



Neuroscience and end-of-life decisions. New anthropological challenges for constitutional law: «Is Human Nature the only science of man?»

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ABSTRACT: Nowadays, neuroscience permits the unveiling of interior elements of human beings - the perception of pain, the presence of consciousness and even the will - in the absence of external manifestations. Physicians, indeed, seem capable of measuring the true mental state of individuals and their inner world through an electroencephalography or a functional magnetic resonance imaging. This new frontier affects the world of law and places heavy demands for lawyers embroiled in end-of-life matters. The present paper focuses on the use of neuroscientific acquisitions within end-of-life decisions, aiming to highlight two risks embedded in this use: the utmost deference towards science and scientific authority and the maximization of self-determination. The paper will provide, at the beginning, a framework of case law and end-of-life regulatory attempts; it will follow the analysis of the main challenges posed to law by advances in neuroscience. In the latter part of this paper, we will offer food for thought on the role of neuroscience and - in a broader perspective - of science in law.

KEYWORDS: Neuroscience; end-of-life decisions; free will; self-determination; human dignity

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1. Introduction

The recognition of human and fundamental rights and the concrete dynamics of their protection are driven from an ineradicable anthropological question. During the negotiations on Declaration of Human Rights, Malik claimed: «The very idea of the rights of man means that man in his own essence has certain rights; that, therefore, what we are going to elaborate must answer to the nature and essence of man»¹. And what is human nature and essence? This question

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emerges – and also most often – in challenges posed by neuroscientific progress and, for sure, it raises also in the scope of the end-of-life law.

Generally, neuroscience and law should be considered “natural partners” because they are both concerned with human beings and human behaviour². This interaction would be even more clear if we factored in the application of neuroscience in the clinical determination of brain death, the role of patient pain assessment in a therapeutic obstinacy evaluation and, eventually, the contribution of neuroscience to determining the incompetent patient’s will. Indeed, one of the most far-reaching challenges posed to the law by the development of neuroscience techniques is the possibility to disclose certain aspects of the human person without the need for mediation³. The perception of pain, the presence of consciousness and the wishes of incompetent patients, once unfathomable because they could not be externalized, are nowadays accessible also from persons unable to express themselves (such as infants, people in comas, severely disabled people, etc.).

This new frontier places heavy demands for lawyers embroiled in end-of-life matters. In view of all this, the present paper aims to highlight how the search for a balanced relationship between neuroscientific acquisitions and end-of-life decisions is weakened by at least two risks: the utmost deference towards science and scientific authority and the maximization of self-determination. The paper will provide, at the beginning, a framework of case law and end-of-life regulatory attempts; it will follow the analysis of the main challenges posed to law by advances in neuroscience. In the latter part of this paper, we will offer food for thought on the role of neuroscience and - in a broader perspective - of science in law.

2. The end of life rights in case law and legislative attempts

Whenever legal systems are called on to address end-of-life issues, many heterogeneous legal issues may arise. There is a difficult line to tread because these legal issues arise from deep and broad questions closely tied to value judgments. Even when these legal issues seem to be a matter of detail, they actually affect the very basis on which constitutionalism lies.

We need only consider, looking at the Italian legal system, the tangle of legal issues that the judges who were called upon to pronounce on the Eluana Englaro case had to unravel: the existence of the right to refuse or discontinue treatment, the difference between withholding or withdrawing a life-sustaining treatment, the possibility to establish a power of attorney to make healthcare decisions on behalf of the incompetent or incapacitated patient and the eventual limitations on that power, the

¹ H.C. MALIK, *An international Bill of rights*, in *The challenge of human rights: Charles Malik and the Universal declaration*, Oxford, 2000.

² O.R. GOODENOUGH, M. TUCKER, *Law and Cognitive Neuroscience*, in *Annual Review of Law and Social Science*, vol. 6, 2010, 61-92.

³ This ability to read the human mind has spread to several contexts. An interesting example is that of the neuromarketing, a field that bridges the study of consumers’ behavior with neuroscience and that benefits from the ability of reading minds in order to measure and to predict consumers’ preferences. One of the most famous experiment of neuromarketing is the McClure experiment “Coke v. Pepsi” (see S.M. MCCLURE, *Neural Correlates of Behavioral Preference for Culturally Familiar Drinks*, in *Neuron*, vol. 44, 2004, 379-387).



definition of therapeutic obstinacy or medical futility and the qualification of artificial hydration and nutrition as medical treatments or life supports.

Within the Italian legal system, the Constitutional Court decision n. 438/2008⁴ can serve as a starting point for dealing with judicial cases. In that judgment, the result of a long and troubled judicial evolution, the Constitutional Court recognized informed consent as a fundamental right that stems from other fundamental rights such as the right to health (art. 32.2 Cost.)⁵ and the right to personal liberty (art. 13)⁶. Articles 32.2 and 13, in conjunction with art. 2 Cost.⁷, represent the firm foundation of the right to self-determination in health care decisions.

Informed consent, acting as an instrument to protect individual self-determination in the end-of-life context, involves the right of the patient to be informed about a procedure, surgery, or treatment, but also the right of the patient «to accept or refuse treatment after receiving adequate information»⁸.

Alongside the positive and negative implications (accepting or refusing) inherent in informed consent, this right is made up of a twofold core of two different but interrelated components: a technical component and a moral component that are supposed to coexist. The technical component, signified by the word “informed”, entails complete and comprehensive information provided by the physician to the patient about the proposed treatment options (potential benefits, risks, any available alternative treatments and so on)⁹. The other component, the moral one, implies the demand to recognize the principle of autonomy that allows the patient to determine what would be good or bad for him. But the exercise of this right to make decisions about one’s body and medical care is strictly intertwined with the patient’s capability. It is necessary that the patient is or was able to express his will. The law does not deny some citizens the right to self-determination because of their incapability, especially where the incapacitation merely consists of the impossibility of communicating his will; nonetheless, the legal system needs to figure out how to protect those who lack the cognitive and legal capacity to understand the decision’s consequences, the ability to understand relevant information or the ability to communicate a choice.

⁴ Italian Constitutional Court, decision no. 438/2008, available at <http://www.giurcost.org/decisioni/2008/0438s-08.html> (last accessed 31/10/2017).

⁵ Art. 32.2 Cost.: «No one may be obliged to undergo any health treatment except under the provisions of the law. The law may not under any circumstances violate the limits imposed by respect for the human person».

⁶ Art. 13 Cost. states that «personal liberty is inviolable». See A. BARBERA, *Un modern “Habeas Corpus”?*, in *www.forumcostituzionale.it*, 2013 (last accessed 31/10/2017).

⁷ Art. 2: «The Republic recognises and guarantees the inviolable rights of the person, both as an individual and in the social groups where human personality is expressed. The Republic expects that the fundamental duties of political, economic and social solidarity be fulfilled».

⁸ Declaration of Lisbon on The Rights of the Patient Adopted by the 34th World Medical Assembly of the World Medical Association at Lisbon, <https://www.wma.net/policies-post/wma-declaration-of-lisbon-on-the-rights-of-the-patient> (last accessed 31/10/2017).

⁹ The importance of information in the physician and patient relationship is an issue dealt with often. It also represents a duty for the physician to perform in order to avoid civil or criminal liability. See, in this sense, N.M. BAKIĆ-MIRIĆ, N.M. BAKIĆ, *Successful doctor-patient communication and rapport building as the key skills of medical practice*, in *Medicine and Biology*, vol. 15, no. 2, 2008, 74-79.



The set of problems concerning the end-of-life decision-making process when the patients' will is unfathomable can represent the core content of Eluana Englaro case¹⁰. This case could also be considered the latest "landing place" reached in the Italian legal system for what concerns the national end-of-life debate (as it is a landmark right-to-die case). If it is undisputed that Ms. Englaro's litigation proceeded in an uncertain legal environment, currently there has been no substantial improvement whatsoever in the situation. As a result of the Englaro case, several bills on end-of-life decisions were submitted to the Italian Parliament but none of them has yet been passed.

The issue raised by Eluana's plight concerned the withdrawal of medically assisted nutrition and hydration from a young woman in a persistent vegetative state. In order to authorize the removal of life support, the Italian Court of Cassation affirmed that two circumstances needed to occur: the first, an objective one, was that the condition of the vegetative state has to be certainly irreversible, on the basis of strict clinical opinion, and that there was no medical basis, following the scientific standards recognized at the international level, that allows the supposition that the person may have the minimum possibility of any, even if feeble, recovery of consciousness and return to a perception of the external world; the second circumstance, a subjective one, the request of removal must truly express the voice of the represented, on the basis of clear, univocal and convincing evidence, obtained from his/her statements or from his/her personality, lifestyle and convictions, corresponding to his/her way of conceiving the very idea of personal dignity, before falling into the state of unconsciousness¹¹.

