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Determinism and Free Will in the Age of Genetics: Theoretical-Legal Concerns About Predictive Genetic Tests

Abstract: *The paper deals with the use of predictive genetic tests in medical research. I limit my discussion to those advances in genetics which try to overcome the limits represented by our genetic make-up, in particular by gene mutations that lead, or could lead, to the development of genetic diseases. Besides the ethical issues concerning the topic of the current discussion, the reader will also find an evaluation of the legal provisions elaborated at the different levels of the legal order (international, European, and national). The aim of this evaluation is to find out which model of Law is being adopted in bioethical issues like the one discussed in this paper. The paper underlines and argues how Law can contribute (and has already contributed at the different levels: International, European, and national) to value and to spread an ethics of responsibility.*

Key words: *determinism, freewill, genetics, legal rules on predictive genetic tests.*

Introduction

The interest in genetics has never been greater than today. Every scientific advance in this field is very often publicized either with enthusiasm or with scepticism. There seems to be no balanced opinion on this topic, at least in mass media and public opinion. A very heated debate concerns an important yet controversial genetic issue, i.e. genetic testing. Indeed, there are still many ethical and legal questions arising from the use of one particular type of genetic tests, i.e. predictive genetic testing. These genetic tests are normally used in asymptomatic persons to predict future risk of disease.

One of the main points about these tests is that they predict susceptibility, not the certainty of developing diseases connected to gene mutations detected with genetic tests. It is a subtle yet relevant difference. In the past, but also in the present, political, criminal, and social decisions have been made on the feeble assumption of *susceptibility*.

In general, the topic of genetic testing has a transverse meaning. Indeed, from a theoretical-legal viewpoint, this issue can be considered as a particular element

of a bigger puzzle dealing with fundamental topics, which have been investigated for centuries.

I refer, on the one hand, to the relationship between Science and Law. On the other hand, to the possibility of considering human beings free, despite the causal determination of their behaviour: free will *v* determinism. In this paper, I investigate these old, yet still at the centre of philosophical, legal, and to some extent scientific concerns, to find out which could be the most adequate ethical and legal approach to scientific advances, that can be useful for human kind to really improve the quality of life without turning each human being into a molecular entity.

Genetic tests can be used for different purposes, such as medical research or criminal investigations. The paper deals with the use of predictive genetic tests in medical research. I limit my discussion to those advances in genetics which try to overcome the limits represented by our genetic make-up, in particular by gene mutations that lead, or could lead, to the development of genetic diseases. I do not deal with genetic enhancement of non-pathological traits[1].

The general philosophical framework is based on the perspective of the Is-Ought Question, and on the meta-ethical view of non-cognitivism and non-objectivism. Besides the ethical issues concerning the topic of the current discussion, the reader will also find an evaluation of the legal provisions elaborated at the different levels of the legal order (international, European, and national). The aim of this evaluation is to find out which model of Law is being adopted in bioethical issues like the one discussed in this paper. The paper underlines and argues how Law can contribute (and has already contributed at the different levels: International, European, and national) to value and to spread an ethics of responsibility.

In the following paragraphs, I will try to answer the following question:

> What are the ethical and legal questions arising from the use of predictive genetic tests?
>
> The answer takes into account two aspects: On the one hand, the historical framework in which genetic determinism has its roots; on the other hand, the management and use of genetic information. As for the first point, references to past experience, in which the theory of (biological) determinism found legal implementation (Positivist School of Criminolgy *v* Classical School of Criminology), contribute to the understanding of how to balance both risks and benefits of current genetic advances by avoiding past mistakes. As for the second point, the focus will be on genetic information as the core aspects of privacy protection intended in a broad sense.

1 On the different uses of genetic engineering see for instance Balistreri 2011.

Law and Science: A controversial relationship

If I followed the 'traditional' way of framing issues in Philosophy of Law, I would begin by making some ethical statements on genetics, in general, and on genetic testing in particular, and then I would draw the legal conclusions by considering if my ethical positions have been translated into legal provisions at the various levels of legal order.

