look back at the results for the other scales used by Hamer et al., namely the self-identification scale, the attraction scale, and the fantasy scale, we can see that the two groups of participants showed a consistent dispersion in

terms of their response. It was only the behaviour scale that seemed to create some overlap between both groups. Hamer and his team tell us that this overlap might be due to adolescent and early adult experience and for this reason they decide to not take it into account.

I am not sure why Hamer et al. decided to collect information about the study participant's sexual behaviour in the first place, but I want to suggest that sexual behaviour should not be included in genetic understandings of sexual orientation, not because these don't neatly line up with a person's attraction, self-identification, or sexual fantasies (as Hamer et al. suggest). I argue that geneticists should not try to account for sexual behaviour because sexual behaviour is heavily dependent on a person's social and political context and might therefore not be able to accurately represent a person's sexual orientation. For example, it is perfectly conceivable that a gay man who lives in a country where homosexuality is criminalised can have sexual desires etc. about men while, due to personal safety issues, choosing not to engage in any sexual behaviour. Again, I think that our concept of sexual orientation will be shaped by the aims the one has. If this aim is to carryout genetic research, then sexual behaviour should not be included as an indicator of a person's sexual orientation.

3.4. Conclusions

One of the things that feminist philosophers have been concerned with are ways in which science affects women's lives. One of the things that they have highlighted is that there is not a whole lot of research that focuses on women and when there is, it's mostly to note their supposed inferiority (Kourany, 2010).

Genetic explanations of sexual orientation are by no means an exception. This is an area that continues to be focused not only on men, but on cis men.

If we agree with some of the scientists and grant that 1) genetic research that looks into the underpinnings of sexual orientation is worth pursuing because proving that sexual orientation has a genetic basis will help change attitudes and laws and 2) that this research project is worth pursuing because it will provide us with some kind of general knowledge about the underlying mechanisms of sexual orientation in human beings, then the kind of questions that geneticists are pursuing and the kind of concepts that they are using has to change. This is because if this is their aim, they are failing to meet this aim. Cis white men do not represent all human beings. Scientists know very little about women's sexuality and relatively nothing about other gender minorities, including people who reject gender categories altogether. There is a lot of diversity out there and this area of research has failed to not only capture this diversity, it has also failed to even attempt to do so. This is because the questions that are getting asked and pursued and the concepts that are being used have focused and continue to focus on cis men.

I propose that two of the most impactful roles that values can play in science is through the direct role that values can play when making decisions about what research projects to pursue and fund and when making methodological choices, including the scientist's choice of concepts. A proposal like this is especially important when it comes to dealing with politically charged research such as sexual orientation. In the first stage (when making decisions about what research projects to pursue and fund), values should play a direct role.

This includes taking the time to weigh up the consequences for the LGBTQI+ community. In the case that we decide that a research project is beneficial and of interest to the LGBTQI+ community, I propose that we push for legislation which encourages scientists to pursue this kind of research and which makes sure that the LGBTQI+ community is represented in this research. In the second stage (making methodological choices), I propose that the concepts used be determined by the goals that one has. To demonstrate this, in the following two chapters I develop two different concepts of sexual orientation that are needed to address two different goals. The first is carrying out genetic research and the second is helping asylums seekers.

4. The Gay Gene(s)? Rethinking the Concept of Sexual Orientation in the Context of Science

In 2013, Hamer claimed that '[…] genes are the single most important factor in determining a person's sexual orientation and outweigh all known shared environmental factors' (D. Hamer, 2013). In this chapter, I argue that we are far from being able to accept or reject a claim like this. A quick look at past and current genetic studies of sexual orientation will reveal problematic metaphysical assumptions that need to be addressed before we are in a position to accept or reject a claim like the one put forth by Hamer. Different scientists seem to understand sexual orientation differently. Some understand sexual orientation through a mix of sexual orientation markers such as self-identification, attraction, fantasy, and sexual behaviour, while others understand sexual orientation through just one sexual orientation marker, such as sexual behaviour. This inconsistency means that scientists might be measuring and talking about different things when talking about sexual orientation. If this is right, then a claim like Hamer's is problematic because, as will see by critically engaging with the genetics literature, we do not have the conceptual tools or the data to assess a claim like this.

Having a clear idea about what concepts things in the world belong to helps us explain and predict future events associated with these concepts. This is because things that belong to say, concept X, track specific patterns and properties that are specific to that concept and that, to a certain extent, differentiate them from other concepts.

If we want a concept of sexual orientation that will have more predictive and explanatory power, we need, at the very minimum, a concept of sexual orientation that tells us what properties or markers are the most helpful in understanding sexual orientation. In this chapter, I argue that scientists should adopt a sexual orientation view that prioritises internal sexual orientation markers such as desire, fantasies, and attraction (I am not committed to any one of these markers. My point is that the sexual orientation markers should be inner states or processes) [13] and that they should move away from sexual orientation views that prioritise sexual behaviour. I also argue that a genetic account of sexual orientation should take into account both the sex and gender of the person one is ascribing sexual orientation to and the sex[es] and gender[s] this person desires, fantasises, and is attracted to.

I begin by providing a quick note on the relationship between sex, gender, and sexual orientation. I then move on to review some common ways of understanding sexual orientation in the genetics literature. I argue that these accounts have a very limited amount of predictive and explanatory power. Following this, I outline what an account of sexual orientation that has more predictive and explanatory power might look like. I argue that this account will be one that focuses on internal markers such as desire, fantasies, and attraction.

[13] These markers need not necessarily be 'sexual', they can also be romantic.

4.1. Sex, Gender, and Sexual Orientation

In this section, I argue that it is unclear how scientists carrying out genetic studies of sexual orientation understand sex and gender and what role they think this has when understanding sexual orientation. Following on from Dembroff, I argue that we should understand these two concepts as distinct, independent, and at least partially socially constructed concepts. I also argue that our concept of sexual orientation should take into account the sex and gender of the person one is ascribing sexual orientation to and the sex[es] and gender[s] that person has desires, fantasies, and attractions about.

Scientists, scholars, and the average layperson take 'sexual orientation' to refer to some kind of attraction, desire, or fantasy towards a person[s] at least partly on the basis of that person's sex and or gender. In the scientific literature that pertains to sexual orientation, scientists do not distinguish between sex and gender and oftentimes use these terms interchangeably. For example, it is not uncommon for scientists to switch back and forth in studies between the gender concept of woman to the sex concept of female. For example, in Hamer et al. 1995, the study begins by claiming that 'Most men are sexually attracted to females whereas most women are attracted to males' (1995, p. 248). There is no explicit view about what these concepts of sex and gender are like or what makes up each of these concepts.

There are, however, many scientific studies outside of the discipline of genetics on the topic of sexual orientation that assume that there are two sexes (female and male) and that there are fundamental differences between these two sexes. For example, some scientists think that there are important differences

between the male and female brain that can help explain sexual orientation. A good example of this is LeVay's study of the hypothalamus (LeVay, 1991). His is a neuroanatomical study. According to him, sexual orientation in men might have some interesting relationship with the INAH3 region of the brain. LeVay buys into the idea that the INAH3 region of the brain is different in male and female brains. Building on this, he claims that this region of the brain in homosexual males is similar to that of heterosexual females and that this is part of what might be able to explain 'sexual feelings or behaviour' towards members of a particular sex[es]. In this study, it is quite clear that LeVay thinks that there are average differences between males and females in the brain. This is not quite as explicit in genetic studies. The closest genetic studies have come to making an endorsement of this kind comes in the form of geneticists claiming that their findings might be able to help explain some of the studies that do make these kind of claims. For example, geneticists might find that an X region of a chromosome that they take to influence sexual orientation might have interesting connections with non-genetic studies. The story typically goes something like this: lower-level biological phenomena such as genes produce certain molecules that then influence (or determine, depending on how strong the claim is) higher-level phenomena. They then take a story like this to confirm and provide an explanation for studies such as LeVay's. Examples like this show that there might be some implicit endorsements by geneticists that there are two sexes and that there are specific differences between these two sexes.

Another way in which geneticists implicitly endorse or assume sex differences is in the ways in which they design and carry out their studies. Take

Hamer et al.'s study. Their study design relies on the assumption that sex is to some extent determined by a person's sex chromosomes. People typically have 23 pairs of chromosomes. The first 22 pairs are called autosomes and the last pair are called sex chromosomes because, in contrast to the autosomes, the sex chromosomes are assumed to play an important role in sex determination. People with XY are assumed male and people with XX are assumed female. There is a prevalent cultural and scientific belief that the X chromosome is the 'female chromosome' and that the Y chromosome is the 'male chromosome'. When in fact, evidence suggests otherwise. For example, recent research has shown that the WNT4 gene on chromosome 1 is thought to play a key role in ovarian development (Richardson, 2013, pp. 6 & 136). Also, genes DMRT1 on chromosome 9 and FOXL2 on chromosome 3, are thought to play a key role in ovarian and testes differentiation (Richardson, 2013, pp. 136 & 204). So it's not just the XX and XY that contribute towards ovarian and testes development and differentiation. Research like this suggests that sex is not so neatly divided along the XX and XY dichotomy, like previously thought. Hamer et al. implicitly assume the model that says that sex is divided along these lines. I am of course attempting to tease out this information from their study because they do not make any explicit claims regarding this subject. However, we are able to gather a few things from their study. The first is that their male participants are ones with XY chromosomes. This information is evident when reviewing their linkage analysis results. I am not attributing any specific theory of sex or gender to Hamer et al. I do, however, think that there are some implicit assumptions about sex being made in their study that require clarification. It is not clear, for example, if they

are assuming that sex is determined by a person's chromosomal sex and if so, what that chromosomal sex determines and how that is relevant to sexual orientation.

There is a lot of unclarity surrounding these issues in the context of genetic studies. However, if geneticists are interested in putting forth a plausible account of sexual orientation, then clarity is needed regarding what they take sex and gender to be and what role they think these concepts have in relation to sexual orientation. If, for example, geneticists think that sex determines gender and that there are only two sexes (male and female) and two genders (women and men), then there will be no room to account for some trans, genderqueer, and non-binary people. For example, while there might be room to account for cis women who are exclusively attracted to other women (lesbian women), there would be no room to account for a genderqueer person who is exclusively attracted to women independently of their sex.

If the aim of these genetic studies is to further understand human sexuality, and not just cis human sexuality, then what we need is an account of sex and gender which allows us to account for the experiences of trans, genderqueer, and non-binary people that might not be able to be accounted for under a restrictive binary view like the one just discussed.

Following on from Dembroff (2016), I think that scientists should understand sex and gender as 1) independent concepts where one concept doesn't determine the other and 2) as socially constructed concepts.

Dembroff argues that the concept of sex tracks biological features and that the concept of gender tracks social features. In addition to this, they argue that

these concepts are at least partially socially constructed and independent of one another (one doesn't determine the other). I think this is a good way of understanding these concepts because it provides us with the conceptual tools to be able to account for the sexual orientation of trans, genderqueer, and non-binary people. For this reason, I think that both of these concepts should be taken into account when understanding sexual orientation. To illustrate this idea consider these two common ways of understanding what 'sexual orientation' refers to:

1) Sexual orientation refers to a person's sexual desire, attraction, etc. to another person at least partly on the basis of that person's sex.
2) Sexual orientation refers to a person's sexual desire, attraction, etc. to another person at least partly on the basis of that person's gender.

Both of these options operate on a one-dimension model. They either account for sex or gender, but not both. I argue that a genetic account of sexual orientation should account for both sex and gender. This would look something like this:

3) Sexual orientation refers to a person's sexual desire, attraction, etc. to another person at least partly on the basis of that person's sex and/or gender.

Under this proposal, we would end up with a two-dimensional model of sexual orientation. One dimension would be sex and the second dimension would be

gender, and these two combined would be part of what would lead us to a person's sexual orientation. For example, if a person X sexually desires, is attracted to, and fantasies about females (sex) and women (gender) only, then we would ascribe them the sexual orientation of lesbian.

Importantly, Dembroff argues that we should understand sexual orientation in a way that only considers the sex and/or gender of the person a person X is attracted to[14]. I disagree. I think that when understanding sexual orientation, we should also take into account person X's sex and or gender.