But the Court of Cassation also added that «if the person is *non compos mentis*, the conflict between the right of freedom and self-determination, and the right to life is only hypothetical and must be resolved in favour of the latter. Since the person is unable to express any will, there is no issue of self-determination or freedom to protect. Article 32 of the Constitution excludes the possibility of making a distinction between life worthy, and not worthy of being lived»¹².

The Italian legal system has tried to protect self-determination in healthcare by identifying – especially through case law – some tools: first, the ex post reconstruction of what the incompetent patient himself "would have wanted" or, to be more exact, what the patient would have done if able to choose for himself (as the Civil Court of Cassation stated in the Englaro case); second, the *ad acta* guardian called upon to express the will of his ward (that is, in Italy, *tutore*, *curatore* or *amministratore di sostegno*)¹³; last, as mentioned above, advance directives or a living will. Nonetheless, the ex

¹⁰ See Sent. Cass. civ. no. 21748 del 2007, available at <http://www.biodiritto.org/index.php/item/187-englaro-cassazione> (last accessed 31/10/2017).

¹¹ See T. GROPPi, *Italian Constitutional and Cassation Courts: When The Right To Die of An Unconscious Patient Raises Serious Institutional Conflicts Between State Powers*, in *ILSA Journal of International & Comparative Law*, 2011, 73-88.

¹² See Sent. Cass. civ. no. 21748 del 2007, available at <http://www.biodiritto.org/index.php/item/187-englaro-cassazione> (last accessed 31/10/2017).

¹³ In this last event, some legal and medical contributions assert that choosing the guardian within the family unit can probably guarantee a better harmony between the patient's will and what the guardian says. But this is not always true. In a few Italian decrees, judges decided to reject the request of an incompetent's relative to be appointed as guardian on the strength of the patient's best interest (*ex multis*, Trib. Modena, January 26, 2009 in www.altalex.com last accessed 31/10/2017). See B. VIMERCATI, *Consenso informato e incapacità. gli strumenti di attuazione del diritto costituzionale all'autodeterminazione terapeutica*, Milano, 2014.



post reconstruction of the patient's will, the living will and the guardian options are highly problematic.

Even if an advance decision «tends to be viewed as the gold standard expression of precedent autonomy»¹⁴, it may entail problematic and weighty implications. First and foremost, whilst actuality is a prerequisite for the validity of consent as a whole, this legal instrument cannot guarantee the actuality of the informed consent. As a consequence of this basic shortcoming, some authors argue that the actuality of the consent must be interpreted not as a chronological actuality but rather as a logical one¹⁵. This view, however, does not entirely overcome this critical flaw. In order to soothe this problem, during the debate on the draft bill concerning end of life decisions, the Italian Parliament decided to add the provision whereby advanced directives will become invalid after 5 years; but this provision has been discarded in the latter draft¹⁶.

The ex post reconstruction and the guardian option might cause similar problems since they are adopted together. In particular, the challenge involves the risks linked to using a “retrospective consent”. Notwithstanding an appropriate recourse to the ex post reconstruction of the patient's will, the judge or the guardian could fall into a reconstruction of one's personality rather than a reconstruction of one's will, despite the request of clear and convincing evidence of the patient's wishes. This is the paradox of the “retrospective consent”: personality, used for the scrutiny of the patient's will, becomes – doubly – the goal of this same scrutiny. Last, it is crucial to stress that consent in medicine is not simple consent, but informed consent. And the aforementioned instruments, in particular retrospective consent and proxy consent, cannot ensure that the patient previously has been informed about the specific treatment.

During the last few decades, many legal systems have had to tackle the problem of guaranteeing the right to self-determination and yet protecting incompetent patients. As evidenced by the extensive case law across the world, this is an issue that many legal systems have in common.

Within the European context, one of the most recent and most highly controversial court cases has been a French case, known as the Lambert Case. This concerned the end-of-life decision-making on behalf of an incompetent patient, Vincent Lambert, a French citizen who lacked a living will expressing his desires and neither had appointed a guardian. He was, according to the medical report ordered by the *Conseil d'État* on February 2014, in a chronic vegetative state, and he required enteral nutrition and hydration supports to be kept alive. The juridical case arose with the withdrawal of the artificial nutrition and hydration allowed by his wife and some of his siblings but opposed by the parents and the rest of the family¹⁷.

The *Conseil d'État* affirmed that, as stated in the French Public Health Code amended by the Leonetti Loi, «the legislature intended to include among the forms of treatment that may be limited or with-

¹⁴ R. HUXTABLE, *Principle or Process at the End of Life?*, in *A Job Neuroscience*, 2016, 69-71.

¹⁵ L. D'AVACK, *Scelte di fine vita*, in U. VERONESI (ed.), *Testamento Biologico. Riflessioni di dieci giuristi*, Milano, 2005, 47.

¹⁶ See R. HUXTABLE, *Advance decisions: worth the paper they are (not) written on?*, in *End of Life Journal*, 2015. In this paper, the author examines eight problems concerning advance directives.

¹⁷ They were not involved in the first collective procedure provided for by Leonetti Loi on patients' rights and end-of-life issues. The case resembles the controversy over Terri Schiavo's case that elevated a family matter into a political and legal battle.



drawn on grounds of unreasonable obstinacy all acts which seek to maintain the patient's vital functions artificially. Artificial nutrition and hydration fall into this category of acts and may accordingly be withdrawn where continuing them would amount to unreasonable obstinacy»¹⁸.

The case was brought in front of the European Court of Human Rights claiming multiple violations of the European Convention of Human Rights such as, inter alia, art. 2 (right to life), art. 3 (prohibition of torture) and art. 8 (right to private and family life). In the Grand Chamber's decision, delivered on June 2015, the European Court concluded that the withdrawal of artificial nutrition and hydration under the procedure required by French legislation would not violate art. 2 ECHR¹⁹. Because of the absence of a consensus among the States Parties to the European Convention, European judges stated that «in this sphere concerning the end of life (...) States must be afforded a margin of appreciation (...) as regards the means of striking a balance between the protection of patients' right to life and the protection of their right to respect for their private life and their personal autonomy»²⁰.

Assuming the judgment, the European Court investigated multiple profiles, two of which are relevant for our purposes. The judges dealt extensively with the reconstruction of the patient's will and the examination of the clinical condition, through the analysis of the irreversible nature of the brain damage and clinical prognosis, Vincent Lambert's capacity to communicate with those around him, and the existence of signs suggesting that Vincent Lambert reacted to the care provided. As regards the reconstruction of patient's wishes, the Court took due heed of what was highlighted by the Conseil d'État: Lambert's wife «had been taken into her husband's confidence and informed of his wishes, as corroborated by statements produced before the domestic courts»²¹.

This brief survey of the Englaro and Lambert cases help us to figure out the two different legal approaches pursued by the courts in tackling this challenge: a so-called libertarian approach²² and a

¹⁸ See R. HUXTABLE, R. MEULEN, *The Voices and Rooms of European Bioethics*, New York, 2015; D. THOUVENIN, *La loi n° 2005-370 du 22 avril 2005, dite loi Leonetti: la médicalisation de la fin de vie*, in J. FERRY (ed.), *Fin(s) de vie*, Paris, 2011, 303-368; C. MAZZOCATO, *Loi «Leonetti», un changement de paradigme qui demandera du temps*, in *Revue internationale de soins palliatifs*, 2012, 3-4; M. GAILLE, R. HORN, *The role of "accompagnement" in the end-of-life debate in France: from solidarity to autonomy*, in *Theoretical Medicine and Bioethics*, 2016, 473-487.

¹⁹ As asserted by the ECHR, the organization of the decision-making process (including the designation of the person who makes the final decision, and the arrangements for the final making of the decision) falls within the margin of appreciation of the State (par. 168). The judges pointed out that the process had taken into consideration all points of view (including the presumed wish of Mr. Lambert himself), and that effective domestic remedies had been available to the applicants. The European Court's decision is consistent with what was said by the *Conseil d'État* but it comes to drastically different conclusions from the Administrative Court judgment. The Administrative Court, in fact, opined that the decision to withdraw artificial nutrition and hydration from Mr. Lambert «had constituted a serious and manifestly unlawful breach of (Mr. Lambert's) right to life».

