

Categorial Gender Theory: A Survey of Gender Frameworks

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Abstract

Categorial gender theory is concerned with frameworks for categorizing human individuals in terms of gender and gender-related notions. A survey of gender frameworks is presented. We observe two alternative ways of conveying similar information: one via features and the other via process algebraic descriptions of gender lifecycles. The development of categorial gender theory is compared with the Formal Gender Theory that was previously developed in collaboration with Laurens Buijs.

1 Introduction

The objective of this paper is to develop gender theory, as a theory of categorization on the basis of gender and related notions. The development is from first principles, with the intention to avoid premature choices, and to provide acceptable and useful suggestions for readers with various viewpoints. The focus is on gender as a means of categorization. The idea is that gender may be considered a categorial variable, that is a characteristic which is useful for the purpose of categorization. This idea, though seemingly obvious, is disputed, see e.g. [25].

1.1 There is no best gender framework and gender framework transition is difficult

We may imagine a traffic regulation framework as a collection of rules on how traffic may proceed on a system of roads.

One particular characteristic of a traffic regulation framework is the preferred side of the road one occupies when driving forward, assuming that traffic moves in both directions on said road. It is a matter of experience that in a geographic unit it is profitable to use the same preferred side on all roads and uniformity in that matter is a sound design rule for designing traffic regulation frameworks. Technically there is no need for such rules, and one may imagine a system where time and again the preferred side swaps. It is clear for symmetry reasons that if a traffic regulation framework has been designed such that uniformly driving to the right of the road works, then there is an equally useful symmetric framework with a preference for driving to the left which works as well. My view on gender frameworks is similar: there is no best option, time and again society looks for an option (gender framework) that meets the needs of the time. Difficulties arise in times of gender framework transition, when different persons and groups have different gender frameworks in mind which implement disparate preferences.

1.2 Broadly defining categorial gender theory

We provide a definition of categorial gender theory in three parts:

- why "categorial"?
- what is it about?
- what sort of issues are accounted for?

To begin with we assume the almost universal presence of an incentive and desire, if not a drive, to categorize persons as male, female or otherwise, that is in terms of gender. Whether or not gender categorization is a good thing remains to be seen but the very objective and practice of gender categorization is at the same time a driver for the development of gender theory, or at least of chapters in gender theory.

Definition 1.1. (*Subject of categorial gender theory*) *Categorial gender theory is the meta-theory of categorization of humans with various so-called gender characteristics. More specifically at least the following characteristics are involved:*

- (i) *categories of b-sex (biological sex) including b-male, b-female, and b-neutral;*
- (ii) *categories of gender which may but need not coincide with categories of b-sex: including: man, male, woman, female, neutral,*

(iii) auxiliary categories which provide a flexible enrichment of the terminology listed in (i) and (ii) above, which is helpful in particular for expressing different ideas about and aspects of gender transition. These additional categories include: AMAB (assigned male at birth), AFAB (assigned female at birth), ANAB (assigned neutral at birth), transman, transwoman, trans man, trans woman, gender, male gender, female gender, transgender, cis-gender, and gender identity.

A gender framework is a specific view of gender theory which incorporates rules and heuristics for assigning gender to persons and for making use of such assignments. We arrive at the following notion of gender:

A gender is an element of the sort of Gender in a gender framework. This definition is vacuous at first sight, but there are well-known examples of notions with similar descriptions:

- A number is an element of the domain of a field.
- A line is an element of the sort of lines of a geometry (where a geometry involves in addition a sort of points and an incidence relation).
- A process is an element of the domain of processes in a process algebra.
- A probability is a value of a probability function, where a probability function is a function from an event space to real numbers which satisfies the Kolmogorov axioms.

Rather than developing gender theory by first giving a definition of gender, I will work the other way around: the notion of a gender framework can be clarified without even attempting to develop a definitive, or preferred, notion of gender. The the notion for categorial gender theory is not gender but gender framework.

Claim 1.1. *It is difficult to define gender, while it is relatively easy to provide a definition of the notion of a gender framework by way of examples.*

The specific objectives of categorial gender theory can be specified as follows:

Definition 1.2. *(Focus of categorial gender theory) Categorial gender theory provides general reflections on and information about:*

(a) *the spectrum of gender frameworks; these frameworks each include an account of the various gender characteristics, where in some cases an account may amount to no more than a mere dismissal of the term/notion;*

- (b) a comparative analysis of various gender frameworks;*
- (c) insights on how to appreciate (from the viewpoint of various gender frameworks), laws, regulations, legal judgments and political statements in which gender categories play a central role;*
- (d) open problems in categorial gender theory, understood as issues in various specific gender frameworks, or as issues crossing the boundaries different gender frameworks.*

1.3 Categorial gender theory versus gender theory at large

A person is cisgender if they have the same gender as the gender assigned at birth (GAAB) and had no different gender in between.

Gender theory at large (i.e. not restricted to the categorial chapter) focuses primarily on the specific behaviours and mindsets of AMAB cisgender persons, and on the specific behaviours and mindsets of AFAB cisgender persons, as well as the specific behaviours and mindsets of ANAB cisgender persons where the subject is approached with an open mind, not presuming any such behaviours and mindsets in advance. Taking gender transition into account, gender theory widens to the context including transgender persons, as well as to the reasons, motives, and mechanisms of gender transition.

In gender theory (at large) key notions like man, woman, transman, transwoman, male, and female have a scientific, or perhaps philosophical, meaning. In categorial gender theory the focus is on aspects of the meaning and function of gender related terminology which are either used for purposes of categorization, or which occur in the context of categorization, where categorization is a (perhaps undesired) side effect, of the use of gender related terminology for other objectives. A specific gender framework sheds a certain light on the meaning of such notions, while categorial gender theory deals with the design and comparison of such frameworks.

1.4 Gender laws, gender law packages

The relevance of categorization is abundantly clear from the presence of gender laws, i.e. laws which either guide or use categorization on the basis of some gender related characteristic. If legal mechanisms impact on sexual orientation there must be an underlying theory of gender categorization available which explains what is meant with various definitions of sexual orientation (as such definitions are conventionally phrased in terms of the gender of potentially interacting persons).

Definition 1.3. (*Gender law, gender law package, gender regulation, gender convention*)

(i) *Gender laws are basic legal rules on how to deal with matters of gender within a certain jurisdiction. Gender law includes authoritative legal judgments regarding the interpretation of relevant law as it is adopted in a jurisdiction.*

The gender law package of a jurisdiction is the combination of its gender laws (which in practice may be a combination of parts of disparate laws some of which have a primary focus different from matters of gender, combined with a combination of outcomes of legal procedures).

(ii) *Gender regulations are specific rules within a context (for instance a branch of sports, a part of the medical sector, the prison system) within a jurisdiction. Gender regulations are implementations of the relevant gender laws, at least in principle.*

(iii) *Gender conventions are informal rules of behaviour in matters of gender in a specific context which may sometimes not be fully in conformance with the gender laws which are in force or with specific gender regulations for that context.*

It is plausible to (try to) understand a gender law package as being based on (and derived from) an underlying gender framework. The gender framework adopted in a jurisdiction may change and so may gender law packages, which leads to the notion of gender law package dynamics.

Definition 1.4. (*Gender law package dynamics, gender regulation dynamics, gender convention dynamics*)

(i) *Gender law package dynamics refers to the change of the package of gender laws in a jurisdiction;*

(ii) *Gender regulation dynamics refers to the change of gender regulations in a context.*

(iii) *Gender convention dynamics refers to the change of gender conventions in a specific context.*

Clearly a change of the gender law package in a jurisdiction may cause a subsequent change of gender regulations within specific contexts and of gender conventions within such contexts. Conversely gender conventions may change and such changes may create pressure for the change of the gender law package.

1.5 Examples of gender law package change

Actual dynamics is about changes which have taken place, potential dynamics is about processes which may eventually bring about actual dynamics.

- Recently (April 2025) in the UK a legal judgment has clarified which meaning to assign to “man”, “woman”, and “transgender” in a specific law. This event constitutes a change of the gender law package, which in turn brings about the need

to change gender regulations in for instance the medical context, in the context of so-called bathroom use, and in the prison system, and which may bring about forthcoming changes in gender conventions in various contexts. (See also Preparatory Claim no. 12 below).

- In the US the gender law package has undergone a drastic change in early 2025 so that now even the use of the phrase gender theory has become problematic, and systematic use of the language needed to express and assess differences of gender perspectives is now discouraged.
- In Germany a recent change (in 2024) in the gender law package has made subjective gender identity the dominant factor for gender determination.
- Potential dynamics concerns plans for changes of law, legal procedures etc. which have not yet come to a conclusion in either direction.

For instance in The Netherlands there is an ongoing political struggle about a possible new gender law. In June 2025 the government finally took the decision to withdraw proposal for a new gender Law.

