

# Formal Gender Theory: a Logical Perspective on Dembroff versus Byrne

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## Abstract

First steps are taken towards a formalization of gender theory. Biological sex, gender and gender identity are cast as total functions into a set containing four labels: male, female, neutral (or NMNF for non-male and non-female), and  $\perp$  (missing gender: no public announcement of self-identification of gender available, no gender known by other means).

Eight different definitions of a gender function are provided none of which meets the well-known criterion that self-identification of say gender  $G$  implies categorization of the same gender  $G$  under all circumstances. These developments provide a baseline from which to contemplate the Dembroff versus Byrne controversy on the proper definitions of woman and of man, as well as the position of Bogardus who casts doubt on the perspective of Ameliorative Inquiry and the position of Barnes who rejects the idea that self-identification (as  $G$ ) would be a necessary condition for categorization (as  $G$ ). These considerations are then construed into a confirmation as being plausible of an NB sceptical position formulated by Buijs.

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# 1 Introduction

We intend to rephrase gender theory as it has been developed since say 2000 in a somewhat formal manner. There are several motivations for this endeavour. To begin with the very objective to categorize persons with a finite number of categories (for instance by labeling persons with three labels: male, female and “non-male & non-female”) introduces seemingly trivial, though actually non-trivial logical problems which can best be addressed with a fairly rigorous approach.

Secondly we intend to argue that the statements made by the second author in [24] are consistent (i.e. not too much in contradiction) with the state of the art in gender theory (which itself is by its deliberative nature not consistent either). Arguing for that position requires a careful reformulation of an extensive body of theoretical work in a single format. We believe that we have achieved the latter objective, as is detailed in 5.1 below.

It is standard terminology to label a person AFAB when they have been assigned biological sex female at birth, and AMAB when they have been assigned biological sex male at birth. Already with AFAB and AMAB logical problems are introduced, we will suggest that introducing a third label is useful thereby making room for persons who are neither AFAB nor AMAB. In the literature on sexuality, a persons’s sex includes more aspects than mere biological sex, already a highly non-trivial notion by itself. It is a biological sex which is assigned at birth, and male and female are first of all labels of biological sex. We will abbreviate biological sex to b-sex below.

Besides b-sex there is a notion of gender, which strongly correlates with b-sex, though may deviate from it in some circumstances, and in particular the identification between gender and b-sex is not always maintained during the life of a person. B-sex may vary in the course of the life of an individual, while gender may vary in more flexible ways than b-sex, and for different reasons. In some cases a b-sex cannot be assigned at birth,

but such cases are considered exceptional. We will assume that “assigning” the newborn some label, an alternative to male or female is appropriate in such cases.

The label might be NMNF (for non-male & non-female), the very well-known label NB (non-binary, nonbinary), b-neutral, or simply neutral. Below we will use b-neutral, which throughout the paper might be replaced by b-NMNF. Reasons for a preference for NMNF over NB are listed in Section 5.3 below, and these reasons serve as a justification for the use of b-neutral as well. A b-neutral newborn is assigned neutral at birth (ANAB). Transitions during life-time from b-neutral to male or to female are conceivable in principle, as well as transitions in the opposite direction. We will use neutral gender in a meaning that differs from the various understandings of gender neutrality as surveyed in [63].

Gender theory has become forefront in the media, perhaps less so in Academia, and it serves as the academic host for quite controversial issues: When is a person a woman?; what is a man?; What if anything is the difference between gender and b-sex?; What is an appropriate role of gender in our and future societies? These matters are far from trivial and the literature is remarkably extensive and complex.

## 1.1 A brief summary of gender theory

Recent literature on gender theory (see e.g. the introduction of [18]) has given rise to a fairly simple and convincing picture of matters of gender:

1. Rather than categorizing humans in b-sex categories male, female, and b-neutral, the categorization may be conducted with three genders: male, female, and neutral. Gender categorization and b-sex categorization may differ in some cases (persons in some stage of their life) and these difference matter a lot both for individual persons and for societies at large.
2. Gender categorization refers to the process/outcome of assigning (reassigning) one of the three gender categories (male, female, neutral) to a person. Gender categorization is decoupled from the categorization of persons in terms of sexual orientations (with abbreviated labels L,G,H,B,T,I,A etc.)
3. Equating gender with b-sex is referred to as the natural notion of gender.
4. Describing the demarcations of the three genders, (i.e. how these differ from the b-sex categories) is a matter of design. The objective of the development of such designs, as well as of their implementation in practice, is to improve lives of persons as well as societal structure. Improvement in this area is referred to as amelioration, and Ameliorative Inquiry works towards “better” definitions of the three genders.

5. In addition to gender the concept of gender identity has grown to become critically important on matters of gender. Gender identity is about the self-identification (in terms of gender) of a person.

The relation between gender identity (which as a matter of principle comes about from self-identification) and gender categorization is at present ill-understood (though Barnes (2022) [6] demonstrates that gender identity (awareness and announcement) and gender categorization are not coextensive, i.e. may produce different outcomes under certain conditions). The relation between gender categorization and self-identification of gender identity is the topic of the so-called “gender wars”.

6. The three genders come with different pronouns. Development of pronouns for the neutral gender, and of protocols for the announcement and use of preferred pronouns, is still ongoing, and is quite dependant on language and culture.
7. Ameliorative Inquiry as it takes place in practice, as well as in the science of gender (commonly referred to as gender studies), is primarily driven by an agenda of political feminism, but other agendas might serve as drivers for Ameliorative Inquiry just as well.
8. Facilitating the lives of MTF (male to female) and (FTM) transgender persons have been major incentives for Ameliorative Inquiry with outcomes that are stepwise being reflected in various jurisdictions. The status of the neutral gender, as well as the phenomenon of FTN (female to neutral), and MTN (male to neutral) is becoming center stage nowadays.
9. In practice, and at least for the time being, different cultures, states, religions, ideologies adopt different definitions (i.e. demarcations) of gender. Differences of opinion on demarcations of gender are proving hard to resolve.

With regard to gender theory we have come to the following working hypotheses:

- grasping some of the foundations of gender theory from first principles in a lightly formalized framework is both possible and useful,
- the insistence on the use of total functions as systematically advocated by James Anderson (see e.g. [3]) is of relevance for the philosophy of gender, and
- these matters allow investigation that is framed in informal logic with a potential of using the tools of formal logic. In particular the dogma that all humans can at any time be convincingly categorized in terms of  $GEN = \{\text{male, female, neutral}\}$  creates complications of a logical nature which are potentially better addressed in the presence of some formality.

We will need additional terminology: at any time besides a gender identity, which results from self-identification, a person has a gender L/I-categorization i.e. the gender someone is legally or institutionally categorized as, which comes about from external processes and which requires some form of social acceptance. Moreover in a local community (much smaller than the area for which L/I-categorization is supposed to be valid) there may be a C-categorization of gender.

Gender categorization, however amounts to the determination of the “true” gender of a person informed by one’s theory of gender while performed, at least in principle independently of L/I-categorization. Following [6] gender categorization and gender identity are not necessarily identical, not even in an ideal world.

In a given jurisdiction gender L/I-categorization depends on laws and on the outcome of various bureaucratic, legal and medical processes. We have the following assumptions:

- Gender L/I-categorization may deviate from what would be desirable.
- Gender may be understood as desirable gender, that is the gender which, according to the gender theory at hand would best fit a person at a given instant of time. The gender of  $P$  is the gender  $P$  is categorized as.
- In our formal gender theory, gender (i.e. gender categorization) is not necessarily equated with gender identity, leaving room in principle for circumstances where these differ. By allowing gender to differ from gender identity a more general theory is obtained.
- Likewise gender may differ from gender L/I-categorization, again in order to have a sufficiently general theory.
- It is plausible that in an ideal world gender and gender L/I-categorization coincide. We intend, however, to develop gender theory in such a manner that it can also be applied in an imperfect world, and in a world where different jurisdictions simultaneously maintain different protocols for gender L/I-categorization.
- C-categorization of gender may replicate L/I-categorization. Alternatively C-categorization may allow persons to make use (for the determination of C-categorization of gender) of their gender categorization according to the favoured theory of gender, or of gender self-identification. (Nowadays an increasing number of organizations maintains rules which guarantee for staff that self-identification of gender determines C-categorization of gender).

## 1.2 Butler versus Bem

The controversy of Butler versus Bem is a hypothetical construction in the following sense: Bem's approach (e.g. in [7]) sex differences as based on androgyny aspires social change but does so from a model that does not involve conflicts per se. By viewing sex along the lines of androgyny, so Bem argues, on the long run differences of biological sex will become less important and needless uses of that difference will fade away. In *Gender Trouble* Butler, however, Butler suggests that conflicts and disruption may be on the critical path of the progress which in fact Bem aspires just as well.

Bem [8] indicates that Bem agrees with Butler in that *Gender Trouble* as a concept may be more effective as a tool for social change than her somewhat modest and individualistic approach via androgyny. The popularity of androgyny as a research theme, clearly visible between say 1975 and 1990, seems to have come to an end with the arrival of Butler's more antagonistic approach, (where to some extent queer replaces androgynous). According to [76] Bem made no distinction between sex (i.e. b-sex) and gender, a distinction which Butler definitely made. According to [76] Bem considered her neglect of a distinction between b-sex and gender to constitute an omission in her own work in hindsight.

However, Bem might not have conceded, and one wonders to what extent continued work along the lines of androgyny is still a viable option as an alternative to the principled trouble announced and pursued by Butler and the many followers of her approach.

**Claim 1.1.** *Androgyny (say as understood by Bem, and essentially understood as a non-political “anti-queer” approach) versus an activist conception of gender (understood as including the rejection of the dominant gender binary in one's aspired positioning in the gender categorization), constitutes to date a meaningful alternative between quite different and both relevant approaches to gender theory and practice.*

Singer [65] has combined (neo)Jungian analytic psychology with androgyny (for a follow-up and a step towards revision see [54] and for a gendered redesign of Jung's A/A theory see [45]), however, as [72] points out androgyny is nowadays a term which seems to lack sufficient focus and for that reason may not be used very often.

**Claim 1.2.** *Androgyny, that is the plurality of its specializations, may serve as so many theoretical cores for projects and activities fitting a non-disruptive approach to gender diversity.*

Approaching gender diversity along the lines of androgyny might be termed gender-‘featherlite’ following the style of terminology of [21] as used e.g. in [20].



### 1.3 Dembroff versus Byrne

A central question of gender theory “what is a (wo)man?” can be rephrased as “Dembroff versus Byrne”. This contrast refers to Robin Dembroff’s (Yale University), response in [33] to the positions proposed and defended by Alex Byrne (MIT) in [26] (2020). Byrne provides a fairly conventional perspective on matters of gender, and is leaving little room for deviation between b-sex and gender as principles of categorization (i.e. labels). Dembroff [33], on the other hand dismisses Byrne’s line of thought and defends recent views that have arisen in gender studies, where gender and b-sex may be remarkably disparate. Obviously the Dembroff versus Byrne controversy is of critical importance for gender theory as the substance of the very notion of gender is at stake.

We are by no means in the position to mediate between both professional lines of philosophical argument. The underlying issue is of fundamental importance, however, Given the contradictory conclusions obtained in these works, asking for “comprehension” of both papers at the same time is perhaps asking too much. Working in between of mathematics, logic and informatics, I have had little exposure to such spectacular forms of academic disagreement. A few further remarks can be made on the debate: (i) Byrne has responded in [27] claiming to refute most if not all arguments put forward by Dembroff. In [18] the question is subsequently turned upside down as the “transgender inclusion problem”: how to define womanhood in such a manner that transwoman are properly included? And the conclusion is drawn that this problem is unsolvable as long as there is no recognition of the following observation: “..., no matter what it means to be a woman, it’s one thing to be a woman, and another thing to identify as a woman.”

Instead we will try to reconstruct a fraction of gender theory in a bottom up manner and see if any additional clarification results. An admittedly modest outcome of this work is that we will demonstrate the usefulness of the concept of gender in addition to the concept of b-sex. However trivial this result may be for gender studies professionals and given the omnipresence of the term gender, Byrne would probably disagree with this assertion already, as he suggests in [26] that sex (we assume b-sex is meant) was renamed into gender (rather than complemented with it). We believe that conceptual flexibility is a critical advantage of the term gender, and flexibility is the feature upon which said result is built. As a second result 8 possible definitions of gender are provided, thereby allowing in principle to analyse the Dembroff versus Byrne controversy for each of these definitions of gender. Of course some definitions will be preferred or ruled out by either or both of these authors.

## 1.4 Bogardus versus Barnes

The controversy Bogardus versus Barnes is about the following question: is self-identification as gender  $G$  a sufficient condition for being categorized as of gender  $G$ . Bogardus (2022) [18] says no, making reference to Barnes (2022) [6] who agrees with the sufficiency of said condition, thereby following a significant volume of literature on gender theory rooted in [42] where the paramount importance of self-identification was first emphasized. Here Barnes represents today's orthodoxy in gender theory, which Bogardus disputes. In the controversy of Dembroff versus Bynre, however, it is Dembroff who represents and defends today's orthodoxy concerning gender theory. While Dembroff versus Byrne is about the rationale of gender theory, Bogardus versus Barnes is about its methodology. Both controversies will remain fundamentally unsettled for decades to come we expect. Each of the four authors can mobilize strong, if not convincing, arguments, though from their own perspectives respectively.