²⁰ ECHR, Grand Chamber, Case of Lambert and others v. France, Application no. 46043/14, 2015, par. 148.

²¹ The Court found the procedure consisting in the determination of the patient's wishes and consulting those close to the patient as well as other medical personnel to be compatible with art. 2: «The Court observes that, although the procedure under French law is described as "collective" and includes several consultation phases (with the care team, at least one other doctor, the person of trust, the family or those close to the patient), it is the doctor in charge of the patient who alone takes the decision. The patient's wishes must be taken into account and the decision itself must be accompanied by reasons and is added to the patient's medical file» (ECHR, Grand Chamber, Case of Lambert and others v. France, Application no. 46043/14, 2015, par. 163).

²² Judges investigate some of the most fundamental principles of our constitutional system in light of the patient's personal, subjective meaning. In doing so, judges stress the importance of the right to self-

more “science-based” approach. Even though judges oftentimes pursue the libertarian approach²³, at times this approach seems to be useless.

When the patient lacks advance directives expressing his desires or when his will is unfathomable, a few national legal systems opt for the best interest test, defined as «an umbrella principle covering different kinds of usage»²⁴. The best interest test encompasses several criteria such as: the person’s past and present wishes and feelings – for example, if a person had strongly-held views in the past, this may shape their treatment; the existence of written statements that provide information about an individual’s wishes of how they would like to be cared for; the beliefs and values that would be likely to influence their decision if they had the capacity – evidence of which can be found by looking at an individual’s cultural background, religious beliefs, political and moral convictions or past behaviour or habits; other factors that they would be likely to consider if they were able to do so²⁵.

But it is worth noting that whenever the patient is - for example - an infant or a severely disabled person since birth, the first three criteria will turn out to be worthless. As a consequence, the latter criterion has to be used and it could be filled with scientific (and neuroscientific) information.

Charlie Gard’s case is a case in point. It represents an example of the science’s role in case law where one of the two approaches is out of reach²⁶. Charlie was, indeed, a 10-month-old boy whose wishes were impossible to derive. In Charlie Gard’s case, scientific and neuroscientific evidence was used in order to ascertain, first of all, whether the experimental therapy is useful or futile (that in this case means pointless or of no effective benefit); secondly, that Charlie’s quality of life is one that is not worth sustaining and that it is in Charlie’s best interest for artificial ventilation to be withdrawn and for his treating clinicians to provide him with palliative care only²⁷.

The overview offered here demonstrates how neuroscience and the measuring the mental state of patients are increasingly gaining ground in legal reasoning and in the solution of sensitive cases involving end-of-life decisions of incapable patients²⁸. This compels jurists to ponder the role of neuro-

determination over other public interests that inform the constitutional framework, such as the protection of human life.

²³ This is what happened, for example, in the Englaro case. Even as the judges were using both arguments, the decision probably relied on the libertarian approach: as judges pointed out, the second condition for withdrawing a medical treatment is the provision that such request truly expresses the very idea of the personal dignity of the voice of the person represented on the basis of clear, concordant and convincing evidence, obtained from her personality, lifestyle and predispositions, corresponding to her way of thinking, before falling in the state of unconsciousness: the person’s very idea of dignity.

²⁴ L.M. KOPELMAN, *The best interests standard for incompetent or incapacitated persons of all ages*, in *The Journal of Law, Medicine and Ethics*, 2007, 187-196.

²⁵ UK Mental Capacity Act, 2005, available here <https://www.legislation.gov.uk/ukpga/2005/9/contents>.

²⁶ See Judgment of the UK Supreme Court in the case of Charlie Gard, 19 June 2017, paragraph 10, available here: <https://www.supremecourt.uk/cases/docs/charlie-gard-190617.pdf>.

²⁷ See C. DYER, *Law, ethics, and emotion: the Charlie Gard case*, in *The British Medical Journal*, 2017; D. WILKINSON, J. SAVULESCU, *Hard lessons: learning from the Charlie Gard case*, in *Journal of Medical Ethics*, 2017; J. SAVULESCU, *Is it in Charlie Gard’s best interest to die?*, in *The Lancet*, 2017, 1868-1869; E. SGRECCIA, *La lezione del piccolo Charlie Gard/The lesson learned from baby Charlie Gard*, in *Medicina e Morale*, 2017, 285-289.

²⁸ Another example of the use of neuroscience is the aforementioned Lambert case when the *Conseil d’État* affirmed that «To that end it needed to have the fullest information possible at its disposal, in particular concerning Vincent Lambert’s state of health. Accordingly, it considered it necessary before ruling on the application to order an expert medical report to be prepared by practitioners with recognised expertise in neuroscience».



science and the interaction between law/rights and neuroscience, as well as the effects of the possibility of reading minds.

3. Neuroscience and the capability of “reading minds”: new challenges for the world of law

Even though the first records of “brain waves” by physicians date from the 1920s²⁹, it is during the last three decades that «neuroscientific studies have begun to meet the challenge of understanding of cognitive function»³⁰. Nowadays, this growing ability apparently permits the unveiling of interior elements of human beings - even the person’s thoughts - in the absence of external manifestations. Physicians, indeed, seem capable of measuring the true mental state of individuals and their inner world through an electroencephalography or a functional magnetic resonance imaging. Experiments and studies have been carried out all over the world regarding the possibility to “read” the mental processes involved in thinking and to communicate with people who cannot speak. In this field, some of the most relevant studies are those made by a group of international researchers working at the Brain and Mind Institute of Western Ontario University, Canada³¹. During these experiments, scientists have applied sophisticated methods of augmentative alternative communication with people unable to speak or move, thanks to brain computer interfaces. They demonstrate that some non-responsive patients can respond to commands by modulating their brain activity according to instructions. The communication is permitted by recording the brain activity of a subject according to external inputs: when the patient thinks about actions or movements that are suggested by scientists, a computer checks if brain areas corresponding to those mental performances are activated. This is possible because when a person thinks, a precise area of his brain (neuro-identified with images) produces a trace discernible through electro-physiological exams. So, for example, it is possible to ask a patient to think of playing tennis if he wants to give a positive response to a question, or think of raising a hand if he wants to give a negative one. Looking at the mental activities (playing tennis or raising hand) emerging by the brain waves read, the person who asked the question is able to understand the answer of his interlocutor. In sum, currently, the «ability to use neuroimaging to “read minds” is unusually advanced, thanks in large part to functional magnetic resonance imaging»³²; this

Moreover, the *Conseil d’État* considered it necessary «to request the National Medical Academy, the National Ethics Advisory Committee and the National Medical Council, together with Mr Jean Leonetti, the rapporteur for the Act of 22 April 2005, to submit general written observations». The expert report found that Lambert’s clinical condition corresponded to a vegetative state, without any signs pointing to a minimally conscious state. The experts also noted that «five and a half years had passed since the initial head injury and that the imaging tests showed severe cerebral atrophy testifying to permanent neuron loss, near-total destruction of strategic regions such as both parts of the thalamus and the upper part of the brain stem, and serious damage to the communication pathways in the brain. They concluded that the brain damage was irreversible».

²⁹ In those years, Hans Berger invented electroencephalography (EEG). See D. MILLETT, *Hans Berger: From Psychic Energy to the EEG*, in *Perspectives in Biology and Medicine*, vol. 44, 2001, 522-542.

³⁰ B. GARLAND, P.W. GLIMCHER, *Cognitive neuroscience and the law*, in *Current Opinion in Neurobiology*, 16, 2006, 130.

³¹ See L. NACI, M.M. MONTI, D. CRUSE, A. KÜBLER, B. SORGER, R. GOEBEL, B. KOTCHOUBEY, A. OWEN, *Brain computer interfaces for communication with nonresponsive patients*, in *Annals of Neurology*, vol. 72, no. 3, 2012, 312-323.

³² H.T. GREELY, *Law and the revolution in neuroscience: An early look at the field*, in *Akron Law Review*, no. 42, 2009, 694.

imaging can check mental signals that «can then be used to assess what brain regions are active during various mental activities, by having people in a scanner see, here, do, move, or think, about something»³³.

These new frontiers reached by scientists affect the world of law both by raising tricky issues with regard to the implementation of some - traditional - fundamental rights (such as the freedom of thought), and by providing new processual tools: indeed, «legal practitioners have increasingly sought to employ cognitive neuroscientific methods and data as evidence to influence legal proceedings»³⁴.