2 Preparatory claims

Although the approach of categorial gender theory is meant to work from first principles, readers are likely to have their views on matters of gender already. I have collected some of many viewpoints on matters of gender as claims in order to give some clarity in advance on “where I stand” in the various debates regarding gender. These viewpoints are phrased as claims, not so much claims that follow from categorial gender theory, but rather claims which should be compatible with categorial gender theory (as a requirement on the latter). I see some evidence for the following claims.

1. (Lack of clarity about the concept of gender.) It is often claimed that transgender rights must be respected. However, in the absence of a comprehensible definition of who is transgender, and in the absence of a clear definition of gender, there is no way to pay this respect in a systematic manner.

This lack of clarity is an important practical matter, with vast consequences throughout the world. As a first step, when investigating what it means to respect transgender rights, one may try to agree on the selection of a gender framework taken from a catalogue of known gender frameworks. In some cases a novel gender framework may be needed.

2. (Ambiguity of “gender”.) Gender is an ambiguous term the meaning of which ranges from biological sex (for which different definitions exist) and gender identity (for which hardly any definition exists).

The situation is comparable with “fraction” (see e.g [4]) the meaning of which ranges from fracterm (a particular kind of expression) to quotient (number denoted by a fracterm).

Another comparison is with algorithm, in practice an ambiguous notion the meaning of which ranges from “the mathematical idea which is or might be implemented by a program” to “the, or a (computer) program implementing said idea”, and even to “the computer running a specific program”. Details of these concepts are elaborated in [5].

3. (Gender framework relativism.) There is no best or ultimate gender framework.
4. (Disambiguation may be needed and may be applied.) In some cases ambiguity of “gender” is hard to accept and a legal procedure may be required to find out which meaning for a given occurrence of “gender” and of gender related terms in a given text fits best. This legal process may achieve disambiguation. The UKSC judgment [27] achieves disambiguation of gender terms (such as man and woman) in the 2010 Equality Act of the UK. Needless to say that the very specific disambiguation that has been chosen in [27] came as a shock for many members of parts the transgender community.
5. (Purely gender identity determined views of gender are problematic.) Equating gender with subjective gender identity is problematic in the absence of a sufficiently sharp definition of gender identity. The availability of such a definition, however, is hard to imagine given the principled subjective basis of that notion.
6. (Categorization of transgender persons will be needed if the transgenering option is to stay.) Only by making distinctions between different categories of transgender persons, each category coming with its own definition, will it become possible to define transgender rights in a stable manner.
7. (Transsexig and transsexuality are still a meaningful notion.) It is unfortunate that transsexig/transsexual as notions have given way to transgenering/transgender at a time where it was not yet clear that the drift towards subjective (i.e. self-identified) gender identity as the major factor for gender determination/discovery would ultimately (and irreparably) obscure the specificity of transsexig/transsexuality. The terms transsexig and transsexual might still be useful to describe persons who

made a full medical gender transition, at least when working within a gender framework where such transitions are supposed to change biological sex (for instance the GAAB/GR/single-MPB-GT/ST/RT gender view as discussed below in 3.5).

8. (Biology is connected with gender.) Gender frameworks which adopt a full separation of gender from biological aspects are at risk to become marginal and without enduring societal influence.
9. (Gender as a philosophical notion.) Gender theory first of all contemplates gender as a philosophical notion. Gender theory comes with the ambition to develop theory which is jurisdiction independent.
10. (Gender theory is not primarily a feminist project.) The idea that gender theory supports, and ought to support, a certain feminist agenda, is wrong. It does not and it should not. Gender theory must be equally useful for persons of any gender assigned at birth. Of course some specific perspective on gender theory may be more close to the objectives of a certain style of feminism than some other perspective, but gender theory is more general than serving any particular emancipatory ideology.
11. (Gender frameworks are so-called total systems.) The idea of a gender framework F is that all humans at any time (at least in principle) can be assigned a gender (from the sort G_F of gender labels used by F). There must be no dark corners so to say.

Typically a gender framework may be understood as being based on some fairly clear intuitions (which may nevertheless be controversial), which are included in a total system. The resulting gender framework is then one of a plurality of possible totalizations of the partial gender framework which merely embodies the given intuitions.

The situation is comparable with the question of division by zero, as it is dealt with in a total systems approach (the theme of the Transmathematica Journal):

- (i) one ends up with a survey of totalizations (so-called fracterm calculi) of partial arithmetics, the details of which are sometimes disappointing and overly complicated,
- (ii) there is no preferred view of division by zero, while
- (iii) for different applications there are different useful views on division by zero, and
- (iv) gradually a methodology of designing total systems evolves.

12. (Practical cases show the need of categorial gender theory more than anything else.) My intention is that categorial gender theory will be helpful for understanding issues related to gender. Case UKSC 16 (2025) is an instructive example of the complexity of the subject and is illustrative for the need of theoretical clarification.

In the UK Supreme Court (UKSC) Judgment [27] mention is made of transgender women who avail of a GRC (gender recognition certificate).

An issue which the Judgment discusses is whether or not transwomen with GRC must be considered as women in the context of applications of the 2010 Equality Act of the UK (EA 2010). The answer in short, is negative: with “woman” as used in the 2010 Equality Act, a reference is meant to AFAB (assigned female at birth) individuals, and in case mistakes were made with gender assignment at birth the biological sex of a person determines their (wo)manhood (in cases of application of EA 2010).

Many comments followed and a representative of PM Sir Keir Starmer was asked whether the PM considered transwomen to be women, with the response that, given the Judgment [27] the PM did not do so. We quote:

Sir Keir Starmer says Supreme Court ruling ‘gives clarity’ that ‘a woman is an adult female’

from [26]. I claim that mere logic immediately reveals complications with this response:

- The Judgment [27] is very clear about the fact that it is not about being a man or being a woman, but only about the reach of such predicates in the context of a certain law. It follows that the PM is in no need to take said position on the basis of [27].
- If the PM holds that there are only two genders, male (man) and female (woman), a transwoman with GRC is either male or female. But both propositions are problematic. Indeed, what can a GRC represent if a man stays a man, and a woman stays a woman (there being no other options) whatever (recognized) treatment and transitional process the person has gone through?
- For gender transition to take place (an idea not rejected by the UKSC) one needs two notions of gender and a transition from the one to the other. If a transition from man to woman is rejected, then perhaps a transition from man to transwoman is considered plausible. That may be so, but at the cost of introducing transwoman (and transman) as additional gender labels. Doing so

is by no means customary in gender theory, however, although the option is relevant and merits investigation.

3 A survey of gender frameworks

Below we will survey several gender frameworks beginning with the GAAB/GR gender framework. The survey is by no means exhaustive. No attempt has been made to include, for every known gender law package, a gender framework which may underpin that particular package.

3.1 The GAAB/GR gender framework

The GAAB/GR gender framework has many supporters, especially in conservative circles.

- All persons are assigned a gender at birth (GAAB), either male or female. In difficult cases a best choice is made on the basis of most recent/compelling science concerning gender relevant biological characteristics. A person is AMAB if male gender was assigned at birth and AFAB if female gender was assigned at birth.

A person is called intersex if their GAAB depends on the criterion used for the determination of biological sex. Intersex newborns are assigned a gender (male or female) on the authority of the medical professionals handling the case.

Criteria for the determination of biological sex at birth change in time, while at any moment different options exist. Nowadays morphology, DNA patterns, sizes of gonads and gametes, and brain scans may each be used, and may yield different results in exceptional cases. Combined techniques may be used in cases of doubt.

- GAAB is a person's gender until death.
- The only gender labels are male and female.
- A (wo)man is an adult human (fe)male.
- In highly exceptional cases GAAB was wrongly chosen and an opposite choice is admitted, with the effect that an opportunity is given to revise the gender of a person (GR: gender reassigned/revised in later life). Then from that moment on GR determines a person's gender until death. (GR may create the situation that an AMAB person is female, or that an AFAB person is male.)

- Gender revision (GR) is only possible if it can be established that at the time of birth adequate practices would have yielded a different result. It is not sufficient to show that more recent views of biological gender characteristics would produce a different result.
- Gender revision is not understood as an instance of gender transition.
- A minor variation is possible where even a gender reassignment in later life may be revised once more, though the idea is the same.
- We refer to a person's gender in the GAAB/GR gender framework as their GAAB/GR gender.