## 1.5 Duyvendak versus Buijs

Unlike the two controversies mentioned above, which exist at an international level, the controversy "Duyvendak versus Buijs" refers to a local conflict in Amsterdam taking place early 2023, which may be considered the first instance of a gender war in The Netherlands. The issue has gained national visibility, the academic position of Buijs is at risk etc. Buijs claims that gender theory lacks scientific solidity regarding the concept of nonbinary gender, and in addition he has suggested in [24] that nonbinary gender is hyped. Duyvendak in [34] representing the current orthodoxy in gender studies denies Buijs' claims. Duyvendak suggests that Buijs is ignorant of substantial scientific consensus, thereby needlessly creating problems for nonbinary persons.

At closer inspection the Duyvendak versus Buijs controversy is a special case of the Bogardus versus Barnes issue: is self-identification as nonbinary a sufficient condition for a person to be categorized as nonbinary? Buijs says no, while Duyvendak is positive about said sufficiency. Now the Bogardus versus Barnes controversy has its roots in the binary context and arguments for both sides (most notably for the position of Barnes) have been developed extensively in recent decades. The Bogardus versus Barnes controversy is fully present when limited to contemplating conditions for a person being categorised as of female gender. For the Duyvendak versus Buijs case which deals exclusively with the non-binary case there is much less literature available arguing for either side of the argument. Buijs can be rephrased as follows: currently (say early 2023) there is no reliable scientific consensus in support of the claim that "self-identification as nonbinary is a sufficient condition for a person to be categorized as nonbinary", and proceeding as if such a consensus has been conclusively obtained cannot be based on the literature of gender studies. More-

over, according to Buijs, if an academic institution (i.e. the University of Amsterdam) proceeds as if formulating doubts concerning the claim that “self-identification as nonbinary is a sufficient condition for a person to be categorized as nonbinary” is unscientific, the institution, by so doing, is itself contradicting precious academic values.

Below in Paragraph 5.1, we will explain why it is the case that Buijs’ views can be reconciled with today’s orthodoxy on gender theory to such an extent that these views should not be ruled out in advance without further investigation. That’s not to say that further research will confirm the positions of Buijs, though we assign a subjective probability of 25% to the state of affairs that his views will become confirmed in forthcoming work by himself and by other workers in applied gender theory.

In the final remarks (p 417) of [78] it is stated that “This paper challenges the binary model of gender/SEX. The very fact that a CUP journal publishes that statement in 2022 (accepted in 2021) indicates that a debate is still ongoing and that researchers feel that arguments are still needed to justify non-binarity of either sex or gender.

Finally the Duyvendak Buijs controversy may be simply regarded a symptom of non-binary gender being a floating signifier following [49] similarly as documented for the binary transgender case in [28]. The latter idea would predict the confrontation between Duyvendak and Buijs as intrinsic to the theme, and not way as brought about by these people.

## 1.6 Accusation theory: complementing the transphobia accusation

Individuals who call into question the principle that self-identification as being of gender  $X$  suffices for the gender  $X$  categorization may be confronted with the ‘transphobia accusation’. As said principle is particular relevant in the trans context, each expression of doubt of the principle’s validity may be classified as an instance of transphobia. Moreover, the trans community reserves the right to determine who is transphobic and who is not. The transphobia accusation has proven to be a very powerful accusation, against which the accusee has little defence. (see e.g. “An army of ‘woke warriors’ stands ready to accuse anyone challenging this narrative of transphobia” as quoted from [75] p 881).

Accusation theory as put forward in [12, 13] and [14] provides tools to discuss accusations in a systematic manner. A remarkable accusation under the name of “gender terrorism” has been coined by Kate Bornstein (see e.g. [19]). Gender terrorism by now is an accusation which has been used in different directions, and when used, requires an explanation in some detail, who precisely is being accused of what attitude or behaviour.

Several patterns of accusation, some complementary to the transphobia accusation are mentioned below. Accusations may or may not signal the presence of blame (see [52, 68]), blame may never be assumed without thorough analysis, however. Blame may exist in the

absence of any accusations, and conversely.

### **1.6.1 The TERF accusation**

A person may be accused of TERF mentality (transexclusionary radical feminism). The TERF accusation is a special case of the transphobia accusation. As an instance of the transphobia accusation, the TERF accusation is specific about both the background and the motivation of accusers.

### **1.6.2 The transmania accusation**

Symmetrically we may speak of the ‘transmania accusation’. The transmania accusation, accuses persons or groups of featuring transmania, where transmania refers to the actions and words of persons who are dismissive of any debate on matters of gender categorization which fails to take a positive answer to question (ii-a) in Question 3.1 below as a point of departure. The transmania accusation is, like the transphobia accusation not a plausible element of scientific or philosophical discourse. The remarks made in [24] where it is suggested that nonbinary gender is hyped may be understood as an instance of the transmania accusation (as issued by the author of [24] though without the use of that phrase).

### **1.6.3 The gender criticality accusation**

Persons may be accused of being gender critical, for instance if they do not support Claim 1.3 below. In practice the gender criticality accusation mostly serves as an alternative to the transphobia accusation. We assume that an assertion is claimed to be gender critical if deviates from a certain self-declared orthodoxy. Be that as it may, it seems to be the case that according to some Claim 1.3 below is gender critical.

### **1.6.4 The micro-aggression accusation**

Micro-aggressions may occur in many forms. In the gender debate one may imagine the situation that reference is made to a paper  $X$  say from 2005 written by an author  $A$  then self-identifying as female, though who self-identifies as male since 2015. Suppose person  $B$  writes in 2023 “when  $A$  wrote  $X$  in 2005, she failed to take into account that ...”. Now  $B$  may be accused of having committed a micro-accusation (by intentionally misgendering  $A$ ).

### **1.6.5 The androgynophobia accusation**

The androgynophobia accusation can be used if one claims that a person or group is phobic of androgynous individuals or more generally if a person or group is strongly dismissive of promoting the androgynous condition as being explanatory for phenomena and circumstances which they prefer to label with non-binary. The strong reaction to [24] (as mentioned in [46]) may be understood as an instance of androgynophobia (because the position taken in [24] is that the androgynous spectrum may to a large extent play the same role which the nonbinary label is meant to fulfil, though with more explanatory strength).

### **1.6.6 The gender terrorism accusation, an ambiguous accusation**

A remarkable accusation under the name of “gender terrorism” has been coined by Kate Bornstein (see e.g. [19]). Gender terrorism by now is an accusation which has been used in different directions with quite different meanings. When used, the gender terrorism accusation requires an explanation of who is being accused of what attitude or behaviour. It seems that, unlike the transphobia accusation, the gender terrorism accusation plays no role anymore in the academic debate on gender.

### **1.6.7 The wokeness accusation, a controversy unspecific accusation**

Controversies in the context of gender com with accusations. For instance supporters of Byrne (in the context of Dembroff) might accuse supporters of Dembroff if being woke. The wokeness accusation, however, is unspecific and requires in each particular case an explanation in detail of what attitude or viewpoint is being labeled as woke. Conversely the transphobia accusation may be issued. In the context of Bogardus versus Barnes, again followers of Barnes might be accused of wokeness while in the other direction the transphobia accusation might be issued. In the Duyvendak versus Buijs case supporters of Duyvendak may accuse supporters of Buijs of being transphobic, while in the other directions wokeness, transmania, and androgynophobia may constitute the label of accusations. Unfortunately the medium of twitter provides a platform facilitating the exchange of accusations with single phrase/word bodies.

## **1.7 Some fundamental questions**

In addition to b-sex, which takes into account the existence of transsexed persons, the notion of gender has become ubiquitous. The idea is that gender like b-sex has three labels, though now augmented with  $\perp$ . The classical idea is that the gender (of  $P$ ) takes

social conventions into account, as well as roles of  $P$  and the personality of  $P$ , while b-sex has an exclusive focus on physical aspects.

However, the following Claim, which we consider to be counterintuitive (thereby leaving open the possibility that Claim 1.3 may in the end prevail) has received significant traction:

**Claim 1.3.** (Counterintuitive claim on unconstrained self-determination.) *Any person  $P$  can (i.e. must be granted the right), at any time, to self-determine their gender (as a label in {male, female, neutral}) with a mere act of will, thereby leaving each and any of the following aspects (in as far as regarding  $P$  and in as far as applicable in the particular case of  $P$ ) without any constraining influence whatsoever on the production of said self-determination:*

*b-sex assigned at birth, b-sex as known during the episode of self-determination, history of gender self-identifications, problems experienced with past gender categorization(s), positive expectations about the advantages of the chosen gender, issues of/problems with transsexuality, history of reassignment therapies, expectations of further reassignment therapies, societal permissions granted to (or withheld from) persons of the various genders given the conventions and legislation in existence, socialization, community, tradition, sexual orientation, and in fact any theory of gender roles, including any claim or even hint regarding the relevance of gender.*

**Question 1.1.** *Why is it the case that many authors consider Claim 1.3 plausible?*

**Question 1.2.** *How to design weaker claims than Claim 1.3 with higher plausibility?*

**Question 1.3.** *What may be merits of availing of weaker claims than Claim 1.3 (with higher plausibility)?*

We will not provide an answer to Questions 1.1, 1.2 and 1.3, though we will show that the gender studies literature (of early 2023) shows signs of doubts regarding the validity of self-identification sufficiency for gender categorization (as made explicit in Claim 1.3).

## 2 Biological sex (b-sex)

We will be somewhat precise about b-sex (as an attribute of humans) so that the relevance, if not need, of a related but different notion of gender will become obvious. Male, female and b-neutral the three elements of the sort bSEX (representing b-sex). Male, female, and b-neutral are categories (or rather category labels) and bSEX denotes a sort containing two categories. bSEX is a sort name, which itself has an interpretation:  $||\text{bSEX}|| = \{\text{male, female, b-neutral}\}$ . Non-human mammals have a b-sex, however to mammals no gender will be ascribed and no gender identity either.

## 2.1 General assumptions concerning b-sex

**Axiom 2.1** (B-sex is a primitive attribute). *The attribute b-sex of a human individual is important for gender theory. B-sex is a primitive notion which does not depend on sexuality broadly conceived, and not on gender or on gender identity.*

Axiom 2.1 will be taken for granted in the rest of this work.

## 2.2 Mutually exclusive assumptions on sexual binarity

The first parameter of gender theory concerns making a choice of the following four mutually exclusive four options on the binarity of sex.

**Assumption 2.1** (RigidBinSex). *All living persons have at birth either b-sex male or b-sex female. Professional techniques from biology, anatomy, and medicine allow determination of the b-sex of a person in an unambiguous manner.*

**Assumption 2.2** (DefaultBinSex). *Except for a very small number of persons (say 0,1 % of the population at most of whom are considered b-neutral), all living persons have at birth either b-sex male or b-sex female. Professional techniques from biology, anatomy, and medicine allow determination of the b-sex of a person in an unambiguous manner, inclusive the determination of the b-neutral cases.*

**Assumption 2.3** (NearBinSex). *Except for a small number of persons (say 1 % of the population at most who are considered b-neutral), all living persons have at birth either b-sex male or b-sex female. Professional techniques from biology, anatomy, and medicine allow determination of the b-sex of a person in an unambiguous manner, inclusive the determination of the undecided cases.*

**Assumption 2.4** (PartialBinSex). *Except for a limited number of persons (say 5 % of the population at most who are considered b-neutral), all living persons have at birth either b-sex male or b-sex female. Professional techniques from biology, anatomy, and medicine allow determination of the b-sex of a person in an unambiguous manner, inclusive the determination of the undecided cases.*

**Axiom 2.2** (Persistency of b-sex). *Persons with b-sex male, b-sex female, or b-sex b-neutral stay in precisely that status until they undergo sex transitioning treatments. A phase of b-sex transitioning can result in b-sex status male, female and b-neutral.*

**Assumption 2.5** (Persistence of non b-neutral b-sex). *Persons with b-sex male or female, stay in precisely that status until they undergo sex transitioning treatments. A b-sex transitioning can result in b-sex status male, female, or b-neutral. Transitioning ending in b-sex status b-neutral is called partial b-sex transitioning.*

The four assumptions RigidBinSex, DefaultBinSex, NearBinSex and PartialBinSex exclude one-another. Many arguments can be found in the literature concerning these matters. Many papers contain explanations of the difficulty of b-sex assignment. We suggest that the nature of such complications is immaterial for the design of gender theory. A choice of one of these assumptions serves as a parameter for theory design, and by taking all four options into account one may obtain a valid picture of the degree to which certain claims or results depend on the choice made.

**Axiom 2.3.** *the notions AFAB (assigned female at birth) and AMAB (assigned male at birth) are well-known and uncontroversial.*

*These notions exist for each of the cases RigidBinSex, DefaultBinSex, NearBinSex and PartialBinSex. In three of these cases ANAB (assigned b-neutral at birth) may be in order (which is not a well-known notion, and which is introduced at this place).*

*The attributes AFAB, AMAB and ANAB remain unchanged during the life of a person (at least in principle, changes of these attributes may take place retrospectively if assignments performed at birth were demonstrably imprecise, prejudiced, fraudulent, or incompetent).*

**Axiom 2.4.** *Heteronormativity, either as a personal attitude or as a societal phenomenon does not depend on or necessarily correlate with any choice of a sexual binarity assumption (in particular not RigidBinSex).*

## 2.3 Transition terminology

**Axiom 2.5.** *A person may change between male female and b-neutral. But each of these changes require medical interventions.*

The terminology for transitions is as follows:

- (i) transsexed males have become male after a transition from (b-sex) female to (b-sex) male (thus following the terminology used in [37]);
- (ii) transsexed females have become female after a transition from male to female;
- (iii) a transsexed b-neutral person has become b-neutral after a transition from either male or female to b-neutral.

With b-neutrality as a first class citizen in bSEX another transformational attribute makes sense: novo-sexed.