In relation to the first aspect, it is worth noting that the possibility of reading minds offered by new neuroscientific techniques represents simultaneously a potential ally and a potential harm for fundamental rights.

An interesting comment³⁵ on Article 9 of the European Convention on Human Rights (“Freedom of thought, conscience and religion”) reads: «It is true that thoughts, as long as they have not been expressed, are intangible and that convictions are really valuable for the person concerned only if he can express them, but the freedom of thought also implies that [...] any form of compulsion to express thoughts [...] is prohibited». As an example of compulsion, the comment mentions the use of lie-detectors or hypnosis³⁶. If we agree that freedom of thought has this wide content and we believe that even the physical/mental phenomena involved in thinking fall under its ambit, we might admit that the use of the neuro-techniques above described jeopardizes the freedom of thought or “freedom of mind”³⁷. And strictly linked to this right is the right to privacy, that could be compromised as well: if scientific progress permits one to reveal someone’s thought in the absence of external manifestations, it is necessary to provide the person (or someone else, i.e. a guardian) with the power of opting out of the interface that is reading his mind, together with the sensitive data available there. Even personal liberty could be challenged by the new forms of brain detection. Within the Italian constitutional literature, it has been affirmed that, under the wide umbrella of Article 13 of the Constitution (“Personal liberty”), there does exist a right of the individual of being protected from «intrusions into his psychic sphere, both with regard to the integrity of this latter [sphere] and with regard to the formation of conscience and thought»³⁸. According to this view, the concept of the person includes his cognitive function. Consequently, we may wonder under which conditions a technique that allows one to detect this function can be considered legitimate, in compliance with the respect for personal liberty.

Finally, as health risks related to the use of neuroscience must not be excluded, another fundamental right potentially put at risk is the right to health: brain imaging, for instance, involves the use of con-

³³ *Ivi.*

³⁴ B. GARLAND, P.W. GLIMCHER, *quoted*, 130.

³⁵ See B. VERMEULEM, *Article 9*, in P. VAN DIJK, G.J.H. VAN HOOF (ed.), *Theory and practice of the European Convention on Human Rights*, Deventer, 1990, 397.

³⁶ *Ivi*, footnote no. 1033.

³⁷ See M.J. BLITZ, *Freedom of Thought for the Extended Mind: Cognitive Enhancement and the Constitution*, in *Wisconsin Law Review*, no. 4, 2010, 1049.

³⁸ G. VASSALLI, *Il diritto alla libertà morale. Contributo alla teoria dei diritti della personalità*, in *Id.*, *Scritti giuridici*, vol. 3, Milano, 1997, 253.



trast fluids injected inside the cerebral organ; these liquids are useful for detecting mental activity, but at the same time they are invasive and it is uncertain whether they are innocuous. The same can be said about those kinds of encephalography that require the application of electrodes on the brain through a surgery. It stands to reason that this issue becomes trickier if these treatments are applied to unresponsive patients, incapable of giving informed consent.

Although the potential impingement of the aforementioned fundamental rights is serious, from an opposite perspective, the capability of “reading minds” also can be seen as a chance to implement the freedom of thought, the freedom of expression, the right to a fair hearing and even the right to therapeutic self-determination.

It is usually affirmed that the manifestation of thought «is a necessary annex to fully realize freedom of thought»³⁹, as «freedom of expression provides the medium for exchange of free thoughts»⁴⁰. In this light, it can be said that forms of communication permitted by recording the brain activity are a way to permit - in fact - unresponsive patients to fully realize, in addition to their freedom of expression, their freedom of thought.

Also the right to a fair hearing - and more generally the right to a fair trial - can benefit from the use of neuroscience⁴¹. Currently, neuroscience «has been proffered and admitted in a variety of jurisdictions, in both civil and criminal cases and for a variety of purposes»⁴². And surely the criminal field is the most affected by this revolution⁴³. Just think about the use of neuroimaging in trials to declare a defendant incapable of standing trial⁴⁴: as O.C. Snead reminds us, one of «the most famous example of neuroimaging being used in an insanity defense is the case of John Hinckley, Jr., who attempted to assassinate President Ronald Reagan in 1981. There, the court admitted a CT scan to show that Hinckley’s brain had atrophied, which the defense argued - over the vigorous argument of the government’s expert - was evidence of organic brain disease»⁴⁵. But other forms of neuroscience are al-

³⁹ J.C. BUBLITZ, *Freedom of thought in the age of neuroscience*, in *ARSP*, 100/1, 2014, 4.

⁴⁰ *Ivi*.

⁴¹ See F.G. PIZZETTI, *Neuroscienze forensi e diritti fondamentali: spunti costituzionali*, Torino, 2012, 41. The author affirms: «Dalla disamina delle disposizioni costituzionali nazionali e delle norme sopranazionali [...] emerge l’esistenza di un diritto alla prova dal perimetro significativamente ampio, tanto da arrivare a comprendere qualsiasi mezzo di prova anche nuovo [...], quali attualmente risultano essere i metodi e le tecniche neuroscientifiche, [...] a più ampia tutela e garanzia del diritto alla difesa» (p. 47).

⁴² See O.C. SNEAD, *Cognitive neuroscience and the future of punishment*, in J. ROSEN, B. WITTES (ed.), *Constitution 3.0: Freedom and Technological Change*, Washington, 2011, 5.

⁴³ As regards the civil context, «neuroimaging has been proffered and admitted to prove actual harm (and, to a lesser extent, causation) in personal injury cases». Moreover, «in contract disputes, neuroimaging has been admitted - and has been found persuasive by fact finders - to show that one of the parties lacked sufficient cognitive capacity to form a valid contract». See O.C. SNEAD, *Cognitive neuroscience and the future of punishment*, quoted, 5.

⁴⁴ See F.G. PIZZETTI, *Neuroscienze forensi e diritti fondamentali: spunti costituzionali*, quoted, 18-21.

⁴⁵ O.C. SNEAD, *Cognitive neuroscience and the future of punishment*, quoted, 6.

so adopted, like advanced methods of lie detection⁴⁶, or even in order to reveal memory traces in a witness's mind, thanks to the sophisticated technique of brain fingerprinting⁴⁷.

Finally, if we imagine the use of brain-computer interfacing to obtain the consent to medical treatments from patients incapable of articulating words or moving the body, we can think of those neuro-techniques as a means to implement patients' right to therapeutic self-determination⁴⁸: «functional neuroimaging may prove to be most valuable, as a unique clinical tool for probing volition [...] without necessarily assuming that the patient is able to produce any motor output»⁴⁹. This last example shows that, although the use of neuroscientific evidence is usually studied in relation to criminal trials, we should not underestimate its use in case law involving end-of-life decisions.

4. Why should we resort to neuroscience in end-of-life decisions?

When dealing with end-of-life and scientific progress, it is worth remembering that «we are living at a time in which scientific progress has revolutionized our relationship with [...] death. Now, unlike before, [...] we can receive extraordinary treatments and be kept for a long period in a state that can be termed “life” purely in terms of physiological function»⁵⁰. On the one hand, medical sciences now permit saving human beings (and keeping them alive for years) even after awful accidents or mortal pathology. On the other hand, it can happen that patients survive but in desperate conditions, of which one of the worst is the unresponsive state. This latter scenario raises hard questions for practical jurists (and for physicians as well): when can extraordinary lifesaving measures be considered legitimate medical treatments? And when, on the contrary, would they be forms of “therapeutic persistence”? What are the limits to the right to receive medical care? If physicians have no doubt that a patient suffers from terrible pains and there is no reasonable hope of healing, is keeping him alive coherent with the fundamental duty of protecting life or, differently, does this constitute a violation of human dignity? In absence of a living will, when should it be in the interest of the unresponsive patients to withdraw life support?

All these hard questions run into the world of neuroscience: even if neuroscientific techniques are not medical treatments (and surely not lifesaving measures), they are diagnostic tools that allow one to better understand the real condition of an unresponsive patient and to distinguish between a co-

⁴⁶ See, above all, H.T. GREELY, J. ILLES, *Neuroscience-based lie detection: the urgent need for regulation*, in *American Journal of Law and Medicine*, no. 33, 2007, 377-431.