Remarks:

- The GAAB/GR gender of a person is defined/known whenever the GAAB is defined/known, and is irrespective of whether or not a person has made a gender transition in the light of a different gender framework. No gender transition can modify a person's GAAB/GR gender.
- It is conceivable that a person is, say AFAB (AMAB), but is unhappy with their body because the body appearance or functioning could have been more close to the majority of females (males). In such cases gender affirming therapy may be helpful and may be applied, though without gender transition in mind.
- Plausible alternative ways to denote the GAAB/GR gender framework are these:
 - Genesian gender framework (in view of alleged correspondence with the Bible book Genesis), or
 - classical gender framework (as it is the point of departure from say 1850 onwards, that is before gender transition was thought of).
 - basic binary gender framework.

3.2 The GAAB/GR/ISGT gender framework

The GAAB/GR/ISGT gender framework is like the GAAB/GR gender framework with the additional option for AMAB intersex persons to once make a gender transition to female gender and for AFAB intersex persons to once make a gender transition to male gender. Such transitions (intersex gender transitions, ISGT's) may be supported by gender (which means the new gender) affirming medical therapy. The difference with the GAAB/GR

gender framework lies in the fact that ISGT is possible without claiming that GAAB was wrongly assigned.

An ISGT transition is preceded by a phase of say 2 years of social transition where the person lives and behaves as a person of the envisaged gender in order to confirm the rationale for the intended transition. During this phase no medical steps are taken.

This survey is not meant to specify the various pathways for the potentially gradual metatransition from social transitioning to medical transitioning other than that the gender transition is supposed to have taken place after completion of the social transitioning phase while medical transitioning follows as gender affirming therapy after ISGT.

3.3 The GAAB/GR/single-MPB-GT gender framework

The GAAB based single gender transition permissive gender framework, for which the best medical/psychological/behavioural practice is assumed to be used for enacting transition, has the following rules:

- All persons are assigned a gender at birth (GAAB), either male or female. In difficult cases a best choice is made on the basis of most recent/compelling science concerning gender relevant biological characteristics.
- GAAB is a person's gender until death unless GT takes place. Gender transition turns a male person into a female person and a female person into a male person.
- A person is cis-gender if they have not yet made a gender transition. A (fe)male cis-gender person is (fe)male. By default a newborn is cis-gender.
- A cis-gender person has a unique (non-repeatable) option to make a (full medical) gender transition (GT). For a GT to be effective:
 - (i) (medical/bodily transition) medical steps (according to the best practices of the day) are needed;
 - (ii) (psychological transition) and mental steps (adopting the life-style of the other gender) must be taken (psychological transition);
 - (iii) (behavioural transition) a person lives as with the new gender.

Gender transition is effective only after the mentioned steps have been completed to the satisfaction of regulators (a parameter to the GT process). With GT completed a male (female) person has become female (male).

- GT requires a person's consent.

- The only gender labels are male and female.
- A transman (transmale person) is a person who was assigned gender female at birth and who made a GT;
- a transwoman (transfemale person) is a person who was assigned gender male at birth and who made a GT.
- Biological sex (b-male/b-female) is assigned at birth (modulo gender revision).
- An AMAB person is b-male, an AFAB person is b-female.
- Gender transition does not change biological sex.
- A transman (transmale person) is biologically female, a transwoman (transfemale person) is biologically male.
- Male and female by default refer to the gender labels, and not to the labels of biological sex.
- The rule “a (wo)man is an adult human (fe)male” is valid for all persons (due to the above default rule in the reading of male/female).
- The rule “a (wo)man is an adult human b-(fe)male” is not always valid and fails on GT persons.
- The gender revision mechanism is available as in GAAB/GR gender theory (and the corresponding change of gender is not considered a gender transition). However, there is an additional option for gender revision if a more recent (or alternative) view on biological gender determination yields a different result.

Remarks:

- The GAAB/GR/single-MPB-GT gender framework is acceptable in Iran.
- The GAAB/GR/single-MPB-GT gender framework is rejected by RCC (Roman Catholic Church) and ROC (Russian Orthodox Church), who both accept the GAAB/GR gender framework.
- Regulations on how much must be achieved with MPB steps are a parameter of the GAAB/GR/single-MPB-GT gender view, by consequence there is a plurality of GAAB/GR/single-MPB-GT gender frameworks.

- The GAAB/GR/single-MPB-GT gender framework is accepted in many western states, while regulations are often more liberal.
- In the UK, trans person, on the basis of the GAAB/GR/single-MPB-GT framework provides the right for a person to receive a so-called GRC (gender recognition certificate). The GRC, however, is not a public document which a person must show to anyone when asked about it. The latter state of affairs creates complex legal issues.
- The GAAB/GR/single-MPB-GT gender framework has a number of variations:
 - GAAB/GR/single-MPB-GT[GD] gender framework: it is required for GT (and for initiating MPB transformational steps) that a person suffers from gender dysphoria (GD).
 - GAAB/GR/single-MPB-GT[age > k] more restrictive gender framework where from an age of k years MPB steps can be taken.
 - Which requirements are imposed for complete MPB transition?
- Suppose a person P is AMAB on the basis of DNA information while b-sex determination on the basis of morphology would yield the result that P has female b-sex. Now P may contemplate these three options:
 - Leave the situation as it is.
 - Ask for gender revision, then retrospectively being considered AFAB (and female for that reason), and now (perhaps) making use of gender affirming (medical/surgical) therapy to be more happy with their body as a female person. (Now the gender has changed while P is not transgender because the current gender and the revised gender at birth coincide. In fact the b-sex of P has changed.)
 - Apply for gender transition to female gender, perhaps in combination with gender affirming therapy thereafter, which may be less intrusive than expected because P is morphologically more female than male (though perhaps not yet as female as desired by P).
- Alternative ways of denoting the GAAB/GR/single-MPB-GT gender framework are:
 - full medical transition permissive version of the Genesian gender framework;
 - full medical transition permissive form of the classical binary gender framework.

3.4 The GAAB/GR/single-MPB-GT/RT gender framework

The GAAB/GR/single-MPB-GT/RT gender framework, is similar to the GAAB/GR/single-MPB-GT gender framework, while it includes the option to retransition (indicated by RT). Retransitioning must be supported by best possible medical (MPB) gender (re)affirming therapy. After retransitioning, which is an option for every transgender person all gender categorization is just as if no gender transition had taken place.

3.5 The GAAB/GR/single-MPB-GT/ST/RT gender framework

Here ST stands for sexual transition, where the idea is that morphological change supported by adequate medical treatment, which change the morphological sex of a person and therewith their biological sex.

In other words: the GAAB/GR/single-MPB-GT/ST/RT framework differs from the GAAB/GR/single-MPB-GT/RT framework in the following way: after a person's (first and only) gender transition, biological gender is redefined as morphological gender, with the effect that gender transition comes with transition of biological sex. Retransitioning undoes the change of biological sex as well as the gender transition.

- All persons are assigned a gender at birth (GAAB), either male or female. In difficult cases a best choice is made on the basis of most recent/compelling science concerning gender relevant biological characteristics.
- GAAB is a person's gender until death unless GT takes place. Gender transition turns a male person into a female person and a female person into a male person.
- A person is cis-gender if they have not yet made a gender transition. A (fe)male cis-gender person is (fe)male. By default a newborn is cis-gender.
- A cis-gender person has a unique (non-repeatable) option to make a gender transition (GT). For a GT to be effective:
 - (i) Medical/bodily transition) medical steps (according to the best practices of the day) are needed;
 - (ii) (psychological transition) and mental steps (adopting the life-style of the other gender) must be taken (psychological transition);
 - (iii) (behavioural transition) must be made.
- GT requires a person's consent.
- The only gender labels are male and female.

- a transmale is a person who was assigned gender female at birth and who made a GT; a transfemale is a person who was assigned gender male at birth and who made a GT.
- Gender transition changes biological sex (upon transition morphological appearance determinates b-sex).
- A transman is a male human, a transwoman is a female human.
- A (wo)man is an adult human (fe)male.
- The gender revision mechanism is available as in the GAAB/GR/single-MBP-GT gender view perspective (and the corresponding change of gender is not considered a gender transition).

Remarks:

- The idea that GT modifies the definition of b-sex, seems implausible, but is unavoidable because it cannot be guaranteed that b-sex is determined at birth in terms of morphology. A DNA based criterion may have been used, or a criterion based on the sizes of gametes and gonads may have been used, or in fact any other criterion which is scientifically accepted at the time of birth.
- Suppose person P has male DNA and in spite of female morphology P is AMAB, the assignment at birth having been done on the basis of a genetic criterion. Now P has a gender transition in order to become female (though with another criterion, now a morphologic criterion, for biological sex). P could reach the same result with gender revision. Remarkably, in the first case P is transgender, and she made the transition without surgery and without changing their gender identity. In the second case P is not transgender.
- Alternative ways to denote the GAAB/GR/single-MPB-GT/ST gender framework:
 - transsexing-transition permissive form of the classical binary gender framework (where a transsexing transition is a gender transition which supposedly changes biological sex as well as gender).
 - transsexing-transition permissive form of the GAAB/GR gender framework.

