Transhumanism and global governance of human genome editing. Common themes and Implications for bioethics

Transhumanismo y gobernanza global de la edición del genoma humano. Temas comunes e implicaciones para la bioética

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Abstract

This article explores the implications for bioethics of the common themes between transhumanism and the global governance of human genome editing (HGE). First, the reflexive thematic analysis (RTA) method was applied to a set of texts on transhumanism and a set of texts on the global governance of HGE. As a result of this application of RTA, three common themes emerged and their elements. After that, an example of implication for bioethics of each one of the common themes was developed. Each implication considers the current situation and a task for bioethics. Finally it is concluded that recognising the

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situation arising from the common themes and working on the three identified tasks is crucial for contemporary bioethics.

1. Introduction

1.1. Transhumanism

Humanity+ (H+) (Cf. 1), formerly the World Transhumanist Association (WTA), presents transhumanism as:

> The **intellectual and cultural movement** that affirms the possibility and desirability of fundamentally **improving the human condition** through applied reason, especially by **developing and making widely available technologies** to eliminate aging and to greatly enhance human intellectual, physical, and psychological capacities, "emphasis mine" (2).

The objective is not to improve the conditions of human life, but the human condition. The *Transhumanist FAQ 3.0* says that "an improvement to the human condition is a change that gives increased opportunity for individuals to shape themselves and their lives according to their informed wishes" (2). Which sort of changes are they talking about? The enhancement proposed by transhumanists is not the physical, cultural, or moral improvement achieved by traditional methods. Technology is the key to a radical enhancement, to move beyond what is currently considered human. According to transhumanists, we are "not limited to traditional humanistic methods, such as education and cultural development. We can also use technological means that will eventually enable us to move beyond what some would think of as "human"(2).

It should be noted that "transhumanists are not content to simply discuss the merit of enhancement, rather they are working to

build a world favorably aligned" (3)candidato a la presidencia de los Estados Unidos de América en 2016. En primer lugar, se demarcará el trasfondo histórico que crea como consecuencia el Partido Transhumanista. En segundo lugar, se explicará la orientación política del partido. En tercer lugar, se analizará las soluciones que propone a los problemas que ellos observan en la sociedad. Por último, se estudiará el pensamiento de Zoltan Istvan, creador del Partido Transhumanista. Para ello se hace una depuración de conceptos básicos y contexto histórico en la política luego del siglo xxi a través de revisión literaria y análisis estadístico.\n\nAlternate abstract:\nThe purpose of this thesis is to analyze Zoltan Istvan's political and transhumanist discourse in his candidacy to the presidency of the United States of America in 2016. In first place, the historical background that create consequently the Transhumanist Party will be demarcated. In second place, the political orientation of the party will be explained. In third place, their solutions they propose to the problems they observed in society will be analyzed. And finally, Zoltan Istvan's thought (the creator of the Transhumanist Party. For transhumanists, what is good depends on what we decide human beings could or should become. This trend poses a major challenge for global bioethics. Indeed, the European Group on Ethics of Science and New Technologies, in the document *Values for the Future*, says the following:

> Just as we started to find some relatively firm foundations for ethics in our common humanity, our evolutionary biology, psychology and common history, some suggest that we consider humanity as something that is not given and can be overcome and transcended by technological design and engineering (4).

The same document notes that this shift in the anthropological scenario brings consequences for ethics: "What we are, and what is good for us human beings, then depends on what we decide human beings could or should become" (4).

1.2. Global governance of HGE

Genome editing (also called gene editing or genetic engineering) is used to change an organism's DNA, adding, removing, or altering genetic material at particular locations in the genome. Advances in gene editing are making the alterations more accurate and more efficient (5). The most common techniques are Zinc Finger Proteins, ZNFs (6), Transcription Activator-Like Effector Nucleases, TALENs (6) and Clustered Regularly Interspaced Short Palindromic Repeats, CRISPR (Cf. 7).[1] No matter the specific tool, gene editing is already being used in plants, animals, and humans (Cf. 9). The present article will consider only the applications to human cells: HGE.

The third international summit on HGE, held in London in March 2023 (Cf. 10), distinguished three types of HGE: somatic, germline, and heritable. Somatic editing (done in non-reproductive cells) has proven effective to treat sickle-cell disease and there are promising clinical trials for other genetic disorders. It is also being tested for therapeutic uses beyond genetic rare disorders, for example, to reduce the risk of cardiovascular diseases (Cf. 11). As for gene editing done in reproductive cells or embryos, following the scandal of Dr He Jiankui's 2018 experiment (Cf. 12), the Statement from the Organising Committee differentiates *human germline genome editing* from *heritable human genome editing* (Cf. 13). The first refers to the editing of human embryos or gametes in a research setting, with

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[1] Although CRISPR seems to be a cornerstone in genetic engineering, other tools are likely to emerge and improve the editing currently possible by CRISPR-Cas9. For instance, the so-called Prime does not require double-strand breaks or donor DNA templates (Cf. 8)a versatile and precise genome editing method that directly writes new genetic information into a specified DNA site using a catalytically impaired Cas9 endonuclease fused to an engineered reverse transcriptase, programmed with a prime editing guide RNA (pegRNA. Prime researchers affirm that it "substantially expands the scope and capabilities of genome editing, and in principle could correct up to 89% of known genetic variants associated with human diseases" (8)a versatile and precise genome editing method that directly writes new genetic information into a specified DNA site using a catalytically impaired Cas9 endonuclease fused to an engineered reverse transcriptase, programmed with a prime editing guide RNA (pegRNA.

no plans for human reproduction. The committee stated that "basic research in this field should continue" (13). The second refers to the editing of human embryos or gametes to be implanted and used for human reproduction. Heritable HGE "should not be used unless, at a minimum, it meets reasonable standards for safety and efficacy, is legally sanctioned, and has been developed and tested under a system of rigorous oversight that is subject to responsible governance. At this time, these conditions have not been met" (13).

When it comes down to the application of HGE technology, many questions emerge. Even if it is technically possible, should it be done? Should all possible HGE applications be authorised? Will a transition path be traced out? How to avoid slippery slopes? How can the difference between countries (culture, resources, policies) be considered? Who should decide? Who will implement the decisions and monitor applications? Which values and principles will be chosen considering a pluralistic world? Will decisions be guided by a moral vision or by public opinion? Which moral vision will enlighten the process? Who will be considered the public (the majority, minorities, lobbies, directly affected people)? What is to be considered a fruitful public debate? How to listen to and consider the different actors and means that come into play in this process? Is good global management of HGE even possible?