⁴⁷ See, among others, W.G. IACONO, *The forensic application of “brain fingerprinting”: why scientists should encourage the use of P300 memory detection methods*, in *The American Journal of Bioethics*, vol. 8, no. 1, 2008, 30-32. The article reads: «Forensic P300-based memory detection methods [...] tap recognition memory for crime-related details, [...] by measuring autonomic nervous system responses to test items» (p. 30).

⁴⁸ See F.G. PIZZETTI, *Libertà di autodeterminazione e protezione del malato nel “Brain-Computer interfacing”: un nuovo ruolo per l'amministratore di sostegno?*, in *Rivista Critica del Diritto Privato*, vol. 29, no. 1, 2011, 31-60; G. RAGONE, B. VIMERCATI, *Lightness, law and neurosciences: a new tool to protect the unresponsive patient's self-determination?*, in AA.VV., *Legal Imagination(s). Memos for a Law of this Millennium. Conference proceedings*, Univali, 2015, 99-112.

⁴⁹ M.M. MONTI, M. MARTIN, M.R. COLEMAN, A.M. OWEN, *Neuroimaging and the vegetative state: resolving the behavioral assessment dilemma?*, in *Annals of the New York Academy of Sciences*, 2008, 81.

⁵⁰ P. DE NARDIS, *End of life arrangements. Round table*, in C. CLEMENTE, G. CERSOSIMO (ed.), *The pre-chosen death. End of life arrangements and instructions*, Milano, 2011, 107.



ma⁵¹, a vegetative state⁵², a minimally conscious state⁵³ and a locked-in state⁵⁴. The consequences of this possibility for the law are various. First of all, the recent «increase in the exploration of residual cognitive abilities»⁵⁵ could make more reliable and accurate the diagnosis of brain death⁵⁶ that is used in many jurisdictions⁵⁷ as an indicator of legal death. Second, the detection of residual brain activity can be an indicator of the reversibility of the unresponsive state, a condition that can be an obstacle to the decision to withdraw life support. Consider the aforementioned Englaro case: in that occasion, the Italian Court of Cassation said that, in order to authorize the withdrawal, the permanent vegetative state must be ascertained, under rigorous medical assessment, and there must not be evidence in support of the possibility that the patient would regain consciousness.

But that is not all: neuroscience promises to let us know some of the inner elements of the person – such as awareness of the outer world⁵⁸, perception of pain⁵⁹ and even will⁶⁰ - that are usually unknown with regard to unresponsive or incapacitated patients and infants, and that can be used by

⁵¹ There are no signs of wakefulness and no signs of awareness. Usually it is transient and in rare cases, chronic.

⁵² There are signs of wakefulness, including eye opening and stimulus-induced arousal, but no signs of awareness of oneself or of the environment.

⁵³ There are signs of wakefulness and inconsistent but reproducible signs of awareness, including sustained visual pursuit, command following, and intelligible verbalization. It may be chronic or permanent.

⁵⁴ Patients are usually aware, but unable to move or speak, and, unless completely locked-in, may communicate via small eye movements. In the acute phase, awareness may be impaired (for the description of this and the previous disorders of consciousness, See L. NACI, M.M. MONTI, D. CRUSE, A. KÜBLER, B. SORGER, R. GOEBEL, B. KOTCHOUBEY, A. OWEN, *quoted*, 312-323).

⁵⁵ See M.M. MONTI, M. MARTIN, M.R. COLEMAN, A.M. OWEN, ADRIAN M., *quoted*, p. 81.

⁵⁶ According to A.K. GOILA, M. PAWAR, *The diagnosis of brain death*, in *Indian Journal of Critical Care Medicine*, 2009 (available here: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2772257/> last accessed 31/10/2017): «Brain death is defined as the irreversible loss of all functions of the brain, including the brainstem. The three essential findings in brain death are coma, absence of brainstem reflexes, and apnoea».

⁵⁷ In Italy, the “cerebral criterion” is established by art. 1 of the law no. 578, delivered 29th December 1993.

⁵⁸ It is not impossible that a patient apparently in coma has awareness of the outer world. Consider the famous case of Martin Pistorius, the South African man who spent eight years fully conscious but locked inside his body by a virtual coma. For more details, see L. BEIL, *Locked Inside: As more people survive brain injuries, scientists work to reach patients with hidden consciousness*, in *Science News*, vol. 188, 2015, 18–21.

⁵⁹ According to Luca Saba (L. SABA (ed.), *Neuroimaging of Pain*, Cham, 2017, IX), «Pain is a complex, multifactorial subjective and conscious experience; an interpretation of the nociceptive input influenced by memories, emotional, pathological, genetic, and cognitive factors. Resultant pain is therefore not always related linearly to the nociceptive drive or input, neither is it solely for vital protective function. By its very nature, pain is therefore difficult to assess, investigate, manage, and treat. Until the advent of modern noninvasive human brain imaging methodologies about 20 years ago, our understanding of the role of the brain in pain processing was limited. In the last two decades, advances in brain imaging techniques have had a profound influence on our understanding of pain processing. In the early 1990s, human whole-brain functional imaging studies first showed multiple brain areas involved in pain processing, whereas other studies have revealed the involvement of forebrain neurotransmitters in pain modulation. Recently, new advances in human brain imaging techniques allowed a better understanding of the functional connectivity in pain pathways, as well as the functional and anatomical alterations that occur in chronic pain patients. Modern imaging techniques have permitted rapid progress in the understanding of networks in the brain related to pain processing and those related to different types of pain modulation. The future is bright for what brain imaging can contribute to our understanding of pain».

⁶⁰ Thanks to experiments as those made in Canada, we can imagine to ask a patient to answer “yes” or “no” to choices and decisions that involve him.

physicians and jurists in many ways. Let us think about the consequence of the possibility of using augmentative communication systems in order to detect the patients' will: this can resolve the huge problems originated by the absence of a living will. Indeed, brain-computer interfacing – currently still in development – could be used in the future to obtain informed consent from patients and to ask them for the permission to keep them alive.

Last but not least, it is worth noting that elements like the awareness of the outer world and the perception of pain are sometimes used by Courts as criteria useful to evaluate the patient's quality of life and, consequently, to decide whether it is in the best interest of the person to be kept alive. That is what has happened with the Charlie Gard case. In this occasion, the UK Supreme Court⁶¹ established that withdrawal was the best choice for the patient considering - among other elements - that: the child had suffered structural brain damage, almost entirely irreversible, due to which he had little or no awareness of the world around him; moreover it was uncertain whether he was suffering pain, but it was likely that he was and at more than a low level.

As it emerges, neuroscience promises the knowledge of elements that seem pivotal in the field of end-of-life decisions and that appear to be useful for those Courts tasked to decide about the withdrawal of vital supports. Nonetheless, it is worth pointing out that most of «these scientific methodologies have largely been designed and validated for experimental use only. Their subsequent use in legal proceedings is an application for which they were not intended, and for which those methods are inadequately tested»⁶². We completely agree with Garland and Glimcher, who recommended that «neurobiologists [...] should be aware of how their papers will be read by the legal community and should play a more active role in educating and engaging with that community»⁶³.

5. Free will and neuroscience: a possible coexistence?

In the previous paragraphs, we pointed out in practical terms the role of neuroscience in end-of-life issues. Beyond the mere usefulness of neuroscience in solving cases involving end-of-life decisions, we want now to address some of the theoretical questions link to this use of science.

As mentioned above, the development of neuroscientific techniques allows us to become aware of the relationship existing - from a physiological point of view - between the cognitive process and the neuronal process. This kind of relationship is evident especially when a pathological or injurious event harms certain specific areas of the brain that are considered the place of cognition processes (regulation of emotional behavior, communication, reasoning, and the understanding of one's own mental state, among others), namely the prefrontal lobes⁶⁴. So, cognitive neuroscience seeks to provide «comprehensive explanations of human behavior in purely material terms»⁶⁵. The Nobel Prize in Physiology or Medicine winner Francis Crick wrote in his book: «You, your joys and your sorrows,

⁶¹ See Judgment of the UK Supreme Court in the case of Charlie Gard, 19 June 2017, par. 10, available here: <https://www.supremecourt.uk/cases/docs/charlie-gard-190617.pdf> (last accessed 31/10/2017).

⁶² B. GARLAND, P.W. GLIMCHER, *quoted*, 130.

⁶³ *Ivi.*

⁶⁴ D. GROSSI, L. TROJANO (ed.), *Neuropsicologia dei lobi frontali. Sindromi disesecutive e disturbi del comportamento*, Bologna, 2013.