3.6 The GAAB/GR/best-single-MPB-GT/RT gender framework

GAAB/GR/best-single-MPB-GT/RT gender framework differs from GAAB/GR/single-MPB-GT/ST/RT gender framework in the sense that GT is accepted also in cases where full MPB transition fails, for instance because a person is unable to proceed with surgical modifications on medical grounds. Then, in some cases, and on medical advice incomplete MPB-transition still suffices for GT. In particular it must be so that GT is deemed essential for resolving gender dysphoria. It is assumed, however, that a best effort is made (given the medical limitations just mentioned) to achieve MPB transition.

The GAAB/GR/best-single-MPB-GT/RT framework rejects the notion of sexual transition. Only the gender revision mechanism may change retrospectively biological sex and GAAB.

3.7 The GAAB/GR/flex-single-MPB-GT/RT gender framework

GAAB/GR/flex-single-MPB-GT/RT gender framework differs from GAAB/GR/best-single-MPB-GT/RT gender framework in the sense that GT is accepted if a limited degree of MPB transition is effectuated, where the only condition is that the gender affirming therapy has been performed to such an extent as is needed to solve gender dysphoria. As with the GAAB/GR/best-single-MPB-GT/RT framework for GT it is required that the transition is considered to be a medical necessity as a remedy for gender dysphoria.

The GAAB/GR/flex-single-MPB-GT/RT framework rejects the notion of sexual transition. Only the gender revision mechanism may change retrospectively biological sex and GAAB.

3.8 The 2G/GAAB/GR/GID-GT gender framework

Gender identity is a personal characteristic of a human which may or may not exist and which a person may or may not be aware of. Gender identity involves a choice between available gender labels, and in a 2G gender theory these labels are male and female. In the 2G/GAAB/GR/GID-GT gender framework, gender transition is driven by (change of) gender identity. The notion of retransitioning still exists but such transitions have no special status.

- All persons are assigned a gender at birth (GAAB), either male or female. In difficult cases a best choice is made on the basis of most recent/compelling science concerning gender relevant biological characteristics.
- GAAB is a person's gender until death unless GT takes place. Gender transition turns a male person into a female person and a female person into a male person.

- A person is cis-gender if they have not yet made a gender transition. A (fe)male cis-gender person is (fe)male. By default a newborn is cis-gender.
- The only gender labels are male and female.
- A person has at any moment a current gender and a current gender identity (which may or may not have been declared).
- Any person (above a certain threshold age, which serves as a parameter) may at any time declare their gender identity. Such declarations must be marginally checked, another parameter, minimally guaranteeing freedom of thought and expression for said person on matters of gender.

A gender transition takes place if and once a person's declared gender differs from their current gender at that moment. Upon GT the current gender changes.

- GT requires a person's consent.
- A transmale is a person who was assigned gender female at birth and who made a single GT; a transfemale is a person who was assigned gender male at birth and who made a single GT.
- A transgender person is a person who has made one or more GT's.
- A male person is an AMAB person who made an even number of GT's or an AFAB person who made an odd number of GT's.
- A female person is an AMAB person who made an odd number of GT's or an AFAB person who made an even number of GT's.
- A (wo)man is an adult human (fe)male.
- The gender revision mechanism is available as in GAAB/GR gender theory (and the corresponding change of gender is not considered a gender transition).
- Gender revision may not be relevant from the 2G/GAAB/GID-GT perspective but it may matter for a person who lives or intends to move to a jurisdiction or context where another gender framework is prevalent, and where GR is accepted while gender identity driven gender transition is not accepted.

Remarks:

- The 2G/GAAB/GR/GID-TR gender framework is acceptable in Germany. It is required that GT is not made in order to misuse its consequences.

- The 2G/GAAB/GR/GID-TR gender framework is acceptable in Scotland, though its implementation in Scotland has become difficult because of legal complications in connection with disagreement on the limits of devolution.
- By making gender identity the driving factor, the biological basis of the concept of gender has been removed, in principle, though we expect that under this regime choosing or acquiring a gender identity equal to GAAB will still prevail in terms of frequency for many years to come.
- The 2G/GAAB/GR/GID-TR gender of a person is their current gender in the perspective of 2G/GAAB/GR/GID-TR.
- From the perspective of 2G/GAAB/GR/GID-TR so-called gender affirming therapy (GAT) may help a person to feel well with the gender corresponding to their gender identity. GAT plays no role, however, in gender transition proper which is exclusively effected on the basis of subjective assessment of a person's gender identity.

3.9 The 3G/GAAB/GR/GID-GT gender framework

The 3G/GAAB/GR/GID-GT framework is a version of 2G/GAAB/GR/GID-GT framework which takes into account the presence of a third gender label, conventionally named “nonbinary”. Gender identity may also take the third label as its value.

- All persons are assigned a gender at birth (GAAB), either male (AMAB) or female (AFAB) or nonbinary (ANAB). In difficult cases a best choice is made on the basis of most recent/compelling science concerning gender relevant biological characteristics.
For nonbinary said best choice may come about from a combinations of best negative choices for male and female.
- GAAB is a person's gender until death unless GT takes place. Gender transition turns a male person into a female person or into a nonbinary person, a female person into a male person or into a nonbinary person, and a nonbinary person into a male person or into a female person.
- A person is cis-gender if they have not yet made a gender transition. A (fe)male cis-gender person is (fe)male, and a nonbinary cis-gender person is nonbinary. By default a newborn is cis-gender.
- The only gender labels are male, female, and nonbinary.

- A person has at any moment a current gender and a current gender identity (which may or may not have been declared).
- Any person (above a certain threshold age, which serves as a parameter) may at any time declare their gender identity. Such declarations must be marginally checked, another parameter, minimally guaranteeing freedom of thought and expression for said person on matters of gender.

A gender transition takes place if and once a person's declared gender differs from their current gender at that moment. Upon GT the current gender changes.

- GT requires a person's consent.
- A transmale is a person who was not assigned gender male female at birth and who made a single GT into male gender; a transfemale is a person who was not assigned gender female at birth and who made a single GT into female gender. A transnonbinary person is a person who is not ANAB and who made a gender transition to nonbinary gender.
- A transgender person is a person who has made one or more GT's.
- A male person is a person with current gender male, a female person is a person with current gender female.
- A (wo)man is an adult human (fe)male.
- The gender revision mechanism is available as in GAAB/GR gender framework (and the corresponding change of gender is not considered a gender transition).

Remarks:

- The 3G/GAAB/GR/GID-TR gender framework is acceptable in Germany. It is required that GT is not made in order to misuse its consequences.
- The 3G/GAAB/GR/GID-TR gender of a person is their current gender in the perspective of the 3G/GAAB/GR/GID-TR framework.
- Nonbinary gender identity may be considered present by default in the absence of male gender identity and of female gender identity.

3.10 The 3G/PGAAB/GR/GID-GT gender framework

The 3G/PGAAB/GR/GID-GT framework is a version of the 3G/GAAB/GR/GID-GT framework which adopts the additional provision that the GAAB of a person is strictly private information so that no actors or agencies are entitled to be informed about the GAAB of a person. PGAAB stands for private GAAB. Similarly a person should be in no need to be open about their being cisgender or transgender.

3.11 The 3G⁺/PGAAB/GR/GID-GT/A gender framework

The 3G⁺/GAAB/GR/GID-GT/A framework is a version of 3G/PGAAB/GR/GID-GT framework which takes into account/allows the presence of persons who claim to have no gender (i.e. being agender, indicated by A). In addition to gender transition a person may perform a gender exit (moving from gendered status to agender status).

Every gender framework with finitely many gender labels will be confronted with persons who prefer to diagonalize over the sort of gender labels and claim that none of these labels applies to them. It is plausible to view agender as a new gender outside the set of proper genders. Agender may be considered a peripheral gender (comparable with peripheral numbers such as positive and negative infinity in certain versions of arithmetic, see e.g. the entropic transreals in [14] with three peripheral numbers).

3.12 The 3G⁺/AAAB/GR/GID-GT/A/PBS gender framework

The 3G⁺/AAAB/GR/GID-GT/A/PBS framework is a version of 3G/PGAAB/GR/GID-GT framework which adopts the policy that all persons are assigned agender (A) at birth. Then individuals may become aware of their gender identity and subsequently adopt the corresponding gender, which may thereafter change if they become aware that their gender identity has changed. Determination of biological sex at birth plays no role. Biological sex is a private characteristic anyhow (indicated by PBS). Biological sex may be inferred from the biometric data which are collected about a person for medical purposes, but is not stored as such.

For an agender person it is a positive step to confirm awareness of a nonbinary gender identity just as much as it is a positive step to confirm awareness of masculinity (in terms of gender) or of femininity (in terms of gender).