- (iv) An novo-sexed male has become male after a transition from b-neutral to male;
- (v) An novo-sexed female has become female after a transition from b-neutral to female;



### 2.3.1 Sex/gender life-cycle of an MTF transsexed and transgender person

As an example we consider in detail an AMAB person  $P$  who after due time becomes a person with b-sex female and with female gender.

1.  $P$  is born AMAB;
2.  $P$  discovers their male b-sex as well as “imposed” male gender;
3.  $P$  develops doubts concerning their gender;
4.  $P$  adopts transgender identity that is: a gender identity different from b-sex (in [37] it is assumed that the transgender identity state is a state of gender female; we will not adopt that convention, however, so as to have the option to decouple gender identity from gender in principle and to decide whether or not to adopt that convention depending on circumstances);
5.  $P$  experiences a transsexual phase, understood as a medical condition (if not, the transgender identity is the final state of affairs);
6.  $P$ 's transsexuality is resolved through reassignment therapies of various kinds, at the end of which  $P$  is transsexed;
7. having made the transition the transgender identity  $P$  has become a gender identity; the gender identity corresponding to b-sex it is now assumed that corresponding gender categorization can be applied;
8.  $P$  is considered a transgender female, and in all contexts is categorized as a woman (a person with female gender).

### 2.3.2 Sex/gender life-cycle of an MTF non-transsexed transgender person

As an example we consider in detail an AMAB person  $P$  who after due time becomes a person with b-sex female and with female gender.

1.  $P$  is born AMAB;
2.  $P$  discovers their male b-sex as well as “imposed” male gender;
3.  $P$  develops doubts concerning their gender;
4.  $P$  adopts transgender identity;

5.  $P$  may experience a transsexual phase, understood as a medical condition (if not, the transgender identity is the final state of affairs, with the gender categorized as female, see e.g [1]);
6.  $P$ 's transsexuality is resolved through reassignment therapies of various kinds, at the end of which  $P$  is not considered to be transsexed ( $P$ 's b-sex may be male or b-neutral);
7.  $P$  is considered a transgender female, and in all contexts is categorized as a woman (a person with female gender).

Now transgenering is the switch of categorization from natural gender male to gender (and former transgender identity) female.

The final step may be controversial. The critical question is under which conditions  $P$  is categorized as a woman. Is the self-identification sufficient, or are partial results of reassignment therapies expected etc. The categorization step allows ramification into different circumstances. Below when describing gender functions we will experiment with one of the possible ramifications of this final stage.

The transphobia accusation is regularly issued towards persons who contemplate imposing additional conditions on the final step (i.e. as a precondition for categorization as female).

## 2.4 The b-sex of a person: a quasi-mathematical total function

A quasi-mathematical function is a mapping, which unlike a mathematical function has some 'real world' collection as its domain. Here we notice that according to mathematical conventions a mathematical function has a set as its domain. We will need the collection of living humans at time  $t$ , a collection which does not qualify as a mathematical set. Nevertheless the idea of a total mapping with domain  $V$ , an association of a unique element from (the same or) another collection  $W$  to all elements of  $V$  makes perfect sense. We will speak of a quasi-mathematical function for that reason (with domain  $V$  and rang  $W$ ). The function being total expresses that there is always an image. Now one of the virtues of using the category b-neutral is that irrespective of the assumption made on sexual binarity one may always (i.e. at any time) assign (at least in principle) an element of the set {male, female, b-neutral} to any person.

**Axiom 2.6** (B-sex as a quasi-mathematical total function). *At any time  $t$  there is a quasi-function  $\text{sex}_t(-)$  from living humans to the set  $b\text{-SEX} = \{\text{male, female, b-neutral}\}$  which yields the b-sex at time  $t$ , written  $\text{sex}_t(P)$ , of  $P$ .*

**Axiom 2.7** (Sex assigned at birth as a quasi-mathematical total function). *There is a quasi-function  $\text{sex}_B(-)$  from living humans to the set  $bSEX = \{\text{male, female, b-neutral}\}$  which yields the sex assigned at birth, written  $\text{sex}_B(P)$ , of  $P$ .*

**Definition 2.1.** *At time  $t$  a male person is a person (say  $P$ ) such that  $\text{sex}_t(P) = \text{male}$ .*

**Definition 2.2.** *At time  $t$  a female person is a person (say  $P$ ) such that  $\text{sex}_t(P) = \text{female}$ .*

## 2.5 Problems with the practical use of the functions $\text{sex}_B(P)$ and $\text{sex}_t(-)$

In practice there are important complications with the use of the functions  $\text{sex}_B(P)$  and  $\text{sex}_t(-)$  which deserve attention and which motivate additional conceptual development.

- there may be mistakes made with assigning  $\text{sex}_B(P)$ ;
- in some jurisdictions there is no recognition of the set  $bSEX$  as its element  $b\text{-neutral}$  is not recognized;
- some people do not believe that for any person  $P$  at any time  $t$ ,  $\text{sex}_t(P) \neq \text{sex}_B(P)$  can be the case. Some religions deny this possibility, whereas other religions do not (see e.g. [69] for the latter);
- determination of  $\text{sex}_t(-)$  is a sensitive process involving privacy issues and moral complications;
- whether or not disclosure of  $\text{sex}_t(P)$  and/or of  $\text{sex}_B(P)$  can be asked or expected from  $P$  is unclear;
- some (adult) persons may be unaware of their  $\text{sex}_t(P)$  (see [6] for an account of this situation);
- some (adult) persons when made aware of their  $\text{sex}_t(P)$  may disagree with that assignment;
- some (young or, adult) persons when made aware of their  $\text{sex}_t(P)$  may agree with that assignment, though at the same time they may be dissatisfied about it;
- determination of  $\text{sex}_B(P)$  and of  $\text{sex}_t(P)$  is to some extent a subjective matter (however upon assuming one of the four binarity assumptions listed above, there is no subjectivity to this matter left),

- a systematic use of  $\text{sex}_t(-)$  and  $\text{sex}_B(-)$  in the organization of a society opens the door (or rather reinforces?) various forms of normativity, phenomena which may be considered useful and and natural by some and may be considered problematic by others.

## 2.6 B-sex identity, envisaged sex, and assessed proxy sex

We will introduce three additional concepts, each modeled as quasi-mathematical functions: b-sex identity, envisaged sex, and assessed proxy sex. We have not found corresponding names for these notions in the literature, mostly informal circumscriptions are used instead.

### 2.6.1 B-sex identity

The idea behind the notion of b-sex identity is that a person can conceive of themselves as having another b-sex than was thought thus far (or assigned at birth). Sexual identity is a complicated subject, usually assumed to incorporate a vaste range of aspects, and by itself its investigation is unlikely to profit from logic or formality. B-sex identity refers merely to an aspect of sexual identity.

### 2.6.2 Three more total functions

We assume the existence of three more total functions each taking images in bSEX.

(i)  $\text{sex}_t^{\text{self:id}}(P)$ : the b-sex as self-identified by  $P$  at time  $t$  (which may differ from  $\text{sex}_t(P)$ );

(ii)  $\text{sex}_t^{\text{self:env}}(P)$ : the b-sex of  $P$  as envisaged, by  $P$  as a goal of future development into (if different from  $\text{sex}_t(P)$ , otherwise simply  $\text{sex}_t(P)$ );

(iii)  $\text{sex}_t^{\text{proxy}}(P)$ , sex of  $P$  if in  $\{\text{male}, \text{female}\}$  and otherwise (i.e. if  $\text{sex}_t(P) = \text{b-neutral}$ ) the b-sex to which at closer inspection  $P$  is nearest (if any of  $\{\text{male}, \text{female}\}$ ) b-neutral otherwise (i.e. if no plausible nearest sex in  $\{\text{male}, \text{female}\}$  can be found). Inspection and finding the nearest b-sex are to be performed by a competent and qualified team of specialists.

In practice the functions involving self-identification may be realised in different ways, but simply asking the person and receiving a response is a straightforward option. Various forms of validation of the resulting response can be imagined but are not presumed.

**Axiom 2.8.** *AFAB as well as AMAB individuals may during their lives become dissatisfied with their assigned gender. ANAB persons may grow to prefer either a male or a female*

status.

**Axiom 2.9.** *An AFAB person may come to believe that they ought or want to be male somehow. In this case at some moment  $t$ ,  $\text{sex}_t^{\text{self:env}}(P) = \text{male}$ . Then the b-sex identity of the person is male rather than female. Sexual transition may bring about the intended state of affairs.*

If at some moment  $t$  after a period of transition  $\text{sex}_t(P) = \text{male}$ , then the transition has been fully successful and  $P$  is a transsexed male who is categorised as male by any account.

Transition may also be partial and end up in a b-neutral status (i.e.  $\text{sex}_t(P) = \text{b-neutral}$ ). Now two cases are distinguished:

(i)  $\text{sex}_t^{\text{proxy}}(P) = \text{b-neutral}$ , in which case the resulting condition may (but need not) be unsatisfactory for  $P$  though without a clear perspective on further improvement (i.e. further transition).

(ii)  $\text{sex}_t^{\text{proxy}}(P) = \text{male}$ . In this case it is certainly conceivable that  $P$  considers their transition as having been successful in spite of the fact that  $\text{sex}_t(P) \neq \text{male}$ .

A similar, though symmetric, situation may arise with  $P$  starting out as AMAB. And a similar situation may arise if  $P$  starts out as ANAB.

**Axiom 2.10.** *An AMAB person may come to believe that they ought or want to be female somehow. Then the sexual identity of the person is female rather than male. Sexual transition may bring about the intended state of affairs. Transition may also be partial and end up in a b-neutral status.*

**Axiom 2.11.** *An ANAB person may come to believe that they ought or want to be male (female) somehow. Then the sexual identity of the person is male (female) rather than b-neutral. Sexual transition may bring about the intended state of affairs. Transition may also be partial and end up in a b-neutral status again.*

In both cases (i) and (ii) it is not so clear how to speak of the sex (b-sex) of  $P$ . Still using the function  $\text{sex}_t(-)$  (and in both cases (i) and (ii) having b-neutral as the current attribution of b-sex) may not comply with the best interests of  $P$ . For instance  $P$  may prefer still to be considered female in case (i) and  $P$  may prefer to be considered male in case (ii). Making use of  $\text{sex}_t(-)$  there is no flexibility left on these matters. In order to achieve some level of flexibility the notion of gender has proven to be of use, where gender is emphatically not understood as a mere synonym of b-sex.

Importantly if  $\text{sex}_B(P) = \text{male}$  or  $\text{sex}_B(P) = \text{female}$  then whatever opinion  $P$  has on the matter (whichever self-identification  $P$  assumes) will not change the b-sex of  $P$ . B-sex is (causally) independent of self-identification. Of course there may be a high correlation between b-sex and self-identification of b-sex in practice.

### 3 Gender: flexibilization of b-sex

Gender theory comes about from the observation that using sex assigned at birth as a categorization mechanism is unsatisfactory because of a plurality of reasons. It is not the case, however, that gender replaces b-sex, as if it were a mere modernization of language. Besides b-sex, gender and gender-identity have become center stage concepts, with self-identification of gender identity as a key mechanism. Below we will list several conditions under which a person is unlikely to announce with confidence that they either have sex male or sex female. The list is not exhaustive.

- ANAB without having envisaged or started a transition into b-sex male or into b-sex female;
- ANAB with  $\text{sex}_t^{\text{self:env}}(P) = \text{male}$  at some time, having started transition to b-sex male while not having yet completed a transition to male (b-sex);
- ANAB with  $\text{sex}_t^{\text{self:env}}(P) = \text{female}$  at some time, having started transition to b-sex female while not having completed a transition to female;
- an AFAB having envisaged sexual self-identification as male (i.e.  $\text{sex}_t^{\text{env}}(P) = \text{male}$ ), and not having completed a transition to male;
- an AMAB having envisaged sexual self-identification as female (i.e.  $\text{sex}_t^{\text{env}}(P) = \text{female}$ ), and not having completed a transition to female.

The concept of gender is introduced in order to simplify the situation, genders are male, female, and b-neutral. Below we will also speak of gender identity, which serves as an auxiliary notion for understanding, and in some cases defining, gender. Gender and gender identity defeat attempts for providing precise definitions. This is not a matter of ambiguity, but rather of intended flexibility. Upon casting this form of flexibility in terms of ambiguity, however, such ambiguities are controversial ambiguities (in the terminology of [10]).

#### 3.1 A spectrum of definitions of gender

The flexibility of the concept of gender is made visible in the present setting by giving different definitions for it. To begin with two elementary ideas about gender, and two more advanced suggestions for a definition of gender, each lead to different definitions, none of which are completely satisfactory. For  $\text{gender}_{\text{mat}}$  as given below the observation that this particular definition of gender happens to be not entirely satisfactory is a key outcome

of [6]. Two out of these four definitions involve self-identification and allo-identification of b-sex (not yet of gender).

**Definition 3.1** (Gender assigned at birth).

$\text{gender}_{saab}$  is just b-sex as assigned at birth:  $\text{gender}_{saab}(P) = \text{sex}_B(P)$ .

In order to incorporate transsexuality (understood as b-sex transition) in the notion of gender, another definition is needed, however:

**Definition 3.2** (Natural gender).

$\text{gender}_{nat}$  has an implicit parameter  $t$  and corresponds to b-sex:  
 $\text{gender}_{nat}(P) = \text{sex}_t(P)$ .