⁶⁵ M.J. FARAH, *Neuroethics: The Practical and the Philosophical*, in *Trends Cognitive Sciences*, vol. 9, 2005, 34-40.



your memories and your ambitions, your sense of personal identity and free will, are in fact no more than the behavior of a vast assembly of nerve cells and their associated molecules»⁶⁶.

This statement discloses why neuroscience is not an entirely certain way to ascertain the patient's clinical condition, but rather it is a scientific theory describing pure human nature itself. Using the theory of the physicalist philosopher Neurath⁶⁷, indeed, the philosophical current called physicalism does not only explain the physical laws governing reality, but it is itself the only way to understand and describe reality. Borrowing this reasoning, the extreme consequence is that free will may be considered as the mere outcome of chemical-physical processes. This assumption creates two problems: the first is a wider and general problem that affects the relationship between citizens and the legal system in terms of legality and the second is a more defined problem bound with the use of neuroscience in the end-of-life decision-making process.

Under the general perspective, the nothingness of free will leads to questions on legal principles⁶⁸. According to Kelsen: «Human Behaviour (...) is either positively or negatively regulated by a normative order. (...) To say that the behaviour of an individual is commanded by an objectively valid norm amounts to the same as saying the individual is obliged to behave in this way. (...) Human behaviour is positively regulated also, when an individual is authorized by the normative order to bring about, by a certain action, certain consequences determined by the order»⁶⁹. In Kelsen's theory, indeed, the «individual is free because one imputed a sanction to his behavior»⁷⁰.

This conception potentially clashes with the effects produced by the application of neuroscience in criminal law. Traditional and current legal categories have been overwhelmed by this application of neuroscience to the extent that some authors argue that «neuroscience will change these moral intuitions by undermining the intuitive, libertarian conceptions of free will upon which retributivism depends. (...) Free will as we ordinarily understand it is an illusion generated by our cognitive architecture. Retributivist notions of criminal responsibility ultimately depend on this illusion (...). At this time, the law deals firmly but mercifully with individuals whose behavior is obviously the product of forces beyond their control»⁷¹.

6. Liberty, neuroscience and law. The subjective–objective dichotomy

Assuming that free will is an illusion, the second, more defined problem is: how can neuroscience offer support to jurists in investigating the patient's wishes? How does the theory excluding free will fit in with the self-determination dogma?

⁶⁶ F. CRICK, *The Astonishing Hypothesis: The Scientific Search for the Soul*, London, 1994, 3.

⁶⁷ See R. CARNAP, C. MORRIS C., O. NEURATH (ed.), *International Encyclopedia of United Science: Foundations of the Unity of Science*, Chicago, 1938-1969; D. ZOLO, *Scienza e politica in Otto Neurath: una prospettiva post-empiristica*, Feltrinelli, 1986; A. REVONSUO, M. KAMPPINEN, *Consciousness in Philosophy and Cognitive Neuroscience*, Hillsdale, 1994; D.D. HUTTO, *Beyond Physicalism*, Amsterdam, 2000.

⁶⁸ See A. ROSENBERG, *Darwinian Reductionism or How to Stop Worrying and Love Molecular Biology*, Chicago, 2006, 2.

⁶⁹ H. KELSEN, *Pure Theory of Law*, Berkeley, 2005, 15.

⁷⁰ *Ibidem*, 98.

⁷¹ J. GREENE, J. COHEN, *For the law, neuroscience changes nothing and everything*, in *Philosophical Transactions of the Royal Society of London, series B*, 2004, 1775–1785.



Neuroscience has indeed the power to reshape some of the legal but also ethical notions underlying end-of-life law. The rights concerning life and death, affected by science and neuroscience, are also ontologically related to a pre-legal dimension that requires a previously moral and ethical reflection. This ethical and moral reflection in turn has been worsened by the jeopardization of a shared set of values⁷². It must further be borne in mind, indeed, that we live in a pluralistic society where there are many conflicting sets of values and where powers are not guided by an indisputable set of values, notwithstanding the axiological constitutional framework⁷³.

This is one of the reasons why a subjectivity process has been gaining ground⁷⁴ and has resulted in a different approach to constitutional interpretation. Most fundamental principles of our constitutional system are investigated in light of the patient's personal, subjective meaning. According to this line of reasoning, human dignity and self-determination overlap. Human dignity has been long considered by European lawyers as an "objective value", able to limit other fundamental rights⁷⁵ (see in this sense the well-known dwarf case⁷⁶).⁷⁷ But dignity is losing this objective connotation and self-determination is becoming its core content; therefore the untouchable worthiness of human beings would consist of the ability to decide their actions and their destiny⁷⁸. Hence, as observed by Snead,

⁷² Beyond the ethical and moral split, there are concepts with a huge number of meanings. Over than 200 senses of the word "free" have counted. Hume, indeed, defined the question of liberty as the most contentious question of metaphysics, the most contentious science (D. HUME, *An Enquiry Concerning Human Understanding*, vol. 37, Part 3, Harvard, 1909-1914).

⁷³ See A. D'ALOIA, *Al limite della vita: decider sulle cure*, in *Quaderni costituzionali*, 2010, 240: «Quando si dice che la Costituzione rappresenta un tentativo di giuridicizzare la morale (...) non ci si può meravigliare poi che questa opera di traduzione e di "valorizzazione" dei valori, finisca col riflettere il pluralism di questo dibattito, riportandolo in pieno, con tutto il suo carico di posizioni inconciliabili, dentro il contest normativo costituzionale».

⁷⁴ See G. CROWDER, *Liberalism and Value Pluralism*, London-New York, 2002; M.J. MOORE, *Pluralism, Relativism, and Liberalism*, in *Political Research Quarterly*, vol. 62, no. 2, 2009, 244-256.

⁷⁵ G. BOGNETTI, *The Concept of Human Dignity in European and U.S. Constitutionalism*, in G. NOLTE (ed.), *European and US Constitutionalism, Science and Technique of Democracy No. 37*, Cambridge, 2005.

⁷⁶ *Conseil d'Etat*, October 27, 1995, Rec. Lebon, 372. The case concerned a dwarf engaged in dwarf throwing (lancer de nain), a controversial activity which commonly occurs in settings such as pubs. The French Court stated that it was a violation of dwarf's human dignity despite the dwarf's consent and the limitation of his right/freedom to occupation. See C. LEGET, "Nobody tosses a dwarf!" *The relation between the empirical and the normative reexamined*, in *Bioethics*, 2009, 226-235; D. BEYLEVELD, R. BROWNSWORD, *Human dignity, human rights, and human genetics*, in *The Modern Law Review*, 1998, 661-680; C. FOSTER, *Human Dignity in Bioethics and Law*, Oxford, 2011.

⁷⁷ See D. FELDMAN, *Human Dignity as a Legal Value*, in *Public Law*, 1999, 682-285: «We must not assume that the idea of dignity is inextricably linked to a liberal-individualistic view of human beings as people whose life-choices deserve respect. If the State takes a particular view on what is required for people to live dignified lives, it may introduce regulations to restrict the freedom which people have to make choice with, in the State's view, interfere with the dignity of the individual, a social group or a human race as a whole. (...). One it became a tool in the hands of lawmakers and judges, the concept of human dignity is a two-edge sword».

⁷⁸ The concept of health itself has become involved in the same phenomenon. Noteworthy is the definition of health offered by the WHO: «Health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity».



«Certain basic assumptions, which served as the foundation for elements of the constitutional system, can be radically altered with time, bringing into doubt the provisions that rely upon them»⁷⁹.

But, at the same time, it seems to be that, within this context marked by subjectivism and the heterogeneity of values⁸⁰, the legal system is attempting to regain a renewed certainty, a renewed objectivity suitable for solving sensitive cases⁸¹. Law itself cherishes the value of certainty. Law, by its very nature, requires and needs order and stability, as highlighted by the long-standing doctrinal debate over it: «Certainty is not a typical feature of law (...). Indeed, certainty is the law itself as well as – circularly – law is certainty itself, since law, in its normative meaning, strives for certainty or certainties»⁸². The typical connotations of law are imbued with an idea of heaviness because law is established to adjust the life of society, giving rationality and stability to the life of society⁸³.

Meanwhile, however, law is strictly intertwined to reality that is in constant evolution because of, among other reasons, scientific progress. Constitutional law, in particular, is facing even growing and deep difficulties because technological changes can cause previously latent theoretical conflicts to surface.