Global governance (GG) is the recent way to manage global problems, considering that issues such as new technologies transcend national borders, and acknowledging that a world government is neither realistic nor desired. Governance can be defined as:

> (…) the process of governing, by formal or informal bodies, including governments; in different frameworks, including hierarchy, market, and network; through different measures, including laws, regulations, norms, money, communication, or exchanges; and over different sorts of aspects of collective human life (14).

To get an idea of how governance goes beyond regulations and judicial decisions, a recent example of this complex process is what happened in the U.S. after the sentence *Dobbs vs Jackson* (Cf. 15) in

2022. The supreme judges declared that there is no basis for a constitutional right to abortion and that the Constitution does not prohibit the citizens of each state from regulating or prohibiting abortion. In this context, some pharmaceutical industries, some employers, businesses, and even the president of the country rapidly offered help to pregnant women seeking an abortion. The means varied from facilitating travels to places where abortion is permitted, easing access to abortive pills (Cf. 16), to erasing research data that might be related to looking for a termination of pregnancy (Cf. 17). Even if this example refers to a national-level governance mechanism, it helps to see how governance is broader than regulations. Laws and enforcement, public debate, communications, the private sector, business, patents, insurance, taxes, and funding, among others, play a role in governance.

Concerning HGE, the framework for global governance published by the World Health Organization (WHO) in 2021 recognises that gene editing goes beyond national borders, so there is a need for global action, and it is better to be proactive than reactive (Cf. 18). WHO enlists 12 sets of *tools, institutions and processes* outlining who may need to be involved with the governance of human genome editing. These range from laws and regulations, patents and licenses, research funding, professional self-regulation and the role of professional bodies, to collaboration with publishers and the role of public advocacy and activism (Cf. 18). It also presents a set of principles to be considered to inform *how* decisions are made: openness, transparency, honesty and accountability, responsible regulatory stewardship, responsible stewardship of science, and responsible stewardship of research resources. And a set of principles to inform *what* decisions are made: inclusiveness, caution, fairness, social justice, non-discrimination, equal moral worth, respect for persons, solidarity, and global health justice (Cf. 18).

1.3. Hypothesis and research questions

The hypothesis was the existence of common themes between transhumanism and the plan for global governance of HGE. If transhu-

manism aims to be an "intellectual and cultural movement that affirms the possibility and desirability of fundamentally improving the human condition (…), especially by developing and making widely available technologies"(19), and if it has been talking about HGE as one of the tools to achieve transhumanist objectives for decades,[2] perhaps transhumanism would somehow present in the global governance of HGE. I do not mean present as lobbying, but rather as a mentality that gradually gained ground in academic, scientific, and cultural spheres. When making a global governance plan for emerging technologies such as HGE, transhumanist ideas would eventually appear. It might even be the case that this global governance plan would not be aligned with transhumanist proposals, but it would probably address some transhumanist themes. For example, an action plan for a technique made half a century ago most likely would not consider issues related to enhancement, while it would be impossible for global governance of gene editing today not to address this issue. Also, it is worth mentioning that the WHO Committee in charge of proposing the global governance framework for HGE hold a webinar[3] to ask for biohackers', DIY community labs', and transhumanists' perspectives on HGE.

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[2] Transhumanists' interest in genetic engineering is noticeable. They accompany such technological advances with singular expectations. "In transhumanist circles, the discovery of new gene editing technologies was greeted with euphoria" (20). Some even consider CRISPR to be "the most powerful technological invention of this decade" (Sorgner in 20). And in the dawn of the first germline interventions, leading transhumanist James Hughes confirmed the official 2004 statement from the WTA which highlights the "desirability and inevitability of germline and enhancing gene therapies" (Cf. 20).

[3] On June 11th, 2020, the following people were consulted:
   – Professor Nick Bostrom, Director, Future of Humanity Institute, University of Oxford.
   – Mr Andrew Hessel, Futurist and catalyst in biological technologies, President, Humane Genomics Inc. Co-founder and Chairperson, Genome Project-write Co-chair, Bioinformatics and Biotechnology, Singularity University.
   – Dr David S. Kong, Synthetic Biologist, community organizer, musician, and photographer Director, MIT Media Lab Community Biotechnology Initiative.

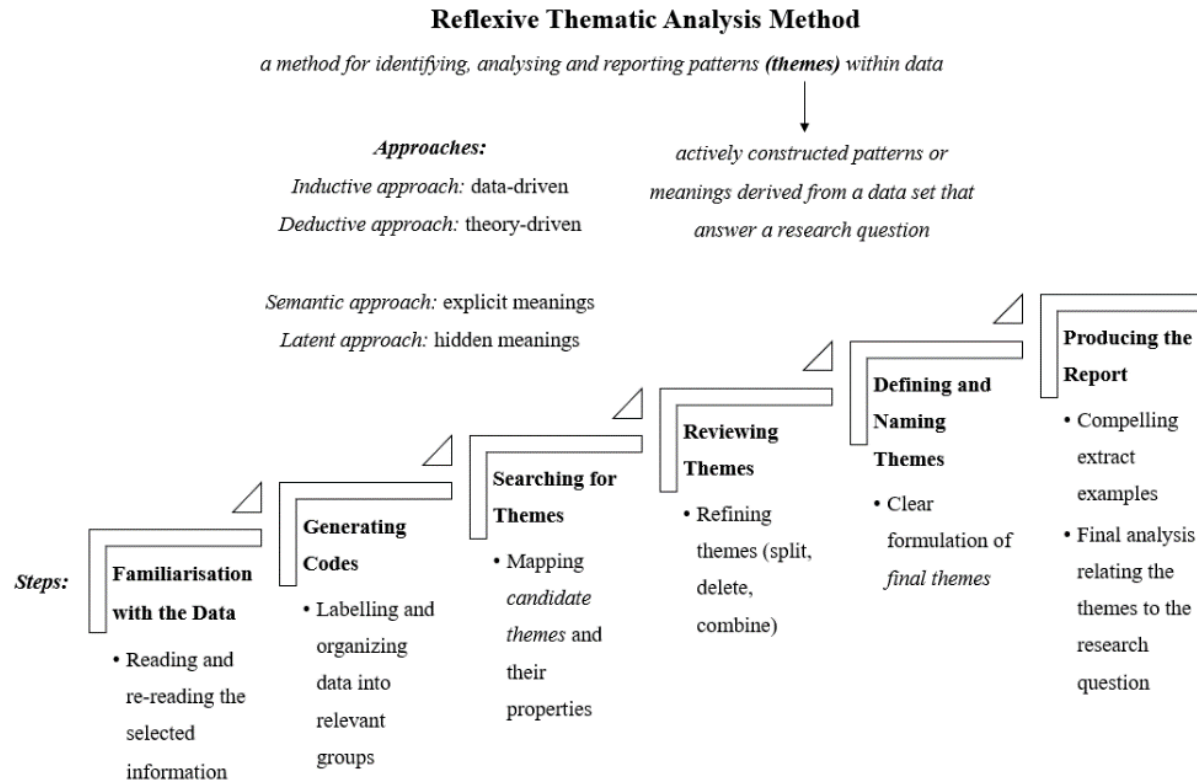Considering the above, the questions leading the present research are:

1. Are there common topics between transhumanism and the plan for global governance of human genome editing? If yes, what are they?
2. Does a common topic mean a shared vision or an agreement on the topic?
3. What are some of the implications for bioethics of the common themes between transhumanism and the plan for global governance of human genome editing?