3.13 Comments on the survey

Several comments may be made:

(i) Gender frameworks may be classified as being either biometry first or gender identity first. The latter have GID in the descriptive codes given above.

(ii) A different way to describe gender frameworks makes use of collections of features and explicit treatment of feature interactions. I will comment on this option below in Section 4.

(iii) For a person the notion of a gender life-cycle emerges which is a trace from a process which specifies potential gender life-cycles as understood from a given gender framework. Some initial thoughts along this line are given in Section 5.

4 Gender life-cycle features and feature interaction

The survey of gender frameworks given above suggests an entirely different presentation: thinking in terms of gender life-cycles and surveying features of such life-cycles. Then a gender framework results from combining a collection of features and dealing with potential or real issues of feature interaction. For feature interaction, a phenomenon which was investigated in great detail in the context of the design of intelligent telephony systems (mainly between 1975 and 1995), see e.g. Bouma et. al. [17].

4.1 Feature listing for gender framework design

The following features play a role in the characterization of gender frameworks. The listing is non-exhaustive, just as the listing of gender frameworks is non-exhaustive.

1. determination of biological sex at birth;
2. assigning GAAB at birth;
3. determination of GAAB in case different criteria for biological sex yield different outcomes;
4. categorizing a person as AMAB, AFAB or ANAB;
5. gender revision;
6. ISGT (intersex condition based sexual transition);
7. transsexing (sexual transition);

8. categorizing a person as AAAB (assigned agender at birth);
9. assigning agender at birth as a universal policy (i.e. everyone is AAAB);
10. gender transition;
11. gender retransition;
12. categorisation of a person as: male, female, a man, a woman, masculine, feminine, transsexual, transgender, a transman, a transwoman, a trans man, a trans woman, transmale, transfemale, transneutral, nonbinary, agender (together 15 features with complicated interactions);
13. performing gender affirming therapy (GAT), given that gender of a person once transition as been done;
14. MBP transition: medical and psychological actions (preceding gender transition);
15. protecting private information against being inspected by agents who are not entitled to such information;
16. self-determination of gender identity;
17. becoming aware of doubts concerning (the real) gender identity;
18. becoming aware of being unaware of one's gender identity;
19. external confirmation of gender identity;
20. developing the intention to change one's gender identity;
21. change of gender identity;
22. public announcement of (change of) gender identity;
23. claiming protection on the basis of transgender rights;
24. obtaining protection on the basis of transgender rights.

Many feature interactions require consideration. In many cases it is not at all clear how feature interactions are to be dealt with.

4.2 Feature interaction issues for gender framework features

Particularly difficult cases of feature interaction are the following:

- between gender transition and change of gender identity;
- between categorizing a person as (fe)male and categorizing a person as a (wo)man;
- between pre-gender transition MBP and post-gender transition gender affirming therapy;
- between self determination of gender identity and external confirmation of (self-determined) gender identity;
- between categorizing a person as ANAB and categorizing a person as AAAB;
- between the various options for categorization listed in Item 12 above and social transitioning;
- between full MPB transitioning (with or without ST) and GID (gender identity driven) transitioning (the interaction bites when it comes to the application of bathroom laws and claiming protection on the basis of transgender rights).

4.2.1 Gender essentialism versus gender co-essentialism

The gender frameworks may be positioned in a spectrum ranging from essentialism to co-essentialism. The GAAB/GR gender framework is essentialist, viewing the essence of gender exclusively in biology. All other mentioned frameworks are less essentialist in some way. Gender essentialism comes with the conviction that there are precisely two gender's: male and female. From a biological perspective it is not self-evident that no other or intermediate gender's need to be distinguished. The 2G/GAAB/GR/GID-GT gender framework is a prime example of a co-essentialist framework. Co-essentialism has been studied mainly in a 2G setting (featuring gender male and gender female only). Co-essentialism may be generalized to any collection of gender identities which one wishes to distinguish. Co-essentialism refers to the position that (self-determined/self-observed) gender identity is the prime determinant of gender at the exclusion of all other criteria.

5 Process expressions for gendered life-cycles

An individual may move through several stages in terms of gender categorization. What may happen to a person depends on the gender framework one has in mind. This observation creates the idea of a gender life-cycle of a person, which in turn leads to the notion of

gender life-cycle process (for a single person): a structured view on the totality of possible gender life-cycles for a single person. In computer science it is a plausible idea to view the totality of possible life-cycles as a process expression in a certain process algebra, for instance the process algebra discussed in [13].

I have experimented with process algebra as a notation for gender life-cycle processes. These expressions (systems of recursion equations) tend to become rather complicated. The virtue (if any) of working out process expressions for gender life-cycles is twofold:

(i) one is forced to reflect on the completeness of the description of a gender framework.

(ii) there is a clear incentive to think in terms of feature collections and feature interactions, which must all be resolved when designing a process expression for a gender life-cycle process.

(iii) in complicated cases this level of precision may be helpful for system verification. For instance during the design of a building one may wish at any moment to know whether or not the bathroom facilities are sufficient for all (relevant) genders.

(iv) Just as in software engineering: formal specification primarily pays off when subsequent formal verification (including proof checking, i.e. automated formal verification of handwritten formal verification).

5.1 Genesian g-life-cycle

$$L^G = born \cdot (A_{mab} \cdot L_m^G + A_{fab} \cdot L_f^G)$$

$$L_m^G = (l_m + sig_m)^* D$$

$$L_f^G = (l_f + sig_f)^* D$$

Here:

- G for Genesis (as the hypothetical source of this gendered lifecycle);
- $born$: the act of a human being born;
- A_{mab} the event of being assigned male at birth and becoming AMAB;
- A_{fab} the event of being assigned female at birth and becoming AFAB;
- D for the end of life;
- ‘.’ for sequential composition;
- ‘+’ for alternative composition;
- ‘*’ for repeating composition;
- l_m for an act of living as a male;
- l_f for an act of living as a female;
- sig_m for an act of signalling male gender;
- sig_f for an act of signalling female gender.

5.2 Genesian g-life-cycle with gender revision

$$L^{G,gr} = born \cdot (A_{mab} \cdot L_m^{G,gr} + A_{fab} \cdot L_f^{G,gr})$$

$$L_m^{G,gr} = D + (l_m + sig_m) \cdot L_m^{G,gr} + rev \cdot L_f^{G,gr}$$

$$L_f^{G,gr} = D + (l_f + sig_f) \cdot L_f^{G,gr} + rev \cdot L_m^{G,gr}$$

Here:

- *rev* denotes an event of gender revision.

5.3 Genesian g-life-cycle with gender revision and GAT

$$L^{G,gr/gat} = born \cdot (A_{mab} \cdot L_m^{G,gr/gat} + A_{fab} \cdot L_f^{G,gr/gat})$$

$$L_m^{G,gr/gat} = D + (l_m + sig_m) \cdot L_m^{G,gr/gat} + rev \cdot gat_f \cdot L_f^{G,gr/gat}$$

$$L_f^{G,gr/gat} = D + (l_f + sig_f) \cdot L_f^{G,gr/gat} + rev \cdot gat_m \cdot L_m^{G,gr/gat}$$

Here:

- *rev* denotes an event of gender revision;
- *gat_m*: gender affirmative therapy towards male gender;
- *gat_f*: gender affirmative therapy towards female gender.

5.4 Genesian g-life-cycle with neutral gender

$$L^{G'} = born \cdot (A_{mab} \cdot L_m^G + A_{fab} \cdot L_f^G + A_{nab} \cdot (L_m^G \triangleleft decide_m \triangleright L_f^G))$$

Here:

- *A_{nab}* the event of becoming ANAB;
- *decide_m*: deciding that the newborn will have male gender (with the other outcome that the newborn will have female gender).

5.5 Genesis g-life-cycle with ANAB and gender affirmative therapy

$$L^{G''} = born \cdot (A_{mab} \cdot L_m^G + A_{fab} \cdot L_f^G + A_{nab} \cdot ((gat_m \cdot L_m^G) \triangleleft choose_m \triangleright (gat_f \cdot L_f^G)))$$

5.6 Basic transition permissive g-life-cycle

$$\begin{aligned}
 L^{TP} &= born \cdot (A_{mab} \cdot L_m^{TP} + A_{fab} \cdot L_f^{TP}) \\
 L_m^{TP} &= (l_m + sig_m)^*(D + dgd_m \cdot gat_f \cdot L_f^G) \\
 L_f^{TP} &= (l_f + sig_f)^*(D + dgd_f \cdot gat_m \cdot L_m^G)
 \end{aligned}$$

Here:

- dgd_m detect gender dysphoria (as a man);
- dgd_f detect gender dysphoria (as a woman).

Assumptions:

- only a single transition allowed per life-time.