Dembroff's motivation for not taking into account the sex and/or gender of the person we are ascribing a sexual orientation to is a political and social one. According to Dembroff, the move to leave out the sex and/or gender of the person we are ascribing a sexual orientation to 'Reduces or eliminates the presumption that cisheterosexuality is the normatively standard sexual orientation and all queer sexual orientations are normatively deviant[…]'(Dembroff, 2016, p. 5). This reduction or elimination happens because by not including the sex and/or gender of the person we are ascribing sexual orientation to, we end up with a radically new sexual orientation taxonomy that does not include sexual orientation concepts such as heterosexual. For example, according to Dembroff's proposal, all men who are attracted to women and all women who are attracted to women would share the same sexual orientation, in virtue of being attracted to the same

[14] Dembroff uses the term 'attraction' as a shorthand for dispositions to engage in sexual behaviour (2016, p. 7). I use 'attraction' when referring to Dembroff's proposal in the way they understand it in order to be consistent with how they use the term. However, this should not be confused by how I use the term in this chapter when I am not discussing Dembroff's work, which is as a kind of internal manifestation that might or might not have anything to do with sexual behaviour, actual or possible.

sex and/or gender. This means that all lesbians and heterosexual men would share the same sexual orientation and the sexual orientation concepts of lesbian and heterosexual would disappear.

The problem for geneticists is that this is not how most people currently understand their own sexual orientation. Studying sexual orientation requires that geneticist use sexual orientation concepts that are in actual use (such as the concepts of lesbian and heterosexual) and not sexual orientation concepts that are not known to people and that are not in use. Crucially, I do not see Dembroff's proposal taking off in the future. This is because for many people, their own sex and/or gender plays an important role in how they understand their own sexual orientation (Bettcher, 2014). Because of this, I think that it is important that our concept of sexual orientation be able to account for the sex and/or gender of the person one is assigning a sexual orientation to.

It is important that we have a clear idea about what our concept of sexual orientation refers to because this will affect our sexual orientation taxonomy and the kinds of people we will be able to account for. While I argue that our concept of sexual orientation should be based on both sex and gender and that we should take into account the sex and/or gender of both the person we are assigning a sexual orientation to and the sex and/or gender that person sexually desires, is attracted to, etc., I remain neutral on a number of issues. For one, I remain neutral on how many sexes or genders there are and I also remain neutral on whether these concepts of sex and gender are discrete or continuous. Addressing these issues would exceed the aims of this chapter.

4.2. Sexual Orientation Views in the Genetics Literature

Leaving the sex, gender, and sexual orientation relationship to a side, I would now like to work through a few common ways of understanding sexual orientation in the genetics literature and show that there is no agreed upon way to understand sexual orientation amongst geneticists.

4.2.1 A Linkage between DNA Markers on the X chromosome and Male Sexual Orientation

Hamer and at al. 1993 study, 'A Linkage Between DNA Markers on the X Chromosome and Male Sexual Orientation', is a good place to begin (D. H. Hamer et al., 1993). In their study,

> 'Sexual orientation was assessed by the Kinsey scales, which range from 0 for exclusive heterosexuality to 6 for exclusive homosexuality (13). Subjects rated themselves on four aspects of their sexuality: self-identification, attraction, fantasy, and behavior' (D. H. Hamer et al., 1993, p. 321).

This group of scientists appealed to a variety of markers typically associated with sexual orientation. Under their view, a person's sexual orientation is a conglomeration of these four markers.

4.2.2 Male Homosexuality: Absence of Linkage to Microsatellite Markers at Xq28

Consider a second study, where sexual orientation was understood through a mix of four different markers: self-identification, corroboration from a secondary source, stereotypes, and a gay interviewer. In 'Male Homosexuality: Absence of Linkage to Microsatellite Markers at Xq28', Rice and colleagues put out an advert in two gay news magazines. They were in search of families that had at least two gay brothers. The individuals that responded to the advert 'volunteered information about the sexual orientation of individuals in their families, including siblings, parents, uncles, aunts, and first cousins, although all members of the extended family were not directly interviewed' (Rice et al., 1999, p. 666). This was the first time they assessed sexual orientation. We can identify this first assessment as self-identification. Later, when it came time for the molecular analysis, they assessed sexual orientation for a second time. The participants who took part in the molecular analysis included the index subjects[15] and their gay brothers. According to Rice et al. in 'Male Homosexuality: Absence of Linkage to Microsatellite Markers at Xq28':

> 'Sexual orientation was confirmed for all subjects[16] at the time of blood sampling by the direct questioning of a gay interviewer. The index subject read gay magazines and volunteered that he was gay, and this observation

[15] Initially, 182 individuals responded to the advertisement for the study. The people who responded to these advertisements are the 'index subjects'. The other participants in the study, including the brothers that participated in the molecular analysis, were recruited through the index subjects.

[16] 'all subjects' here refers to all subjects who participated in the molecular analysis.

was corroborated by interviewing the gay brother'[17] (Rice et al., 1999, p. 666).

Quite a few things require unpacking from this passage. First, it is important to highlight the appeal to gay magazines and self-identification as markers of the study participants' sexual orientation. Rice et al. inform us early on in their paper that the adverts for this study were published in two gay magazines, and this is made quite clear. However, this is not what is going on in this passage. Rice et al. seem to be appealing to the fact that the index subject read gay magazines and self-identified as gay men as sexual orientation markers. That is, this was taken as information that helped confirm the sexual orientation of the index subjects.

If this is right, then many issues need to be raised. The first is that it is not clear that there is any correlation between reading gay magazines and being gay. It is perfectly conceivable that heterosexual people read gay magazines. It is also perfectly conceivable that not all gay people read gay magazines. Because of this, it is not clear that reading gay magazines can shed any light on a person's sexual orientation.

Leaving this difficulty aside, it is odd that Rice et al. only appeal to reading gay magazines as some kind of marker for their index subject's sexual orientation, but not for all of their participants, including the index subject's gay brothers who

[17] The advertisements for this study were published in gay news magazines. It is unclear if the fact that index subjects responded to this advertisement was taken as the only evidence to establish that the index subjects read gay magazines. It is also unclear if the brothers of the index subjects were asked if they read gay magazines.

are also participating in the molecular analysis. In other words, if these scientists consider that reading gay magazines is an important marker or indicator of someone's sexual orientation, then it is not clear why they didn't ask the index subject's gay brothers if they also read gay magazines.

Furthermore, Rice et al. report that the index subject's sexual orientation was corroborated by interviewing the index subjects' gay brothers and, in a sense, the gay brothers seem to have also corroborated the information provided by the index subjects that they themselves are gay by taking part in the study. According to Rice et al., sexual orientation also has to do with how others, other than the person in question, understand their sexual orientation. That is, there seems to be something important about another person's assessment of one's own sexual orientation. It would have been interesting to see what Rice et al. would have done if the answers provided by the study participants didn't neatly line up. That is, if some of the brothers came back and said that their brother (an index subject) was not gay but bisexual, for example. This would have been a good indicator of how much weight another person's assessment of one's own sexual orientation has over other sexual orientation markers used by Rice et al.

Then we have the gay interviewer whose job it was to confirm all of the participants' (index subjects' and their gay brothers') sexual orientation. It is not clear what questions were asked by the gay interviewer or why it was important or relevant that the interviewer was gay. It is not clear if the gay interviewer was supposed to help the participants feel more comfortable due to the nature of the study or if Rice et al. were assuming that gay people have some kind of gaydar ability which provides them special access to a person's sexual orientation.

Drawing strictly from Rice et al.'s study, the relevance of 'the gay interviewer' in assessing sexual orientation is unclear. What is clear is that the gay interviewer was part of assessing the study participant's sexual orientation and therefore part of Rice et al.'s understanding of sexual orientation. To sum up, Rice et al. seem to understand sexual orientation through a mix of self-identification, corroboration from secondary sources, stereotypes, and a gay interviewer.

So far I have listed only two examples from the literature on sexual orientation: Hamer et al.'s 'A Linkage Between DNA Markers on the X Chromosome and Male Sexual Orientation' (1993) and Rice et al.'s 'Male Homosexuality: Absence of Linkage to Microsatellite Markers at Xq28'(1999). However, even just looking at these two examples it is easy to see that these scientists sometimes are referring to different things when talking about sexual orientation. We can see that while Hamer et al.'s study understands sexual orientation on the basis of a combination of markers such as self-identification, behaviour, attraction, desires, and fantasies, Rice et al.'s study understands sexual orientation on the basis of self-identification, corroboration from secondary sources, stereotypes, and a gay interviewer. If both studies conclude that sexual orientation is, to a certain extent, influenced by genes and they both understand sexual orientation differently, they are going to end up with different and possibly conflicting results. The only factor that might remain stable across these two studies is that they will both be able to capture a group of people that self-identify with a particular sexual orientation. However, unless scientists are ready to subscribe to a self-identification view of sexual orientation (which I will later argue is not desirable), they might be selecting for different groups.

4.2.3. Genome-Wide Association Study of Male Sexual Orientation

Consider another study. According to 'Genome-Wide Association Study of Male Sexual Orientation'(2017) by Sanders and colleagues, they '[…] classified men as homosexual based on both their self-reported sexual identity and sexual feelings (Kinsey 5-6)' (Sanders et al., 2017, p. 3). Note how this is different from the previous two studies (except for self-identification marker). According to this study, sexual orientation has to do with only two markers: self-identification and sexual feelings.

4.2.4. Large-scale GWAS Reveals Insights into the Genetic Architecture of Same-Sex Sexual Behaviour

Lastly, consider a study that is, at the time of writing this chapter, claimed to be the largest genome-wide analysis of sexual orientation. The title of the study is 'Large-scale GWAS reveals insights into the genetic architecture of same-sex sexual behaviour', by Ganna et al. (2019). According to Ganna and colleagues, 'Twin and family studies have shown that sexual orientation is in part genetically influenced (~40% narrow-sense heritability), but previous efforts to identify the specific genes involved have been unsuccessful due to a lack of power' (2018). This is where Ganna and colleague's study comes in. According to them, they had close to 500,000 participants, so this study is supposed to address the lack of

power that affected previous studies. The problem with their study, however, is that sexual orientation is mostly[18] understood in terms of sexual behaviour:

> 'Our primary phenotype of interest is a binary, self-reported measure of whether respondents had ever had sex with someone of the same sex (here termed "nonheterosexuals") or had not (here termed "heterosexuals") (Box 1)' (Ganna, Verweij, Nivard, Maier, Wedow, Busch, Abdellaoui, Guo, Sathirapongsasuti, 23andMe Research Team, et al., 2019, p. 1)

This is a problem because Ganna et al. are using different sexual orientation markers from the ones used in previous studies to which their study is referring, and which they wish to confirm. Sanders and colleagues, for example, did not even examine sexual behaviour in their study. Sanders et al.'s study seems to understand sexual orientation through self-identification and sexual feelings, while Ganna et al.'s study mostly understands sexual orientation through sexual behaviour. This is a problem because if it turns out that they are talking about different things, then the results from Ganna and colleagues might not be confirming the idea that sexual orientation is genetically influenced in the same

[18] Ganna et al. discuss other sexual orientation markers in their study such as sexual identity, sexual attraction, sexual experience, sexual fantasies, gender and emotional connection, gender and socialization, and gender and time spent/comfort. However, these markers were only used to assess the sexual orientation of 23andMe study participants (the smallest set of participants), but not used to assess the sexual orientation of all study participants in their study including their UK Biobank participants. This creates a lot of difficulties for their study, which I will address later on in this chapter.

way that Sanders and colleagues are claiming that sexual orientation is genetically influenced, for example.

4.2.4.1. A Quick Discussion of Ganna et al.'s Study

Before continuing to discuss these studies, I would like to make a quick detour to discuss Ganna et al.'s understanding of sexual orientation in a bit more detail. The reason for this is that this study is a bit more complicated than the other three studies I've discussed. While Ganna et al. mainly understand sexual orientation in terms of sexual behaviour, it is also true that they use six additional sexual orientation markers in their study. My aim in these next few paragraphs is to highlight just how problematic these other six sexual orientation markers are. There are too many problems with the ways in which Ganna et al. collected and assessed this data for it to be useful for their study.