However, I would like to start with the legal findings on this topic, and then draw the ethical conclusions. The reason for proceeding in this way is that, in my opinion, there are enough good examples both from past and present legal experience, that contribute to give an orientation and a direction to the more general, and still incredibly controversial, ethical debate on this issue.

The legal experience I refer to is made up both by legally binding and non-legally binding (yet legally relevant, *soft law*) documents. For those who have little experience of law, this distinction may sound unclear, and in need of a clarification. Therefore, I will clarify briefly this point. In the legal debate concerning the relevance of *soft law* documents, some authors still argue that, as it is hard to identify a clear *hierarchy of norms* (Knoppers 2006), it is difficult, if not impossible, to say what is legally regulated and what is not, and the consequence is a *legal vacuum*. This statement has, legally speaking, no foundation[2]. Rather, it serves some ideological purpose like excluding the existence of a quite coherent regulatory framework for genetic issues (Salardi 2010: 102), especially on the part of those scientists and researchers who fear legal constraints on their activity. In the following analysis, I will demonstrate that there is no *legal vacuum* on genetic testing, and I will bring evidence for the existing coherent (with certain ethical assumptions) legal framework.

For a long time, Science and Law have been considered as the two opposites of an insurmountable dichotomy. This is mainly due to researchers' perception of Law, on the one hand, as a tool to impose both procedural and substantial constraints on scientific research, without any benefit even for the patients, and on the other hand, as a rigid and formalistic system of general, abstract rules incapable of adapting to concrete cases. Isn't this an overly narrow and ideologically connoted perception of Law? If the answer is positive, then I have to prove the view false. This I will do in this paragraph by means of (selected) existing legal provisions.

2 Jurists, lawyers and judges do have the necessary legal tools for interpreting and reconstructing the hierarchy of norms. The traditional distinction between *soft law* and *hard law* is not so rigid as it used to be. For example, in environmental matters, *soft law* is now essential in creating a general consensus for the further implementation of legally binding documents. And indeed, the legal relevance of *soft law* is proved by them being often mentioned in the Preamble (integral part of treaties as far as their interpretation is concerned, see Art. 31 Vienna Convention on the Law of Treaties) of legally binding documents.

In 1988 the European Parliament declared its intention of evaluating and assessing social, economic, ecological, health, ethical and legal aspects of new developments in the field of genetic engineering in a Resolution (A2-327/88) *on the ethical and legal problems of genetic engineering*. This Resolution takes into account many aspects of genetic analysis to be found later in other legal documents. The most important concerns about genetic testing that the Resolution (A2-327/88) refers to fall under the following headings: First, informed consent as the exclusive basis for all genetic analysis (medical research, selection of workers on genetic criteria and so on), including the right to refuse genetic tests, the right not to know the results as well as the duty of the physician not to inform others, including family members, without the patient's consent. Second, the absolute precedence of patient's right to self-determination over economic pressures of any kind. Third, a ban on the use of genetic analysis for "positively improving the population's gene pool". Fourth, the prohibition on the development of genetic strategies for the solution of social problems. Fifth, insurance companies have no right to demand that genetic testing being carried out before and after the conclusion of an insurance contract. Sixth, genetic analysis in legal proceedings should be admissible only in exceptional circumstances to be determined by the judge alone and in certain limited areas; only those elements of a genome analysis may be used which are relevant to the case and do not allow conclusions to be drawn as to the genotype as a whole.

This brief summary of the Resolution's content shows how, twenty years before the GINA[3], and some years before the UNESCO Declarations[4], the European Parliament had already taken positions on those controversial issues that will some years later explode in legal cases on genetic discrimination, especially in the US.