This trend is growing among judges who more and more often rely on a scientific approach as the legal argument by which they can unravel the knot⁸⁴. An example is the cross-reference to quality of

⁷⁹ O.C. SNEAD, *Technology and the Constitution*, in *The New Atlantis*, 2004, 61-69. An example is offered by the recognition of the right to die fostered by this conception of human dignity: «We express our individuality not only in the way we live our lives but also, even more profoundly, in the way we choose to die. (...) There is no decision in life in which one's personal dignity and autonomy are more profoundly implicated than the deeply personal decision about when and how to die» (P. TEACHOUT, *A Time to Die: A Proposed Constitutional Framework for Dealing with End-of-Life Decisions in a World Transformed by Modern Technology*, in C. CASONATO (ed.), *Life, Technology and Law*, Bologna, 2007, 53).

⁸⁰ As another consequence, courts and judges play an increasing role in this kind of issue. «Legislatures will not always have the fortitude to take on the challenge of bringing the Constitution and the laws into line with changing technologies, and the questions facing judges will grow more complex and more daunting as new technologies emerge» (O.C. CARTER, *Technology and the Constitution*, quoted, 69).

⁸¹ «The solidity of facts and the rigor of the law are two kinds of hardness to which one can only submit» (B. LATOUR, *Scientific objects and legal objectivity*, in A. POTTAGE, M. MONDY (ed.), *Law, Anthropology and the Constitution of the Social: Making Persons and Things*, Cambridge, 2004, 73-113).

⁸² A. RUGGERI, *La certezza del diritto al crocevia tra dinamiche della normazione ed esperienze di giustizia costituzionale*, in www.costituzionalismo.it, 2015 (last accessed 31/10/2017): «La certezza non è, infatti, del diritto, al pari di altri attributi che ne danno la complessiva caratterizzazione. Piuttosto, la certezza è diritto, così come, circolarmente, il diritto è certezza, se è vero che il diritto, nella sua accezione normativa (non la sola, come si sa, ma di certo una delle sue più immediatamente qualificanti espressioni), inteso cioè come regola (o insieme di regole), si costituisce allo specifico fine di dare certezza, anzi: certezze».

⁸³ See L. VIOLINI, *Tra scienza e diritto: i nodi irrisolti della fecondazione medicalmente assistita*, in N. ZANON, A. CELOTTO (ed.), *La fecondazione medicalmente assistita: al margine di una legge controversa*, Milano 2004, 39: «La scienza è in continua evoluzione, in continuo ripensamento rispetto a se stessa, mentre il mondo delle norme, pensate come fattore di stabilità, di razionalizzazione e di continuità ha come connotato saliente la staticità. L'una sembra, così, mettere in continua discussione l'altro».

⁸⁴ O.C. SNEAD, *Cognitive Neuroscience and the Future of Punishment*, quoted, 130-152: «Also like other disciplines within modern science, cognitive neuroscience operates by way of reduction. That is, its chief explanatory aspiration is to explicate complex matters in the most simple and elemental terms. It seeks to explain the "macrophenomena" of thought and action solely in terms of the "microphenomena" of the physical brain». See also R. BIN, *La Corte e la scienza*, in A. D'ALOIA (ed.), *Bioteologie e valori costituzionali. Il contributo della giustizia costituzionale*, Torino, 2005: «il problema della rilevanza dei dati scientifici è cruciale soprattutto nei



life criteria in end-of-life issues⁸⁵. These criteria, which come into use as a tool for pursuing subjectivity, are increasingly filled with scientific (objective) elements, such as neuroscientific data⁸⁶. The term “quality” itself entails something measurable through objective scientific tools and techniques.

It is expedient to underline the fact that, as with criminal law, the remarkable developments in understanding the neurological mechanism controlling human choices may reframe the question of autonomy. Is still free will a valid concept for law or is free will worth practically nothing because it follows ineluctably from the law of nature?⁸⁷ «Are the harmful effects and risks of neuro-scientific techniques so great that they overcome the possible benefits of using these new techniques?»⁸⁸.

Given any positive answer to the previous question, it may result in a torsion of the subjectivity process mentioned before. The cornerstone of the subjectivity process (free will/self-determination) will turn into an objectivity process, allowing science/neuroscience to control the most sensitive issues addressed by constitutionalism⁸⁹, born to limit powers and to protect the freedom of individuals⁹⁰.

Nevertheless, some experts in neuroscience argue that the level of sophistication achieved by neuroscience is still inadequate to affirm that each human choice is determined by the laws of nature and that free will is a façade or illusion. Not to mention, it further runs into the science paradox: in sci-

giudizi di merito, ove la tentazione di delegare alle scienze “certe” ciò che il giudice non ritiene di poter decidere sulla base dei soli strumenti giuridici costituisce ormai un problema di grande rilievo».

⁸⁵ M.A. TESTA, D.C. SIMONSON, *Assessment of quality-of-life outcomes*, in *The New England Journal of Medicine*, 1996, 835-840; R.M. KAPLAN, *The significance of quality of life in health care*, in *Quality of Life Research*, 2003, 3-16; R. HEYWOOD, A. MULLOCK, *The value of life in English law: revered but not sacred?*, in *Legal Studies*, 2016, 658-682.

⁸⁶ See, in this sense, General Medical Council, *End of life treatment and care: Good practice in decision-making (UK)*, 2010. The latest version is available here: www.gmc-uk.org/guidance (last accessed 3/11/2017): «For children or adults who lack capacity to decide, in reaching a view on whether a particular treatment would be more burdensome than beneficial, assessments of the likely quality of life for the patient with or without the particular treatment may be one of the appropriate considerations. After the WHO’s definition of health, quality-of-life issues have become more and more important in health care practice. While in 1973, only 5 articles listed “quality of life” as a reference key word, during the following 5 years there were 1252 articles (see M.A. TESTA, D.C. SIMONSON, *Assessment of quality-of-life outcomes*, in *The New England Journal of Medicine*, 1996, 835-840).

⁸⁷ See M. RUOSO, *Libero arbitrio e neuroscienze. Alcuni spunti di riflessione*, in *Esercizi Filosofici*, vol. 9, no. 2, 2014, 126-144. The author recollects the remarkable experiments performed by Libet (B. LIBET ET AL., *Time of conscious intention to act in relation to onset of cerebral activity (Readiness-Potential). The unconscious initiation of a freely voluntary act*, in *Brain*, 1983, 623-642). The Libet experiment is commonly used as an evaluation point for essays discussing free will and determinism, although he never affirmed that free will is an illusion (B. LIBET, *Mind Time: The Temporal Factor in Consciousness (Perspectives in Cognitive Neuroscience)*, Harvard, 2004, 143). See J. LEVIN, B. LIBET, *Free Will, and Conscious Awareness*, in *Journal of Cognition and Neuroethics*, 2015, 265-280.

⁸⁸ E.D. COOK, *Neuroscience in Perspective: An Introduction to Ethical Considerations*, 2008, in <https://cbhd.org/content/neuroscience-perspective-introduction-ethical-considerations-0> (last accessed 31/10/2017). See, on the principle of beneficence, T.L. BEAUCHAMP, J.F. CHILDRESS, *Principles of Biomedical Ethics*, Oxford, 2012.

⁸⁹ See M. IENCA, R. ANDORNO, *Towards new human rights in the age of neuroscience and neurotechnology*, in *Life, Science, Society and Policy*, 2017: «While these advances can be greatly beneficial for individuals and society, they can also be misused and create unprecedented threats to the freedom of the mind and to the individuals’ capacity to freely govern their behavior».

⁹⁰ See G. BOGNETTI, *Dividing Powers. A Theory of the Separation of Powers*, Bologna, 2017.



ence, the only certainty is uncertainty about the likelihood that we are accurately describing a particular phenomenon⁹¹.

Even if the suggestion concerning the relationship between free will and determinism may be considered overblown, several questions remain open⁹². The use of neuroscience in bioethics asks jurists constitutional questions, including the relationship between science/neuroscience and the law. The difference between an organism and a human person as understood as stemming from neuroscientific acquisitions, for example, could affect some fundamental rights. Referring to human beings in persistent vegetative state, Peter Singer wrote: «It most respects, the human beings do not differ importantly from disabled infants. They are not self-conscious, rational, or autonomous, and so considerations of a right to life or to respecting autonomy do not apply. If they have no experiences at all, and can never have any again, their lives have no intrinsic value. Their life's journey has to come to an end. They are biologically alive, but not biographically»⁹³.