For one, their two main groups of study participants were not asked the same kind of questions that were used to assess their sexual orientation. The first main group of participants came from UK Biobank and this was their largest group at 408,995 study participants. The second main group came from 23andMe and was made up of 68,527 study participants. The UK Biobank study participants were asked only about their sexual behaviour (and were asked different sexual behaviour questions compared to the second group). The 23andMe group of study participants were asked seven questions (including a question about sexual behaviour) to assess their sexual orientation. The questions for the 23andMe group were questions about their sexual identity, sexual attraction, sexual experience, sexual fantasies, gender and emotional connection, gender and

socialisation, and their gender and time spent/comfort (2019, pp. 6–7). It is problematic that these groups were asked different questions because Ganna et al. use both of these groups as one large set of data, as if both of these groups have had their sexual orientation assessed in the same way, when in fact, they have not. For example, the UK Biobank study participants were asked: 'Have you ever had sexual intercourse with someone of the same-sex?' (2019, p. 4). After answering this question, the study participants answered two further questions that determined whether they were exclusively homosexual or heterosexual: ''About how many sexual partners have you had in your lifetime?' and 'How many sexual partners of the same sex have you had in your lifetime?'' (2019, p. 4). In order to be considered an 'exclusive homosexual', the study participants had to answer yes to the first question. Additionally, the number of same-sex partners had to be equal or greater than the total number of sexual partners reported:

> 'Participants that responded affirmative to this question and for which their total number of same-sex sexual partners was equal or greater to their total number of sexual partners were considered exclusively homosexual, whereas those who never had sex with a same-sex partner were considered heterosexual. Participants that reported to have never had a sexual relationship and those with both same-sex and opposite-sex sexual partners were set to missing' (2019, pp. 4–5).

Those study participants that never had a same-sex partner were labelled heterosexual. However, participants from 23andMe were assessed quite

differently. Even though the participants were asked 'With whom have you actually had sex?' and then had seven options form which to choose (1) other sex only, 2) other sex mostly, 3) other sex somewhat more, 4) both sexes equally, 5) same sex somewhat more, 6) same sex mostly, and 7) same sex only'), Ganna et al. reassessed this information '[…] with participants who answered 0 (other sex only) being considered as heterosexuals and those who answered 1 (other sex mostly) to 6 (same-sex only) as non-heterosexuals' (2019, p. 7). This means that in the case of 23andMe study participants, it only took 1 same-sex sexual encountered to count as a 'homosexual', while the UK Biobank study participants required that the number of their same-sex partners be equal or greater to their total amount of their sexual partners. This is problematic because Ganna et al. then use the data collected form 23andMe and from UK Biobank as one set of data. However, had they used one set of criteria across the board, their results would have been different. For example, if they applied the 'one same-sex sexual encounter' rule to the UK Biobank study participants, they would have ended up with a lot more people that were 'homosexual', according to their criteria (this couldn't be done the other way around because 23andMe study participants did not report a total number of sexual partners or same-sex partners).

Second, the study participants from 23andMe were asked completely different questions about their self-identification by 23andMe compared to how Ganna et al. understand and report this information. 23andMe asked the study participants 'How do you label, identify, or think of yourself?' (2019, p. 42). The study participants then had seven options from which to choose as their answer: 1) heterosexual only, 2) heterosexual mostly, 3) heterosexual somewhat, 4)

bisexual, 5) homosexual somewhat more, 6) homosexual mostly, 7) homosexual only (2019, p. 42). A scale like this is problematic because some of these concepts are not popular self-identifications of sexual orientation outside of surveys like this. It is unclear what 'heterosexual somewhat' is supposed to refer to here and it is also quite uncommon for someone outside of these studies to self-identity as 'heterosexual somewhat'. It is unclear what the difference or relationship between 'heterosexual somewhat' and 'bisexual' is supposed to be, for example, or between 'homosexual somewhat more', 'bisexual', and 'homosexual mostly'. As interesting as this problem is, this is not the main problem I want to highlight. The main problem I want to highlight is that Ganna et al. ignore the information about self-identification. Ganna et al. classified anyone who had ever engaged in same-sex behaviour in some of their tests as a 'nonheterosexual' and anyone who had never engaged in same-sex behaviour but only in opposite-sex behaviour as a 'heterosexual'. This is problematic because self-identification then gets reduced to a problematic classification of the study participant's sexual behaviour. As I have argued in previous paragraphs, it is problematic to reduce a person's sexual orientation to their sexual behaviour because sexual behaviour is heavily dependent on a person's social and political context. It is unreasonable to classify anyone who has ever engaged in same-sex sexual activity as a 'nonheterosexual', especially if this involves ignoring their self-identification as heterosexual. It is perfectly conceivable that someone had a same-sex sexual encounter and still be heterosexual. This same-sex sexual encounter can be accounted for in many ways. Perhaps the person in question had that same-sex sexual encounter while sexually

experimenting in their early adulthood. An account that ignores self-identification in this way is not able to account for these kinds of complexities.

Additionally, 'nonheterosexual' is not a popular sexual orientation concept used outside of these studies. While Ganna et al. worry that a term like this might be offensive (it is), their actual problem (which they do not address) is that sexual orientation concepts like 'nonheterosexual' are not sexual orientation concepts used in the real world. If they want to study sexual orientation, then they need to use sexual orientation concepts used in the actual social context in which their study participants find themselves.

Furthermore, the self-identification information collected by 23andMe is used to test for phenotypic and genetic correlations between this and the other six markers (sexual attraction, sexual experience, sexual fantasies, gender and emotional connection, gender and socialisation, and gender and time spent/comfort). Although there appears to be a high correlation between sexual experience and sexual identity (self-identification) by looking at the graphs provided by Ganna et al. (figure S7), it is unclear how self-identification was assessed for this test. It is unclear if Ganna et al. applied the same one-person rule, where all it takes is for a study participant to report one same-sex sexual encounter to be classed as a 'nonheterosexual' or whether they actually honoured the seven-point scale: (1) heterosexual only, 2) heterosexual mostly, 3) heterosexual somewhat, 4) bisexual, 5) homosexual somewhat more, 6) homosexual mostly, 7) homosexual only). In the supplementary material, Ganna et al. report that for the 23andMe data set 'The sexual experience question (item 3) was transformed in a dichotomous variable (to be consistent with the

dichotomous variable from UK Biobank) and analyzed as the main phenotype, with participants who answered 0 (other sex only) being considered as heterosexuals and those who answered 1 (other sex mostly) to 6 (same-sex only) as non-heterosexuals' (2019, p. 7). If this one person method was applied, then this is extremely problematic because this is then no longer a reflection of how the study participants actually self-identified and if they used the seven-point system, this is also a problem for two different reasons. The first is that these seven self-identification options are different compared to the data used in the rest of the tests carried out within the study, where Ganna et al. label their study participants as 'nonheterosexuals' and 'heterosexuals'. This means that even within their own study, Ganna et al. appear to be talking about different kinds of things; this seven-point scale and the one-rule method are not the same kind of thing. The second problem is one that I keep repeating and that is that it is unclear just how much these seven self-identification options actually reflect how people in the real world self-identify. This point is important to highlight again because the claim by Ganna et al. in the above-mentioned test is that there is a phonotypic and genetic correlation between how people self-identify and their sexual behaviour. This is also problematic given that Ganna et al. take their results to confirm previous genetic studies such as Hamer et al.'s, for example. The glaring problem is that other geneticists such as Hamer do not account for self-identification using this seven-point scale. They use concepts such as gay, lesbian, and heterosexual.

The last problem I would like to draw our attention to is to Ganna et al.'s understanding of sex and gender. According to Ganna et al. 'Throughout this

manuscript, we use the terms “female” and “male” rather than “woman” and “man.” This is because our analyses and results relate to biologically defined sex, not to gender’ (2019, p. 2). However, it is unclear what this actually means. That is, it is unclear what, according to them, makes up biological sex. It is clear that they only considered two sexes: female and male, but it is unclear what determines these sexes. It is unclear if it is chromosomes, genitalia, etc. Second, it is unclear how this actually relates to their understanding of sexual orientation. Additionally, although they claim to only be focusing on sex and appear to be making some kind of distinction between sex (biological) and gender (social), some of their study participants were asked questions about gender. This information was then used to check for phenotypic and genetic correlations with the rest of the sexual orientation markers (2019, p. 36). Consider these three 23andMe questions (out of the seven questions they were asked): Gender and Emotional Connection: Whom do you feel more drawn to or close to emotionally?. Gender and Socialization: Which gender do you socialize with?, and Gender and Time Spent/Comfort: In which community do you like to spend your time? In which do you feel most comfortable? (2019, pp. 6–7). Arguably, these discrepancies do not affect their main phenotype which is sexual behaviour, but it is one more example that shows the inconsistencies between how the data was collected by 23andMe and how this data was actually interpreted and used by Ganna et al. in their study.

4.3. Self-Identification & Inconsistent Uses of Sexual Orientation Markers

So far, I have listed four studies and have shown that they all seem to understand sexual orientation differently and some, very problematically. First on the list was Hamer et al.'s study 'A Linkage Between DNA Markers on the X Chromosome and Male Sexual Orientation'(1993). According to Hamer and his team, sexual orientation can be understood through a mix of four markers: self-identification, attraction, fantasy, and behaviour. The second study on the list was Rice et al.'s 'Male Homosexuality: Absence of Linkage to Microsatellite Markers at Xq28'(1999). According to Rice and team, sexual orientation can be understood through a mix of self-identification, corroboration from secondary sources, stereotypes, and a gay interviewer. The third study was Sanders et al.'s 'Genome-Wide Association Study of Male Sexual Orientation'(2017). According to them, sexual orientation can be understood through two markers: self-identification and sexual feelings. And lastly, the fourth study was Ganna et al.'s 'Large-scale GWAS reveals insights into the genetic architecture of same-sex sexual behaviour'(2019). According to Ganna and colleagues, sexual orientation can be understood mostly through sexual behaviour.

There is no 'one' marker of sexual orientation that these four studies all use in identifying sexual orientation. There is, however, one marker that three of these studies use. That marker is self-identification, but this marker aside, the authors of these studies use different markers to identify sexual orientation. In this section, I argue that it is undesirable for scientists to adopt the self-identification view of sexual orientation and that the inconsistent use of sexual

orientation markers in genetic studies is a problem. I start by addressing the self-identification view.

The self-identification view of sexual orientation is the view that sexual orientation '[…] is based on one's sense of what his or her own sexual orientation is' (Stein, 2001, p. 44). This is the view that if person X really believes that they have q sexual orientation, then that is their sexual orientation. This seems like a pretty straightforward way to understand sexual orientation and in fact, many areas of research successfully employ this understanding to their studies. For example, if we want to find out if there are any wage gaps between say, lesbian women and heterosexual women, then it makes sense that when collecting information from study participants, that we collect sexual orientation information based on how the study participants self-identify.

For example, in 'Sexual Orientation, Labour Earnings, and Household Income in Canada'(2018), information about the study participants' sexual orientation was collected through a self-report by the study participants (Dilmaghani, 2018). Studies like Dilmaghani's do not aim to find an underlying mechanism that is responsible for what makes someone gay or heterosexual. They aim to find out whether there are any income differences between groups of people that already self-identify with a particular sexual orientation. In contrast, genetic studies aim to find an underlying mechanism that is responsible for sexual orientation. The difference in research aims helps explain why the self-identification view of sexual orientation view might be useful for economical and statistical studies like Dilmaghani's study, but not useful for genetic studies. To illustrate this idea, consider the case of political lesbianism.

Political lesbianism, just as the name suggests, is a political movement that aims to challenge male supremacy by prioritising women. For some women, part of this prioritisation includes exclusively engaging romantically and/or sexually with other women. In this sense, political lesbianism is a political identity that has been taken up in a *political sense* by (previously) self-described heterosexual, bisexual, and lesbian women. In contrast, there are self-described lesbians that were lesbians long before committing to a political lesbian identity whom took the concept of lesbian to describe their sexual desires, attraction, fantasies, etc., regardless of their political commitments.

Coming back to the Canadian Household Income study, it makes sense that political lesbians should be understood as lesbian women because it does not matter whether or not they 'really' are lesbians or not. It matters that socially, they are subject to the same kind of injustices as lesbian women. For example, if two political lesbians are in a relationship and that relationship is read as a lesbian relationship, then they will be subject to the same kind of wage discrimination that other lesbian women face. For this reason, it is important that they be considered lesbians in studies such as the Canadian Household Income study. In contrast to economic and statistical studies like the Canadian Household Income study, genetic studies aim to find an underlying mechanism for sexual orientation that is unrelated to political identity[19]. These geneticists will not want to include people who identify as lesbians for political reasons. This is because it seems that what geneticists aim to uncover is something deeper about sexual orientation. I

[19] In a different chapter, I argue that we need a different sexual orientation concept to address social issues such as the income disparity issue mentioned in this study.

argue that this 'something deeper' (if there is such a thing) will have to do with a person's internal states such as sexual desire, attraction, fantasy, etc. towards a person, at least partly on the basis of that person's sex and/or gender. For this reason, I do not think that a self-identification view is enough to carry out the job in the context of genetic studies. Geneticists need something else in addition to a person's self-identification that will aid them in identifying an underlying mechanism for sexual orientation (if it turns out that there is one). Later in this chapter, I argue that that something is a person's self-report of their sexual desire, attraction, and fantasy. That is, I argue that geneticists should focus not only on self-identification, but also on sexual desire, attraction, and fantasy. However, before moving on to this part of the chapter, I would like to say something about why I think it is problematic that geneticists are currently using a variety of inconsistent sexual orientation markers.