The Resolution 1988 represents, in fact, a good example of a proper appreciation of the risks of genetic manipulation, and of the potential misuse of genetic information as well as of the benefits of genetic engineering. This attempt to balance risks and benefits is a widely shared characteristic of all the legal rules (international, European, national) on genetic testing. Indeed, given the risks of potential misuse[5] (genetic discrimination and surveillance society), legally, and

3 Genetic Information Nondiscrimination Act approved by the US Congress in 2008.

4 Universal Declaration on Human Genome and Human Rights (1997), International Declaration on Human Genetic Data (2003), Universal Declaration on Bioethics and Human Rights (2005).

5 For instance GINA 2008: "New knowledge about genetics may allow for the development of better therapies that are more effective against disease or have fewer side effects than current treatments. These advances give rise to the potential misuse of genetic information to discriminate in health insurance and employment. (2) The early science of genetics became the basis of State laws that provided for the sterilization of persons having presumed genetic "defects" such as mental retardation, mental disease, epilepsy, blindness, and hearing loss,

non-legally binding documents (ethical codes as well[6]) do not prohibit genetic testing[7] (Salardi 2010). On the contrary, they do point out the new opportunities offered by genetic testing, technologies, and research for individuals thanks to medical progress[8]. So, it can be said that Law in this context tries to balance conflicting interests (right to scientific research, right to self-determination, right to non-discrimination, right to privacy etc.), and to avoid indulging in the crudest sort of genetic determinism, recognizing that the genetic make-up of human beings, although an essential part of our being, does not fully determine a persons's character, in the sense that the developmental steps from the genotype to the phenotype need integrations with other elements and factors in order to assert that human beings are Moral Agents. One of the best legal example of this assumption is Article 3 of the International Declaration on Human Genetic Data, according to which: "each individual has a characteristic genetic make-up. Nevertheless, a person's identity should not be reduced to genetic characteristics, since it involves complex educational, environmental and personal factors and emotional, social, spiritual and cultural bonds with others and implies a dimension of freedom". This Article, although briefly and generally formulated, as it usually happens with articles in universal declarations, best expresses the general legal trend with regard to scientific advances. This trend is not arbitrarily founded, but it is scientifically informed by the overcoming of the simplistic dichotomy between Nature and Nurture, and by the acceptance of the gene-environment interplay[9] (Rutter et al. 2006) following the trend in medicine. The above mentioned legal framework appeals, on the one hand, to the scientific knowledge of the reciprocal influences between biological and cultural evolution, refusing "the claim that our nature is our biology" (Buchanan 2011: 7) as it is misleading, and on the other hand, it sustains, philosophically and ethically, the perspective that does not oppose cultural to 'biological' causes. Indeed, the legal approach to scientific advances in genetics refuses both strict determinism as well as the agency theory, and indeterminism. As for genetic testing, the law adopts a compatibilist stance, in particular the

among other conditions. The first sterilization law was enacted in the State of Indiana in 1907. By 1981, a majority of States adopted sterilization laws to "correct" apparent genetic traits or tendencies. Many of these State laws have since been repealed, and many have been modified to include essential constitutional requirements of due process and equal protection. However, the current explosion in the science of genetics, and the history of sterilization laws by the States based on early genetic science, compels Congressional action in this area...".

6 Article 46 on Predictive Genetic Tests of the Italian Code of Medical Ethics.

7 This is true of all the legal documents concerning this topic, for a wider analysis, see Salardi 2010.

8 See for instance GINA 2008, sec. 2 Findings; Preamble of the International Declaration on Human Genetic Data (2003), Art. 12 European Convention on Human Rights and Biomedicine (1997) etc.