**Definition 3.3** (Natural gender with b-sex identity bias I).

$\text{gender}_{nat:id1}(P)$  is determined as follows:

1. if  $\text{sex}_t(P) = \text{male}$  then male;
2. if  $\text{sex}_t(P) = \text{female}$  then female;
3. if  $\text{sex}_t(P) = \text{b-neutral}$  and  $\text{sex}_t^{\text{self:env}}(P) = \text{male}$  (i.e  $P$  is in transition with envisaged outcome male) and  $\text{sex}_t^{\text{proxy}}(P) = \text{male}$  then male;
4. if  $\text{sex}_t(P) = \text{b-neutral}$  and  $\text{sex}_t^{\text{self:env}}(P) = \text{female}$  (i.e  $P$  is in transition with envisaged outcome female) and  $\text{sex}_t^{\text{proxy}}(P) = \text{female}$  then female;
5. if  $\text{sex}_t(P) = \text{b-neutral}$  and  $\text{sex}_t^{\text{proxy}}(P) = \text{b-neutral}$  and  $P$  is in the process of transitioning from b-sex male then male;
6. if  $\text{sex}_t(P) = \text{b-neutral}$  and  $\text{sex}_t^{\text{proxy}}(P) = \text{b-neutral}$  and  $P$  is in the process of transitioning from b-sex female then female;
7. Otherwise (that is if  $P$  is in the process of transitioning from b-neutral and no further information is available) then b-neutral.

ANAB persons may develop a plausible preference for being assigned b-sex either male or female. Another definition of gender can take that option into account.

**Definition 3.4** (Natural gender with b-sex identity bias II).

$\text{gender}_{nat:id2}(P)$  is determined as follows:

1. if  $\text{sex}_t(P) = \text{b-neutral}$  and  $\text{sex}_t^{\text{proxy}}(P) = \text{b-neutral}$  and  $\text{sex}_t^{\text{self:env}}(P) = \text{female}$  then female;

2. if  $\text{sex}_t(P) = b\text{-neutral}$  and  $\text{sex}_t^{\text{proxy}}(P) = b\text{-neutral}$  and  $\text{sex}_t^{\text{self:env}}(P) = \text{male}$  then male;
3. Otherwise  $\text{gender}_{\text{nat:id1}}(P)$ .

The four different definitions of gender given above already suggest that gender may differ from b-sex (i.e.  $\text{gender}_{\text{nat}}(-)$ ) in a relevant manner. Nevertheless, we understand Byrne (2020) [26] as claiming that essentially only  $\text{gender}_{\text{nat}}(-)$  provides a plausible definition of gender, while Dembroff (2021) [33] argues for the opposite position. We believe that  $\text{gender}_{\text{nat:id1}}(P)$  provides a conceivable alternative for the definition of gender which is a candidate for refuting the claim of [26].

Decades of work on gender and sexuality, as pursued by many scholars and philosophers, and from very different perspectives have made the following claim plausible.

**Claim 3.1.** *Gender is a concept which may serve as a carrier of significant aspects human identity. It may play this role even better than b-sex.*

**Claim 3.2.** *Whereas b-sex is first of all an objective categorization, which may be assigned and re-assigned to a person, gender incorporates a subjective element which allows some form of influence of a person's identity on their gender.*

Based on Claim 3.2 one may expect that feelings and intuitions about gender create preliminary, intermediate or even definitive sentiments of gender identity. Following the terminology of [6] We will distinguish gender categorization from gender identity (determination). Gender categorization is a societal process in which a person is categorized and a gender in  $\text{GEN} = \text{bSEX}$  is attributed to the person. Gender identity (say of  $P$ ), however, is first and for all the outcome of processes within an individual person  $P$ . Assuming that  $\text{gender}_{\text{nat:id1}}(P)$  and  $\text{gender}_{\text{nat:id2}}(P)$  represent plausible notions of gender, we may conclude that a distinction between b-sex and gender exists, in other words that plausible notions of gender may deviate from natural gender. Having drawn these conclusions, the following questions arise:

**Question 3.1** (Centrality questions of gender identity).

(i) *Does gender differ from gender identity? (In other words: can gender categorization and gender self-identity declaration diverge?)*

(ii) *If so: in what manner are gender and gender identity disparate? More specifically:*

(ii-a) *is having (self-declared) gender identity  $G \in \text{GEN}$  for a person  $P$  a sufficient condition for  $P$  being categorized as  $G$ ?*

(ii-b) *is having (self-declared) gender identity  $G \in \text{GEN}$  for a person  $P$  a necessary condition for  $P$  being categorized as  $G$ ?*



In [6] a conclusive answer to question (i) is obtained: there is a difference and (ii-b) has a negative answer. Further [6] states that (ii-a) has a positive answer, by definition so to speak, i.e. as a consequence of the very idea of gender. This particular position of [6] is criticized in [18].

## 3.2 Reformulating questions on gender and gender identity

The centrality questions on gender identity allow a variety of different formulations. In [18] an almost formalistic logical approach is taken. Starting from some accepted definition of b-sex, [18] describes the Ameliorative Inquiry approach (terminology due to S. Haslanger) is used for conceptual engineering. Man (male gender), women (female gender), and non-binary (nonbinary gender) are seen as concepts to be engineered (i.e. designed or developed) such that certain criteria are satisfied: (i) the new concepts are of use for a feminist political agenda, and (ii) allowing (facilitating) all persons to carry their self-identified gender. The outcome of [18] is that whatever political (or feminist) agenda one may have in mind, it is simply impossible on theoretical grounds to engineer a concept of womanhood (read: in our current framework a gender function, taking for woman a person with female gender), which guarantees that self-identified gender is precisely coextensive with the gender function. The crux of the argument (which is played out under a variety of different conditions) is that in each case a circular definition cannot be avoided.

We notice that having female gender attractive for cis-gender females and transinclusive for sufficiently many self-identified females is the key design problem of Ameliorative Inquiry (we refer to [18] for an illuminating explanation of these matters). A corresponding, in fact symmetric, design problem exists with w.r.t. women (and men), and [18] refers to both issues as the transinclusion problem for ameliorative design (of the extension, i.e. meaning, of gender labels).

## 3.3 Gender definitions involving self-identification

We now assume that at any moment in time a person  $P$  maintains a self-identification of their gender. A function  $\text{gender: self: id}_t(P)$  determines this attribute. gender self-identification may yield male, female and neutral. In addition self-identification may yield NSI for no self identification.

Following conventions of abstract datatypes we will write  $\perp$  for NSI. A person may be unwilling, incapable or otherwise disinclined to declare a self-identification in {male, female, neutral}, in which case that state of affairs is encoded as NSI. We will write GEN for {male, female}  $\cup$  {neutral} and  $\text{GEN}_\perp$  for  $\text{GEN} \cup \{\perp\}$ .

Following the conventions of [15] we will refer to  $\perp$  as a peripheral gender. It serves

as a possible result of the gender function while not being understood as a gender proper. Peripheral values are well-known in the theory of computer arithmetic, for instance the transreal arithmetic of [3] and the fracterm calculus of [15].

Thus  $\text{gender:self:id}_t(-)$  is a total pseudofunction with range  $\text{GEN}_\perp$ . The function  $\text{gen}$  from  $\text{GEN}_\perp$  to  $\text{GEN}$  is given by  $\text{gen}(\text{male}) = \text{male}$ ,  $\text{gen}(\text{female}) = \text{female}$ ,  $\text{gen}(\text{neutral}) = \text{gen}(\perp) = \text{neutral}$ .

The first idea is to have a person in full control of their gender by way of self identification. A complication is that although  $\text{gender:self:id}_t(-)$  is a total pseudofunction the outcome NSI is not in  $\text{GEN}$ . Some form of default is needed to handle that case.

**Definition 3.5** (gender with full self-identification).

$$\text{gender}_{\text{self:id1}}(P) = \text{gen}(\text{gender:self:id}_t(P))$$

**Definition 3.6** (gender with full self-identification II).

$$\text{gender}_{\text{self:id2}}(P) = \text{if } \text{gender:self:id}_t(P) \neq \perp \text{ then } \text{gender:self:id}_t(P) \text{ else } \text{sex}_t(P).$$

One may imagine that in particular persons  $P$  with b-sex assigned b-neutral wish or need to be in the position to opt for themselves for a more specific gender in  $\{\text{male}, \text{female}\}$ .

**Definition 3.7** (gender with self-identification from b-neutral).

$$\text{gender}_{\text{self:id3}}(P) \text{ if } \text{sex}_t(P) \in \text{bSEX} \text{ then } \text{sex}_t(P) \text{ else } \text{gen}(\text{gender:self:id}_t(P)).$$

Using self-identification of gender a more constrained version of  $\text{gender}_{\text{nat:id1}}(P)$  can be obtained, where as much as possible it is required gender assignments correspond with self-identification.

**Definition 3.8** (Gender with self-identification enhanced transition).

$\text{gender}_{\text{self:nat:id1}}(P)$  is determined as follows:

1. if  $\text{sex}_t(P) = \text{male}$  &  $\text{gender:self:id}_t(P) = \text{male}$   
then male;
2. if  $\text{sex}_t(P) = \text{female}$  &  $\text{gender:self:id}_t(P) = \text{female}$   
then female;
3. if  $\text{sex}_t(P) = \text{male}$  &  $\text{gender:self:id}_t(P) = \text{female}$   
then neutral;
4. if  $\text{sex}_t(P) = \text{female}$  &  $\text{gender:self:id}_t(P) = \text{male}$   
then neutral;

5. *if  $\text{sex}_t(P) = \text{male}$  &  $\text{gender:self:id}_t(P) = \text{neutral}$   
then male;*
6. *if  $\text{sex}_t(P) = \text{female}$  &  $\text{gender:self:id}_t(P) = \text{neutral}$   
then female;*
7. *if  $\text{sex}_t(P) = \text{b-neutral}$  &  $\text{sex}_t^{\text{self:env}}(P) = \text{male}$  &  $\text{sex}_t^{\text{proxy}}(P) = \text{male}$  &  
 $\text{gender:self:id}_t(P) = \text{male}$   
then male;*
8. *if  $\text{sex}_t(P) = \text{b-neutral}$  &  $\text{sex}_t^{\text{self:env}}(P) = \text{female}$  &  $\text{sex}_t^{\text{proxy}}(P) = \text{female}$  &  
 $\text{gender:self:id}_t(P) = \text{female}$   
then female;*
9. *if  $\text{sex}_t(P) = \text{b-neutral}$  &  $\text{sex}_t^{\text{proxy}}(P) = \text{b-neutral}$  &  
 $P$  is in the process of transitioning from b-sex male &  
 $\text{gender:self:id}_t(P) \in \{\text{female}, \text{neutral}\}$   
then neutral;*
10. *if  $\text{sex}_t(P) = \text{b-neutral}$  &  $\text{sex}_t^{\text{proxy}}(P) = \text{b-neutral}$  &  
 $P$  is in the process of transitioning from b-sex female &  
 $\text{gender:self:id}_t(P) \in \{\text{male}, \text{neutral}\}$   
then neutral;*
11. *if  $\text{sex}_t(P) = \text{b-neutral}$  &  $\text{sex}_t^{\text{proxy}}(P) = \text{b-neutral}$  &  
 $P$  is in the process of transitioning from b-sex male &  
 $\text{gender:self:id}_t(P) = \text{male}$   
then male;*
12. *if  $\text{sex}_t(P) = \text{b-neutral}$  &  $\text{sex}_t^{\text{proxy}}(P) = \text{b-neutral}$  &  
 $P$  is in the process of transitioning from b-sex female &  
 $\text{gender:self:id}_t(P) = \text{female}$   
then female;*
13. *Otherwise neutral.*

The purpose of this listing of possible definitions of gender is not to provide a survey of the most important or useful definitions of gender. What has been shown, however, is that self-identification can be used to formalize additional definitions of gender. Many more definitions of gender can be imagined.

### 3.4 The personal gender life-cycle

Assuming three genders (the elements of SEX) all persons move through a life-cycle in which they are assigned labels in SEX as their sex for successive stages. Protocols will determine how such life-cycles can look like. The examples above can all be understood as protocols.

**Definition 3.9.** (*Pure self-identification*)  $P$  starts with the natural gender corresponding to the  $b$ -sex assigned at birth. Whenever  $P$  announces a new self-identification (of gender), say  $G$ , then  $P$  assumes gender  $G$ .  $P$  preserves the same gender until a new gender is self-identified by  $P$  and is then assigned to  $P$ .

**Definition 3.10.** (*Delayed self-identification*)  $P$  starts with the natural gender corresponding to the  $b$ -sex assigned at birth. The gender of  $P$  is left unchanged until the age of 15. Thereafter, whenever  $P$  announces a new self-identification (of gender), say  $G$ , then  $P$  assumes gender  $G$ .  $P$  preserves the same gender until a new gender is self-identified by  $P$  and is then assigned to  $P$ .

**Definition 3.11.** (*gender assigned by LGAA*)  $P$  starts with the natural gender corresponding to the  $b$ -sex assigned at birth. The gender of  $P$  is left unchanged until the age of 10. Thereafter, every 5 years an official bureau (say LGAA, the local gender assessment authority) makes an assessment of the situation of  $P$ . The result may be a new gender  $G'$  which  $P$  then acquires, or the advice to transition to a new gender  $G'$  upon which engages in the process of transitioning to  $G'$ . At the end of the transitioning phase LGAA will be consulted to determine the gender that was actually achieved, which thereupon is assigned to  $P$ . If the transition has failed the gender is determined by LGAA (and reconsidered after each interval of 5 years).

**Definition 3.12.** (*gender assignment support by LGAA*)  $P$  starts with the natural gender corresponding to the  $b$ -sex assigned at birth. The gender of  $P$  is left unchanged until the age of 15. Thereafter, whenever  $P$  feels the need: at any time  $P$  can request an assessment of their gender, to be performed by an official bureau (say LGAA, the local gender assessment authority) of gender assessment and reassignment. The result may be a new gender  $G'$  which  $P$  then acquires, or the advice to transition to a new gender  $G'$  upon which may (or may not) be engaged in the process of transitioning to  $G'$ , at the end of the transitioning phase LGAA will be consulted to determine the gender that was actually achieved, which thereupon is assigned to  $P$ .