2. Common themes

The first question was: *are there common topics between transhumanism and the plan for global governance of HGE? If yes, what are they?* To answer that, the reflexive thematic analysis (RTA) was applied, a qualitative research method according to Braun and Clarke (Cf. 16, Cf. 17, Cf. 18, Cf. 19, Cf. 20, Cf. 21, Cf. 22, Cf. 23, Cf. 24, Cf. 25, Cf. 26, Cf. 27). This method's output is the so-called themes, understood as patterns or meanings constructed from data. In Figure 1, I synthesise the method and its steps.

– Dr Todd Kuiken, Senior Research Scholar Executive Committee Member, Genetic Engineering and Society Center NC State University Raleigh.
– Dr Elsa Sotiriadis, Synthetic biologist, futurist keynote speaker and science fiction writer Founder, The Biofuturist Lab (Cf. 18).

Figure 1. Reflexive Thematic Analysis Method (33)

Reflexive Thematic Analysis Method

a method for identifying, analysing and reporting patterns (themes) within data

Approaches:

Inductive approach: data-driven

Deductive approach: theory-driven

actively constructed patterns or meanings derived from a data set that answer a research question

Semantic approach: explicit meanings

Latent approach: hidden meanings

Steps:

Familiarisation with the Data

• Reading and re-reading the selected information

Generating Codes

• Labelling and organizing data into relevant groups

Searching for Themes

• Mapping *candidate themes* and their properties

Reviewing Themes

• Refining themes (split, delete, combine)

Defining and Naming Themes

• Clear formulation of *final themes*

Producing the Report

• Compelling extract examples

• Final analysis relating the themes to the research question

Source: adapted from Braun and Clarke (2006).

The selected texts to represent transhumanism in this research were the three documents Humanity+ calls the "original documents on transhumanism"(19), giving them primacy over other transhumanist works to represent the convergences among transhumanists. These texts are:

– The Transhumanist Declaration (Cf. 1)
– Transhumanist FAQ 3.0 (Cf. 2)
– The Transhumanist Manifesto (Cf. 34)

The selected texts to represent the global governance of HGE were the three documents published by who on the topic in 2021. This choice considered the multinational reach of who and, most importantly, that these texts are the only *global* plan for the governance of HGE to date.

– Human genome editing: a framework for governance (Cf. 18)
– Human genome editing: recommendations (Cf. 35)
– Human genome editing: position paper (Cf. 36)

Therefore, 6 texts divided into 2 datasets (Humanity+ and who) constituted the selected data in this research. I used ATLAS.ti software to upload the data and to create labels with the 8 codes and 16 subcodes I chose to apply to the data. Quotation by quotation were read and coded them accordingly. The six documents, containing about 260 pages, resulted in 755 coded quotations. An Excel from ATLAS.ti, containing the coded quotations separated in tabs by codes was downloaded. All quotations related to the topics/codes were read to analyse the content of each one. In addition to the organisation of the data, codes, and coded quotations, the software was useful to draw some mental maps. After that, there was a searched for themes, starting with 8 candidate themes. A work was developed with their supporting quotations and elements, following the verification questions (Cf. 22) and guidelines by Braun and Clarke

until getting the 3 final themes with their elements. RTA "is a time consuming process" (37), which implies going back and forth searching, analysing, relating, reorganising, and reviewing information until the final definition of themes.

The following is synthesized the main information concerning my application of the RTA method to this research. Each table corresponds to one of the six steps of the RTA. The first row presents the *step* of the method, and the second, a brief *description* of its implications. The third row enunciates the *choices* made within the boundaries of the corresponding step. The fourth presents the *outcomes* of the specific step.

Table 1. Application of the RTA method-Step 1

1. FAMILIARISATION WITH THE DATA	
Description	- Selecting data according to the research objective - Reading and re-reading the information
Choices	- H+ original documents on transhumanism - WHO documents on global governance of HGE
Outcomes	- 6 documents (263 pages) divided into 2 sets: - 3 H+ documents (*Declaration*, *FAQ*, *Manifesto*) - 3 WHO documents (*Framework, recommendations, position paper*)

Source: prepared by the author.

Table 2. Application of the RTA method-Step 2

2. GENERATING CODES	
Description	- Labelling and organising data in relevant groups - Generation of codes and subcodes - Application of the codes to the select data
Choices	- Hybrid approach *Which ideas are present in H + documents?* - Inductive and Semantic approaches to create the codes and apply them to H + documents. *Are these ideas present in WHO documents?* - Deductive and Latent approaches to apply the created codes to WHO documents.

Outcomes	**755 coded quotations according to these 8 main codes and 16 subcodes:**
	1. Science and technology
	  a. tech benefits
	  b. direct evolution/redesign nature
	  c. gene editing
	2. Enhanced human condition
	3. Risks of misuse of tech
	4. Research efforts, decisions, and implementation
	  a. social order that decides/implements (governance)
	  b. risk-benefit approach
	  c. tech risks
	  d. public debate
	5. Urgent priorities to be funded
	  a. reduction of existential risks
	  b. preservation of life and health
	  c. alleviation of suffering
	  d. funding
	6. Policy making guided by moral vision
	  a. policies
	  b. individual rights
	  c. solidarity, inclusion and no eugenics
	  d. equality, social justice
	  e. responsibility future generations/sustainability
	7. Well-being of all sentience
	8. Wide personal choice

Source: prepared by the author.