9 Acceptance of the gene-environment interplay in medicine is quite recent (1990s).

normative compatibilism (Grim 2007) which is rooted in Strawson's distinction between reactive attitudes and objective attitudes (Strawson 1982). Strawson, as did also for instance Mario Calderoni[10] a century before him in Italy, tries to reconcile determinists and anti-determinists by considering that the traditional causal explanation of human actions is incomplete if referred to and used to clarify the "ordinary inter-personal relationships". According to Strawson, in the various kinds of normal relationships we can have with other people, we are usually prone to react to their attitudes and intentions demanding "some degree of goodwill or regard on the part of those who stand in these relationships to us" (Strawson 1982: 63). However, under some circumstances we tend to fall into objective attitudes towards some agents as we see them "in a different light from the light in which we should normally view one who has acted as he has acted" (Strawson 1982: 65), for instance in those cases in which the agent's attitudes are "partially or wholly inhibited by abnormalities or by immaturity".

In Strawson's perspective, we find the core elements of the modern compatibilist approach to the relationship between freewill and causal explanation of human behaviour. What I would like to underline in his theory is the fact that "free action…is action that reliably tracks the agent's values or reasons for action". The relevant aspect is the emphasis on normativity, which characterizes moral judgments. "If freedom of choice is not a metaphysical property but an evaluative status, metaphysical determinist arguments will be simply off target. The 'could not have done otherwise' concept that appears in determinist arguments is a descriptive property of events. The 'could have done otherwise' concept crucial to our moral judgments, in contrast, may be something very different: part of a locus of concepts to be understood not in terms of the metaphysics of causality but the normative evaluation of action" (Grim 2007).

The compatibilist approach allows the orientation of political, social, and legal decisions in a way that can be helpful to safeguard individual self-determination and moral responsibility. This leads to scientific advances being used to amplify and not to limit individual freedom. I will come back to this point later.

With regard to predictive genetic testing, it can be stated that the law has followed this path. Indeed, although predictive genetic tests can be used, and in the (not

10 Mario Calderoni was an Italian philosopher who lived in the XIX and XX centuries. He tried to overcome the dichotomic approach to human actions used both by deterministsand anti-determinists. He distinguished between voluntary and involuntary actions, but he did not consider the two types of actions as opposed, rather he depicted instincts, impulses, and passions (involuntary actions) as the raw material for the voluntary action, in which another element plays a fundamental role, i.e. the set of believes according to which we interpret others' actions as well as ours. In the current Italian philosophical and bioethical context, Calderoni's theory has been carefully revisited by Borsellino 2009.

so distant[11]) past they have been used, for instance, to deny access to insurance policies or to work, and hard determinism has been used to shape certain criminal policies, the law in the age of genetics has adopted a non-prohibitionist approach. This choice is in line with the idea of law as a *choosing system*, which in some degrees guarantees the ability "to predict and plan the future course of our lives within the coercive framework of the law" (Hart 1968: 181). Indeed, despite the potential (but also real) danger of genetic tests, legal provisions at the international, European, and national level do not prohibit the use of genetic tests, they only limit their uses to medical purposes and to medical research as stated for example in the *Convention on Human Rights and Biomedicine* (1997).

What is certainly forbidden is genetic discrimination and stigmatization. This prohibition is indirectly expressed in the *Universal Declaration on Human Rights* (1948), in the *Nuremberg Code* (1949), in the *Helsinki Declaration* (1964). It is directly expressed in the three UNESCO's Declarations: *The Universal Declaration on Human Genome and on Human Rights* (1998), *The Universal Declaration on Bioethics and Human Rights* (2003) and in *The International Declaration on Human Genetic Data* (2005).

At the European level, genetic discrimination is prohibited (among others) by the *European Charter of Fundamental Rights* (2000), by Art. 11 of the *Convention on Human Rights and Biomedicine* (1997), by Art. 6 of the *Reccomendation* (2006) 4 *of the Committee of Ministers to the member states on research on biological materials of human origin*; by Article 4 of the *Additional Protocol to the Convention on Human Rights and Biomedicine, concerning Genetic Testing for Health Purposes.* At the national level, for instance in the Italian legislation, this prohibition is expressed in the Privacy Code (legislative Decree 196/2003) as well as in other legally binding acts concerning the use of biological samples (like the General Authorization for processing genetic data, i.e. Autorizzazione al trattamento dei dati genetici del Garante per la protezione dei dati personali, 22 February 2007, relativo alle modalità di trattamento del prelievo e utilizzo dei campioni biologici e relativi dati', elaborated by the Italian Data Protection Authority).