**Axiom 3.1.** If  $P$  has acquired gender  $G$ , then as long as

(i)  $P$  does not exercise any physical reassessment practices, and

(ii)  $P$  does not announce that it has come to self-identify a gender say  $G' \neq G$ ,

it will be the case that  $P$  is still categorized as being of gender  $G$ .

### 3.5 Controversial ambiguity of gender

There seem to be no properties of a a notion of gender, understood as a total pseudo-function from living persons to GEN which are universally accepted. Different persons, groups, religions and states seem to make use of different definitions of gender. These differences may be understood as manifestations of ambiguity and in that case such ambiguities are controversial.

There is a space of possible definitions of gender, and at first sight no well-known constraints are available.

**Claim 3.3.** *Working at the level of abstraction of formal gender theory permuting male and female constitutes a homomorphism. Asymmetries are all hidden in the details of the functions  $\text{sex}_B(-)$ ,  $\text{sex}_t(-)$ ,  $\text{sex}_t(-)$ ,  $\text{sex}_t^{\text{self.env}}(-)$ , and  $\text{sex}_t^{\text{proxy}}(P)$ . Formal gender theory as outlined above, abstracts from the particularities of these b-sex related functions, however.*

### 3.6 Gender framework: four options

With gender framework we indicate a broad outline of matters of gender. Various combinations of principles are being used. Below we will describe four options for a gender framework. Throughout this paper only the four label principle is used. Gender principles are options chosen from a large design space, for instance there could be a continuous spectrum of genders between male and female, or the neutral category could be split in two genders, one for persons combining male and female features, and another gender for persons who combine the absence of male features with the absence of female features.

#### 3.6.1 Strict binary framework (binarism)

The strict binary framework (or alternatively: strict 2G framework) does away with a notion of gender and makes use of b-sex only in combination with the assumption RigidBinSex or the assumption, so that neutral b-sex can be left unmentioned. Moreover it is assumed that neutral b-sex never occurs as a consequence of a partial or failed attempt for transition. The strict binary principle underlies the classical approach from which the three label principle, the four label principle and the androgyny principle are recent deviations.

#### 3.6.2 Extended Binary Framework

The extended binary framework adopts the idea of two labels for b-sex (male and female), while RigidBinSex is not assumed so that b-sex may be neutral. The notion of gender at use when working with the three label principle is the natural gender.

### 3.6.3 Ternary Framework (3G framework)

The ternary framework adopts three sexes: male, female and b-neutral as well as three genders: male female, and neutral. Within a ternary framework different gender architectures may be used.

### 3.6.4 $\perp$ -Extended Ternary Framework (3G $\perp$ framework)

The 3G $\perp$  makes use of the following assumptions:

1. There are four genders: male, female, neutral and  $\perp$ , where  $\perp$  is a peripheral gender. We write  $GEN = \{\text{male, female, neutral}\}$  and  $GEN_{\perp}$  for  $GEN \cup \{\perp\}$ . The presence of  $\perp$  simplifies the logic of gender and avoids using neutral for two very different intuitions: (i) the combination of not male and not female, and (ii) not known, unavailable, private etc.
2. An alternative sign (synonym) for neutral (as a gender) is NMNF (not male and not female), the corresponding synonym for b-neutral is b-NMNF. (Both NMNF and b-NMNF must not be assigned other meanings than these, as synonyms not based on 'neutral' must be available).
3. There is a notion of biological sex which can be determined of any person at any time. For biological sex there are three options:  $bSEX = \{\text{male, female, b-neutral}\}$  (It would be more systematic to write b-male and b-female as well but that's too unusual).
4. At any moment of time all persons are categorized as having a gender in  $GEN \cup \{\perp\}$ . If  $P$  travels to an other jurisdiction with a different gender architecture it may happen that  $P$ 's gender is modified. A gender function represents this categorization, and that is done on the basis of a person's gender life-cycle.
5. A woman is an adult human with gender female; a man is an adult human with gender male.
6. The gender life-cycle of a person involves all events of relevance for the determination of a person's gender: e.g. sex assigned at birth, self-identification of gender at different occasions, gender reassignment treatments, formalized outcomes of gender categorization.
7. The precise description of gender related possible events as well as gender related (categorization) functions as well as their mutual relationships is referred to as the gender architecture (also referred to as the gender categorization protocol).

Gender architectures that adopt the above principles are referred to as  $\text{GEN}_\perp$  gender architectures. Since about 2000, mainstream gender theory adopts  $\perp$ -augmented ternarism, which has become normative for that reason. We will refer to this phenomenon as the ternary normative for gender theory.

### 3.6.5 Androgyny principle

Androgyny provides a different approach to gender categorization, in particular by providing different categories. For androgyny we refer to Bem (1974) [7], and Singer (1977) [65]. For recent work on androgyny we mention [35] on advertising which adopts the spectrum of gender identities as proposed in [7], and [5] where androgyny seems to be used as a synonym of non-binary gender expression, again against the background of the spectrum of [7].

In [56] a survey of different interpretations of androgyny is given which demonstrates that the notion is highly ambiguous so that each use of it must be qualified and restricted in order to prevent confusion.

Androgyny has advantages and disadvantages in comparison to mainstream gender theory. As advantages we mention: (i) a rich scheme of gender characterizations, (ii) intrinsic descriptions of the various gender characterizations, (iii) well-developed connections with analytical psychology, (iv) an apolitical individualistic approach, and (v) marked distance to b-sex. As a disadvantage we mention that androgyny lacks a uniform definition.

Androgyny provides a link between contemporal thought on gender diversity and the classical mythical and religious heritages of disparate cultures and continents (see e.g. [71]).

## 4 Gender architectures: the workshop of ameliorative inquiry

Gender architectures come about by means of design. The original situation is that gender and b-sex are considered coextensive, amelioration is about changing the gender architecture for the better. Tis very notion depends on one's gender political preferences.

## 4.1 Two trivial solutions: pure self-identification versus outsourcing to an external authority

For gender architectures leaving many details aside there are two trivial (in the mathematical sense) solutions: (i) all persons are in charge of their own gender, (ii) everybody gets their gender assigned by some specialized authority (say the local the gender assignment authority, LGAA for short). In other words decision taking about gender categorization (as well as transition) is outsourced to an external authority.

These options correspond with Definition 3.9 and Definition 3.11 above respectively. Option (ii) and its variation as specified in Definition 3.12 allows little freedom for the individual on matters of gender. As it stands, as far as we can see, mainstream gender theory has adopted trivial solution (i) (pure self-identification of gender), as the best possible available option. Though [6] suggest that minor variations may be needed with regard to persons are considered to be unable to produce a self-identification of gender which serves their own interests.

## 4.2 Pure self-identification of gender: an appraisal

In [18] pure self-identification of gender is discredited as being circular and for that reason uninformative. Be that as it may, it is a completely clear proposal which must be considered if only because of its astonishing simplicity. At first sight it is implausible that a trivial gender architecture might actually work. Nevertheless the undeniable circularity of this proposal does not in any manner impede its clarity. Implementation of this idea seems to be rather straightforward.

Further remarks on pure self-identification as the mechanism of a gender architecture:

1. It is a rather non-trivial insight of mainstream gender theory that pure self-identification of gender might well be the final outcome of ameliorative inquiry on the long run, and for that reason might well be indicative for the future of gender. The technical simplicity of that proposal suggests attractive conceptual depth.

The technical simplicity of gender categorization in conformance with pure self-identification is lost in part when taking [6] into account, where the case is made that a female person  $P$  may self-identify as  $\perp$ , thereby abandoning the idea that self-identification as of gender  $G$  is a necessary condition for being categorized as of gender  $G$ .

2. A major advantage of pure self-identification is that once having adopted a new gender a person will never be forced or even suggested to undergo reassignment



treatments of any kind. Medical reassignment treatments are primarily in order for solving specific health problems

3. However, it is not obvious that pure self-identification is necessarily the only adequate endpoint of the evolution of gender architectures. Other options for ultimate gender architectures ought to be studied just as well.
4. Reading [6] one gets the impression that some absolute notion of gender is being discussed (where relevant forms of inclusion are guaranteed by the principle of self-determination of gender). A more convincing reading of [6] is that an ideal (not amenable for further amelioration) gender architecture is meant, quite irrespective of current political facts, and without paying much attention to the idea that different gender architectures might be equally effective in working towards a just society.  
So if [6] maintains that self-identification as female is a sufficient condition for being a woman, what seems to be meant that this would be the case in an ideal world. Similarly the idea that self-identification by  $P$  as of neutral gender is a sufficient condition for  $P$  being categorized as of neutral gender is an assertion about a hypothetical (and ideal) world.
5. Only in practice it can be assessed if and to what extent self-identification of gender meets the high expectations that some maintain about that mechanism. In other words: pure self-identification of gender can be assessed in terms of its quality to prevent gender inclusion problems (be it ethical deficiencies or practical complications) only after it has been implemented in practice and its consequences have been studied in sufficient detail. That is more easily said than done.
6. In [31] it is suggested that gender categorizations must not be conducted with the idea in mind that so-called gender kinds are kinds in the philosophical sense of which membership is characterized in some fundamental manner: there is no such thing as really being a woman. The analysis of [31] highlights the degrees of freedom which pure self-identification of gender needs. In addition [31] argues why such degrees of freedom are needed. Pure self-identification brings such degrees of freedom.
7. It follows that pure self-identification of gender stands out as the only proposal for a definition of gender which has been claimed (though not very explicitly) to constitute a desirable final stage of development of gender architectures. The latter judgement is independent of any political agenda, in spite of the fact that most authors do have political agendas and are not in the least worried by that state of affairs.

8. In [9] a definition of the concept of algorithm is given which is significantly more detailed than what usually presented in textbooks on computing. Said definition makes an attempt to combine formal aspects with informal aspects so as to combine vastly different aspects in a single unified framework.

We can imagine that gender architectures can be specified in similar ways, thus combining quite disparate aspects, ranging from gender expression (see e.g. [77] for this term) to gender identity, but also including societal gender perception.

#### **4.2.1 Architectural gender categorization dynamics**

It is conceivable that starting from natural gender (i.e. gender equated with b-sex) in a number of stages, each representing intermediate gender architectures so to say, the actual (i.e. politically confirmed) gender architecture progresses into an optimal form from which little room for subsequent amelioration is left.

Architectural gender categorization dynamics refers to the change (or changes if multiple contexts are taken into account) of gender categorization protocols. Discussion of the forces at work for architectural dynamics lies outside the scope of this paper.

#### **4.2.2 Transitional gender categorization dynamics**

Transitional dynamics refers to the change in gender categorization of a population due to individual gender transitions. Degrees of freedom for transitional gender categorization dynamics are determined at any time by the then actual gender categorization protocol.

### **4.3 Gender Architectural Diversity (GAD)**

The above survey of 8 detailed definitions of gender, with the successive Definitions starting with Definition 3.9, is by no means exhaustive, many more gender architectures can be imagined. If one prefers to think in terms of ambiguity of gender then here is a case of controversial ambiguity (in the terminology of [10]). fails to capture the remarkable differences between the various definitions of gender as given above. Different definitions of gender relate to different views on how to use gender for taxonomic purposes. According to [16] different views on the meaning of gender terminology arise within and between various transgender communities, as well as between different cultures.

There may be no best or final notion of gender, and looking for definitive truth on matters of gender may be in vain. Such conclusions need not be considered negative. Being explicit about different definitions of gender is helpful for developing gender taxonomy diversity. We will use gender architecture for the cluster of theory of gender and semantics

of gender related terminology, in particular a definition of a preferred notion of gender, and we will speak of Gender Architectural Diversity for the variability of gender architectures as used by various communities.

Male, female and non-binary may be understood as categories in a taxonomy, and indeed of a taxonomy that is much richer than these three elements. In [2] a survey of taxonomic projects and outcomes is discussed. The conclusion is drawn that although queering constitutes an outright denial of imposing a taxonomy, taxonomy can be queered: taxonomy may be used for original intentions and objectives of the queer movement. In different parts of the world, cultures or contexts different concepts (i.e. definitions) of gender can be used, thereby creating different taxonomies, and such differences of approach may represent valuable aspects of human diversity. Advantages of a formal approach to gender may be these:

- [DAG] Different political systems, and different states, perhaps even different organisations may use different definitions of gender. Currently no specific definition of gender will acquire universal acclaim, which need not be a problem. Being able to maintain different definitions of gender may be supported by the formal approach that has been taken above.
- [bSex insufficiency] Only using b-sex in terms of  $sex_i(-)$  and  $sex_B(-)$  does not provide the flexibility needed for contemplating possible implementations of different political agendas. Making use of the freedom of choice given by the four options for binarity will not provide enough freedom.
- [Intrinsic degrees of freedom] The field of gender studies is not like number theory in mathematics: the numbers are known and now let's find out facts about the numbers (then to find after some 2500 years that following Gödel it's not as simple as that). Political agendas must be taken into account and informal rigour is needed to make the terminology work. Looking for the right definition of gender can be replaced by looking for one's favourite choice from a menu of options for such definitions.
- [Non-trivial subject] These matters are far from trivial: it is not the case that by means of theorizing about these concepts the famous question "what is a woman" can be given an unambiguous and conclusive answer (in spite of [26]). That question is not simple after all, it has different phrasings to begin with (e.g. "What makes a man a man and a woman a woman?" from []) and the yardstick of success for the development of gender theory is not that seemingly simple questions get straightforward answers. The question whether or not the universe has a finite age is straightforward, but it would have been futile to expect that Newton would have

anything beyond mere speculation to say on that matter. Even for Maxwell, Lorenz, Poincaré, Einstein, Hilbert and the many other theorists between 1875 and 1925 who came closer to grounded speculation about the age of the universe that would be too much to expect. Simple questions for an outsider, which they may propose or even use as a yardstick for progress, may turn out not to be simple questions for a research area. These considerations apply to the seemingly simple question “what is a woman”?