Table 3. Application of the RTA method-Step 3

3. SEARCHING FOR THEMES	
Description	Mapping candidate themes and their elements
Choices	- Identification of common elements between the 2 sets of texts - Presentation of the most relevant coded quotations from H+ Documents and who Documents regarding the topic of each of the 8 main codes - 1 candidate theme for each main code

Outcomes	**8 candidate themes and their elements:**
	1. The significant impact of technology
	  - Increasing availability
	  - Impact of HGE
	2. The scenario of human enhancement
	  - Addition of desired new traits
	  - Concerns: equality, liberty, social acceptance
	3. The unscrupulous and destructive use of technology
	  - Recognition of this risk
	  - Call for solutions
	4. Governance to minimise risks and maximise benefits
	  - Will to reduce risks and maximise the benefits of new technologies
	  - Need for good global governance
	  - Public debate
	5. The allocation of funds according to priorities
	  - Funding as a governance tool
	  - Preservation of life and health
	  - Reduction of suffering
	6. Policy making guided by values
	  - Autonomy and individual rights
	  - Equality and solidarity
	  - Responsibilities towards future generations
	7. Beyond personal well-being
	  - Well-being as a goal
	  - Extension to more beings
	8. Wide personal choices in health and reproduction
	  - Respect for the wishes of individuals
	  - Protection of people who cannot express their wishes

Source: prepared by the author.

Table 4. Application of the RTA method-Step 4

4. REVIEWING THEMES	
Description	- Refining candidate themes (splitting, deleting, combing themes and elements) - Using the verification questions
Choices	- Grouping candidate themes - Analysis of candidate themes' elements, and then deleting, combining, and splitting candidate themes and their elements accordingly
Outcomes	**4 groups of candidate themes** - Technology (candidate themes 1 and 3) - Well-being and Enhancement (candidate themes 2 and 7) - Governance (candidate themes 4, 5, 6) - Liberty (candidate theme 8)

Source: prepared by the author.

Table 5. Application of the RTA method-Step 5

5. DEFINING AND NAMING THEMES	
Description	- Giving a clear formulation (definition) of final themes - Giving a short title (name) to each final theme
Choices	- Line: what (HGE), what for (intended uses), how to manage (GG)

Outcomes	**3 final themes (definitions, *names,* and elements)**
	1. The significant impact of new technologies such as HGE
	    WHAT: impact of HGE technology
	    Increasing power and availability
	    Potential benefits
	    Risks: technical and misuse
	2. HGE for health, well-being, and enhancement
	    WHAT FOR: health, well-being, and enhancement
	    Priorities: life, health, well-being
	    Possibility: enhancement

	3. Global Governance to minimise risks and maximise benefits of HGE - HOW TO MANAGE: governance to maximise benefits - Elements: research, funds, public debate, policies - Values: individual rights/autonomy in health and reproduction. Protection of people who cannot express themselves. Equality-solidarity

Source: prepared by the author.

Table 6. Application of the RTA method- Step 6

6. PRODUCING THE REPORT	
Description	- Compelling extract examples supporting the final themes - Mental map recommended - Final analysis relating the themes to the research question
Choices	- Explanation of steps taken accompanied by tables, figures, and mental maps
Outcomes	**Research questions 1 and 2 answered**

Source: prepared by the author.

So, answering the first research question —*are there common topics between transhumanism and the plan for global governance of HGE? If yes, what are they?*— three common themes resulted from my application of the RTA method. These themes (**definitions**, *names,* and elements) are shown in Figure 2:

Figure 2. Final Themes (33)
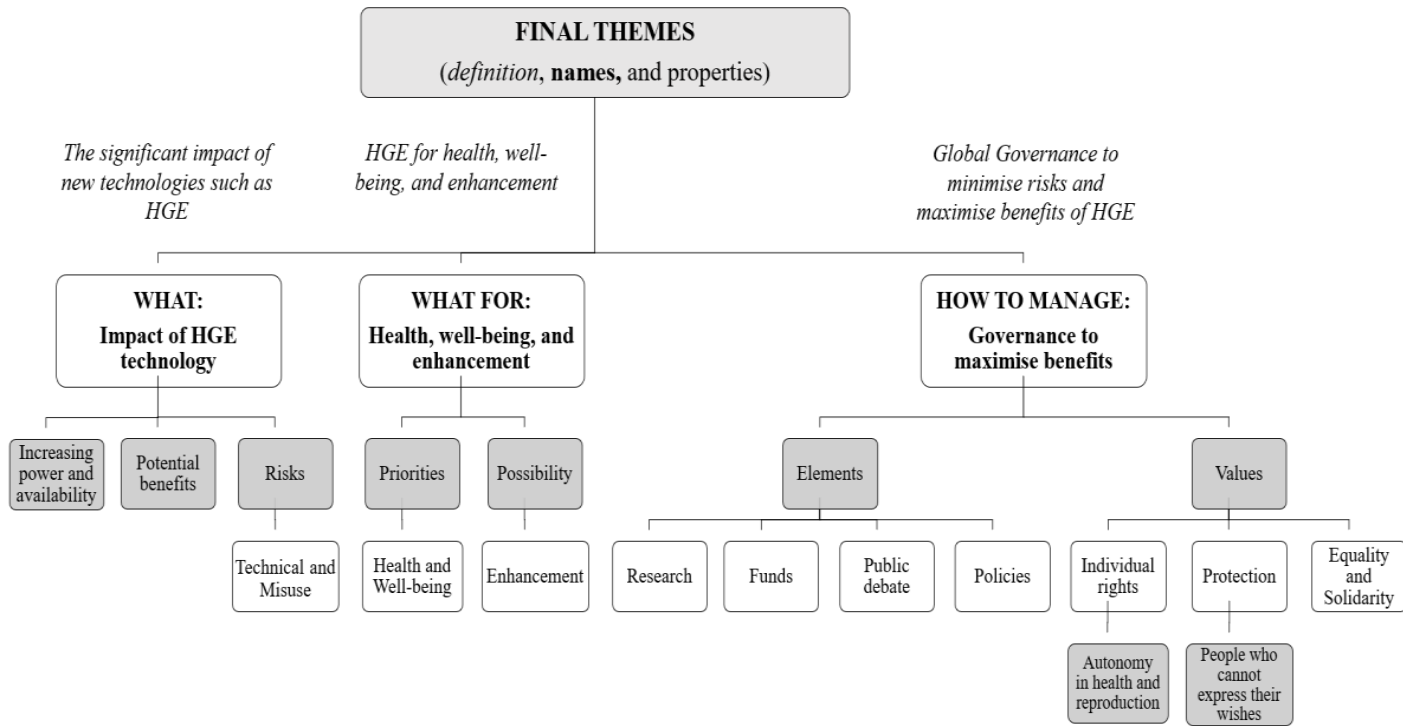
Source: prepared by the author.