Many legal provisions, with regard to biobanks, also underline the primary role of self-determination expressed through informed consent. Ethical questions in the biobanking sector arise with regard to genetic information, in particular with reference to storage, management and use of biological materials from which the information derives, sincewe can identify individuals by means of genetic information (as is the case of National DNA databases for criminal investigations), and also acquire information on individuals' immutable characteristics, like susceptibility to pathologies. With regard to this second aspect, in legal

11 For instance: *Havasupai Tribe vs. Arizona State University* 2010; *Newborn Blood Spot Litigation* 2010.

literature[12] and documents[13] it has been suggested that genetic information differ from sensitive, personal data, and have a special status, therefore they are in need of a special legal protection. In this sense the main problem is how to anonymize the biological material. The *proper* solution is to anonymize the name of the donor, not totally, but by attributing a code to the sample in order to be able to communicate the results of the research. This method presupposes a signature of informed consent on the part of the donor with regard to the current and future uses of his/her sample.

Some international organizations (American Society for Investigative Pathology, Association of American Medical Colleges, WHO, and some national bioethics committee) support the "blanket informed consent" as the most efficient and economic form of consent, as it is given once and for every present and future research project on biological samples. There are, however, other organizations like *The American Society on Human Genetics*, which are against the "blanket informed consent" as they consider it a violation of individuals' self-determination.

The solution to this dilemma can be found in the already existing legal provisions that regulate the storage and management of biological samples at the international and European level. In fact, they state a regulatory framework shaped by the self-determination principle as referred to the professional behaviour of different actors.

For instance: Art. 3, 2 of the *Charter of Fundamental Righs of the European Union*, which states that the informed consent of the interested person must be respected, and in Art. 8 which gives the right to protection of personal data and that "such data must be processed fairly for specified purposes and on the basis of the consent of the person concerned or some other legitimate basis laid down by law. Everyone has the right of access to data which has been collected concerning him or her, and the right to have it rectified"; *Rec.* (97) 5 which provides a very detailed regulation of genetic data and of the right to be informed; *Rec.* (92) 3, *on genetic testing and screening for health purposes*; Art. 5 self-determination *Recommendation* (2006) 4 *on research on biological materials of human beings*; Directive 2004/23/EC on *setting standards of quality and safety for the donation, procurement, testing, processing, preservation, storage and distribution of human tissues and cells*; Directive 2002/98/EC *setting standards of quality and safety for the collection, testing, processing, storage and distribution of human blood and blood components*.

12 For instance, in Italy, Stefano Rodotà argues in favour of genetic exceptionalism, whereas Amedeo Santosuosso has changed his mind on this point, being now against genetic exceptionalism.

13 See for instance Article 29 Data Protection Working Party, *Working Document on Genetic Data*, 2004 (12178/03/EN WP 91); Article 13 of the *International Declaration on Human Genetic Data*.

Free Will or Determinism? Is this the question?

Genetic determinism is a "new" version of the old philosophical-scientific thesis of *hard* determinism. Determinism is the view that every event, including human cognition, behaviour, decision, and action, is causally determined by an unbroken chain of prior occurrences. Determinists believe the universe is fully governed by causal laws resulting in only one possible state at any point in time. *Hard* determinism had been proven false both on philosophical and scientific levels. Indeed, with regard to the latter, in the nineteen thirties, "modern physics, through Heisenberg's principle of indeterminacy, has loosened Laplacian determinism sufficiently to allow *uncaused* atomic events, creating in certain specifiable situations the occurrence of genuine chance... Physics thus makes understandable the occurrence of *chance*, of true alternatives upon which the course of events can seize. Physics alone, in its present state, can account for unpredictable, erratic human behaviour" (Margenau 1967). With regard to the former aspect, many philosophers all over the world (Glover, Lucas, Hospers, Calderoni etc.), have developed valid theories to find a balanced approach to the determinists *v* anti-determinists debate. As I suggested before, Peter Strawson's theory, is one of the best example of this attempt of reconciliation.