5.7 Basic transition permissive g-life-cycle with repeated transition

$$\begin{aligned}
 L^{TPr} &= born \cdot (A_{mab} \cdot L_m^{TPr} + A_{fab} \cdot L_f^{TPr}) \\
 L_m^{TPr} &= (l_m + sig_m)^*(D + dgd_m \cdot gat_f \cdot L_f^{TPr}) \\
 L_f^{TPr} &= (l_f + sig_f)^*(D + dgd_f \cdot gat_m \cdot L_m^{TPr})
 \end{aligned}$$

5.8 Transition permissive g-life-cycle with repeated transition and transition towards nonbinary gender

$$\begin{aligned}
 L^{TPrn} &= born \cdot (A_{mab} \cdot L_m^{TPrn} + A_{fab} \cdot L_f^{TPrn} + ANAB \cdot L_n^{TPrn}) \\
 L_m^{TPrn} &= (l_m + sig_m)^*(D + dgd_{m \rightarrow f} \cdot gat_f \cdot L_f^{TPrn} + dgd_{m \rightarrow n} \cdot gat_n \cdot L_n^{TPrn}) \\
 L_f^{TPrn} &= (l_f + sig_f)^*(D + dgd_{f \rightarrow m} \cdot gat_m \cdot L_m^{TPrn} + dgd_{f \rightarrow n} \cdot gat_n \cdot L_n^{TPrn}) \\
 L_n^{TPrn} &= (l_n + sig_n)^*D
 \end{aligned}$$

5.9 Transition permissive g-life-cycle with repeated transition and transition towards nonbinary gender, with and without medical transition

$$\begin{aligned}
 L^{TPrn'} &= born \cdot (A_{mab} \cdot L_m^{TPrn'} + A_{fab} \cdot L_f^{TPrn'} + ANAB \cdot L_n^{TPrn'}) \\
 L_m^{TPrn'} &= (l_m + sig_m)^*(D + (dgd_{m \rightarrow f} \cdot gat_f + aga_f) \cdot L_f^{TPrn'} + (dgd_{m \rightarrow n} \cdot gat_n + aga_n) \cdot L_n^{TPrn'}) \\
 L_f^{TPrn'} &= (l_f + sig_f)^*(D + (dgd_{f \rightarrow m} \cdot gat_m + aga_m) \cdot L_m^{TPrn'}) + (dgd_{f \rightarrow n} \cdot gat_n + aga_n) \cdot L_n^{TPrn'} \\
 L_n^{TPrn'} &= (l_n + sig_n)^*(D + (dgd_{n \rightarrow f} \cdot gat_f + aga_f) \cdot L_f^{TPrn'} + (dgd_{n \rightarrow m} \cdot gat_m + aga_m) \cdot L_m^{TPrn'})
 \end{aligned}$$

6 Methodological matters

Gender theory is written in the midst of complex societal changes, ongoing at different pace and with different directions in different parts of the world. Not even the existence of academic gender theory has been established beyond reasonable doubt. Many different methodologies may apply, so that comments on methodology are needed, though such comments may easily trigger new questions.

I hold that gender theory need not be normative. It suffices for the existence of gender theory that there are questions for which it is relevant and potentially possible to produce directions regarding how societies and jurisdictions might best develop in the long run. Much is unknown about “the future of gender”, however. Listing such open issues may help to see the urgency or at least relevance of systematic work on gender theory.

6.1 Open issues in categorial gender theory

First of all there are questions, for each of which one may try to find predictions on a theoretical basis:

1. At the time of writing two gender labels, male and female are prevalent. By far the most people are either male or female. Is the future different: are there reasons to expect that in say 100 years a quite different distribution of gender labels pertains?
2. At the time of writing biological sex, however defined, as determined at birth (and as laid down in a birth certificate) is considered an important characteristic of a human individual.

Now binary biological sex is no more than a very compressed view of the biometrical information which one may obtain about a newborn person. Are we heading for a future in which much more biometrical information will be crafted on a birth certificate so that summarizing such information in terms of “biological sex at time of birth” is considered futile?

3. The notion of gender identity has become central for the philosophy of gender. The viewpoint that gender identity determines gender (and not the other way around) has become popular. What is the future status of this position, is gender identity a notion that will be increasingly used, or is it a lost case due to lack of an evidence base needed for its determination?
4. Gender transition has become standard practice in a large number of jurisdictions. It has become plausible to view a transwoman as a woman and a transman as a man.

However, both the US and the UK seem to have made a U-turn on this matter. So what is the future: will gender transition from male to female, and from female to male, stay in place or will this idea become deprecated, for instance in such a manner that gender transitions will turn a man into a transwoman, and a woman into a transman, with transman and transwoman used as gender labels (so that, with the inclusion of neutral, at least 5 gender labels come into play).

5. In recent years the non-binary gender has made headlines with many individuals making a gender transition from male to non-binary or from female to non-binary.

These questions arise: (i) has non-binary come to stay? (ii) is having a non-binary gender the result having a non-binary gender identity? (iii) Will there ever be a situation where most (or even all) jurisdictions accept non-binary (or simply X) besides male and female as gender labels?

6. Some jurisdictions allow a person to transition to another gender a number of times (say every 5 years or so). Has this freedom come to stay, or will it disappear as a short-lived anomaly?

7. It has become widely accepted that both male and female persons plausibly have a sexual orientation. The most well-known forms of sexual orientation are homosexual and heterosexual, notions which make reasonable sense for cis-male and cis-female persons (and less so for transman and transwomen and for non-binary persons). In some jurisdictions homosexuality (for men as well as for women) is forbidden, or its practice is forbidden. Clearly by ruling against homosexuality the existence (in scientific terms) of the phenomenon is taken for granted and accepted. The question arises if, similarly to sexual orientation a notion/phenomenon of gender orientation will become relevant and accepted?

6.2 Landmarking approach

With categorial gender theory I adopt an approach which I have made use of before in quite unrelated themes, here phrased as “what is” questions, in particular:

- What is a fraction in elementary arithmetic? ([4]).
- What is an algorithm? ([5]).
- what is a computer program? ([12]).
- What is a fault in a computer program. ([3]).
- What is genocide? ([10, 11]).

The approach takes these four steps:

1) to argue that the key notion (fraction, algorithm, computer program), is hard to define (the case with “computer program”) and may be ambiguous (the case with fraction, algorithm, program fault).

2) To classify an ambiguity at hand as a controversial ambiguity or a non-controversial ambiguity. (Here we adopt the view that “gender” is ambiguous, and that the ambiguity of gender is controversial. On the other hand the respective ambiguities of fraction, algorithm, and program fault are non-controversial).

3) To find or develop one or more nearby notions (so-called landmark notions) which are less ambiguous, therefore more easy to provide convincing definitions of, and for that reason, hopefully, less controversial. For gender theory the notion of a gender framework will serve as a landmark notion. The notion of a gender framework is exemplified by the survey in Section 3. These gender frameworks are named and thereby serve as conceptual landmarks as well.

4) To use the landmark notions in order to rephrase key aspects of the topic at hand.

Categorical gender theory uses gender framework as a landmark notion (and takes gender and gender identity to be ambiguous beyond repair). Gender frameworks are easier to define than gender (or gender identity). Categorical gender theory may be informative in particular if one has no favored definition of gender. It is also informative concerning interactions with others who maintain different or perhaps unknown conceptions of gender.

6.3 Opponents of gender theory

Opposition to gender theory comes from many sides. With shocking arrogance the Vatican has denounced gender theory (see [1]). It is hard to believe that according to the Vatican and according to two successive popes, gender theory can and should be denounced, and that neither of them arrives at the obvious appreciation that they prefer one gender framework over certain other gender frameworks. In denouncing gender theory they merely provide an approach to gender theory which they strongly prefer. It follows that self-declared opponents of gender theory are (for that reason) proponents of some approach to gender theory.

6.4 What makes defining gender hard?

There are several complications concerning “gender” which make setting up any gender theory difficult:

- The use of the word “gender” is by itself controversial, in some jurisdictions even speaking of or writing about gender is considered problematic because doing so may open the door to undesired outcomes.

At the time of writing this paper, research on gender theory is unwelcome in the US, in the Russian Federation, in the Roman Catholic Church as well as in the Russian Orthodox Church, to name just the most noticeable jurisdictions where an open debate on gender theory is prohibited. My position on these matters of academic freedom is as follows:

(i) I insist that whoever denies others the right to speak or write about gender and or gender theory is in fact promoting and applying some perspective on gender theory at the expense of other perspectives. Such use (of a perspective on gender theory) will necessarily need some part of gender theory in order to explain their resistance towards alternative perspectives.

(ii) On the long run there is no role for authoritarian structures which prevent the very option of conceptually developing gender theory with the intention and effect that critical assessment of the politically prevalent gender theory is blocked.