It is problematic that geneticists are currently using an inconsistent variety of sexual orientation markers in the genetics literature of sexual orientation because this could lead to different and potentially conflicting results within the genetic sexual orientation literature. Recall that Ganna and colleagues understood sexual orientation mostly in terms of sexual behaviour and that they took their study to confirm much of the genetic research of sexual orientation that has been previously carried out, although in much smaller numbers. I argue that it is highly improbable that Ganna et al.'s study confirms the results of previous genetic studies. This is because other studies seem to be talking about different, although arguably similar kinds of things. Consider the study carried out by Sanders and colleagues, for example. According to them, sexual orientation was

identified on the basis of two sexual orientation markers: sexual identity and sexual feelings. These markers are different from the sexual behaviour marker that Ganna and his colleagues seem to be focusing on. To illustrate this point, consider the case of Sam. Sam is a gay man who has only recently come out and has only ever sexually engaged with women. If Sam was a study participant in Sanders et al.'s study he would be identified as a gay man (because of his self-Id). However, if Sam was a study participant in Ganna et al.'s study, Sam would potentially be identified as a heterosexual man (due to his sexual history). I argue that the reason that Sam is able to end up with a different sexual orientation in each of these studies is because these geneticists are not talking about the same thing when talking about sexual orientation. This is problematic because geneticists like Ganna et al. then assume that they *are* talking about the same thing and then take their results to confirm previous results, when these results do no such thing.

This has the consequence that the predictive and explanatory power of these studies is then reduced to whatever it is that they are measuring individually and in that specific context. This is in contrast to what they aim and take themselves to be doing, which is providing a larger-scale predictive and explanatory power of sexual orientation across the discipline. For example, while Ganna et al.'s study might be able draw some interesting conclusions from their data on sexual behaviour, any predictions or explanations resulting from these conclusions would only apply to the cultural context in which they collected their data or to a similar context. This is because behaviour is very much dependent on cultural context. So perhaps they can, based on their data, make some predictions

and explain sexual behaviour patterns (but not sexual orientation) based on the data that they produced and only in relation to that specific context. For example, their study participants were from the UK, the U.S., and Sweden. My thought here is that their results would only apply to these contexts and perhaps to other similar contexts. This is because sexual behaviour is heavily dependent on a person's social and political context. The UK, the U.S., and Sweden are all countries that afford the LGBTQI+ community with greater rights and liberties than say, places like Sudan, Iran, Saudi Arabia, or Yemen, where homosexuality is criminalised, and in some places punishable by death. It is not difficult to imagine that LGBTQI+ people that live in places where homosexuality is punishable by death might not engage in the sexual behaviour that best reflects their sexual orientation. In fact, it is quite likely that many of these LGBTQI+ people are engaging in sexual behaviour that does not reflect their actual sexual orientation. This is just one example of how sexual behaviour can change from context to context, due not to a person's sexual orientation, but due to that person's social and political context.

4.4. The Problem with Behaviour Views of Sexual Orientation

In this section, I argue that behaviour is the least reliable indicator of sexual orientation. If scientists are right and there is some kind of genetic basis, then this will most likely be explained in terms of some kind of mechanism[s]. If it turns out that there is a mechanism[s], then behaviour will just end up being some kind of consequence of this mechanism[s], but only in some cases (for example, some

people will act on these desires and fantasies and as a result engage in sexual behaviour, but others will not).

In the previous section, I argued that it is problematic that geneticists are using a variety of inconsistent markers to identify sexual orientation in their studies. I argued that this was a problem because many of these scientists were taking themselves to be talking about the same concept when talking about sexual orientation, when in fact in many cases they were talking about different things. To illustrate this idea I discussed the case of Sam, a person who had recently come out as a gay man and who had only ever engaged in sexual behaviour with women. I argued that Sam would be accounted for as a gay man in Sanders et al.'s (2017) study but that at the same time he would most likely be considered a heterosexual man under Ganna et al.'s (2019) study. I talked about how this was problematic and wrapped up that section by pointing to some reasons as to why understanding sexual orientation in terms of sexual behaviour might be unhelpful for geneticists. In the next few paragraphs, I argue that geneticists should move away from behaviourist understandings of sexual orientation altogether.

In its most radical version, behaviourism is the thesis that behaviour can be explained without reference to inner activity or processes. In the context of the sexual orientation literature, this means that sexual orientation can be understood and accounted for in terms sexual behaviour, without any reference to inner activity or processes. This means that a person X's sexual orientation will be whatever their sexual behaviour amounts to (Stein, 2001). For example, if a woman has only ever had sex with women, then she would be classified as a lesbian, according to a behaviourist account of sexual orientation.

There is, however, something strange about adopting this kind of view, or versions of this kind of view, when the aim of genetic studies is to find some kind of genetic influence. This is because most genetic studies are looking for some kind of sexual orientation mechanism concerned with the inner activity and processes of sexual orientation. This mechanism[s] (if it turns out that there is one) will be one that shows the complex biological low-level ways in which sexual orientation is genetically influenced. Strictly speaking, it is not clear what sexual behaviour has to do with this mechanism. Sexual behaviour is a very unreliable marker of sexual orientation, if not the most unreliable of all. This is because there are many other variables (aside from the possible genetic underlying mechanism) that might play a role in whether or not someone chooses to engage in sexual behaviour. For example, someone might live in social context in which homosexuality is criminalised and might therefore choose not to engage in sexual behaviour. It might also be the case that someone has chosen to remain celibate, despite having sexual desires, fantasies, etc. about people on the basis of their sex and or gender. Another possibility is that one might choose to engage in sexual behaviour because one is a sex worker. The possibilities are endless.

Some geneticists might object to this line of reasoning and argue that despite these problems, a behaviourist understanding of sexual orientation can still be saved. The thought might be that this can be accomplished if we exclude all of the problematic cases where a person's sexual behaviour does not reflect their actual sexual orientation and we only include cases where sexual behaviour is reflective of a person's sexual orientation. Although this might seem like an intuitive move, I argue that geneticists should not opt for this option.

In the philosophical literature, many philosophers have moved away from talking about 'actual' behaviour to talking about 'potential' behaviour that might manifest under 'certain conditions'. The thought is that moving away from talking about actual behaviour to potential behaviour that might manifest under a particular set of conditions gets rid of the problem of including a person's sexual behaviour that might not be reflective of the person's sexual orientation. This way of understanding sexual orientation is usually cashed out in terms of dispositions[20]. Dispositions are meant to give account of how a thing, substance, or person might behave under a particular set of conditions. For example, under a particular set of conditions a glass might break, water might boil, or a person might behave generously. With sexual orientation, the idea is that given a particular set of conditions, a person might engage in sexual behaviour and that this sexual behaviour would then be reflective of this person's actual sexual orientation. It seems to me, however, that this is the wrong way to go for geneticists.

Dispositions (sometimes also understood as possibilities, potentialities, abilities, capacities, etc. depending on what philosopher you ask) are understood in relation to possible worlds. Possible worlds are different from the actual world. For example, in the actual world FIFA (The Fédération Internationale de Football Association) pays women's teams significantly less[21] than men's teams who take part in the world cup. In a different world, if we didn't live in a patriarchy, the

[20] In what follows, I engage with possible-world semantics because this is the mainstream approach in the sexual orientation literature.

[21] In the last women's world cup (2019), the winning team received a total amount of £3.2 million, while the winning men's team received a total of £310 million.

women's team would receive equal pay. In this example, the condition for the women's team to receive equal pay in our possible world is that there be no patriarchy. A possible world, then, can be understood as a place in which possible events might take place, given a certain set of conditions. For sexual orientation, this means that what is taken into account under a dispositional view is not the actual behaviour that takes place in the actual world, but the behaviour that could take place in a possible world, under a certain set of conditions.

Currently, geneticists that understand sexual orientation in terms of sexual behaviour only consider behaviour that has taken place in the actual world and as such, they ask their study participants about their actual sexual behaviour. For example, in the UK Biobank data set used in Ganna et al.'s study, participants were asked questions such as: ''Have you ever had sexual intercourse with someone of the same-sex?'[…], 'About how many sexual partners have you had in your lifetime?', and 'How many sexual partners of the same sex have you had in your lifetime?'' (Ganna, Verweij, Nivard, Maier, Wedow, Busch, Abdellaoui, Guo, Sathirapongsasuti, Team, et al., 2019, p. 4). These questions were about the actual sexual behaviour that study participants have had in this actual world. This way of understanding sexual orientation is problematic because it fails to take into account the many ways in which this sexual behaviour might not be reflective of the study participant's actual sexual orientation. For example, someone might have experimented during their early adult years, worked as a sex worker (part or all of their life), lived in a social and political context that meant they couldn't engage in the sexual behaviour that best reflects their actual sexual orientation, etc.

Alternatively, if geneticists were to adopt a dispositional view, they would be asking their study participants not what actual behaviour they have engaged in in this actual world, but what behaviour they might possibly engage in in a possible world, given a certain set of conditions. For example, if geneticists wanted to capture what sexual behaviour a person that currently lives in a context where homosexuality is punishable by death would engage in if they lived in a possible world where homosexuality was not criminalised, then one of the conditions they might add would be a condition that reflects this. For example, this condition might say something like 'that there is sexual freedom in this possible world'. However, someone might object and say that this condition is not enough because in addition to needing sexual freedom, a person would also need a context in which there is a variety of sexual partners available. Therefore, geneticists might decide to include this as a condition as well, and so on. They could keep on adding more conditions, until they feel like they've arrived at a dispositional account that captures a satisfactory understanding of sexual orientation.

In theory, dispositional views of sexual orientation might seem like a good idea, but in scientific practice, geneticists face the problem of having to find a way to (imaginatively) transport their study participants to possible worlds to see what possible sexual behaviours they might engage in so that they can then record this information for their genetic studies. However, it is unclear how geneticists can achieve this.

A dispositional view would require study participants to be able to accurately imagine what it would be like to be in one of these possible worlds,

which can be problematic. Take for example a person who has grown up in social and political context where homosexuality is criminalised. Let's call this person Joe. Joe has same-sex sexual desires, but is convinced that engaging in same-sex sexual behaviour is wrong in this and in any possible world. Asking Joe to imagine what behaviour they would engage in in a possible world where they would be able to freely express their sexual desires would not be very helpful for geneticists. This is because Joe already believes that same-sex sexual behaviour would be wrong in any possible world. Joe's case is not an extreme case. A person does not have to live in a place where homosexuality is criminalised in order to believe that same-sex sexual behaviour is wrong. A person could have grown up in a place where homosexuality is not criminalised (like the U.S. or the UK) and still believe that same-sex sexual behaviour is wrong. The problem for geneticists is that they have to trust that their study participants would be able to imagine possible worlds that are quite different from the actual worlds their study participants actually live in.

4.5. Towards a New Genetic Understanding Sexual Orientation

Instead of appealing to behaviour (including plain behaviourist views or fancier dispositions-to-behaviour views) to understand sexual orientation, I propose that geneticists should appeal to inner states or processes such as sexual desire, attraction, and/or fantasies. I do not aim to propose a specific account of sexual desire, attraction, and/or fantasy in this chapter. Nor do I propose that it is these states and only these states that geneticists should take into account. Rather, what I aim to do here is argue in favour of the idea that geneticists should move

away from problematic behavioural accounts to ones that are concerned with inner states or processes. This is because I think that these will be more reliable markers of sexual orientation and will therefore be more helpful in trying to find an underlying mechanism[s] of sexual orientation (if it turns out that there is one).

Esa Díaz-León offers an interesting alternative to how we should understand sexual orientation. According to Díaz-León, we should understand sexual orientation in terms of sexual preferences. A sexual preference, according to Díaz-León, is a '[…] disposition to have sexual desires of certain kinds, given certain manifesting conditions'(Díaz-León, forthcoming, p. 14). There are a few things to note here. The first is that her proposal appeals to dispositions, which I find unhelpful when thinking about sexual orientation for all of the reasons I have already discussed in the previous paragraphs about dispositions. For the reasons I discuss in those paragraphs, I do not think it is a good idea to appeal to dispositions even when appealing to complex mental states such as sexual desires. Díaz-León's proposal is one that argues that we should understand sexual orientation in terms of dispositions to desire. My proposal would be to keep her focus on desires, but drop her focus on dispositions. I think that geneticists should move towards understandings of sexual orientation that concern inner states or processes, such as sexual desire. Díaz-León's desire view is just one example of how this view might look.