I have already dealt with this topic in the previous paragraph. At this point of my discussion I would like to mention the legal impacts, that the deterministic theory had in the XIX century in Europe, in particular in criminal policy and law.

In the second half of the XIX century, two Schools of Criminology shared the scene in the Italian criminal debate[14]. On the one hand, the Positivist School of Criminology, which, as the scientific method became the major paradigm in the search for all knowledge, tried to find evidence for scientific objectivity in the measurement and quantification of criminal behaviour. On the other hand, the Classical School of Criminology focused on the moral liability of participants considered as moral agents. According to this view, the legal evaluation took primarily into account the characteristics of the crime (*actus reus*) and the *means rea* (states of mind) as two essential elements of criminal liability. Instead, the Positivist School's focused on the offender's dangerousness, and on his/her intrinsic characteristics (Ferri 1923), whereas the crime played a very little role in legal evaluation.

By changing the assumptions of criminal liability, the Positivist School was actually seeking to introduce a different model of criminal law. In this light, criminal law should have been used as a *social prophylaxis*, and individual liability transformed in an absolute social responsibility. The Positivist School, whose

14 The debate started in Italy, but it soon spread all over Europe, as it is documented by Jiménez de Asùa 1923. Argentina's criminal code was influenced by Ferri's Social Defense Theory.

world-wide known expertises were Cesare Lombroso and Enrico Ferri, adopted the scientific (experimental) method as the unique basis for a 'new' criminal science, and a new criminal law. In their view, social order was assimilated to the natural order, and therefore, it was assumed to function according to the principle of causality. In this sense what counted was how society could have been best preserved from socially dangerous agents. The technique proposed by Ferri was rooted in the Social Defense Theory which led to the classification (Marro 1887; Fornari et al. 1996) of agents in accordance with their potential social dangerousness, and the preservation of society from these dangerous agents by means of preventive and eliminative measures (Ferri 1929). 1921 Ferri's proposal was used to elaborate a Draft Criminal Code, termed *Progetto Ferri*, whose Section 20 (1) clearly stated: the degree of liability for a crime depends "on the dangerousness of the criminal determined within the limits prescribed by law, according to the gravity of a particular criminal offence and other specific circumstances, motive, and the personality of the criminal". Sentencing was, in large part, at the discretion of the judge. While the above-mentioned section required that the penalty should be within the limits prescribed by law, subsection 75 (2), for example, permitted penalties exceeding the maximum sanction by up to one-third if several factors of greater dangerousness were present. This Draft never became law in Italy, but the Positivist School's approach can be traced in current legal provisions at the highest levels of legal systems. Indeed, today's *Rule of Law* (at least in Western democratic nations) has maintained the Classical School's view in legal systems, preserving, however, strict liability for some crimes. A good example of this legal structure is the Italian legal order. Indeed, the Italian Constitution (Art. 27) provides *mens rea* as the main criterion for criminal liability, but it also considers (Art. 25) reduction and preventive measures (proper of the Positivist School of Criminology) for some particular cases listed in criminal Acts.