- [Cross-definitional cooperation] In some cases progress can be made on matters related to gender even if cooperation is needed between groups maintaining different definitions of gender. For instance the pursuit of gender neutral bathroom facilities does not depend on an agreement on the definition of gender. Similarly the use of gender in transgender healthcare depends on gender-identity in combination with b-sex, rather than on the use of a once and for all definition of gender.

#### 4.4 Man and woman defined relative to gender

Having available a notion of gender, generic definitions of woman and man can be given. Clearly these definitions depend on the choice of the gender function (one the 8 options listed above, or yet another one).

**Definition 4.1.** (*Man, woman*)

(i) *A man is an adult human whose gender is male.*

(ii) *A woman is an adult human whose gender is female.*

**Definition 4.2.** (*A gender neutral adult*)

*A gender neutral adult is a human whose gender is neutral.*

The clarity of these definition requires that the (i) three genders are mutually exclusive, which is guaranteed by conceiving of gender as a function, and (ii) that everyone has a gender different from  $\perp$ .

#### 4.5 Back to Dembroff versus Byrne

Our reading of the main claims of Byrne [26] is as follows:

AHF: a woman is an adult human (say  $P$ ) with  $\text{sex}_t(P) = \text{female}$ .

AHM: a man is an adult human (say  $P$ ) with  $\text{sex}_t(P) = \text{male}$ .

Some clarification of these matters is obtained by finding the combinations of binarity assumptions and gender definitions for which both claims hold. Due to the symmetries of

the matter we may restrict attention to AHF only as AHM will be valid/invalid for the same combinations as AHF. The result is fairly simple: only  $\text{gender}_{nat}(-)$  (that is b-sex) satisfies AHF and AHM, none of the other gender functions do. In particular  $\text{gender}_{nat:id1}(-)$  fails to satisfy both AHF and AHM. Moreover,  $\text{gender}_{self:id1}(-)$  may not satisfy AHF and AHM in spite of being more demanding for both male gender and female gender than  $\text{gender}_{nat:id1}(-)$ . it seems to me that  $\text{gender}_{self:id1}(-)$  is not to vulnerable to the criticism of [18]. Moreover, it seems to me that  $\text{gender}_{nat:id1}(P)$  is obtained in a bona fide manner along the lines of what [18] refers to as using ostension (making use of how the words are used in some actual and practical contexts, for instance in transgender communities) to find a revised (ameliorated) definition of gender in line with the proposal of [31].

The consequences of these considerations are drastic, according to Byrne (2020) [26] except for  $\text{gender}_{nat}(-)$  all other definitions of gender do not allow to de fine a woman as an adult person with female gender. Have we refuted Byrne 2020? Probably not, because there is no proof that any of the other 7 proposed gender functions must be taken seriously by Byrne. Nevertheless, at this moment we am inclined to support the following claim:

**Claim 4.1.** *Ameliorative inquiry is likely to produce in due time a workable definition of gender (say gender function  $\gamma$ ) such that:*

- (i) AHF and AHM will fail for gender as encoded/defined with  $\gamma$ ,*
- (ii) the revised definition (with  $\gamma$ ) serves the political agenda of gender studies at large, and*
- (iii) the revised definition (with  $\gamma$ ) meets a restricted self-identification requirement where*
  - (iii-a) self-identification is understood via a protocol of public announcement,*
  - (iii-b) that protocol imposes severe constraints of persistence,*
  - (iii-c) self-identified gender is supposed to come with a sound justification, and third persons are involved in the assessment of soundness of said justification,*
  - (iii-d) the protocol will also govern the gender categorization of a deceased person, and*
  - (iii-e) the protocol will involve provisions for persons who are unable to self-identify gender (see [6] for that situation in more detail).*

The project of ameliorative inquiry with the objective of engineering a gender function with desirable properties is attractive, and one might look for an axiomatic approach. In the terminology of [18] it is not so much the gender function but the concept of woman which is under revision (and a candidate for amelioration). For symmetry reasons the same holds for the concept of man (male adult human). This the conventional notion of b-sex is revised into a gender function that yields desirable concepts of woman and man using Definition 4.1.

Now symmetry requires that amelioration is also achieved for the revision of b-neutrality into gender neutrality. The latter phase poses several difficulties:

- (i) the baseline b-neutral is still underdeveloped,
- (ii) a definition of neutral gender (i.e. an ameliorated revision of b-neutrality) cannot be developed independently of (revised) definitions of manhood and womanhood.
- (iii) too large a role of self-identification for inclusion in neutral gender is incompatible with the requirement that the three genders male, female and neutral cover all persons and are mutually exclusive. (It is quite implausible that say a 15 year old juvenile, one the verge of self-identifying as neutral will grasp the multitude of complications of this categorization problem, that has been under investigation during some 20 years of scholarly studies already, by way of pure intuition).
- (iv) support for justification of self-identification of neutral gender status will be needed for all but the most informed persons.

Writing NB gender for neutral gender, as is conventional the following claim is plausible:

**Claim 4.2.** *The combined complications (i), ..., (iv) as mentioned above justify the serious doubts expressed in [24] regarding the reliability and usefulness of the currently advocated concept of NB gender (which in the context of gender studies as conducted in the University of Amsterdam is considered to be co-extensive with self-identification as of neutral gender as a matter of principle).*

## 4.6 Axioms for the gender function

Given the level of formalization that we have achieved the very presence of a design problem for a gender function is intriguing. Precisely such problems call for an axiomatic approach. Which properties of a gender function  $\gamma$  are required.

**Axiom 4.1.** (M1) *If at time  $t$  person  $P$  meets the following criteria:*

- (i)  *$P$  has (is assigned/categorized as) b-sex male, and*
  - (ii)  *$P$  self-identifies as of gender male, and*
  - (iii)  *$P$  is considered competent for producing a self-identification of gender,*
- then:  $P$  is categorized as having male gender (i.e.  $\gamma_t(P) = \text{male}$ ).*

In the above and following definitions competence refers to a sufficient ability to take their own interests into account when producing a self-identification of gender, there are not theoretical or conceptual (let alone biological) constraints on self-identification. An example of taking issues of competence into account can be found in [6].

**Axiom 4.2.** (F1) *If at time  $t$  person  $P$  meets the following criteria:*

- (i)  $P$  has (is assigned)  $b$ -sex female, and*
  - (ii)  $P$  self-identifies as of gender female, and*
  - (iii)  $P$  is considered competent for producing a self-identification of gender,*
- then:  $P$  is categorized as having female gender.*

**Axiom 4.3.** (N1) *If at time  $t$  person  $P$  meets the following criteria:*

- (i)  $P$  has (is assigned)  $b$ -sex  $b$ -neutral, and*
  - (ii)  $P$  self-identifies as of neutral gender, and*
  - (iii)  $P$  is considered competent for producing a self-identification of gender,*
- then:  $P$  is categorized as having neutral gender.*

However trivial these axioms may seem, precisely here lies an essential observation which needs to be discussed in some detail.

These axioms are not in conformance with  $b$ -natural GCP (by being compatible with transsexed persons) while being consistent with natural GCP. However self-evident, if not overly cautious, the axioms M1, F1, and N1 may seem, explicit support of these of any of these three axioms may still be forbidden, leading to significant penalties in some jurisdictions.

#### **4.6.1 The transmania aggression question**

At this point an important question arises:

**Question 4.1.** *(Transmania aggression question) The transmania aggression question is about the observation that the dialogue about gender diversity is in peril because certain well-organized participants single out their opponents who are then accused of being transphobic, and this is done in such a manner that the well-being of these opponents is intentionally destroyed.*

For useful remarks on the transmania aggression question we refer to [75]. For the use of the word question I refer to [22] where the word question should not be taken literally as a question stated by certain persons with the intention to find an answer. Instead questions may carry political momentum, and so does Question 4.1.

Transmania aggression has become a worry for persons who contemplate participation in the gender debate.

**Definition 4.3.** *(Transmaniaphobic) Someone who is afraid of transmania aggression is transmaniaphobic. A person may self-identify as being transmaniaphobic.*

Transmaniaphobic individuals are advised to strengthen their transmania aggression resilience.

**Definition 4.4.** (*Transmania aggression resilience*) *Transmania aggression resilience denotes the ability of a person or of a community to withstand sustained and malicious transmania aggression.*

Thinking in terms of the transmania accusation may be a helpful tool for obtaining transmania aggression resilience. These considerations do matter because elaborating the design of axioms in excess of M1, F1 and N1 by an academic who fails to believe Claim 1.3, might be cast as an instance of a gender critical attitude.

The seriousness of being accused of a gender critical attitude requires attention. For instance one may consider the Lemkin Institute which maintains a website (<https://www.lemkininstitute.com>) where gender critical attitudes are brought into connection with genocide (see [50]). Reading the statement on the Lemkin site in detail the suggestion arises that ‘gender critical’ refers to those only who identify gender with b-sex assigned at birth, in which case Kathleen Stock would not be considered gender critical. A recent tweet by professor Sarah Bracke (University of Amsterdam) reads:

As entanglements between anti-transgender & fascist ideologies become more visible everywhere (no surprise Nazis turning up at the anti-trans rally in Melbourne), time to share this statement again on the nature of gender critical movements.

with a link to [50]. This tweet involves no clear precautions against the scope of gender criticality being too large.

Although we are confident that our work is not taken as a sign of sympathy for nazism, facism, or genocide by professor Bracke, we would be happy to obtain an explicit and publicly available confirmation of the fact that our work is not considered gender critical. We hesitate to say (by way of an escape from the scope of the above tweet) that we are not part of a movement because we seem to be part of an informal movement indeed.

#### 4.6.2 More axioms

We may contemplate the following axiom.

**Axiom 4.4.** (M2) *If at time  $t$  person  $P$  meets the following criteria:*

*(i)  $P$  has age over 20 y,*

*(ii)  $P$  self-identifies as of gender male, and*

*(iii)  $P$  is considered competent for producing a self-identification of gender,*

*then:  $P$  is categorized as having male gender.*



The age limit is meant to avoid a potential but unintended self-harming effect of the transition. The question is then: who might be harmed when Axiom 4.4 were adopted? One may simply imagine a situation where a person  $P$  with b-sex female (or b-neutral) and without any problems with that state of affairs would for some reason, whether credible or not, transition to male gender and perform correspondingly in any context whatsoever. Unlike the case of so-called stealth MTF transfemales it is hard to see that anyone could feel physically threatened by  $P$  acting as male. Conceivably the children of  $P$ , if any, might have problems, but such problems would be comparable to what would happen were  $P$  to transition in terms of b-sex as well (so that such problems may not be considered impediments in all cases).

The following axiom matters for  $P$  with b-sex neutral or b-sex male (the conclusion is already given for  $P$  with b-sex female of course):

**Axiom 4.5.** (F2) *If at time  $t$  person  $P$  meets the following criteria:*

- (i)  $P$  has age over 20 y,*
- (ii)  $P$  self-identifies as of gender female, and*
- (iii)  $P$  has length below 175 cm, weight below 75 kg, and has no male sex organs,*
- (iv)  $P$  is considered competent for producing a self-identification of gender,*

*then:  $P$  is categorized as having female gender.*

**Promise 4.1.** *(promisers: authors; scope: all; promisees: readers) Adopting Axiom 4.4 does not harm anybody's interests.*

Confronted with an MTF transperson with b-sex male or b-neutral, if  $P$  intends to be categorised as being of gender female then an axiom must be designed which applies to  $P$  (but not only to  $P$ ) and for which sufficient support can be found. After transition of  $P$  has been secured the rule remains valid and can be applied on forthcoming cases.

Next we may contemplate the following axiom.

**Axiom 4.6.** (N2) *If at time  $t$  person  $P$  meets the following criteria:*

- (i)  $P$  has age over 20 y,*
- (ii)  $P$  self-identifies as of gender neutral, and*
- (iii)  $P$  is considered competent for producing a self-identification of gender,*

*then:  $P$  is categorized as having neutral gender.*

**Promise 4.2.** *(promisers: authors; scope: all; promisees: readers) Adopting Axiom 4.6 does not harm anybody's interests.*

We notice that contemplating in depth axioms M2, F2, and N2 in order to determine whether or not these can be maintained, would probably be considered an instance of

gender critical behaviour, and might well trigger a gender criticality accusation, for the simple reason that one would be implicitly contemplating the possibility that these axioms might fail to hold true.

## 4.7 Why striving for a specific gender categorization at all?

Theoretical work in gender theory usually dispenses with any model of the relevance of gender identification and gender categorization. Assuming genders male, female and neutral, it is not at all obvious why a person would consider it advantageous to be categorized as male, female or neutral. One may imagine a world where no genders exist and categorizations in such discrete clusters are absent. One may imagine that instead a plurality of properties like “is able to give birth to a child” and “can perform sustained breastfeeding of a baby” replace aggregates male, female, and neutral. Using the phrase aggregation dynamics of [73] male, female, and neutral are changing and evolving aggregates. According to [73] aggregates arise as solutions of problems, thereby invariably giving rise to new problems, which in turn lead to new aggregates and so on.