According to Díaz-León, '[…] sexual desire is a mental state that is somehow connected with some experiences such as sexual arousal (which is typically correlated with the physiological state of arousal but is not identical to

it)'(Díaz-León, forthcoming, p. 16). This is the idea that sexual arousal need not necessarily result in physiological sates but can also result in psychological states.

Díaz-León argues for a hybrid view of sexual desires. According to her, '[…] A sexual desire (for men and/or women, or people of certain sex and/or gender) involves the combination of a propositional attitude (of the form "S bears the relation of desiring towards proposition p") plus a disposition to be sexually aroused by, or sexually attracted to, men and/or women.' (Díaz-León, forthcoming, p. 17). In this sense, her view of sexual orientation combines complex mental states that involve a propositional attitude that require that a person be disposed to be sexually aroused (might be physiologically but also just psychologically) about certain kinds of people (or as she also leaves open as a possibility: caused by certain kinds of people).

In this chapter, I will not go into the technical details of this view because this is not my aim. My aim is to give an example of how a desire view might be look and what kind of understanding of sexual orientation geneticists should start to move towards. I think that Díaz-León's view is an interesting one. There are, however, many issues that one might want to challenge. This includes whether sexual desire requires a propositional attitude, whether preferences are dispositional mental states, whether sexual orientation are sexual preferences, etc. For the purposes of this chapter, I remain neutral on most of these questions. The only issue I have a stake in, for the purposes of this chapter, is on the issue of dispositions. I do not think that a dispositional view would be helpful to geneticists. I have argued that it is not clear how geneticists would go about when trying to measure and account for these dispositions in their studies.

Instead, I propose that whatever desire view geneticists adopt, it should be one without dispositions. Some philosophers, including Díaz-León will object and argue that without dispositions, a desire view will be subject to a lot of the same problems associated with a behaviourist view of sexual orientation because desires, just like behaviour, are influenced by other mental states as well as by a person's social and political context. For example, it could be the case that a person's homophobic social and political context will influence that person's sexual desire to the extent that they repress their sexual desires. I think this is a worry, but to a lesser extent than it is for a behaviourist view.

Like Stein (2001), I think that this objection actually offers a great explanation as to why it sometimes takes LGBTQI+ people such a long time to come out to themselves or to come to terms with their sexual orientation. The difference between behaviour and desire to me, however, is that once people come out with a particular sexual orientation, they are much more likely to hold on to these sexual desires as a reflection of their actual sexual orientation than they are with their sexual behaviour. For example, a gay man living in a country where homosexuality is punishable by death might still hold his sexual desire towards other men as a reflection of his actual sexual orientation even though he might not be able to engage in sexual behaviour that reflects his sexual orientation with other men. Because of this, I think that the way forward for geneticists is to move towards some kind of desire view.

Earlier in the chapter, I argued that self-identification alone was not enough to understand sexual orientation. This was because self-identification can oftentimes be used for purely political reasons. I argued that what geneticists

were actually after seemed to be something deeper than political reasons and that this something deeper were inner states and processes. I argued that the problem with self-identification was that it was not good on its own because it was not able to capture this 'something deeper'. However, when inner states and processes such as desires are combined and taken into account, this is no longer a problem. This is because self-identification is no longer only a reflection of a person's political commitments, it is also a reflection of that something deeper. If we think that that something deeper is desires, then self-identification would in part, be a reflection of those desires. In practice, this means that study participants in genetic studies would self-report their desires (according to the view that geneticists adopt) as well as their self-identification, and these two things would need to line up.

4.6. Conclusions

To circle back to the quote that I started this chapter with, I do not think there is empirical evidence available to support (or reject) Hamer's claim that '[…] genes are the single most important factor in determining a person's sexual orientation and outweigh all known shared environmental factors' (D. Hamer, 2013). Even though there are a few genetic studies of sexual orientation published on this topic, I have argued that these studies are far from being able to support or reject a claim like Hamer's because of the different and oftentimes problematic understandings of sexual orientation that these studies adopt.

I proposed that geneticists should adopt an inner state like understanding of sexual orientation that includes self-identification as an important marker of

sexual orientation. I remained neutral on a number of issues throughout this chapter. These issues require greater attention and discussion. I have not been able to do that here, nor was this my aim. My aim in this chapter was to offer a convincing argument for geneticists to start using uniform understandings of sexual orientation across all genetic studies of sexual orientation and to offer an argument to convince geneticists that the best way forward for them in terms of understanding sexual orientation is to adopt a view concerned with inner states or processes plus self-identification.

5. An Ameliorative Approach to Thinking about Sexual Orientation

You cannot be a lesbian if you have had heterosexual relationships or you cannot be a lesbian if you have children. This is part of what the UK's Home Secretary barrister said to Aderonke Apata, a Nigerian lesbian and gay-rights activist seeking asylum in the UK on the basis of sexual orientation (Allegretti, 2015). There is also a risk of not being able to count as a Lesbian and thus deported if you are not familiar with Oscar Wilde, do not go to gay clubs, or do not attend Pride (Bennett, 2014). These real-life cases reflect troubling assumptions on which the UK's Home Office ascribes sexual orientation.

Cases like this show that thinking about what sexual orientation is important for addressing social injustices faced by the LGBTQI+ community. As others have pointed out, there is currently a lot of confusion around sexual orientation (Dembroff, 2016; Stein, 2001). There are questions about whether one is born with a particular sexual orientation or whether one chooses it, what constitutes a sexual orientation, how one should ascribe sexual orientation, etc. What's more, governments, LGBTQI+ advocacy groups, scientists, and the average layperson, all seem to have different and conflicting answers to these questions. As a result, there is a lot of philosophical work that needs to be carried out in order to help clarify and address these issues. However, it is important that this work be carried out with care. It's important that we have a clear idea about who we have in mind when we address these issues and how we think these proposals might impact these groups of people.

In this chapter, I put forward a new way of thinking about sexual orientation: a political cluster concept approach. Under this approach, sexual

orientation relies heavily one's social and political context and consists of three main sexual orientation markers: self-identification, behaviour and internal manifestations. I engage with four metaphysical accounts of sexual orientation and argue that if we centre the concerns of some of the most marginalised groups in the LGBTQI+ community, these accounts fail at being able to address social injustice issues that arise due to discriminatory practices and attitudes on the basis of sexual orientation.

My aim in this chapter is to think about the metaphysics of sexual orientation with the goal of advancing LGBTQI+ rights, especially for people of colour, immigrants, trans, and genderqueer people. In this sense, this chapter is not an abstract metaphysical exercise. It is important to think about this issue in order to address social injustices. In particular, I focus on members of the LGBTQI+ community who seek asylum because they have had to flee or need to flee their home country due to severe violence and persecution, and who face persecution, harassment, and violence *on the basis of sexual orientation*. For example, what happens when someone from the LGBTQI+ community applies for asylum on the basis of sexual orientation? How is sexual orientation being understood by people making the decision to grant or deny asylum? And more importantly, how should sexual orientation be understood in these contexts to help better protect the LGBTQI+ community, especially its most disadvantaged members?

I begin by providing some context. I then move on to discuss four metaphysical accounts of sexual orientation: self-identification, behaviourism, ideal dispositionalism, and bidimensional dispositionalism. Drawing from Haslanger's method of ameliorative analysis (Haslanger, 2012), I argue that if we

centre the concerns of some of the most marginalised groups in the LGBTQI+ community, these four sexual orientation accounts fail at being able to address these concerns. To help in addressing these concerns, I put forward a new way of thinking about sexual orientation: a political cluster concept approach[22]. I argue that we should allow for the possibility of taking into account the social and political context and that we should extend the number of sexual orientation markers to include self-identification, behaviour, and internal manifestations such as desires and fantasies.

5.1. Context

The 1951 Refugee Convention outlines what a refugee is, their rights, and the legal obligations of ratifying countries to protect refugees. Sexual orientation has oftentimes been protected under the Convention through what is outlined in Article 1A(2) as protection for a *particular social group*:

> 'As a result of events occurring before 1 January 1951 and owing to well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group or political opinion, is outside the country of his nationality and is unable or, owing to such fear, is unwilling to avail himself of the protection of that country; or who, not having a

[22] I am specifically putting forward an account for the purposes specified in this chapter. For other purposes, such as scientific ones, a different account will be needed (see chapter 4). I take this account and scientific accounts to do be doing different work. The aim of this account is to be better equipped to address social injustices faced by the most marginalised members of the LGBTQI+ community. Scientific accounts have other aims. One might be, for example, to learn more about human sexuality. I do not think these two are incompatible. One can have an account of sexual orientation that aims to address social injustices while having another account that aims to understand human sexuality.

> nationality and being outside the country of his former habitual residence as a result of such events, is unable or, owing to such fear, is unwilling to return to it.' (United Nations, 1951, p. 14)

Because there is no explicit mention of sexual orientation, it is up to the countries who ratified the 1951 Convention to account for sexual orientation as they best see fit (if they consider members of a sexual orientation to constitute a particular social group that needs protection in the first place). Because there is no 'universal' or agreed upon way of understanding sexual orientation, different countries understand sexual orientation differently. Furthermore, because most countries do not publish information on asylum applications, it is really hard to give a full report on the accounts they are currently using to assess sexual orientation. However, through information that has been made available (e.g. state reports, media reports, legal decisions, personal reports, LGBTQI+ advocacy groups, and leaked documents), we know that different countries assess sexual orientation differently.

One way of understanding sexual orientation has been through sexual behaviour. For example, in the UK, a confidential Home Office document that was leaked in 2014 showed a disturbing focus on sexual acts as a way to assess an asylum seeker's sexual orientation (Taylor & Townsend, 2014). Some of the questions asked, according to the leaked document, focused on specific sexual acts and the asylum seekers' physiological responses to these (Taylor & Townsend, 2014).

A second way of understanding sexual orientation has been through sexual arousal examinations such as penile plethysmography and vaginal photoplethysmography, which are highly invasive and unreliable indicators of sexual orientation. Such examinations have taken place in the Czech Republic (The BBC News, 2010).

To give a third example, sexual orientation has also been understood through stereotypes. In 2018, it was reported that Austrian authorities rejected an asylum application on the basis of sexual orientation because according them, the applicant did not walk, behave, or dress in a way that indicated that the applicant was homosexual (The Economist, 2018).

While the Court of Justice of the European Union ruled in 2014 that EU countries (including the ones just mentioned) cannot use tests like penile plethysmography and vaginal photoplethysmography to assess sexual orientation, they did not entirely rule out the use of stereotypes or the use of information provided by asylum seekers about their sexual practices (A, B, C v Staatssecretaris van Veiligheid en Justitie, 2014).[23]

5.2. Sex and Gender

Before moving on to discuss the four metaphysical accounts of sexual orientation, it is important to draw attention to the often-confusing relationship between sex, gender, and sexual orientation. For one, the concepts of sex and gender are important when engaging with the metaphysics of sexual orientation because

[23] For a short summary, please see (A, B, C v Staatssecretaris van Veiligheid en Justitie, 2014)

they determine, to a certain extent, what the concept of sexual orientation refers to.

On some understandings, sexual orientation refers to a person's attraction, desire, etc. to people with a particular sex[es]. For example, under the UK's Equality Act (Equality Act 2010, 2010) sexual orientation has to do with a person's sex:

> '(1) Sexual orientation means a person's sexual orientation towards—
>
> (a) persons of the same sex,
>
> (b) persons of the opposite sex, or
>
> (c) persons of either sex' (Equality Act 2010, pt. 2, Ch.1, 12)

On other understandings, sexual orientation refers to a person's attraction, desire, etc. to people with a particular gender[s]. For example, according to the International Lesbian and Gay Association (ILGA), sexual orientation 'Refers to each person's capacity for profound affection, emotional and sexual attraction to, and intimate and sexual relations with, individuals of a different gender or the same gender or more than one gender' (ILGA-Europe, n.d.). And to further complicate things, on some understandings of sexual orientation, sex and gender don't seem to figure at all. For example, Stonewall, an LGBTQ rights charity in the UK, defines sexual orientation as 'A person's romantic and/or sexual attraction to another person' (Stonewall, n.d.).

A further problem is that, when sex and gender do figure, it is not clear how these categories are being understood or what the relationship between

these categories is (if any). This is important because our understanding of these two issues will have a big impact on our resulting sexual orientation taxonomy.