We can now move to the second research question: *does a common topic mean a shared vision or an agreement on the topic?* More than mere topics, the method helped me to get common themes. A theme in RTA is a pattern or meaning derived from data. To make it clearer: global governance, for example, is simply a topic, while the theme related to global governance presents the meaning and elements that appeared as a pattern related to this topic in the selected data (see definition and elements of theme 3). That makes themes, in RTA, more valuable for knowledge than mere topics.

However, it should be noted that a theme or pattern does not imply agreement on every detail. For example, both sets of texts address enhancement, with the meaning of an intervention that improves some average functioning. That does not mean that the two sets of texts agree on every aspect of their vision regarding enhancement. For instance, H+ considers it a priority, but WHO does not. Also, the expectations and concerns about enhancement are not exactly the same: one emphasises liberty and the other equality. However, what is presented in the final themes and their elements is the shared pattern of enhancement as a possible use of HGE. To give another example, theme one refers to the impact of HGE technology, considering its increasing power and availability, its potential benefits, and risks. However, transhumanists have higher expectations concerning new technologies compared to those of WHO. In H+ texts, technology is seen as the means to direct evolution and improve humanity itself. WHO texts focus primarily on the use of science and technology to promote health. WHO seems more worried about ensuring effective governance of new technologies, so its texts pay more attention to the risks and challenges of new technologies than H+ texts do.

In a few words, a common *topic* does not constitute a shared vision or agreement. Instead, a common *theme* in RTA constitutes a shared pattern of meaning, although not implying an identical view or agreement on every detail related to the theme.

3. Implications for bioethics

After the first two research questions were answered, we now move to the third and last question: *what are some of the implications for bioethics of the common themes between transhumanism and the plan for global governance of HGE?* Once the common themes are found, one can either remain to note the current issues and obstacles for bioethics or look at what can be done, considering reality the starting point. Before the present situation raising from the common themes between H+ and WHO texts, what should be done? What does that mean for bioethics? Why should we care? What can we do? What are the tasks for bioethicists? What are the implications for bioethics?

Before anything else, what is to be considered an implication for bioethics? In this work, *implication* comprehends two aspects. First, the *recognition of the current situation* for bioethics following these common themes between transhumanism and the global governance of HGE. Second, the *identification of the tasks* for bioethics arising from this reality. So, the presented implications have less to do with the passive attitude that only lists or analyses possible difficulties emerging from the common themes, and more to do with tasks considering the present scenario. Therefore one example of an implication for bioethics for each common theme is given, and the implication comprises a *situation* and a *task*.

3.1. *An Implication of theme 1*

Theme one concerns *the significant impact of new technologies such as HGE*. This theme had three elements: first, the increasing power and availability of technology. Second, the potential benefits. And third, the risks (both technical risks and the risk of misuse).

The current situation is the renewal of technology as an important topic in the past, present, and future of bioethics. It is not the first time that a new technology provokes ethical questions. From the beginnings of bioethics (Cf. 38), through what is seen today, and

in what is foreseen for the future (Cf. 39), technology is an important trigger factor. It creates new situations and dilemmas that call for bioethical deliberation. The birth of bioethics was closely linked to technological progress, and a little more than fifty years later, the "bridge to the future" (Cf. 40), must be updated to confront emerging questions. Benanti points out the difference between the consideration of technology in the past and now: he says that while it is undeniable that human beings have been co-evolving with their technologies since prehistory, now we have moved beyond external technological interventions to transform ourselves from the inside out (Cf. 41).

The chosen task is the expansion of bioethics' range of consideration to include three new concerns: first, the increasing potential of HGE and how it might affect the human condition. Second, the increasing availability of technology combined with the do-it-yourself (DIY) mentality. And third, technology at the service of desires.

Regarding the first concern, bioethics should refocus the question of the human condition considering the increasing potential of HGE and the spread of transhumanist ideas. Could the human condition one day be changed? Could some applications of HGE get to the point of changing human identity? Will that depend on the therapeutic or enhancement *intention*? Will the difference depend on the use of human genes vs the addition of any novelty to the *human genetic pool*? Will the answer depend on the *amount* of human or non-human genetic changes? Could the key factor be the *kind* of genetic alteration? Or will that depend on the overall *effects*? Where will be the line between a modified (maybe enhanced) human and a chimaera? What is the human being after all? Many would agree that the human being is not defined only by genes. And yet, it is a fact that humans are embodied beings. But embodied with which kind of body? The *human* body. And does it matter? Biologically, what makes our human body belong to this species? And will the answer last? Should we change what is currently considered the reference human genome? Should we leave the idea of the average and move to an

incremental reference? What if it becomes technically possible to customise the body at a genomic level? Do we actually have a kind of biological or "morphological freedom" (Cf. 42)? In such a scenario, how will belonging to the human species be defined? "Where does biology become metaphysics? Where do we cross the threshold between actualizing potentials we have always had and becoming new kinds of beings?" (43). These are no longer futuristic questions. With the technical possibilities of interference in the natural processes of evolution of whole species, answers are demanded with more urgency than before. Whether or not the human condition is susceptible to change at this essential level, I agree with Austriaco that "twentieth-first century bioethics is going to struggle primarily with questions regarding human identity" (44).

Always referring to the task of addressing new concerns, the second mentioned concern was the increasing availability of HGE combined with the DIY mentality. Not only the potential of gene editing is increasing but also its types of users. Considering the growing number of biohackers and DIY communities (Cf. 45)as well as by the general public and the media. While DIY approaches enjoy increasing diffusion even in official research, different social actors frequently talk about them in different ways and circumstances. Interaction and negotiation processes amongst actors (e.g. policy makers and DIY communities, we witness how "ordinary people" are using the huge amount of information available on the internet and getting the necessary tools for an accessible price, experimenting, and then sharing the information on social media, aiming to make science and high-tech part of everyday life (Cf. 46). Transhumanist Natasha Vita-More has said that DIY strongly exemplifies transhumanist behaviour (Cf. 47). Biohackers engage with transhumanism[4] not only intellectually, but actively and physically (Cf. 49). Historically, bioethics has directed its reflections almost exclusively

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[4] The following article explores the relationship between Biohacking and Transhumanism (Cf. 48).

to health researchers and medical staff. Now, bioethics should not ignore the DYI movement and the open science mentality.