- There is no such thing as an uncontested definition of gender. Disagreements on matters of gender are deeply felt, and compromising on such issues seems to be undoable in practice, at least so for the time being.
- There is no intellectual tradition in gender theory which has a primary focus on asking questions instead of on providing answers. As a consequence it is unclear how to appreciate and understand partial results in gender theory. Stepwise and incremental work seems to be unknown in this area.
- In different jurisdictions different perspectives on gender theory are leading (dominant, prevalent), and these perspectives are often under development and are moving in several directions with unpredictable outcomes.
- There is no “best gender theory” known at this moment, all one may do is contemplate on the assessment of states of affairs and on reasons and options for change.
- Unfortunately even the viewpoint that there is no best gender theory available is highly controversial because different sides in the ideological debate on gender seem to hold that no respect is due to other sides in the debate, so that, as a matter of fact, there seems to be no debate.

6.5 Objectives of developing a logical perspective on gender theory

Objectives are these:

- (i) Supporting an incremental approach of the subject, any time leaving open room for discussing and comparing a diversity of views.
- (ii) Obtaining ideologically neutral foundations for gender theory.
- (iii) Making an assessment of proposals for a perspective/policy on gender theory, where if logical flaws are detected in a given perspective/policy the prediction is warranted that sooner or later said perspective/policy (assuming it has been put into practice) will become problematic and will feature complications, so that a modification of said perspective/policy will be needed.
- (iv) Developing guidelines for the incremental development of successive gender views.

6.6 What is or might be a logical perspective?

Claiming to provide a logical perspective on an essentially philosophical theme is ambitious, perhaps even unreasonable. I will list some aspects which I consider to be central to a logical perspective:

1. Clarity is sought in specific cases on whether an account of a theme (here either gender theory as a whole or some chapter in gender theory) is axiomatic in style, or whether it is a constructive bottom-up approach defining concepts in a modular manner from first principles and definitions.
2. The axiomatic approach to geometry, which started out with Euclid and which turned out to allow for quite different (non-Euclidian) interpretations in the 19th Century, is taken for a role model on how an axiomatic approach may cover different views.
3. The axiomatic approach to ZF set theory (Zermelo-Fraenkel set theory, early 20th Century) is taken for a role model on how an axiomatic start may lay the foundations for bottom-up development.

For instance, the development of a theory of rational numbers within ZF set theory is essentially constructive and bottom-up, in spite of the axiomatic basis given by ZF.
4. The theory of fields (such as fields of rational numbers, real numbers, complex numbers) as developed within ZF set theory is taken as a role model for creating an axiomatic approach within a constructive setting (which is created within ZF set theory).

Again an axiomatic approach creates clarity (on what is a field) while leaving key parameters open (which field in particular).

5. It is fully recognized that seemingly obvious intuitions (such as the concept of logical implication) may be extremely difficult to analyze convincingly and in full detail. Similarly it is appreciated that defining “man” and “woman” may be very difficult.

Moreover, it is recognized that, as in philosophical logic, and even in mathematical logic, there is no unique best option. Logic(s) is (are) a helpful tool, though no more than that, for the design of theory and of methods of use for a theory.

6. Detecting self-reference and avoiding circularity of definitions is taken seriously.

Complications around circularity are well-known in gender theory where defining gender in terms of gender identity fails (according to some authors) on difficulties of defining gender identity in a non-circular manner.

7. For a given perspective on gender theory it is important to develop reasoning methods specific for that perspective.

7 Connections with the formal gender theory (FGT) of J. A. Bergstra and L. J. Buijs

This paper owes much to recent joint work with Laurens Buijs on formal gender theory (Hereafter FGT), which we carried out from early 2023 till May 2024, with as its result a series of posts on the website [URL](#) on on gender-theory, starting with [6]. Our joint project came unfortunately to an end due to unforeseen personal circumstances. Differences are as follows:

- Categorical gender theory focuses on a restricted theme: gender in the context of categorization, while FGT aims at a providing formal approach to gender theory at large.

The objectives of FGT, however, are doubtful in view of the complexity of the literature of the metaphysics of gender. A definite choice, however, to ignore considerations about the metaphysics of gender in favour of disambiguation of the notion of gender was not made in FGT while precisely that choice has been made in the design of categorical gender theory.

- The existence of genuine transgender persons, for instance transwomen who are categorized as women, was taken as a basic assumption in FGT. Recent developments,

political in the US and legal in the UK, have shown, however, that not even this seemingly trivial assumption can safely be made and a that a more general setup is needed which may pay due attention to approaches where (i) gender transition from male cannot create a female person, (ii) gender transition from female cannot create a male person, (iii) where transwoman is an additional gender label rather than a subcategory of woman, and (iv) where transman is an additional gender label rather than a subcategory of man.

- Categorical gender theory has gender framework as a basic notion, thereby dropping the search for a proper or best definition of gender, whereas in FGT we have paid much attention to iterative mechanisms for improving definitions of gender. FGT assumes that the notions of gender and transgender have evolving definitions, with an evolutionary process, steadily moving in the direction of being more gender transition permissive, while said evolution differs in speed and direction in different parts of the world. In the work on FGT we have paid much attention to the remarkably strong and widespread opposition to the idea that gender identity determines gender. For instance we wrote several texts supporting gender critical views expressed by J. K. Rowling, unaware at the time that her views would be supported by the UKSC.
- FGT provides relevant information for logical aspects of various gender frameworks. The task to rephrase results from FGT in terms of gender frameworks is left for future work. However I will mention some connections and related considerations in some detail:
 - (Gender frameworks hinted at.) In [7] arguments are provided for the rationale of the gender framework specified above in 3.6 (see also [8]).
 - (FGT loosely distinguishes versions of gender theory, missing a precise counterpart for gender frameworks.) In [9] it is argued that a plurality of methods for gender assignment must be distinguished, an idea which now translates into making gender framework a core concept. FGT comes with the notion of a version of FGT which is roughly the same as a gender framework. The focus of FGT is on the justification of versions of FGT from the perspective of these providing solutions for gender dysphoria and related problems. Categorical gender theory on the other hand is not about justification but merely about the internal logic of gender frameworks, leaving aside justification in medical, moral or philosophical terms.
 - (Dembroff versus Byrne.) The Dembroff versus Byrne controversy has been discussed in detail in [6]. We find that said controversy is unambiguously

settled, though in different ways, in each of the listed gender frameworks. (See [20] and [15, 19] for the details of this controversy.)

- (Design rather than discovery.) In categorial gender theory it is obvious that gender categorization is a matter of design, and in categorial gender theory it appears that the notions gender and transgender are designed (as a function of the design of a gender framework) rather than discovered. FGT is about the stepwise design (a process called concept engineering) of notions of gender, where FGT embodies a sense of direction. Categorial gender theory on purpose does away with any sense of direction and is purely descriptive. (For original work on concept engineering see Jenkins [22, 23].)
- (Jurisdiction dependence.) In FGT jurisdiction dependence is considered both illuminating and relevant. In categorial gender theory we adopt the idea that a gender framework may or may not be compatible with (admitted by) a certain jurisdiction.
- (Bottom-up versus top-down concept engineering.) FGT highlights the contrast between on the one hand, increasingly sophisticated notions of gender found by bottom up concept engineering starting from what is, in the terminology of categorial gender theory, the GAAB/GR gender framework, and on the other hand, increasingly sophisticated notions of gender found by top-down concept engineering starting from what is, in the terminology of categorial gender theory the 3D/GAAB/GR/GID-GT gender framework (where the latter framework corresponds most directly to the idea that gender identity determines gender).

I will refer to the bottom-up engineered class of notions/definitions of gender as biometry-first notions of gender (where in successive stages of bottom-up design the biometrical determination of gender is compromised in various ways), and to the top-down notions of gender as gender identity first notions of gender (where in successive stages of top-down design the role of subjective determination of gender identity is compromised). The necessity and relevance of top-down concept engineering for gender identity first concepts of gender was convincingly established by Elizabeth Barnes in [2].

- (Protecting core achievements of gender theory.) In terms of moral objectives, FGT has been designed with the following considerations in mind:
 - (i) (FGT has a primary focus on bottom-up concept engineering of notions of gender.) The original biometry-first notions of gender serve to support individuals suffering from gender dysphoria by providing tools for gender transition, and that subsequent bottom-up concept engineering of increasingly sophisti-

cated notions of gender (and gender transition for that matter) may provide increasingly more adequate protection for individuals whose intention is to solve their gender dysphoria or gender dysphoria related problems,

(ii) (FGT adopts protection for biometrically transgender persons as a major priority.) FGT assumes that the protection mentioned in (i) itself is of critical value, and constitutes a bundle of mechanisms which in turn deserve protection: the meta-protection of transgender persons (including those who envisage or aspire gender transition, though limited to those whose problems may be solved by means of transgending into the opposite gender from the biometry-first class of notions of gender).