The first three metaphysical accounts which I will be discussing (self-identification, the behavioural view, and the dispositional view), are all set up by Stein with the aim of not committing to any of the ongoing debates in the metaphysics of sex and gender[24]. In order to do this, Stein adopts 'sex/gender' as a placeholder for 'sex' or 'gender'. For example, instead of saying something like: sexual orientation refers to a person's attraction, desire, etc. to people with a particular 'sex[s]', under Stein's proposal we would say: sexual orientation refers to a person's attraction, desire, etc. to people with a particular 'sex/gender'.

I think that a placeholder like 'sex/gender' is not very helpful because it does not help us narrow down an account of sexual orientation that will be most useful for addressing social injustices faced by some of the most marginalised groups in the LGBTQI+ community. Following on from Dembroff, I will argue that both sex and gender should be included and that these categories should be understood as socially constructed and independent of each other. I remain neutral on the question of how many sexes or genders there are and whether these are discrete or continuous categories.

[24] Stein is only committed to 'sex' referring to biological features and 'gender' to cultural ones. He remains neutral on what determines sex or what determines gender, how many sexes or genders there are, and whether these are discrete or continuous categories.

5.3. Metaphysical Accounts of Sexual Orientation

I now turn to four existing metaphysical accounts of sexual orientation: self-identification, behaviourism, ideal dispositionalism, and bidimensional dispositionalism.

5.3.1. Self-Identification View

One way of understanding sexual orientation is in terms of self-identification. According to Stein, this is the view that if a person X says that they have a 'q' sexual orientation, then that is their sexual orientation. (Stein, 2001, pp. 44–45). This view is widely used in, for example, economic studies and statistical surveys and reports.[25]

Stein argues that the self-identification view is problematic because it does not allow for the possibility of self-deception (Stein, 2001). That is, it is possible that someone might identify with a sexual orientation that does not match the one they actually have. The thought is that perhaps someone has repressed their desires so deeply, that they now believe they have a different sexual orientation to the one they actually have. I agree with Stein that this is a problem for the self-identification view. This view does not allow for the possibility that someone's self-identification and attraction, desire, etc. can come apart and be in opposition to each other. This is important if we want to be able to account for the experiences of, for example, people who live in homophobic

[25] Examples of these include: Dilmaghani, 2018; ONS, 2019; Uhrig, 2015.

societies and who as a result of this are unable to come to terms with their sexual orientation as quickly as their heterosexual peers.

In the context of asylum applications on the basis of sexual orientation, the self-identification view is also problematic because it is restrictive in terms of the number of cases it can account for. The view is restrictive because it is only able to account for one sexual orientation marker, self-identification, and fails to account for other markers typically associated with sexual orientation, such as behaviour. Most countries that criminalise homosexuality criminalise what they call 'homosexual behaviour'. People with an LGBTQI+ sexual orientation who have been accused of engaging in 'homosexual behaviour' are oftentimes subjected to extreme violence and in some cases, death. It seems that in cases like this part of the basis for which people are being persecuted for has to do with the behaviour or assumed behaviour that they are thought to be engaging in and not because they identify with 'X'. For example, it is possible for a woman to be persecuted for engaging in sexual behaviour with other women while not identifying as a lesbian (because maybe that concept is not available in her context). The self-identification view is problematic because it is unable to account for the kind of hate and discrimination that people in these situations are and have been subjected to.

5.3.2. Behaviourism

Another way of understanding sexual orientation is in terms of sexual behaviour. Under this view, sexual orientation is determined solely on the basis of observable

sexual behaviour. According to Stein, this is the idea that one's sexual behaviour determines one's sexual orientation (Stein, 2001).

This view runs into three main problems. The first is that it is not able to account for the fact that one's sexual desires and fantasies might be in conflict with one's actual sexual behaviour. For example, LGBTQI+ people living in extreme situations, like in Sudan, Iran, Saudi Arabia, or Yemen, might find that they are not able to express their sexual orientation through behaviour without putting their life at risk. The opposite is also true. There is a possibility that LGBTQI+ people living in these places might actually be engaging in sexual behaviour that does not reflect their sexual orientation. While these situations might sound extreme or only applicable to countries where homosexuality is criminalised, this is not the case. There is social pressure to avoid LGBTQI+ relationships, and enter heterosexual ones, even in countries where homosexuality is not criminalised. A good example are forced heterosexual marriages, where sexual behaviour is often expected. Consider the case of British South Asian communities in the UK. According to the Forced Marriage Unit (FMU), in 2017, 1,196 people reported or sought advice relating to a forced marriage. Out of these, 21 people identified as LGBT. But it is important to note that the number is probably higher because people are not always asked by the FMU for their sexual orientation and as a result, this information is not always collected. These are, of course, cases that have been formally reported, but there are plenty of others cases that go unreported. The experiences of the LGBTQI+ British South Asian community being forced into heterosexual marriages is well documented, even if through anonymity (Kotecha, 2017). This is another example of people

who might be engaging in sexual behaviour that does not reflect their sexual desires and fantasies, even in countries where homosexuality is not criminalised.

Another reason that a behavioural account of sexual orientation is problematic is that if one has never had sex, then one does not have a sexual orientation (Stein, 2001, p. 43). This doesn't seem right because it seems possible that people can have internal manifestations of their sexual orientation, including sexual desires and fantasies that haven't yet been expressed.

Furthermore, this view is unable to account for a lot of the hate crimes and discrimination faced by the LGBTQI+ community on the basis of sexual orientation. LGBTQI+ people are often subject to hate crimes and discrimination on the basis of sexual orientation that might not have anything to do with sexual behaviour. Take for example, political lesbianism. This was (mostly) a feminist second-wave political movement that aimed to challenge male supremacy. The idea was that the most effective way to challenge and disrupt the political system that benefited men and oppressed women was to stop taking part in that system. Political lesbianism challenged the idea that women were inferior to men. They refused to be defined by men and instead redefined themselves. They put women first. For some women, this commitment included engaging in sexual and romantic relationships with other women. Under patriarchy, it was (and still is) a political act to love and prioritise women. Some of these women were already self-described lesbians and bisexual women, and some were self-described heterosexual women who wanted to make a political statement. Political lesbianism was and still is controversial because it disrupts, amongst others things, patriarchy. Sexual behaviour aside, the idea that women do not need men

to exist is (sadly), still a radical idea. Two women in a relationship challenge assumptions about the role of men in society; it disrupts power balances that benefit men. In most social contexts, that is a political act. Lesbians are the subject of hate crimes and discrimination not just because of the assumed sexual behaviour they are thought to be engaging in. They are also the subject of hate crimes and discrimination because they challenge patriarchy, misogyny, and power relations that oppress women. Reducing sexual orientation to sexual behaviour fails to capture this complexity. This example, I think, highlights why it is a mistake to reduce sexual orientations to sexual behaviour. Homophobes are not just angry because lesbians are engaging in or thought to be engaging in sexual behaviour with each other. They are also angry because lesbians challenge heteronormative and patriarchal systems. An account of sexual orientation that reduces sexual orientations to sexual behaviour misses the bigger picture. And in doing so, it fails to account for many of the social injustices faced by the LGBTQI+ community.

5.3.3. Ideal Dispositionalism

A third way of understanding sexual orientation is through what Stein calls Ideal Dispositionalism. According to Stein: '[…] a person's sexual orientation is based on his or her sexual desires and fantasies and the sexual behaviours he or she is disposed to engage in under ideal conditions' (Stein, 2001, p.45). According to him:

> ‘Conditions are ideal if there are no forces to prevent or discourage a person from acting on his or her desires, that is, when there is sexual freedom and a variety of appealing sexual partners available’ (Stein, 2001, p. 45).

This proposal, as pointed out by Stein, incorporates to a certain extent aspects of self-identification and sexual behaviour. It takes into account people’s sexual desires and fantasies, in a way that a behavioural account of sexual orientation does not. It also manages to take into account sexual behaviour through dispositions. In other words, sexual behaviour is relevant to this account because it reflects dispositions.

The problems with this account, however, are many. First, this account assumes that there is something ‘deep’ about sexual orientation that remains constant in an ideal possible world. A related problem is that it is not clear if what remains constant are a person’s sexual desires, fantasies, sexual behaviours, social context, available sexual orientation categories, etc. Another problem with this account, and one that Stein acknowledges (although he later dismisses), is what he calls ‘the counterfactual problem’. According to ideal dispositionalism, in order for a person to know their sexual orientation, they need to know what they would do in a counterfactual situation (i.e. what they would do under ideal conditions). This, however, is difficult to assess because it is very difficult to know what one would do in a counterfactual situation. According to Stein, this is a problem but does not count against ideal dispositionalism because this account is a metaphysical one and the problem highlighted by the counterfactual problem is

an epistemological one. In other words, Stein argues that his proposal is a metaphysical one concerned with the way things are, and the epistemological problem posed by the counterfactual problem is one about what we can know. One could ask if Stein is justified in separating the metaphysical question from the epistemological question, but I think that this misses the point. Instead, I argue that whether Stein thinks this is a problem for ideal dispositionalism or not is beside the point. If we want an account of sexual orientation that is helpful in addressing the social injustices faced by the LGBTQI+ community, then an account in which one might never have epistemological access to one's sexual orientation is not a very good one. An account in which one does not have access to one's sexual orientation would not be helpful in this actual world, where LGBTQI+ people are in need of reporting a hate crime, seeking asylum, or reporting discrimination on the basis of sexual orientation. It is not helpful in reporting and it is not helpful for government officials assessing these reports and claims. This is a good reason to dismiss ideal dispositionalism.

5.3.4. Bidimensional Dispositionalism

Another way of understanding sexual orientation is through what Dembroff calls Bidimensional Dispositionalism. According to them:

> 'A person S's sexual orientation is grounded in S's dispositions to engage in sexual behaviors under the ordinary condition[s] for these dispositions, and which sexual orientation S has is grounded in what sex[es] and

> gender[s] of persons S is disposed to sexually engage under these conditions' (Dembroff, 2016, p. 18).

This account follows Stein's account in that it appeals to dispositions. Contrary to Stein, however, Dembroff aims to move away from appealing to ideal conditions. Instead, they appeal to what they call 'ordinary conditions'. Ordinary conditions are meant to fall somewhere in between 'actual conditions' and 'ideal conditions'. Ordinary conditions, according to Dembroff, are '[…] conditions under which people in fact apply the term 'sexual orientation' (and relevantly associated terms)' (Dembroff, 2016, p. 15). The conditions under which people in fact apply the term, according to Dembroff, are three. The first condition is that, in order to ascribe a person a sexual orientation, that person must be attracted to persons because they are of a particular sex or gender (2016, p. 17). The second condition requires that there be a '[…] reasonable diversity of potential sexual partners' (Dembroff, 2016, p. 17). This move intends to move Dembroff's proposal away from Stein's ideal conditions. Under Stein's account, ideal conditions required that one have a 'variety' of sexual partners available. Dembroff aims to tone down this requirement, but not so much so that it reflects actual conditions in which people might have very limited options of sexual partners available. With this move, they seek to only capture sexual behaviours that arise when one has options, and not when one has limited options (like e.g. in prisons). The third condition requires that '[…] one is willing and able to sexually engage with other persons' (Dembroff, 2016, p. 17). This condition is meant to restrict the kinds of sexual behaviour that one should consider relevant to ascribing sexual

orientation. According to Dembroff's proposal, non-consensual sexual behaviour would not count as relevant to ascribing sexual orientation. Sexual orientation would also not be ascribed to those who are physically or psychologically unable to engage in sexual behaviour (Dembroff, 2016). These three conditions make up the 'ordinary conditions' under which we would ascribe sexual orientation under Dembroff's proposed bidimensional dispositionalism.

Another important departure from Stein's ideal dispositionalism is that Dembroff treats sex and gender as different categories. Stein avoids making any specific distinction between the two and instead uses 'sex/gender' as a placeholder to talk about sexual orientation. Dembroff treats them as separate categories. They argue that people can be attracted to people on the basis of certain sex[es] and gender[s], and that these two categories won't necessarily align like they do under an account which takes one of these categories to determine the other. That is, some philosophers argue that the category of sex determines the category of gender. While other philosophers argue that the category of gender determines the category of sex. Dembroff calls the first the 'cisnormative view' and the second the 'unification view'. Under these accounts, sex is taken to be a biological category and gender a social category (along the nature/culture binary divide). Dembroff rejects both the cisnormative view and the unification view. They argue that sex does not determine gender and that gender does not determine sex. They argue that there is a distinction between the two, although not one along the nature/culture binary. On their view, both of these categories (sex and gender) are '[…] (at least partially) socially constructed […]' (Dembroff, 2016, p. 9). Although this distinction is not entirely clear, they

seem to be committed to the idea that the category of sex tracks biological features (it is not clear what these features are), that the category of gender tracks social features, and that both of these are in some sense socially constructed. The reason this distinction is important when thinking about sexual orientation is because the way in which we account for sex and gender will determine, in part, how we account for sexual orientation.