The third concern was technology at the service of desires. To propose effective measures for ethical living, bioethicists must see the mindset behind a new situation made possible *by* some new technology. And even before that, the hopes and desires that made possible *a* concrete technology. As Jasanoff explains: "Through technology, human societies articulate their hopes, dreams, and desires while also making material instruments for accomplishing them"(50). The novelty to be addressed is technology not just an expression of but at the service of desires. And that becomes problematic in a framework where autonomy-understood as the right to accomplish personal wishes, is a high, perhaps the highest value. Today the individual's desires are almost unquestioned. It seems that technology must satisfy personal wishes. "What do people want?" Some people want a baby, genetically related to them, healthy, with or without some specific characteristics.[5] So, technology should give it to them. Someone wants a body in the image of his imagination. Technology should help him to get that. Someone wants to improve his performance to increase his chances in sports, studies, work, or relationships. Technology is expected to be at hand for that. In addition, it seems that today we want *more*: more happiness, satisfaction, safety, power, status, relationships, wealth, health, respect, beauty and so on. Although we see that many people have all that still feel unfulfilled (Cf. 52). We hope HGE will prevent and cure some diseases. But we know the desires are likely to go far beyond that. It is foreseeable that HGE will, like other technologies, be at the service of individual desires. "The discoveries of genetics will not be imposed on us. Rather, they will be sold to us by the market as something we cannot live without."(Mark Frankel in 53). Generalising, we will probably desire HGE and use HGE at the services of our desires.

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[5] This question and the respective answers echoes the list of what prospective parents want according to the Nuffield 2018 report on HGE and human reproduction (Cf. 51).

To conclude this example of an implication of common theme one, a crucial task for bioethics is to expand its considerations, trying to give answers to these new concerns: HGE and the human condition, HGE and DYI, and technology at the service of individual desires.

3.2. An Implication of theme 2

Theme two is about *HGE for health, well-being, and enhancement.* This theme was divided into priorities (health and well-being), and possibility on the horizon (enhancement). In the selected texts, health and well-being were often presented together as connected concepts and regarded as priorities. Enhancement was commonly treated as a possibility on the horizon. It was considered a priority only in H+ texts, not in WHO texts. But in synthesis, these are the three intended uses of HGE.

The current situation is the following: bioethics is working with an unclear and changing framework regarding interventions, especially considering the limits of the therapy vs enhancement paradigm. There are unclear definitions to work with. Not even health and enhancement are concepts clearly agreed upon. Regarding the term enhancement, it is sometimes used as opposed to therapy, other times as modifications beyond human capacities, in some cases it refers to any improvement, and sometimes it means free modifications.[6] Regarding health, the Constitution of WHO (1946) affirmed that: "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity"(Cf. 54). If health is a complete well-being state, can enhancement be part of this desired state? The goals of medicine also seem difficult

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[6] Perhaps, more than the word "enhancement", which involves a recognition of what is *good* and what is *better*, the term "modification" expresses more accurately what is being proposed by some transhumanists, and what liberal societies are heading at. The future controversy may switch from the possibility of *enhanced* to *freely modified* people.

to define as today's standard medicine includes many practices that do not aim to cure diseases or injuries. For example, preventive medicine, palliative care, obstetrics, sports medicine, plastic surgery, contraceptive devices, fertility treatments, cosmetic dental procedures, and much else (Cf. 55). So, some ask: isn't enhancement a new and more adequate goal of medicine? (Cf. 56). Could both therapy and enhancements be goals of medicine? Or would augmentative medicine be a contradiction? Then, if enhancement implies going beyond (individually or as species), what is considered normalcy? "Is it average? Is it whatever nature has prescribed? Is it whatever luck has wrought?" (6) Even if agreed that the goal of medicine is only to cure and prevent diseases, what is a disease? To define disease, what is a normal health state? What if the consideration of normalcy migrates from the average to a self-defined state? For instance, it is not average to be deaf. Most human beings can hear. Yet, some deaf people do not consider they have a disease that should be treated. And "opinions differ as to whether genetically caused deafness, dwarfism or autism should be considered a disease"(6). Are they normal varieties of human expression?

In addition to the previously mentioned unclear concepts, the usual framework to guide decisions, therapy (morally acceptable) vs enhancement (not acceptable), is also changing. Prevention is a grey area, seen as a moral good, and claimed by both sides. Moreover, it was affirmed that we can be treated by enhancement, introducing the notions of therapeutic and non-therapeutic enhancements (54), and making meaningless the contraposition between therapy and enhancement. And even in cases where the intention is clear to be either therapy or enhancement, the end is not the only determinant factor for the ethical analysis of an intervention. Indeed, not everything proposed for therapy purposes is moral only based on the good intention of restoration of health (e.g., consider situations involving organ trafficking, forced therapies, or futile treatments). And that not everything proposed for improvement is immoral (e.g., intervention enhancing normal cells to prevent or fight cancer, playing

classical music to an unborn baby to improve chances of musical talent, using glasses when it is average and natural to lose sight at a certain age). As the differentiation of enhancement or therapeutic intention does not seem adequate to determine morality, we need to update the usual framework to guide ethical decisions.

The chosen task for bioethics is an ethical deliberation on interventions, attentive to the options on the horizon. Enhancement is understood here as a human intervention to the normal/average trait to improve its performance. First, we should verify if enhancement is intrinsically bad. For that, I will consider the object, end, and circumstances of enhancement in general. If we want to do good and avoid evil, we should reject evil in these three elements, otherwise, we will do the evil we aim to avoid. Regarding the end of enhancement, it can be divided into a proximate end (improvement) and some remote deeper intentions (e.g., to cure an illness, to prevent disease, to be better than others and have some advantage, to increase the probability to be fit for a specific mission, work, sport, etc). Theoretically, someone can have good intentions in both levels. Regarding the circumstances of enhancements, they are the most common concerns found in bioethical literature. For instance, the risk of discrimination, social rejection of human vulnerability or disability, inequality of access to enhancement tools, too much equality as a result and the loss of diversity, lack of liberty (coercion, external influences on desires and choices, the idea of perfection, decisions made by others, e.g., future generations, people unable to consent), etc. But if all the above could be solved, at least at a satisfactory level, would enhancement be good or bad? Finally, regarding the object, the intervention that improves a human function above the average level in an age group or a population at the current time, it might be neutral, good, or bad for the person and the species. It depends on the concrete intervention and the means. Means should be always legitimate (good or neutral), but also adequate for the specific case.