### 4.7.1 Formalizing advantages and disadvantages of specific gender categorization

Adopting the sufficiency of self-identification of gender for gender categorization requires some form of justification, which in turn may be based on some form of formalization or modeling. One may imagine axioms of the following form:

**Axiom 4.7.** (*Quantifiable advantage of gender categorization*) For a person  $P$  with gender identity  $G = G_i(P)$  there is a (positive or negative) advantage  $A_H(P, y) \in \mathbb{Q}$  for being categorized as having gender  $H$  during year  $y$ .

**Axiom 4.8.** (*Justification of gender self-identification sufficiency*) Using the notation of Axiom 4.7, for gender  $H \neq G$ , it is the case that  $A_H(P, y) < A_G(P, y)$  and  $0 < A_G(P, y)$ .

If no advantage can be obtained by being categorized with the preferred (self-identified) gender it becomes unclear why gender would be an issue at all.

### 4.7.2 Pure self-identification: informative or uninformative?

Following [18] a gender definition which is based purely on self-identification must be rejected for being (viciously in the wording of [18]) circular. According to [18] circularity of the gender definition must be rejected for being uninformative.

By not providing information that correlates with other data gender, an announcement of gender would be highly informative from the viewpoint of information theory. It tells us what identity a person prefers to have, which may after all be very informative.

### 4.7.3 Do we expect gender kinds to be informative?

A comparable consideration is put forward in [32] where it is claimed that preferably one has more to say about genderqueer than that it is a record of what people think of themselves. By casting genderqueer as a so-called critical gender kind which works as follows, quoting [32]

The solution, we suggest, lies in understanding the category genderqueer not in terms of external or internal features, but rather in terms of political features—in particular, features that combine both external and internal components. We suggest that genderqueer is best understood as a category whose members collectively resist the assumption that men and women are discrete, exclusive, and exhaustive gender categories, and where this resistance arises from the members’ felt or desired gender categorization outside this exclusive and exhaustive binary.

This definition of being genderqueer has the remarkable property that once nonbinary gender would become a household phenomenon people would not anymore need to rely on their own experience to acquire the mentioned political view, and the kind of genderqueer people would become empty. From a logical perspective, however, circular definitions can be understood as specifications involving self-reference, a feature which is not necessarily problematic.

## 5 Concluding remarks

### 5.1 Tenability of the position of Buijs

The position of Buijs (2023) [24] can now be summarized as follows:

(i) Buijs is unconvinced about the principles of gender architecture as listed above in Section 3.6, in particular Buijs finds insufficient representation of the androgynous spectrum, about which a substantive literature can be found,

(ii) granting these principles, though reluctantly, however, Buijs still denies that gender studies have now progressed to a stage where the following claims have been established beyond doubt: (1) pure self-identification of gender is the way to go, and (2), there is no need for or benefit to be expected from for designing intermediate gender architectures which (if only for the time being) restrict the grip of self-identification of gender.

(iii) More specifically Buijs would prefer to see an intermediate gender architecture designed and used which at least for the time being limits the impact of NB self-identification for non-adult persons. Buijs considers it unproven (in any case not proven to the extent

that any debate about the matter can be equated with an unreasonable denial of scientific progress) that the introduction of an intermediate gender architecture where NB self-identification must be complemented (in the case of non-adult persons) with some third party validation will not and cannot be fruitful.

(iv) Finally Buijs is sceptical about the compelled use of NB gender pronouns in classrooms.

In support of Buijs' positions the following arguments may be used:

### **5.1.1 Improved ameliorative inquiry may not produce a perfect outcome**

We notice that the abstract of [42] speaks of giving an improved ameliorative analysis from which we infer that according to [42] imagining subsequent stages of gender architecture makes sense. Jenkins (2016) [42] introduces a dual model where self-identification is on equal footing with a class view of gender, then giving priority to identity, however. These ideas primarily refer to issues regarding MTF transgenders, and according to [4] fail to solve the transinclusion problem. Claiming that the rather less well-defined NB inclusion problem has been satisfactorily solved seems unreasonable in the light of this ongoing discussion.

### **5.1.2 What sort of gender kind is NB?**

The conceptual difficulty of nonbinary is illustrated in [32] where genderqueer is considered a gender kind that does not enjoy the property that membership of the kind is co-extensive with self-identification as a genderqueer. Nonbinary, however is a gender kind which is used for classification of persons, and such gender kinds (like woman and man) now following [31] are coextensive with the kind of those who self-identify as nonbinary. Particular attention is paid to the distinction of different views on gender kinds: indeed the question "what is the Ukrainian army" is not the same question as "what does it mean to be a member of the Ukrainian arm" and a similar distinction in order for the gender kind NB. For instance it must not be excluded beforehand that the NB gender kind in its entirety exercises a political influence which cannot be understood by analysing mere membership conditions of it.

### **5.1.3 Plurality of gender kinds taken seriously**

In [43] plurality of gender kinds is advocated. This we take as an argument in favour of working with various intermediate gender architectures.

From [55] we highlight the following fragment:

Non-binary illustrates the way in which what was (in the 1990s) a non-category has become a category that people do inhabit, and in doing so may fuel social change.

Perhaps here lies the key virtue of non-binary: the introduction of this category is proving to be an effective instrument of social change. At the same time, however, one may wonder (what Buijs apparently does) to what extent the social change fuelled by the availability of the non-binary label is well-directed, and is unfolding with sufficient caution.

#### **5.1.4 Progress on defining gender identities within NB can be made**

Being explicit about NB identities is the topic of [41]. Only the surface is touched, but the text is unconventionally explicit already. With reference to [70] pp 18–19, [41] mentions: “felt sense of gender”—meaning that gender, while socially influenced, is ultimately about what you feel internally—and an adage common in the trans community that “sexual orientation concerns who one wants to go to bed *with*, whilst gender identity is who one goes to bed *as*”. Although [41] delves into significant conceptual detail on developing linguistic means to express for a person in direct terms their orientations, as well as those aspects which attract another’s attention, it is clear from this work that it will be quite hard to arrive at a workable collection of implicit definitions of non-binary gender types in terms of descriptions of sexual orientation and gender identity (as defined implicitly above in terms of “with” versus “as”).

Nevertheless the paradigm suggested by [41] may be feasible, in which case a path towards the validation of gender self-identification would come closer (the bringing about of which, however, may not have been the intention of the author of [41]).

#### **5.1.5 The rationale of NB categorization is still being discussed**

As recent as 2022 in [61] the arguments for the “existence” (non-emptiness) of NB gender are given in detail (with reference to [26] for the relevance of the work.) Demonstrating that NB is non-empty is the very objective of [61]. Another paper with similar emphasis is [40]. From the abstract thereof we quote:

Drawing on the findings of this review it has been shown that gender self-categorization is often implicitly presumed to be cis- gender identification. To overcome this bias, it is suggested that greater attention to specific gender self-categorization mechanisms are needed to open opportunities to include transgender experiences.

Here self-categorization corresponds to what we refer to as self-identification, and transgender experiences refers to experiences of non-binary persons. Quite explicitly [40] mentions as a motivation for the work that the psychological literature is still dominantly binary (and even cis-normative), which the authors consider to be in need of change.

There are self-declared non-binary individuals who claim that the NB status is not fitting for them after all, and who express in addition that an increased awareness of the inherent difficulties and conceptual complexity of NB status did contribute to them now making said claim (see e.g [30, 57]).

### **5.1.6 The “NB floating signifier question”**

The question arises if NB qualifies for the status of a floating signifier (following [49]). This qualification would entail that the concept is devoid of intrinsic content and is moulded in various directions according to the use that authors and NB self-identifiers wish to make of it.

The threshold for qualification of a concept as a floating signifier is not excessively high. For instance the notion of integration (of members of Muslim communities in traditional European communities) is qualified as a floating signifier in [22], which apparently must not be read as a disqualification of the vast plurality of integration efforts that are being pursued in close cooperation by members of various communities on a daily business (and in which the authors of this paper participate on a regular basis). Similarly qualifying NB as a floating signifier (which we consider a reasonable option) would not be meant to impact negatively on any particular and personal use of that notion. Convincingly qualifying NB as a floating signifier will, however, put into question any suggestion that long standing scientific consensus has been already achieved regarding the status and meaning of NB.

### **5.1.7 Viewpoint diversity versus action diversity**

The question to which extent an academic teacher must use the gender pronouns for which a student has announced their preference is a complicated one for which the US legal tradition provides some guidance (see e.g. [64] and [51]). Viewpoint diversity is important and the right to utter and explain one’s views, for instance the viewpoint that directives for the use of new gender pronouns are problematic (as is done by Buijs in [24]) is an important right which merits being upheld. On the other hand “action diversity”, understood as the right to act in conformance with one’s own (and known) viewpoints is limited: (i) repeated misgendering in a classroom context may be considered problematic, (ii) and the use of preferred gender pronouns by a teacher should not be construed as an expression of ideological support for any policy of using gender pronouns, so that a refusal to use such

pronouns (if performed by way of action) cannot reliably be grounded on one’s views concerning the principles of the matter. These considerations suggest that (required tolerance for) viewpoint diversity may exceed (required tolerance for) action diversity.

## 5.2 On the structure of the neutral gender kind

The terminology that has been developed this far give rise to various decompositions in disjoint subcategories of the natural gender kind. Below we will present one such decomposition. Each proposed subcategory of the neutral gender kind is specified as a property of a person  $P$ . The decomposition is understood to be made at some time  $t$ . We limit attention to persons who made zero, one, or two b-sexual transitions before time  $t$ . Gender self-identification is supposed to take place at time  $t - \Delta$ , just preceding gender categorization at time  $t$ . And it is assumed that at time  $t$  gender categorization of  $p$  is either done for the first time or repeated.

1.  $P$  is ANAB and  $P$  is cis-gender (i.e.  $P$  has stayed b-neutral so that  $\text{sex}_t(P) = \text{b-neutral}$ ) and  $P$  self-identifies as of gender neutral,
2.  $P$  is AFAB and b-neutral (i.e.  $\text{sex}_t(P) = \text{b-neutral}$ ), and  $P$  was female until transition to neutral gender (so that  $P$  is FTN and became transsexed at  $t - \Delta$  i.e. before  $t$ ), and  $P$  self-identifies as of gender neutral,
3.  $P$  is AMAB and b-neutral (i.e.  $\text{sex}_t(P) = \text{b-neutral}$ ), and  $P$  was male until transition to neutral gender (so that  $P$  is FTN and became transsexed at  $t - \Delta$  i.e. before  $t$ ), and  $P$  self-identifies as being of gender neutral,
4.  $P$  is b-neutral, AFAB, female until FTM transition to male b-sex, thereupon MTF transsexed to female b-sex, subsequently female until FTN transition to b-neutral, and  $P$  self-identifies as neutral,
5.  $P$  is b-neutral, AFAB, male until FTM transition to female b-sex, thereupon FTM transsexed to male b-sex, subsequently male until FTN transition to b-neutral, and  $P$  self-identifies as neutral,
6.  $\text{sex}_t(P) = \text{female}$  and  $P$  rejects or fails to self-identify as male and and  $P$  rejects or fails to self-identify as female, and  $P$  has been categorized by some relevant authority as of neutral gender,
7.  $\text{sex}_t(P) = \text{female}$ , and age of  $p$  is above 25, and  $P$  self-identifies as neutral,
8.  $\text{sex}_t(P) = \text{male}$ , and age of  $p$  is above 25, and  $P$  self-identifies as neutral,

9.  $\text{sex}_t(P) = \text{female}$  and  $P$  has made at least one b-sex transition before  $t$ , and age of  $p$  is 25 or below, and  $P$  self-identifies as neutral,
10.  $\text{sex}_t(P) = \text{male}$  and  $P$  has made at least one b-sex transition before  $t$ , and age of  $p$  is 25 or below, and  $P$  self-identifies as neutral,
11.  $P$  is AMAB,  $P$  has not made a b-sex transition to b-sex female (i.e. is not transsexed) and  $\text{sex}_t(P) = \text{male}$ , and age of  $p$  is 25 or below, and  $P$  self-identifies as neutral,
12.  $P$  is AFAB,  $P$  has not made a b-sex transition to b-sex male (i.e. is not transsexed) and  $\text{sex}_t(P) = \text{female}$ , and age of  $p$  is 25 or below, and  $P$  self-identifies as neutral.

In as far as [24] expresses doubts about the validity of neutral gender categorizations these doubts refer to subcategories 11 and 12 only. Moreover the second author believes that his doubts may be restricted to subcategory 12 only. In terms of frequencies, however, subcategory 12 may be more relevant than the other subcategories combined.

### 5.3 Arguments in favour of using NMNF instead of NB

In this Section we will collect reasons for preferring the use of NMNF (non-male and non-female) over NB. In fact we prefer neutral over NMNF, but not everyone may agree, and our primary objective is to criticize the term non-binary (or NB for that matter).

Our preference for ‘neutral’ over NMNF is that it even less suggests being used as a default when other options of categorization are considered unconvincing.

#### 5.3.1 Manifest cis-genderism

Using the NB category (as an entry in the class of genders) induces an asymmetry: as if binary people must and will positively identify with one of the two genders without experiencing many shades of grey for that matter. For symmetry reasons it would be reasonable to ask of non-binary individuals to identify themselves in positive terms, an inspection of the internet brings about many options: gender-fluid, bigender, agender, girflux, demi-girflux, feminine genderflux, male genderflux, boyflux, demiboyflux, genderqueer, gender non-conforming, questioning, gender diverse, etc.