According to Dembroff, if we do not distinguish between sex and gender, the sexual orientation account that will follow will be a one-dimensional account that will only ever be able to account for either 1) sex-attraction or 2) gender-attraction. Under a cisnormative view and a unification view, this means that we will only ever be able to treat the categories of sex and gender in relation to each other, but never independently of each other (because under these views, one category determines the other). This is a problem for Dembroff who not only argues that the cisnormative view and the unification view have got it wrong, they also argue that it makes more sense to treat these categories as independent because it gives us the conceptual tools to account for the gender identity and/or anatomical transition of, for example, genderqueer and trans people. Dembroff wants to allow for the possibility that these categories can be combined in a variety of ways. Under their view, sexual orientation tracks both sex and gender, as independent categories. This makes their view bidimensional, instead of unidimensional.

Dembroff's account also makes an important move away from ideal dispositionalism by proposing that sexual orientation is grounded in the sex[es] and gender[s] one is disposed to sexually engage with and *not* on one's own sex

and gender. The thought is that this move will do away with the assumption that cisheterosexuality is the norm and that all other sexual orientations are deviant. In order to carry this out, Dembroff proposes that we rearrange people into new sexual orientation categories that do not assume a distinction between cisheterosexuality and queer sexual orientations (Dembroff, 2016). This means that under bidimensional dispositionalism, we end up with a completely new taxonomy of sexual orientation categories. Current understandings of sexual orientation categories such as heterosexual, lesbian, bisexual, etc., disappear under bidimensional dispositionalism. Take for example, Alfonso, who is a cis heterosexual man. Under bidimensional dispositionalism, he would have the same sexual orientation as Margarita, who is a cis lesbian woman. This is a big move away from current western understandings of sexual orientation. It's also a big move away from how we account for political distinctions that are able to bring light to certain forms of oppression. Under our current view, for example, it seems right that lesbians and heterosexual men have different sexual orientations and that we continue accounting for these sexual orientations in this way because lesbians and heterosexual men do not share the same political struggles. However, under Dembroff's proposed view, these two groups would share the same sexual orientation.

I think that, although this account raises important questions and worries about our current western understandings of sexual orientation, it ultimately fails to address the many social injustices that the LGBTQI+ community faces, something which Dembroff wants to achieve. According to them, a new concept of sexual orientation should be (amongst other things): '[…] conductive for

establishing legal and social protections for persons who have queer sexual orientations' (Dembroff, p. 5). In what follows, I will argue that the bidimensional dispositional account of sexual orientation does not achieve this goal. First, I will argue that the concept of sexual orientation put forward by Dembroff is ultimately unhelpful for establishing protections for people with an LGBTQI+ sexual orientation. Second, I will argue that, contrary to Dembroff's proposal, one's sex and gender should play an important role in understanding sexual orientation.

5.3.4.1. Problems with Bidimensional Dispositionalism

According to Dembroff, sexual orientation is 'explained by' a person's dispositions to engage in sexual behaviours. However, saying that sexual orientation has to do with a person's dispositions to engage in sexual behaviours is not enough to explain the concept of sexual orientation. This is because an appeal to dispositions does not specify the conditions under which these dispositions manifest. This is why Dembroff further specifies that the relevant conditions for the manifestation of these dispositions are 'ordinary conditions'. This concept is supposed to explain the conditions under which these dispositions manifest and by doing that, offer further clarification about the concept of sexual orientation. Dembroff's three conditions corresponding to the concept of ordinary conditions, however, offer no such clarification.

The first condition, for example, stipulates that '(1) The operative concept assumes attraction to persons of a certain sex or gender (at least partially) because they are that sex and/or gender' (Dembroff, 2016, p. 17). In the beginning pages of their chapter, Dembroff tells us that attraction is just shorthand for

dispositions to engage in sexual behaviours: 'To this end, talk of attraction in what follows generally can be understood as shorthand for dispositions to engage in sexual behaviours' (Dembroff, 2016, p. 7). If we plug in this information to the first condition, it reads something like this: '(1) The operative concept assumes *dispositions to engage in sexual behaviours* to persons of a certain sex or gender (at least partially) because they are that sex and/or gender'. The problem with this is that the dispositions mentioned in this condition are part of what Dembroff is trying to explain in these conditions in the first place. To put it another way, under Dembroff's account, sexual orientation is explained by a person's dispositions to engage in sexual behaviours under ordinary conditions. However, when putting forward their account of ordinary conditions, Dembroff appeals to dispositions to engage in sexual behaviours in order to explain ordinary conditions. This is a circular move. The problem with this is that dispositions to engage in sexual behaviours is what is meant to be explained by ordinary conditions in order to help explain what sexual orientation is.

Condition two faces similar problems. According to Dembroff, '(II) The operative concept assumes attraction to certain persons while having a reasonable diversity of potential sexual partners' (2016, p. 17). This condition also appeals to dispositions in order to explain sexual orientation, when this condition is in fact supposed to be doing part of the explanatory work. In addition to this problem, I would like to highlight two further problems with this condition. The first of these two problems is that this condition leaves unclear who one is supposed to be 'attracted to' in order to be able to ascribe a sexual orientation. According to Dembroff's second condition, it is '[…] attraction to certain

persons[…]' (2016, p. 17). However, it is unclear who these 'certain persons' are or who counts as a certain person. Without a clarification, 'certain persons' could be taken to refer to persons without tracking the fact that these persons have their sex and gender in common. One way of clarifying this issue would be to say something along the lines of: 'The operative concept assumes attraction *to persons of a certain sex or gender* while having a reasonable diversity of potential sexual partners '. However, it is unclear if this is what Dembroff aims to capture. If 'certain persons' was employed by Dembroff with the intention of remaining ambiguous, then a different issue arises: this condition fails to capture details that are significantly relevant to our everyday concept of sexual orientation, something which Dembroff is also committed to preserving. Namely, that sexual orientation seems to refer to a person's attraction to persons at least partly because of their sex and gender. For this reason, more clarification is needed.

Leaving this issue aside, there is another problem that I would like to draw our attention to. This problem has to do with the vagueness of the second condition when it comes to stipulating the amount of potential sexual partners that are required in order to be able to ascribe sexual orientation. As I mentioned in the previous paragraphs, 'reasonable', in this condition, aims to seek some kind of middle ground between conditions in which one might have a very limited amount of potential sexual partners available and conditions in which one might have an 'unrestricted' amount of potential sexual partners available. I take the point that these conditions are not meant to stipulate any necessary and sufficient conditions. However, if we want an account of sexual orientation that '(iv) Is conductive for establishing legal and social protections of persons who have queer

sexual orientations' (Dembroff, 2016, p. 5), then we need more detail about what 'reasonable' is supposed to capture here. Dembroff argues that a concept of sexual orientation should not capture sexual behaviour that arises in situations in which there is a very limited amount of potential sexual partners available. This is because these sexual encounters will oftentimes not be reliable markers of a person's sexual orientation. However, while it might be clear that a prison setting does not have a 'reasonable' amount of potential sexual partners available, it is not clear what counts as reasonable outside of circumstances like these. How big of a community does one need to be in in order to meet this condition? How big does a town, for example, have to be before it is able to meet this second condition? This might sound irrelevant, but it is important if this is a condition that must be met in order to assign a person a sexual orientation. Actual cases hang on this distinction. Often, people applying for asylum on the basis of sexual orientation come from small towns and so, if this is to be a condition for an account of sexual orientation that is meant to be conductive to establishing legal protections for people with queer sexual orientations, then it is important that we re-evaluate this second condition so it is able to capture the experiences of people who might not clearly meet it, but are in need of protection on the basis of sexual orientation.

Many of these worries apply to condition number three. According to Dembroff, '(III) The operative concept assumes that one is willing and able to sexually engage with other persons' (Dembroff, 2016, p. 17). In this condition, it is also unclear who these 'other persons' are supposed to be. Again, if Dembroff aims to be vague on this issue, this condition would then be in danger of not

capturing details that are important to our everyday concept of sexual orientation. The second problem that I would like to highlight has to do with the explanatory work that 'willing' is tasked with carrying out. I agree with Dembroff that a concept of sexual orientation should not count nonconsensual sexual behaviour as reflective of a person's sexual orientation. The problem is that Dembroff does not provide us with the conceptual tools that we need in order to stipulate what counts as 'willing' in situations in which people *have* given their consent. Consider the case of a lesbian woman who is seeking asylum on the basis of her sexual orientation. This woman has only ever engaged in sexual behaviour with men. The behaviour was consensual, but according to the woman, this sexual behaviour is not reflective of her actual sexual orientation. She goes on to explain that when the opportunity to engage in said sexual behaviour arose she thought to herself 'why not'. In this case, it is not clear what sexual orientation one would ascribe her. According to Dembroff, 'We refuse to ascribe sexual orientations to someone on the basis of their actual sexual behaviors if (*e.g.*) they are voluntarily celibate, subject to sexual contact without consent, or possess a prohibitive medical condition' (2016, p. 17). The woman in our example, however, did consent and was willing to engage in said sexual behaviour. Dembroff's account does not give us the conceptual tools to be able to clearly claim that this is a lesbian woman. Under a strict reading of condition number three, this woman's sexual behaviour would correspond to that of a heterosexual woman because she was willing to engage in sexual behaviour with men. This, however, is undesirable because it prevents her from getting the protection that she needs. This is a

problem for Dembroff's account, which aims to protect people with LGBTQI+ sexual orientations.

Another main issue with bidimensional dispositionalism has to do with its narrow focus on dispositions to sexual behaviour. Because Dembroff's account narrowly focuses on sexual behaviour, it fails to account for hate crimes and discrimination on the basis of sexual orientation that might not have anything to do with sexual behaviour. The political lesbian example discussed in the behaviourism section is a good example of this. This is a problem if we want an account of sexual orientation that is going to be able to help in addressing these issues.

Because of this and all of the unclarities that I have drawn attention to, Dembroff's view is undesirable and ineffective when it comes to addressing problems that some of the most marginalised groups in the LGBTQI+ community face. I have chosen to focus on issues to do with asylum because I consider asylum to be one of these such issues. However, I take this to be only one example out of many. The problems that I outlined also arise when we apply them to other situations in which people with an LGBTQI+ sexual orientation face hate and discrimination on the basis of their sexual orientation.

5.4. Political Cluster Concept Approach

With the aim of addressing the concerns of some of the most marginalised groups in the LGBTQI+ community, I propose a new way of thinking about sexual orientation: a political cluster concept approach. This political cluster concept consists of three main sexual orientation markers: self-identification, behaviour

(sexual but also romantic), and internal manifestations, such as desire, attraction, and fantasies. I propose that the weight of each of these markers should rely heavily one's social and political context.

My proposal has the advantage of having the conceptual capabilities to account for more than one sexual orientation marker. A reductive approach that only focuses on one marker, fails to account for people in vulnerable situations who might not be able to express their sexual orientation through that one sexual orientation marker. Furthermore, a reductive approach that only focuses on one marker, fails to account for social injustices on the basis of sexual orientation that fall outside of the scope of that one sexual orientation marker. For these reasons, my proposal seeks to account for three main sexual orientation markers that are typically associated with sexual orientation, self-identification, behaviour, and internal manifestations. The hope is that this proposal will expand the number of conceptual tools available to people with an LGBTQI+ sexual orientation, so that they are better prepared to report a hate crime and or seek protection, should they need to.

According to this cluster concept approach, it is an a posteriori question what sexual orientation markers will count towards ascribing someone a particular sexual orientation. This ascription will depend largely on the social and political context. However, under this approach, as with other cluster concept accounts, there will sometimes be sexual orientation markers that people with a particular sexual orientation will have in common with each other, and which will help us to identify them as being a member of a particular sexual orientation category. In addition to this, I propose that instead of ascribing sexual orientation

in terms of necessary and sufficient conditions, we ascribe sexual orientation in terms of factors that might be relevant to assessing a person's sexual orientation. The aim is that this proposal will provide us with a much more flexible framework by 1) not necessarily requiring any one sexual orientation marker in order to ascribe sexual orientation and by 2) allowing for the possibility of taking into account the social and political context of those reporting their own sexual orientation and of those assessing a person's sexual orientation. The three factors are:

1. That a person self-identify with a sexual orientation.
2. That they have desires and fantasies about other people at least partly because those people are of a particular sex[es] and gender[s].
3. That they've engaged in consensual sexual or romantic behaviour with other people at least partly because they are of a particular sex[es] and gender[s].