If enhancement is not an intrinsic evil, what are the conditions for a morally acceptable enhancement? I explored some proposals by non-transhumanist authors. For instance, Cortina affirms that
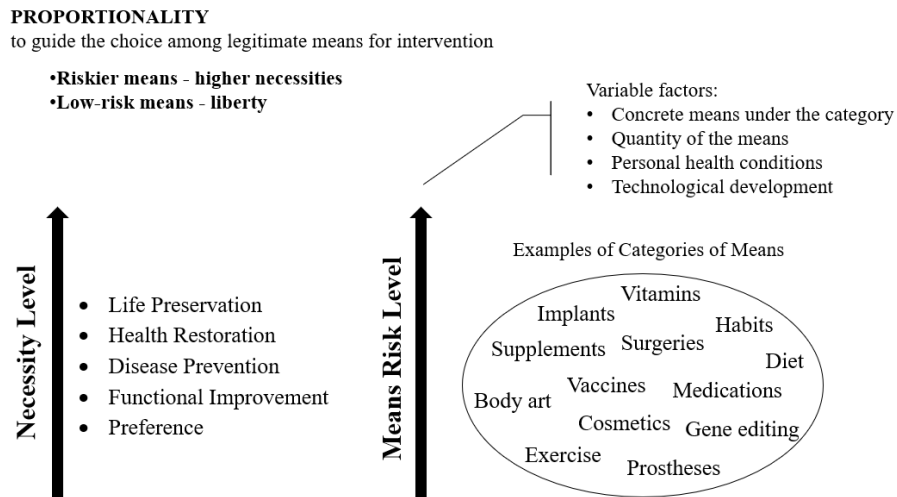
morally acceptable enhancements should not compromise other goods and values, be imposed coercively, or involve risks greater than the potential benefits (Cf. 57). Postigo says we should consider, one by one and in detail what each intervention and what it implies, the intentions, the means. Also, it should respect the do not harm principle, serve human progress and the common good, and not violate the fundamental rights and norms of ethics and human life in society (Cf. 58). And Austriaco claims that the therapy-enhancement distinction should be replaced by a therapy-nontherapy distinction that acknowledges that some therapies are enhancements. He also says that the benefit-burden distinction should be employed alongside the therapy-nontherapy distinction (Cf. 54).

Ethical reasoning should move towards proportionality for the choice among legitimate means for interventions. Consider the following example: Bostrom complains that enhancements such as playing Mozart to an unborn child are accepted while genetic enhancement to increase the chances of musical talent is rejected. He says that, to transhumanists, this looks like doublethink (59). But why does Bostrom not consider that playing music and genetic interventions are very different means for the same end? The controversies are not due to the improvement *intention*, but rather to the different *means* proposed. And there is not even an intrinsic problem with the means itself (gene editing) but with the *adequacy* of its use in the cited scenario. Although the end of improving musical ability is the same, the two means make the cases quite different. Applying a simple risk-benefit approach makes clear that Mozart-in-the-womb has potential benefits and a very low or inexistent risk for the mother and the baby. In contrast, *in uterus* somatic or heritable genetic intervention carry health risks for the child and the mother, risks that are not worth taking to increase the chances to be a musician. "Comparisons with the development of persons sought through physical and spiritual means, education, mentoring, etc. are misleading" (60). The logic implied by transhumanists to compare enhancements done by low-risk means to enhancements by riskier means is weak. That is because "regardless of the similarity of the intent, the actual

nature of the action makes them significantly different" (60). In a few words, the element that seems to be lacking in many of the transhumanist proposals, in my point of view, is proportionality for the adequate choice among legitimate means.

Proportionality between the levels of necessity and risk level of means helps the adequate choice among legitimate means for intervention, as shown in Figure 3. In practice, that means that more interventions and more daring ones are allowed to save lives than to achieve personal preferences. But it does not mean that everything is allowed for health restoration, nor does it mean that everything is forbidden for personal preferences. A path towards proportionality could be synthetically enunciated as follows: the adequate choice among legitimate means for interventions implies proportionality, meaning that risky means are proportionally permitted to the level of necessity, and less risky means are allowed at any level of necessity. So, riskier means can be implied for higher necessities, while there is more liberty to use low-risk means.

Figure 3. Principle of Proportionality

PROPORTIONALITY
to guide the choice among legitimate means for intervention

- **Riskier means** - **higher necessities**
- **Low-risk means** - **liberty**

Variable factors:
- Concrete means under the category
- Quantity of the means
- Personal health conditions
- Technological development

Necessity Level
- Life Preservation
- Health Restoration
- Disease Prevention
- Functional Improvement
- Preference

Means Risk Level

Examples of Categories of Means

Vitamins
Implants
Supplements Surgeries Habits
Body art Vaccines Medications Diet
Cosmetics Gene editing
Exercise Prostheses

Source: prepared by the author.

This framework:

- Is not based only on the intention to allow/prohibit the use of any means.
- Recognises different levels of necessity and risks, and it does not exclude a legitimate risky means if there is a proportional need for its use.
- Does not deny the use of legitimate means only because they could be misused or disproportional on some occasions.
- Shows that modifications with aims different than *life preservation*, *health restoration* and *disease prevention*, such as *functional improvement* or *personal preference,* are allowed as well, but with a proportional approach to avoid unnecessary harm.

Therefore, no type of improvement is advocated based solely on the intention of improvement or claiming respect for individual choices. Nor are all possible interventions aimed at improvement condemned, as if it were a mistake to try to improve. Reject all enhancements in effect avoiding the associated risks. But that is not considered a sound rationale or an intellectually honest position, not to mention that it seems inconsistent with the history of humanity.

It is worth noting that there is a tendency to contrast transhumanist proposals either by emphasising *circumstantial* concerns or by fighting against the *intention* of improvement. However, it seems that the most appropriate reasoning against some enhancements has to do with the disproportionate use of means. It is far easier to criticise than to remedy, but we should at least try to do the latter. Perhaps what we need is more people working on enhancement and the conditions for an ethically sound enhancement, one that is adequate and convenient for humanity. The issue of enhancement should not be identified with transhumanists only, otherwise, our societies might accept many kinds of enhancements in the way proposed by transhumanists. We need other types of pro-enhancement thinkers; people open to some improvements while abiding by other values and

ethical frameworks than the transhumanist ones. Enhancements interventions with a good end, circumstances, and object, using adequate (proportional) means can be ethical.

We must return to the most notorious defenders of enhancements, the transhumanists. Even if transhumanists may not share my framework, I think there is an element of convergence at least worthy of discussion. Let us consider their agenda: "The transhumanist agenda, which is to make such *enhancement options safely available to all* persons (…)" (Cf. 61). Let us leave aside the parts of "enhancement" (end) and "available to all" (circumstance of equality of access) for a moment. Let us face the concretization of "safe". And here, perhaps, transhumanists and people following other ethical frameworks might also find my proportionality reasoning useful to deliberate whether an intervention is recommended, whether it is safe enough and if it is expected to bring more risks than benefits. To me, proportionality is not simply a safety factor, but an element of prudence and ethics, guiding the adequate choice among legitimate means. But I think people with other moral standards and frameworks can agree that a person should not be put at an unjustified and irresponsible risk, and when it happens, the responsible person should be held accountable for such a choice.