The example mentioned shows how useless it is to reason on the basis of undeservedly opposed theories to claim either free will or determinism as the truth of human nature. There are things, like our genetic make-up, that can perhaps be enhanced, but we are not free to choose. Similarly, if we think that we are just our genetic make-up, it follows that no choice is possible in our life. What is then the path we should follow? The path has already been chosen, and translated into the regulatory framework I have underlined before. It is the path of reconciliation between scientific advances, their casual explanation of the understanding of human behaviour, and the ethical view of human beings as Moral Agents. This position can be summarized in the words of an Italian acute philosopher of law, that from a non-cognitivist and non-objectivist point of view ("ethics without truth", as he called it) stated that human beings are not free because we can demonstrate their freedom from a scientific viewpoint, human beings are free because "we can make them free" by "choosing to have the value of freedom in our ethics" (Scarpelli 1982).

Predictive genetic tests and genetic determinism

Although determinism in its *hard* form has been largely disproven, it has spread again by the advances in genetics. According to genetic determinists[15], we are our genes and nothing else but that. This implies that our behaviour and our life totally depend on our genetic make-up. This is true, but only to some extent. Like other forms of *hard* determinism, genetic determinism has being denied both scientifically and philosophically.

From a scientific point of view, the acceptance of the *gene-environment interplay* (Boncinelli 1998), including gene-environment correlation (the genetic influence on exposure to *environment*) and gene-environment interaction (genetic susceptibility to *environments*, i.e. the impact of environmental factors may differ depending on a person's genetic make-up), has proven genetic determinism false.

From a philosophical point of view, *hard* determinism can be argued against by adopting the above mentioned compatibilist stance. Especially in those cases in which genetic tests *predict* a *susceptibility* to a certain disease, this knowledge can be used to amplify and not to reduce individual freedom. Let me put it in the following way. When a predictive genetic test identifies a susceptibility to a certain pathology, the detected gene mutation can be seen as a *constitutional* requirement[16] (Ross 1975: 162–164), without which it would be impossible to intervene in one's life. What do I mean? To develop a multifactoral genetic disorder, the gene mutation is a necessary but not sufficient factor, indeed interactions with environmental factors are needed.

If this is true, it can be said that on many environmental factors the individual can have the opportunity to intervene (by changing some environmental conditions), i.e. the *occasional* requirement. Ultimately, the choice if and how to intervene or not depends exclusively on the agent's personal motivations (*motivational* requirement). Hence, knowing gene mutations can amplify the possibility to intervene to change the future of the agent's life. *Constitutional* requirements do not invalidate free choice on the part of the agent, as the knowledge about their existence is a pre-condition in deciding if and how the agent wants to intervene (therapeutically, changing lifestyle etc.) to reduce the risk of developing a given pathology. If we agree with this line of reasoning, it becomes clear why different organizations and scientific literature (Nuffield Council on Bioethics 2002; Bates et al. 2003) have suggested since 2002 that expressions like 'a gene for x' is problematic and misleading, as it does not convey to the public the complexity of the

15 As Lewontin underlines in a critical way (2005).

16 I borrow this terminology from Alf Ross 1975: 162–164. According to the author "the human act…demands the fulfilment of three sets of requirements: the constitutional, the occasional, and the motivational".

role of genetic factors in causal explanations of human behaviour, and why they have suggested not to employ such sentences.

To avoid public misunderstanding on this topic and at the same time to allow "*individuals to take advantage of genetic testing, technologies, research, and new therapies*", the law has established some restrictions to genetic testing, which cannot be considered, in my opinion, as too strict in limiting the right to research on the part of scientists.

Some conclusions

The determinists *v* anti-determinists debate (free will *v* determinism) has not lost its fascination, despite having been proven unfruitful, and scientifically as well as philosophically unfounded. In the age of genetics, however, the debate is still heated because of the spreading of genetic determinism due to many factors (economic interests, new form of criminal policies in line with the Positivist School's approach, mediatic pressure, etc.).