(iii) (The ideological battlefield is between different transition permissive gender frameworks.) The movement to replace said bottom-up designed notions of gender (that is biometry-first notions of gender) by top-down designed notions of gender (that is gender identity first notions of gender), constitutes a fundamental threat to the mechanisms deserving protection (as mentioned in (ii)) (where the recent judgment of the UKSC as discussed in 1.5 above exemplifies this very threat),

(iv) (Seen from FGT a satisfactory outcome of top-down concept engineering is hard to imagine.) The theory of top-down design of notions of gender starting from gender identity seems to be yet underdeveloped, and is beset by inconsistencies and circularities, see Bogardus [16], and Gascoigne [21]. A recent proposal for the solution of these difficulties can be found in Willems [28]. The latter paper is illustrative of the quite non-trivial philosophical exercise involved in establishing that the notions of gender and gender assignment are such that every woman is indeed assigned female gender, and insisting that the grounds of the equivalence do not lie in a trivial, uninformative, and for that reason indefensible, circularity of the various definitions.

Gender fictionalism, as advocated in Logue [24] provides a perfect realization of the famous FPA (first person authority) about one's own gender. It comes as a cost: academics working in gender theory will knowingly consider gender to be a fiction and (for that reason) pretend naivety when speaking/writing about gender in daily life. Non-academics (of gender theory proper) may be (yet) uninformed about the fictional character of gender and will for that reason not be pretending when using gender talk. Gender obtains its force from the ubiquitous use by persons who have not become aware of the fictitious nature of gender. That gender is (really) fictional does not prevent the use of the concept of gender to have disadvantageous consequences. Just as the fictitious notion of a witch did much harm some centuries ago, gender fiction may be harmful

today. The gender fiction may work positively as well, however. Logue sees no principled intrinsic merit in the gender fiction and can imagine a world without it.

Unfortunately Logue does not explain which advantage is obtained by the gender theorist by casting gender as fictional: can gender talk still be used but with a weaker logic, which is permissive for contradictions and which is best used with some paraconsistent logic in mind, or is gender to be disambiguated into one or more specific interpretations before or during use (inside academia and preferably also outside academia).

From the perspective of categorial gender theory one may understand gender as weighted average of gender framework dependent notions of with weights related to the social (or moral, or ..) relevance of the various gender frameworks. Perhaps there is merit in the suggestion that such a weighted average of interpretations of gender produces a fiction rather than a genuine notion.

(v) (Lack of academic freedom.) During the work on FGT we were constantly aware that individuals who highlight and study the issues mentioned in (iii) and (iv) are likely to be accused of being gender critical, for being transphobic, for being anti-trans, and of being opponents of adequate rights for transgender persons, while none of this is remotely true. In contrast one may very well be writing in a gender critical style in order to protect the rights of an important category of transgender persons, or equally importantly, to stabilize the protection of such rights under adverse conditions (which are, writing in 2025, currently manifestly present in the US as well as in the UK, and in several EU countries).

(vi) (Need of clarity for the sake of protection.) The defects mentioned in (iv) are serious to such an extent that, from an academic perspective, there is insufficient justification for taking the risk of degradation of the protection of transgender persons whose gender can be adequately understood in terms of bottom-up engineered concepts of gender as mentioned in (i) above,

(vii) (Lack of clarity on gender in medical schools.) In FGT it is claimed that professionals in the medical sector whose contribution lies primarily in the use of bottom-up engineered notions of gender should be more clear about their position in the debate/conflict implicit in (iii) above, so that they support gender theorists who are or may be in trouble because of the issues referred to in (iv).

- (Just before the drastic turnaround.) The work on FGT was done from March 2023 to March 2024 and was terminated while clearly unfinished and yet in-

adequately published. At the time of working on FGT we were unaware of the looming force of the gender critical movement and we felt the need to speak out in favour of victims (including Laurens Buijs) of what may be called the anti-gender critical movement. Nevertheless the work on FGT may turn out to have been even more timely under the new conditions which seem to realize the formidable threat mentioned in point (iii) of the above item. These new conditions seem to mark a drastic turnaround in the conceptualization of gender.

- (Demonstrating that Laurens Buijs was wrongly victimized for his claims on gender theory.) The primary objective of FGT was to demonstrate that the following statements made by Laurens Buijs in [18] were reasonably consistent with the academic literature on gender theory available early 2022:
 - (i) the concept of nonbinary gender has no solid basis in gender theory,
 - (ii) nonbinary gender may well be a matter of fashion, and
 - (iii) the 100 % decoupling of gender categorization from categorization of biological sex is unconvincing and problematic.

These objectives have been achieved to our satisfaction in FGT, while categorial gender theory is uncommitted to any such specific issues.

In the first quarter of 2025 two major events took place: in the UK the dogma that gender identity determines gender has become legally discredited and in the US the very recognition of both transgender and nonbinary persons has become problematic. The weakness of gender theory, which has widely adopted the dominance of gender identity over biological gender, has become manifest given that even the justification of and protections for gender transition under any of the (transition permissive) biometry-first notions of gender have come to be considered questionable in jurisdictions of major importance.

- (MotR guided approach) The objectives of FGT were also formulated as an attempt to determine or design a middle of the road (MotR) approach to gender theory which seeks to avoid the pitfalls of the extreme positions (frameworks) while being helpful to a substantial class of persons experiencing “gender trouble”. Stated in terms of gender frameworks, the technical focus of FGT has been on bridging the gap between biometric gender frameworks and gender identity based gender frameworks. The development of FGT suggests that attempts for bridging this gap will not lead to any unique result, and that the realization of a plurality of different progressions to intermediate (MotR) gender frameworks is to be expected.

While both extremes: a transition non-permissive biometry based gender framework and an unrestricted gender identity based gender framework appear to be very clear and stable, MotR gender frameworks unavoidably involve lots of design decisions which may make an arbitrary impression and which may trigger criticism. Unavoidably an MotR gender framework, once widely adopted in the gender law package in some jurisdiction will show aspects of a compromise, besides aspects of logical and systematic design.

8 Concluding remarks

Many authors in gender theory write from some moral perspective. My writing is no exception: I became interested when I saw the verbally aggressive style of self-assertion of certain transgender groups who act as if it is their right to move anybody out of the way who does not agree with their views. I found it disappointing to see this happen at the University of Amsterdam. I saw little awareness that infringement of the individual rights of a member of the academic community who they consider to be gender critical should not be an option for students and staff members.

Upon looking into the subject in more detail, and in the course of working on FGT (Formal Gender Theory) Laurens Buijs I became increasingly fascinated by the remarkable complications of defining the concepts of man and woman, male and female, and the theme of gender categorization. I became convinced that the option of gender transition is an important medical and cultural achievement which should be preserved and protected. However, I also became convinced that such preservation and protection requires moderation with the development of gender theory. Moderation in particular by not adopting a radical co-essentialist position and by striving toward a middle of the road gender framework which gives ample room for biological aspects of gender. Moderation involves accepting that gender is not simply used as a criterion for admission to sports event consisting of competitions for both biological genders. Lack of moderation has complicated consequences.

During the work on FGT (Formal Gender Theory) with Laurens Buijs we have commented in a number of blogs on the remarkable discreditation of J.K. Rowling. She has been a monumental victim of trans based hatred. Her fame and wealth enabled her to survive these issues, but she is an exceptional case, and now, finally the UKSC supports the view of the feminist group which Rowling has been supporting both ideologically and financially for several years, in spite of her being targeted by actions of hatred and dislike. In any case it has been demonstrated that in the UK it is possible to withstand the organized hatred of factions of the trans community, and that fact by itself is of reassuring. At the

same time the UKSC ruling (re)introduces problems for trans persons who went through full scale medical transition. I will refer to these persons as bodily transgender persons.

I see no way around the conclusion that transactivist pressure is pursued at cost of the status of bodily transgender people. The latter phenomenon is now very clear in the US. I sympathize with the rights of bodily transgender persons, and these rights deserve protection and preservation. It not obvious that gender transition as a mechanism will be around in Western democracies till the end of this Century. I see no justification for co-essentialism oriented trans groups to push their agenda at the cost of bodily trans persons. Logue [24] holds that the tendency towards a GID based determination of gender came from outside academic gender theory. If that is true, not so easy to check, then GID based (i.e. co-essentialist) gender theory and its remarkable weaponization by certain trans groups constitutes a manifestation of anti-intellectualism rather than a manifestation of academic progress. The latter manifestation may well have been co-responsible for paving the way towards the remarkable opposition to gender theory shown by the new US administration since the beginning of 2025.

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