To conclude the example of an implication of theme two —the one regarding the uses of HGE for health, well-being, and enhancement— bioethicists are facing an important challenge. First, we need to acknowledge the limits of the therapy-enhancement framework, which simply considers the first ethical and the second unethical. Second, we need to recognise that the usual circumstantial concerns surrounding enhancements do not constitute solid, unchangeable, and sufficient reasons against all possible enhancements. This common theme brings a critical task for bioethicists: to deliberate on interventions considering the options on the horizon and to develop criteria for morally good enhancements.

3.3. An Implication of Theme 3

Theme three concerns *global governance to minimise risks and maximise benefits of HGE*. This theme comprehended the main elements (research, funding, public debate, policies) and the predominant values (autonomy, protection, and equality/solidarity) commonly found in the selected texts.

The current situation is bioethics' search for its role in the global governance of HGE. Ethics go beyond procedures, bioethics should do more than call for a transparent, inclusive, and accountable governance. Ethics has to do with people, but it is difficult to reach the multiple agents of the global governance of HGE. And in addition, the values supporting the barriers in the HGE debate are changing (Cf. 62).

The chosen related task for bioethics is to refine the predominant values found in the global governance of HGE. Regarding the first value, autonomy is indeed an important value. Coercion in its different forms such as forced labour, forced marriage, lack of informed consent, and other forms of constraint decisions regarding important aspects of the individual's life is not desired. But now, autonomy seems to be above many other possible values. Moreover, it seems to shape the other predominant values in the global governance of HGE (e.g., protection of *people who cannot express their wishes;* equality changing according to personal ideas of fairness). bioethics should help autonomy to move from meaning "choices in health and reproduction" to "reconnected liberty". For instance, a kind of liberty linked to other values such as humility (which recognises that individuals can be mistaken), responsibility (because individuals are accountable for their choices), and sociability (which points out that some individual acts have social effects). This network of values would be especially helpful in the context of HGE. Then, liberty, to truly be so, should be protected from explicit and implicit coercion. Does the autonomy of expressing choices guarantee liberty? No, indeed liberty can be very diminished even when the individual

clearly enunciates his wishes. Because implicit coercion, mostly economic and social pressure in their different forms, has an impact on personal "free" choices.

Regarding the value of protection, it is a socially aware value. It is encouraging to note that not all concerns are self-centred. The value of protection shows that what is highly appreciated for the individual, is also desirable for the others. And it shows the recognition that people who cannot express themselves need and deserve something from the people who can express themselves. What do they deserve? More than compassion, they deserve protection from harm. But only people who cannot express themselves need protection? The refinement this value needs is an openness to vulnerability. Protection should be given to all the vulnerable, to all people in need of protection. That includes people who cannot express themselves (either because they are not born yet or because they are unable to express their will), but also physically and socially disadvantaged people, and people who are coerced by society or by their own suffering when expressing themselves, etc.

Regarding the third value, it should be noted that equality and solidarity are presented as two sides of the same coin, encompassing a set of related values. Most WHO values are related to equality/solidarity: *inclusiveness*, *fairness*, *social justice*, *non-discrimination*, *equal moral worth*, *solidarity* and *global health justice* (Cf. 18). The selected texts on transhumanism also express concern for inequality and discrimination (2). This value or set of values regarding equality and solidarity is very important. It has the potential to moderate destructive interpretations of autonomy. The value of equality implies the recognition that everyone has equal moral worth and deserves to be treated fairly. Societies must be inclusive and not discriminate against people. Equality asks for global health justice and implies solidarity. It may sound idealistic. But which kind of equality are we talking about? Equality of access? Equality of opportunities? Equality in the outcomes? Intrinsic equality? Extrinsic equality? To ensure that equality/solidarity is put into action, it is necessary to give it a solid and

real foundation: to stress intrinsic equality. Otherwise, equality/solidarity can be invoked to embellish actions, but they might be empty, and in practice, some people may be left behind. To ensure this equality as equal moral worth, it needs to be intrinsic, which means due to human beings for the mere fact of being human. If extrinsic, equality will never be real. If equal moral worth depends on particular traits (e.g., intelligence, autonomy, capacity of production…), there will be always people who manifest more or less a specific trait. In this logic, some people should be treated well, while others could be mistreated. "If human dignity is extrinsic, then not everyone is equal" (44). On the other hand, it is good to note that a kind of extrinsic equality is not desirable. It would lead to uniformity, damaging diversity. So, a path forward is to refine this value by stressing intrinsic equality. Aiming at a more equal distribution of healthcare or the equality of opportunities are consequences of this intrinsic equality.

To conclude this example of implication, the task for bioethics is to refine the predominant values. *Autonomy* is asked to mean more than the fulfilment of personal wishes in health and reproduction, connecting to other values such as humility, responsibility, and sociability, and always being attentive to explicit and implicit coercions. The value of *protection* of people who cannot express their wishes should be expanded to protection of all the vulnerable. And *equality/solidarity,* aiming at consistency, should stress intrinsic equality.

4. Conclusion

The following table presents a synthesis of the three common themes (their definitions and elements) along with the chosen implications for bioethics. Recognising the current situation emerging from these common themes and working on the identified tasks is crucial for contemporary bioethics.

Table 1. Common themes and implications for bioethics

COMMON THEMES	IMPLICATION FOR BIOETHICS
The impact of HGE technology - Increasing power and availability - Potential benefits - Risks: technical and misuse	**Situation: technology in the past, present, and future of bioethics** **Task: to address new concerns** - Increasing power of HGE and the human condition - Increasing availability of technology and DIY mentality - Technology at the service of desires
HGE for health, well-being, and enhancement - Priorities: health and well-being - Possibility: enhancement	**Situation: An unclear and changing framework** (limits of therapy vs enhancement paradigm) **Task: to work on a bioethical deliberation on interventions considering the options on the horizon** - Object, ends, and circumstances of enhancement - Some proposals by non-transhumanists - Principle of proportionality

GG to maximise benefits of HGE
- Elements: research, funds, public debate, policies
- Values:
  a. Individual rights (autonomy in health and reproduction)
  b. Protection (of people who cannot express themselves)
  c. Equality and solidarity
	Situation: bioethics' role in the GG of HGE (ethics, main agents, and values)
	Task: to refine the predominant values in the GG of HGE
	- Autonomy: reconnecting liberty and attention to coercion
	- Protection: to all the vulnerable
	- Equality: Intrinsic

Source: prepared by the author.

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