Although neuroscience can determine the level of awareness and wakefulness⁹⁴, could this determination be assumed as the legal argument in order to affirm that a life is not worth living⁹⁵? What about dignity and what about freedom? May quality of life be reduced to a neuroscientific evaluation? May the value of a life be merely determined by means of the neuroscientific scrutiny of quality of life?

⁹¹ S.S. SILBEY (ed.), *Introduction in The International Library of Essays in Law and Society*, Padstow, 2008, XI: «This should not be taken to suggest homogeneous consensus concerning scientific facts or theories. In contrast to some popular, idealized accounts, science is not a bounded, value-free, amoral, autonomous enterprise engaged in a self-regulated search for timeless, universal, irrefutable truths. Science is the same as all other human activities: a socially constructed phenomenon – the product of collectively organized human labour and decision-making that involves contest, dispute and struggle. Scientific facts are produced under constraints that vary historically and culturally; thus scientific inquiry is both enabled and constrained by what is already known, by technological capacity and the available material resources, as well as the human capacity for work, imagination, collaboration and communication. Those constraints shape both the content of the science and the process of producing that content. Scientific facts have variable status. Some claims have proved durable and sustainable over long periods of time, generating additionally durable and sustainable observations, and explanations have developed thus constituting what we might think of as a core of scientific knowledge; other scientific facts exist in the making, and are actively challenged. Nonetheless, the process is collective and open to those who pursue the training to speak the languages of scientific discourse». See also M.M. MONTI, M. MARTIN, M.R. COLEMAN, A.M. OWEN, *quoted*, 87.

⁹² Marzocco is sceptical about the existence of a complex scenario (V. MARZOCCO, *Le neuroscienze e i nuovi scenari della "vita materiale"*, in A. BALLARINI (ed.), *Costituzione, morale e diritto*, Torino, 2014, 117).

⁹³ P. SINGER, *Practical Ethics*, New York, 1993, 395.

⁹⁴ M.Y RADY, J.L. VERHEIJDE, *Judicial oversight of life-ending withdrawal of assisted nutrition and hydration in disorders of consciousness in the United Kingdom: A matter of life and death*, in *Medical Legal Journal*, 2017, 148-154.

⁹⁵ Royal College of Physicians of London, p. 76 Royal College of Physicians of London. Prolonged disorders of consciousness: national clinical guidelines. London: RCP, 2013. Available at: <http://www.rcplondon.ac.uk/resources/prolonged-disorders-consciousness-national-clinical-guidelines> (last accessed 31/10/2017): «Once it is known that a patient is in permanent VS [vegetative state], further treatment is considered futile. Processes to consider withdrawal of life-sustaining treatments, including CANH [clinically assisted nutrition and hydration], should begin on the basis of their best interests».

7. A matter of balance and a matter of roles

Allowing science to define the concept of personhood means that we are charging science with an improper task. It may be seen as a loophole for legal system based on a deep ethical disagreement. Meanwhile, this surrogacy of science sometimes hides a judgment value (see, for example, the relationship between determination of death and organ donation). This double face of science, both used in order to allow a reflection on sensitive values and to justify a specific purpose, needs to refocus the wide-open question concerning the role of science in law.

As asserted by Carlo Casonato, «one may say that history teaches us that both law and science fail if they try to do [it] all by themselves, if they want to proceed without the acknowledgment of mutual limits and the need to respect reciprocal restrictions and proportions»⁹⁶.

Neuroscience and science are not required to remain uninvolved in legal matters. The capability of “reading minds” made available by neuroscience can play a notable role within end-of-life contexts⁹⁷. Nonetheless, science and neuroscience (in this specific context) are some of the decision-support tools that can be useful in figuring out what the legal problem is and how it can be resolved; and it is not enough to follow a procedure that provides transparency in enclosing scientific data and knowledge⁹⁸. The procedure is in turn a tool and it cannot solve the problem of science’s role in law⁹⁹.

Perhaps it might help if legal systems consider to what extent scientific (and neuroscientific) knowledge can affect legal concepts, legal values and, in particular, constitutional values, a fortiori within pluralistic legal systems.

In “The Right to Have Rights”, Rodotà wrote: «Technologies broaden and lessen the concept of human being/personhood. According to electronics we are our information/data and according to genetics our genes define us. It is appropriate to put less emphasis on technology in order to avoid biology from erasing biography and virtuality from considering abstractly the human being. A human being is much more than just a combination of physical and virtual data»¹⁰⁰.

Nowadays, legal systems fail to define what this “much more” is. It could be identified with dignity (that is, with something belonging to all human beings simply because of their existence), even if

⁹⁶ C. CASONATO, *Introduction. Confronting Life, Technology and Law in a Comparative Perspective*, in C. CASONATO (ed.), *Life, Technology and Law*, quoted, 5-10.

⁹⁷ See above par. 3.

⁹⁸ See above par. 3. There is an assonance between legal science and hard natural science. See G. DEMURO, *La ricerca scientifica e il diritto alla salute*, in *Rivista AIC*, 2013: law is a set of rules and procedures as well as scientific protocols.

⁹⁹ See C. CASONATO, *Un diritto difficile. Il caso Lambert fra necessità e rischi*, in *La nuova giurisprudenza civile commentata*, 2015, 489-501; D. VESHI, *Comments on the Lambert case: the rulings of the French Conseil d’État and the European Court of Human Rights*, in *Medicine, Health Care and Philosophy*, 2017, vol. 20, 187-193; B. BARBISAN, *The case of Vincent Lambert: Who Will Be Able to Unravel the Knot?*, in *BiLaw Journal*, 2014.

¹⁰⁰ S. RODOTÀ, *Il diritto di avere diritti*, Bari, 2015: «Le tecnologie sottopongono il concetto di persona a spinte incrociate di dilatazione e di riduzione. L’elettronica induce a concludere che “noi siamo le nostre informazioni”, la genetica fa ripetere che “noi siamo i nostri geni”. Bisogna allentare l’enfasi tecnologica, per evitare che la biologia cancelli la biografia, che la virtualità trascini di nuovo la persona lungo i sentieri estremi dell’astrazione. Vi è una permanente eccedenza della persona rispetto all’insieme dei dati fisici e virtuali che la compongono».



human dignity is often depicted as a vacuous concept and as «a mere placeholder for varying ethical commitments and biases»¹⁰¹. Even though this definition of “much more” stands by, legal systems’ awareness of something that goes beyond determinism is at least crucial because human nature - with its own utmost indeterminacy¹⁰² - is the solid foundation for the other sciences. Indeed, as claimed by Russel, «Science tells us what we can know, but what we can know is little, and if we forget how much we cannot know we become insensitive to many things of very great importance»¹⁰³.

¹⁰¹ S.M. SHELL, *Kant’s Concept of Human Dignity as a Resource for Bioethics*, in *Human Dignity and Bioethics. Essay Commissioned by the President’s Council on Bioethics (US)*, Washington, 2008, 333. About the concept of human dignity see P.G. CAROZZA, *Human Dignity and Judicial Interpretation of Human Rights: A Reply*, in *The European Journal of International Law*, vol. 19, no. 5, 2008, 931–944; C. MCCRUDDEN, *Human Dignity and Judicial Interpretation of Human Rights*, in *The European Journal of International Law*, vol. 19, no. 4, 2008, 655–724; C. MCCRUDDEN (ed.), *Understanding Human Dignity*, Oxford, 2013; M.A. GLENDON, *Foundations of Human Rights: The Unfinished Business*, in *American Journal of Jurisprudence*, vol. 44, 1999, 1-14; M. RUOTOLO, *Appunti sulla dignità umana*, in A. CELOTTO, M. RUOTOLO (ed.), *Studi in onore di Franco Modugno*, Napoli, 2011, 3123-3173; G. MONACO, *La tutela della dignità umana: sviluppi giurisprudenziali e difficoltà applicative*, in *Politica del Diritto*, 2011, 45-78.

¹⁰² Borrowing the indeterminacy principle articulated in 1927 by the German physicist Werner Heisenberg (W. HEISENBERG, *Über den anschaulichen Inhalt der quantentheoretischen Kinematik und Mechanik*, *Z. für Phys.* 43, 1927). See also A. BACHEM, *Heisenberg’s Indeterminacy Principle and Life*, in *Philosophy of Science*, vol. 19, no. 4, 1952, 261-272.

¹⁰³ B. RUSSELL, *History of Western Philosophy (1945)*, New York, 2008, XIV.