#### 5.3.2 Implicit and unjustified labeling of male and female persons as binary

By using NB, instead of say NMNF the suggestion is made that those who self-identify as female (including cis-gender female) or as male (including cis-gender male) by default



subscribe to a self-identification as “binary”. However recent insights seem to indicate that the binary imperative for cis-gender traditions has a Western and Christian background, and that decolonisation of gender terminology might first of all do away with the prejudice of binarity. In other words, assuming that a male person  $P$  has already self-identified as congruent with the imperatives of decolonisation, there is no reason at all (on the contrary) for  $P$  to self-identify as binary (which undeniably comes with the connotation of excluding other options besides female and male). In particular  $P$  may consider it offensive to be asked to categorize anyone as NB for the simple reason that doing so adds to the prejudice that he himself would self-identify as binary on top of his “true” self-identification as male (which he intends and wishes to understand without any inherited “binary” connotation).

We find some confirmation of these views in the following three quotes from [39]

Therefore, in the area of identity labels and politics, one of the potential future directions of non-binary gender identities seems to trouble the liberal-and somewhat self-congratulatory-Anglo acceptance of trans bodies by inviting us to truly dismantle cisgenderism; to question the assumed essentialism of masculinity and femininity as natural polarities; to consider our complex, intersectional bodies and lived experiences; and to engage with a different framework of genders altogether.

As Heraclitus teaches us, the “only constant is change”, yet the more privileged we are, the more we believe that we are in control of our destiny, to varying degrees. You might be wondering what this has to do with the future directions of non-binary genders. It seems to me that we are only beginning to understand (again) and to (re)imagine what a world based on gender diversity might look like.

Ultimately, the future trajectories of non-binary genders are likely to be multiple, mutable, and unpredictable. Therefore, I invite you to hold this speculative chapter on future directions, as lightly as it is offered.

### 5.3.3 Underestimating the complexity of male/female self-identification

In [62] one finds a modern way of approaching judgements about gender based on the FTA (fitting treatment account). FTA allows to overcome ambiguities (different definitions of the same term, e.g. woman), while FTA at the same time pinpoints genuine disagreements. In [62] it is demonstrated that an understanding of the binary genders, compatible with binary transgenderism can be improved with the use of FTA.

## 5.4 Vulnerability of neutral gendered persons

Non-binary gendered persons are collectively (and for that reason also individually) exposed to accusations from a remarkably wide range of directions:

- Conservative religious groups produce accusations of misleading youth in directions against the natural order of things and so do conservative/right wing political groups. They may claim that NB gender identities are hyped. As with all hypes: only years later one knows whether or not a trend was a hype (do we know about Bitcoin, not yet, or about any of the other informational moneys). We do not believe that today's science can decide whether or not NB is hyped even when granting that it exists without reservation.
- Radical feminists, socialist feminists: they consider the major task of feminist liberation as paramount and distractions from that course of activism as harmful. (Indeed [59] suggests that the radical feminist tradition may be accused of lacking integrity in writing about other people, non-binary persons in particular.).
- Binary transgenders feel marginalised by the increased visibility of non-binary transgenderism with its focus on self-identification. The recent conflict with Kathleen Stock about her expression of views on qualities of transgender identity can be understood as an eruption of such worries, see also [58].
- Groups working for seemingly moderate and conventional objectives such as same sex marriage, which in some countries is still very difficult may need to separate themselves from non-binary transgenderism in order to avoid being marginalised. In [67] a type of prejudice is mentioned that may serve such groups:

Prejudice against non-binary people might be especially likely to involve claims that non-binary people's gender/sex identities are fake, invented, only exist in online contexts, or are the result of confusion about gender/sex [-].

## 5.5 A cis-gender understanding of queer

Quoting Wikipedia (28 February 2023) on 'queer':

In academia, the term queer and the related verb queering broadly indicate the study of literature, discourse, academic fields, and other social and cultural areas from a non-heteronormative perspective. It often means studying a subject against the grain from the perspective of gender studies.

Using this interpretation of queer it is possible to have a queer perspective on behaviour of male or female cis-gendered persons (see e.g. [48]), and queer masculinity and queer femininity become relevant gender identities. In [74] the complicated entanglement of male personal and group histories with current experiences and perspectives of surviving members thereof is described, and the non-trivial question arises: what does one want queer masculinity to achieve? I expect that queer masculinity will develop further and take such entanglements into account while striving towards modern forms of inclusion and practice of gender diversity. Ultimately the label queer masculinity will be viewed as redundant and ‘queer’ will be deleted from it.

## 5.6 A remark on TGNB, NBGQ, TGB and SOC-8

In [67] the assumption is made that non-binary people may or may not be transgender i.e. may not assign themselves any gender and may be literally agender for that reason. This situation may be co-extensive with the gender kind which has been termed cis-neutral above. These persons are non-binary (neutral) while not being transgender.

So it seems reasonable to speak of “transgender or non-binary persons” as an umbrella category. Indeed [53] uses TGNB (transgender and non-binary) as an abbreviation for the central category of their work. In [55] NBGQ (non-binary and genderqueer) is used as an umbrella term, we assume that the same categories are meant with TGNB and NBGQ.

An alternative label is TDG (transgender and diverse gender) as it is adopted in SOC-8 [29]. As SOC-8 indicates the terminology is still evolving, and moreover it is a challenge to adapt terminology which works in North America and Europe (while being introduced and discussed in English) to different languages which may have very different and traditionally deeply rooted ways of dealing with matters of gender.

In the Chapter on nonbinary SOC-8 speaks of a the problem for a person that their non-binary self-assignment may be considered non-valid. There is however, no indication about if or when a non-binary self-assessment may be considered invalid. Such judgements are not medical judgements, and (following SOC-8) medical staff must not promote nor try to change such judgements. Nevertheless the question about whether to (and if so, how to) check the validity of a persons’ adoption of NB status stands out as an issue of some importance.

There are many studies with a medical background on disorder treatment for persons who self-identify as NB. Such studies, however, do not depend on the concept of NB being well-defined beyond the idea of self-assessment, a matter which is easy to check.

From a medical perspective it is NB gender identity that matters, not so much NB gender categorization. From a medical perspective the cluster TGNB is plausible because there are many shared symptoms, complaints and treatments.

For medical studies NB self-assessment may be understood as no more than one of a range of possible symptoms, and whether or not the presence of the symptom can be explained in a particular case is not decisive about its status as a relevant symptom.

## 5.7 Meta-gender talk

With meta-gender theory we denote the various ideas that surround gender theory. For instance the accusations mentioned in 1.6 may be considered part of meta-gender talk. An important element of meta-gender talk is the notion of being gender critical. We will pay some attention to the idea of being gender critical. We hold that a person  $P$  maintains a gender critical position if either

- (i)  $P$  adopts a 2G framework or an extended 2G framework, or
- (ii)  $P$  adopts a 3G or a  $3G_{\perp}$  gender framework, and  $P$  fails to adopt Claim 1.3.

By qualifying Claim 1.3 as counterintuitive, rather than as valid by definition, the authors have come to maintain a gender critical position so it seems to us.

## 5.8 Unfinished business

Scholarly work on gender and transgender is unfinished business altogether. Making use of an author's personal experience has been a driving factor in Genderqueer studies, but such perspectives have no claim to the production of ultimate truth. For an expression of this perspective in a survey of academic work on gender identities we quote [66].

This multidisciplinary produces a rich, but often contradictory, set of knowledge frameworks that do not easily cohere in any single or 'general' idea of sex, gender, and what it means to be trans. Indeed, the different knowledge fields in which trans may be located conceptualise trans in particular ways pertaining to the various conventions and norms of the particular field or discipline.

A particular aspect of the current phase of gender theory is presented by the international differences in appreciation of approaches to matters of gender. Some jurisdictions outlaw homosexuality and accept transgendering, some jurisdictions take an opposite stand, some accept both of the two, some accept none of the two. When contemplating gender architectural diversity on a world-wide scale it is perhaps unconvincing to view gender and sexual orientations as disparate themes admitting independent analysis.

For instance in [69] the author advocates taking Iranian policies on matters of transgender seriously. Indeed an intercultural and inter-religious approach to gender theory may

be helpful, though adopting such an approach will require to describe, name, and respectfully analyse positions concerning gender which one would not prefer to adopt. As a side remark [69] mentions an Islamic source for the existence of four genders. Such matters might be of relevance for discussions in North America and Western Europe as well.

Another aspect of the unfinished business of gender theory comes about from the diversity of media that are being used in the battle ideas on gender. For instance participants in the debate may threaten other participants with cancellation, the latter being primarily a weapon on social media. Besides the ethics of how to perform proper scholarly work also the ethics of manipulation on social media enters the subject of gender studies. The latter by itself has already become a significant subject, which comes with its own type of accusation: a charging accusation which deals with blame (see e.g. [44, 47] and [52]).

## 5.9 Structure and terminology of gender theory

Gender theory is a complex area of studies with unclear boundaries. We hold that *androgynical studies* is an area within gender studies. More precisely it is a part of what we will call analytical gender theory, i.e. an approach to gender theory which attempts to provide intrinsic characterizations of gendered properties, traits and qualities of human individuals. Unlike formal gender theory (FGT), analytical gender theory (AGT) does not focus on developing sharp boundaries between a discrete collection of gender labels. Analytical gender theory allows two approaches: (i) 2G (or 3G/3G<sub>⊥</sub>) person level AGT where questions like “what makes a person a woman?”, “what makes a person a man?”, and “what makes a person neutral gendered?” are central, and (ii) trait-level AGT where traits are considered as being (2G) gendered and even polarized so that a person is understood as combining a family of traits thereby combining various (positive or negative) gendered traits.

### 5.9.1 Analytical gender theory (AGT) versus formal gender theory (FGT)

Androgynical studies is the same as trait level AGT. We believe that 2G person level AGT is outdated, and we notice that FGT seems to pay no attention to any possible outcomes of 2G (or 3G, or 3G<sub>⊥</sub>) person level AGT, a state of affairs which may be considered counter-intuitive at first sight. Androgynical studies constitutes the core of AGT. We will simplify the picture and let analytical gender theory stand for androgynical studies, thereby ignoring person level AGT. Now we may claim that androgyny, i.e. the phenomenon that a person may combine a family of gendered (and perhaps signed) traits, features as a (conceptual) tool belonging to AGT.

With formal gender theory we denote approaches to gender theory where gender labels

like male, female, and neutral denote disjoint classes of persons at any time. Formal gender theory is relevant for the design of passports, for entry conditions for bathroom facilities, for participation in sports, for issues about gender diversity in a work place, and to a lesser extent for matters having to do with intersectionality.

### **5.9.2 Perspectives of analytical gender theory**

AGT takes the various gender kinds for fuzzy classes of persons: membership is a matter of probability, or of degree, boundaries are not sharp. Different persons may judge differently about a person's gender, and gender categorization is primarily a linguistic tool and not so much a legal issue. For the time being FGT is an unavoidable component of gender theory. FGT is often codified in laws, so that a person's gender (i.e. the expected outcome of gender categorization) may differ from one jurisdiction to another jurisdiction, depending on the relevant laws in each jurisdiction. Although FGT is not in need of any justification as a meaningful or relevant subject, each of its various approaches are very much in need of justification and of philosophical (if not religious) foundation.

At this moment the role and status of analytical gender theory (theories) is unclear. However we expect that AGT may play in analytical psychology as well as in humanistic psychology. Working towards a first class position of AGT in the style of Bem [7], with well-developed psychometrics, though now carried out with better and more modern methods is too much of a challenge for both authors in this phase of their respective working-life-cycles.

Besides FGT and AGT we will distinguish societal gender theory (SGT) which has an emphasis on the societal role of gender kinds as collectives of individuals. Whatever finite gender framework one assumes, be it 2G, 3G, or  $3G_{\perp}$  two forces must be balanced: private preferences concerning their own gender categorization of individual citizens and politically motivated communal preferences. Understanding the plurality of the latter preferences is the topic of SGT.

### **5.9.3 Societal gender theory (SGT)**

The step from Bem to Butler may be understood as a swing of focus from AGT to SGT. SGT as perceived by Butler has a focus on: (i) gender roles as impacted by societal structures, (ii) societal structures as mechanisms which constrain the evolution of gender frameworks and corresponding gender roles, (iii) modification of gender frameworks and of gender roles as mechanisms for societal change.

To these considerations we add: macro-ameliorative design of gender frameworks and gender architectures. How to design gender frameworks and architectures in such a way that the well-being and functionality of society as a whole is best served?

A typical question for SGT is as follows: suppose one adopts the  $3G_{\perp}$  gender framework and a gender categorization protocol which admits that some male persons give birth to children. Now suppose that transitional categorization dynamics works to the extent that say 40% of the persons who might give birth to children are categorized as male. Then one may ask: (i) must one expect under such circumstances that it will become problematic for the population to reproduce in a stable and predictable manner? (ii) Is it to be expected that there will be gender sub/cross-categories like “able to give birth to a child”, and “able to produce fertile semen”, (iii) Is it to be expected that strong societal forces will work towards lowering the percentage of persons able to give birth to a child who are not categorized as female (i.e. either as male or as neutral or not at all, that is as  $\perp$ )?

Another question is how a gender architecture must be complemented with permissions (access rights) and preferential conventions per gender so that indeed gender categorization plays a useful societal role. Yet another question for SGT is to contemplate to what extent responsibility for future generations (see e.g. [17]) imposes constraints on the design and realization of gender frameworks and corresponding gender architectures.

#### 5.9.4 Mythical gender theory

As a matter of completeness we mention that many myths involve gender. Myths play a role in transpersonal psychology. Mythical gender theory (alternatively: mythandrogyny), that is the collection and analysis of myths involving gender, may serve as a tool for transpersonal psychology. We notice that in comparison with analytic psychology and humanistic psychology transpersonal psychology is less stable and well-recognized.

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