Unlike the time in which the Positivist School's approach tried to found criminal law on scientific advances in sociology, statistics etc., but without knowing that determinism's theory would be scientifically disproven in the coming century (Heisenberg's principle of indeterminacy). Today, we can appeal both to the scientific evidence that proves *hard* determinism false, and to the philosophical trend (revisited from a classical to a modern view), that has inspired the relationship between science and law, i.e. compatibilism. For these reasons, today, the decision to rely on claims of genetic determinism is crudely ideological, and serves only to classify individuals, and to confine them in a fatalistic perception of their lives, making the exercise of control over them easier.

Why then, is normative compatibilism the proper way to address the relationship between science and law? To appreciate this philosophical approach, we should keep in mind the following considerations.

If we consider that prescriptive statements are not derivable from assertions of facts or descriptive statements (naturalistic fallacy), it follows that when we value or disvalue, say, gene mutations, by choosing for instance to discriminate individuals on their genetic make-up as it results from predictive genetic testing, we are confusing ethics and nature. A given gene mutation is a *fact*, and the decision to interpret this fact in accordance with values or disvalues is a *normative choice*, that should be always clearly expressed, if we do not want to fall into ideology as Kelsen (Kelsen 1952) means it. The gene mutation potentially causing a future disease is a fact, and on this fact we cannot deny or affirm moral freedom or the right/duty to non-discrimination. Facts and the assertion of facts (scientific realm) are useful to explain certain biological and natural phenomena, so that choices at

the normative level (both ethical and legal) can be taken on assumptions free from misunderstandings on how certain biological or physical mechanisms work. However, the interpretation of facts or of natural phenomena belongs to the prescriptive level. It presupposes 'the choice to choose' how to interpret any fact in a way functional for certain aims, such as deciding to use the genetic information in a way which most conforms to the state of facts. For example, not intentionally avoiding to mention the fundamental role played by environmental factors, so that we can "make the human being free" despite its causal determination.

Normative compatibilism allows a 'functional coexistence' (Salardi 2010) between two realms, i.e. science and ethics (and law as a part of ethics), which advance an overall view as well as a better understanding of both individual behaviour, and inter-personal relationships, since in this perspective the awareness of one's own personal genetic make-up can be considered the starting point for sound knowledge useful for the increase of an individual's freedom of choice (Borsellino 1979; Borsellino 2009; Salardi 2010).

De iure condito and *de iure condendum* law is trying to follow the compatibilist approach to deal with scientific advances in genetics. As for the relationship of law and ethics, which can be briefly expressed in what model of law can best lead to a peaceful and 'moral' society, law has chosen to permit genetic tests, but limiting their *potential misuse* by providing, at different levels of the legal order, the protection of individuals from discrimination based on their genetic make-up, by considering non-discrimination and non-stigmatization as well as the self-determination principle as minimal values shared by all humans.

In this perspective, the law guarantees peaceful coexistence between different ethical views on the basis of minimal standards shared among human beings.

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Determinizam i slobodna volja u veku genetike:
teorijsko-pravna razmatranja prediktivne genetike

Apstrakt

Tekst se bavi primenom prediktivnih analiza u medicinskim istraživanjima. Diskusija se odnosi samo na one vidove genetike kojima se pokušavaju prevazići ograničenja sadržana u našem genetskom sklopu, pre svega ograničenja koja su izazvana mutacijama gena koja izazivaju ili mogu izazvati pojavu genetskih oboljenja. Pored etičkih pitanja vezanih za temu ove diskusije, tekst razmatra i pravna rešenja s različitih nivoa pravog poretka (međunarodni, evrospki, nacionalni). Cilj procene pravnih rešenja je da utvrdi koji je pravni model usvojen u sličaju bioetičkih pitanja kojima se bavi ovaj tekst. U tekstu se naglašava da zakon može doprineti (i već je na različitim nivoima i doprineo, međunarodnom, evropskom i nacionalnom) afirmisanju i širenju etike odgovornosti.

Ključne reči determinizam, slobodna volja, genetika, pravna regulativa u oblasti prediktivne genetike.