This account is able to account for intuitive cases in which all three of these sexual orientation markers line up. Consider the case of a woman who is a self-described lesbian. This woman only desires and fantasises about women and has only engaged in sexual behaviour with other women. This woman would count as a lesbian under this account. This account would also be able to account for the sexual orientation of people whose sexual orientation markers don't all line up. Consider the case of another woman. This woman also self-identifies as a lesbian but lives in a country where homosexuality is criminalised. She desires and

fantasises about women, but due to the criminalisation of homosexuality in her country, she has never engaged in sexual behaviour with other women. Under this cluster concept approach, and according to her social and political context, we would assign her the sexual orientation she identifies with and that corresponds with her desires and fantasies. A woman who has only engaged in consensual sexual behaviour with women, only desires and fantasises about women, but who does not self-identify as a lesbian (because perhaps she lacks the concept, due to her oppressive social context), would be able to be accounted for as a lesbian under this proposal.

This cluster concept approach is not designed to clearly demarcate between all possible cases. It admits that there might be borderline cases that might be hard to pin down, but as far as I am concerned, this is not a big problem. This is because this approach does not seek to find out 'what *really* makes one a heterosexual' or 'what *really* makes one gay'. This approach aims to find out what account of sexual orientation is best equipped to address social injustices faced by some of the most marginalised groups in the LGBTQI+ community.

5.4.1. Sex and Gender

Furthermore, I propose that a person's sexual orientation is based both on sex and gender. I follow Dembroff on this point and agree with them that sex and gender are independent categories that are (at least partially) socially constructed. This theoretical move allows us to expand our current sexual orientation taxonomy. For example, on a binary account that takes sex to determine gender or where gender is taken to determine sex, there are very little

to no conceptual resources for trans, genderqueer people, and people who identity outside of this binary to map their sexual orientation. This is because the categories of sex and gender, under these accounts, will always line up with each other, and so will not be able to account for someone whose sex doesn't line up with their gender or with someone whose sex and gender identity lie outside of this binary model. Since my aim in this chapter is to advance the rights for some of the most marginalised groups in the LGBTQI+ community, including trans and genderqueer people, it is important that an account of sexual orientation be able to provide this community with the conceptual resources that are needed in order for these groups to be able to report social injustices and seek protection on the basis of sexual orientation. An account that allows these two categories of sex and gender to come apart is in a better position to be able to account for trans and genderqueer people whose sex and gender might not necessarily line up. An account like this would allow that someone could be attracted to someone on the basis of their sex and gender, independently of each other.

I disagree, however, with Dembroff's argument that one's own sex and gender should not play a role in understanding sexual orientation. For many people, their sex and gender play an incredibly important role in understanding their sexual orientation (Bettcher, 2014). In addition to this, getting rid of this component would weaken our account of sexual orientation because it would leave us without the conceptual tools required to address many of the *current* social injustices faced by the LGBTQI+ community. This is because understanding sexual orientation only on the basis of the sex[es] and gender[s] one is attracted to and not on one's own, would get rid of our current western sexual orientation

taxonomy and lead us towards a completely new one. For example, under a sexual orientation taxonomy that does not take into account one's own sex and gender, men who are attracted to women and women who are attracted to women would share the same sexual orientation. That is, heterosexual men would share the same sexual orientation as lesbian women. This is the same for women who are attracted to men and men who are attracted to men. They would share the same sexual orientation in virtue of being attracted to same sex and gender. This means that heterosexual women and gay men would also share the same sexual orientation. This is not helpful in addressing some of the *current* discrimination faced by lesbians, bisexuals, and gay men. Consider the following cases. (1) The recent homophobic attack on two women on board a London bus. According to the women, they were physically beaten in a homophobic attack for refusing to kiss for a group of young men (The BBC News, 2019). (2) The recent case of a young lesbian attacked in Hull, in virtue of being a lesbian (Sky News, 2019). (3) A recent report which found that LGBT employees in Britain earn 16% percent less (on average) than their heterosexual peers (Milne, Amber, 2019). This specific kind of hate and discrimination is not experienced by heterosexual men. Heterosexual men do not experience hate and a pay cut for being heterosexual men. Lesbian women do, to note one example. If we lump heterosexual men and lesbian women together into one category in virtue of their desires, sexual behaviour, etc., we lose important conceptual tools that allows us to draw attention to these kind of problems. Furthermore, if we apply this model to asylum applications on the basis of sexual orientation, we end up with really odd and undesirable consequences, especially if one aims to best serve the LGBTQI+

community. If heterosexual men and lesbian women share the same sexual orientation, then this would either mean that heterosexual men could get asylum on the basis of sexual orientation or, if we reject this, that lesbian women would not be able to get asylum. I propose that in order to be in a better position to address these kind of social injustices faced by the LGBTQI+ community, we keep one's sex and gender as an important component of sexual orientation. This will allow us to keep the sexual orientation categories that we already have.

In addition to keeping some of our current sexual orientation categories, this proposal would also allow us to account for new sexual orientation categories. This is because if we take sex and gender to come apart, this allows us to able to account for people who are attracted to various combinations of sex and gender. I admit that this model is more complicated than the common unidimensional account and requires a lot more work. Up until now, many issues remain unresolved as regards the categories of sex and gender. For example, I have not said anything about how many sexes and genders there are and whether these are discrete or continuous categories. This topic deserves full attention on its own, which I am not able to do here. I will say, however, that in order to move towards an account of sexual orientation that is better prepared to deal with social injustice issues faced by some of the most marginalised groups of the LGBTQI+ community, we need an account of sex and gender that is flexible enough to capture existing sexual orientation categories as well as provide the conceptual tools to be able to account for new sexual orientations. I have argued that the first step in being able to do this is through an account of sexual orientation that accounts for both sex and gender, where these categories are

understood as independent of one another and socially constructed. I have also argued that we should understand sexual orientation not only on the basis of the sex[es] and gender[s] one is attracted to, but also one the basis of one's own sex and gender.

5.5. Conclusions

I have put forward a political cluster concept approach of sexual orientation and argued that this account would be better suited than self-identification, behaviourism, ideal dispositionalism, and bidimensional dispositionalism to address some of the social injustices faced by some of the most marginalised groups in the LGBTQI+ community. This cluster concept includes three main sexual orientation markers: self-identification, behaviour, and internal manifestations of one's sexual orientation such as desires and fantasies. According to the cluster concept approach, no one sexual orientation marker is necessary for ascribing sexual orientation and the weight of each of these markers is dependent on the social and political context of those ascribing sexual orientation. I have also argued that both sex and gender, understood as independent and socially constructed categories, are relevant when ascribing sexual orientation, this includes one's own sex and gender.

There remain some important questions about the nature of the categories of sex and gender and how these will impact our resulting cluster concept sexual orientation categories. While I don't have the space to explore the issue of whether sex and gender categories are discrete or how many sexes and genders there are, I do think that the cluster concept framework is flexible enough

to allow that we are both able to keep some of our existing sexual orientation categories and expand our conceptual tools to map new sexual orientation categories. An account of sex and gender that gets us closer to being able to capture these experiences will be better equipped to deal with some of the hate and discrimination that some trans, non-binary, and genderqueer people face. With this in mind, I leave open the question of whether we should understand the categories of sex and gender as discrete or how many sexes and genders there are. I do, however, think that the cluster concept offers a flexible framework and a good starting point to work through these questions.

Conclusions

The aim of this thesis has been to offer a new way of thinking about the role that feminist values can play in science. In the first chapter, I considered a prominent approach amongst feminist philosophers of arguing for this role by appealing to underdetermination. One of the first issues I focused on was the difference between Duhem's and Quine's proposals. I argued that Duhem's underdetermination proposal might be of little value to feminist scholars since his focus is solely on physics. In contrast, and in addition to physics, feminist scholars seem to be interested in other scientific disciplines. Furthermore, Duhem was committed to the idea that 'passions and interests' should not fill in the gap in cases of underdetermination. The problem is that this is exactly the claim that feminist philosophers want to be able to make. Feminist philosophers want to be able to claim that feminist considerations can contribute to good science in cases in which theory is underdetermined by the data. In Quine's underdetermination proposal, we found a proposal that was a little friendlier to feminist aims. This was because Quine extended his account to cover all knowledge claims. This means that it was able to cover other scientific areas that might be of interest to feminist philosophers. The problem with Quine's proposal, however, was that he argued that there was a sharp boundary between science and the kind of political considerations that feminist philosophers are interested in. This is all of little use to feminist philosophers who appeal to both Duhem and Quine in order to argue for a role for values via underdetermination. I hope I've managed to convince my reader that even if we ignore these problems, underdetermination is still not very useful to feminist philosophers because it offers a very limited role for feminist

values. This role comes in only after all empirical considerations have been exhausted.

A better strategy is to argue for a role for values throughout the scientific research process. I reviewed two proposals that did just that. The first was Kourany's proposal that we should implant egalitarian social values into science and that these values, along with epistemic values, should control every aspect of the scientific research process. As it stands, I argued that Kourany's proposal is not very useful for scientists because it leaves them without sufficient guidance about the relationship between these values, how they should weigh up these values, and about whether these values should be playing a direct or indirect role throughout the scientific research stages. Douglas' proposal proved to be more efficient in terms of being able to provide more guidance in these areas. In this sense, I argued that it was a preferable account. However, in thinking about the usefulness of this account for feminist philosophers, I proposed some changes to two crucial stages of the scientific research process: problem selection and methodology selection.

In the problem selection stage, Douglas argued that values should be able to play a role when trying to decide what research problem to pursue and what research project to fund. According to her, 'We choose to fund areas of research about which we care to know more' (2009, P. 99). I argued that the process of selecting a research project and securing funding were a little more complicated to what Douglas suggests. To illustrate this point, I gave the example of the NIH political scandal, which showcased 1) the political pressure that scientists were put under to not research any areas of research that would benefit the LGBTQI+

community and 2) that showed how difficult it can be to secure funding for a research project that the scientist or social community might value. To aid with these complications, and following Kourany (2003), I proposed that what was needed is a more direct approach. This includes 1) pushing for legislation that ensures that research projects that are beneficial and of interest to minority groups (e.g. the LGBTQI+ community) get the funding they need and 2) that these groups are included in the scientific research.

In the methodology selection stage, Douglas argued that values should be able to play a role when it comes to answering questions about the ethical acceptability of such methodology. I agree that this is a good role for values to play. However, what I thought was missing was a discussion about the additional role that values seem to play as far as the choice of concepts that are embedded in the methodology. To explore this idea, I developed a case study that looked into genetic explanations of sexual orientation. In the case study, I pointed to specific instances where queer feminist values could come in to shape concepts. In this sense, I argued that another key area where feminist values could play a key role is in the choice of concepts, and that this choice would be determined by the goals that one has.

To demonstrate this, I showed how different concepts are needed for two different goals: carrying out genetic studies and helping asylum seekers. This is perhaps one of my most original contributions. In my proposal for thinking about sexual orientation in the context of genetics, I challenged the concepts, study design, data collections, and interpretation of results. This is an area of research that has received very little attention in the philosophical community. My

proposal maps out a potential new area for values but also provides geneticists with a new way of understanding sexual orientation. However, due to space restrictions, I was unable to explore many issues. This includes issues to do with what specific inner states geneticists should take into account. The hope is that my proposal will serve as a starting point to start thinking about these kind of issues in future research.

I also proposed a new way of understanding sexual orientation for addressing social injustices: the political cluster concept approach. Although the general aim of this dissertation was to focus on the role that values play in science, I was very happy to have the opportunity to propose a new understanding of sexual orientation that might help in thinking about how to address the many social injustices that the LGBTQI+ community faces around the world, especially its most vulnerable and disadvantaged members. My proposal offers a starting point to start thinking about how we might be able to address some of these issues. I focused on asylum seekers because this is one of the most pressing issues of our time, but this is not the only one. Hate crimes on the basis of sexual orientation continue to rise at an alarming rate around the world and some of the most vulnerable groups are people of colour, trans women, non-binary people, and genderqueer people. It is for this reason that I centred my discussion on issues that affect them. As with my previous sexual orientation proposal, there are many issues that I was not able to explore. This includes questions about the nature of the categories of sex and gender such as whether we should understand these categories as discrete or continuous or how many sexes or genders there are. I

hope that the political cluster concept approach frames the discussion in which to start thinking about these questions in future research.

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