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From the breakdown of psychiatry during nazism and the Nuremberg Code, to the materialist neuropsychological model in contemporary science and society: A bioethical analysis

Francisco López-Muñoz,[1,2] Francisco Pérez-Fernández[1,3]

[1] Facultad de Salud, Universidad Camilo José Cela, Madrid, España.
[2] Instituto de Investigación Hospital "12 de Octubre" (i+12), Madrid, España.
[3] Evidentia University, Kissimmee, Florida, USA.

Correspondence:
Francisco López-Muñoz
Facultad de Salud, Universidad Camilo José Cela.
C/ Castillo de Alarcón, 49, Urb. Villafranca del Castillo,
28692 Villanueva de la Cañada, Madrid, Spain.
Email: flopez@ucjc.edu

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ABSTRACT

The breakdown of German psychiatry with the coming to power of the National Socialist regime in 1933 resulted in a revival after the war of bioethical issues, the immediate effect of which was the enactment of the Nuremberg Code. In many ways, this breakdown was the result of the historical evolution of psychomedical knowledge and the mass dissemination of reductionist discourses and ideas that created a breeding ground for tragedy. The cyclical discourse of psychic materialism, which has been repeated for centuries in the history of science in different formulations, can, if not properly interpreted, lead to far-reaching appropriations and risks, to which due attention must be paid. The latest manifestation of this issue, the view of mental life as basically cerebral, neurological, biochemical, and determinist, a view that has not been managed or presented adequately to the public, could become the basis for perverse new perspectives and applications in the current context of research and academic activity.

Keywords: Degenerationism, materialism, nazism, nuremberg code, neuroscience.

RESUMEN

La llamada "quiebra" de la psiquiatría alemana en 1933, tras la llegada al poder del régimen nacionalsocialista, tuvo como resultado una reactivación de la cuestión bioética, cuyo efecto inmediato fue la promulgación del famoso Código de Nuremberg. En más de un sentido, tal ruptura fue el resultado del devenir histórico del conocimiento psicomédico, así como de la difusión masiva de discursos e ideas reduccionistas que terminaron por generar un caldo de cultivo propicio para la tragedia. El discurso cíclico del materialismo psíquico, que se reedita en la historia de la ciencia, en diferentes formatos y formulaciones, desde hace siglos, no bien interpretado, puede inducir apropiaciones y riesgos de largo alcance a los que se debe prestar la debida atención. Así, el último episodio de este asunto, la visión de la vida mental como vida básicamente cerebral, neurológica, bioquímica y determinista, no bien gestionado y presentado a la opinión pública, aunado a las condiciones actuales de la actividad investigadora y académica, podría convertirse en piedra angular de nuevas perspectivas y aplicaciones perversas de este asunto.

Palabras clave: Degeneracionism, materialismo, nazismo, código de nuremberg, neurociencia.

INTRODUCTION

The problems associated with explaining psychic life and the human condition in biological, physiological, and ultimately materialist terms have become a staple of bioethical research. Their earliest formulations date to the end of the nineteenth century, an era which underwent a paradigm shift in the understanding of psychiatric therapeutics. The decline in the moral treatment of mental patients, whose greatest exponents were Philippe Pinel (1745-1826) and his protégé Jean-Étienne Dominique Esquirol (1772-1840), slowly gave way to the anatomoclinical, neurohistological, and neuropathological approaches proposed by the emerging German school. There were exceptions to this rule, of course, such as occasional attempts to keep the treatment of mental patients within moral criteria using all sorts of devices, for example, the architectural designs of Thomas Story Kirkbride (1809-83) in the United States (Pérez-Fernández & López-Muñoz, 2019). These also fell within the framework of the sociopolitical culture of welfarism and charity, as was the case of the network of asylums run by the Hospitaller Order of St. John of God in Spain (Pérez-Fernández & Peñaranda-Ortega, 2017). However, the general trend in psychiatric practice was different, and gradually led to a more somatic reading, not only of mental pathology, but also of the human condition itself.

These rapid changes in approach, which took barely three decades to consolidate, were the result of disparate lines of research which found convergent paths, inspired by common themes. These included, for example, "degeneration theory," which, although it had been proposed some time before, became established through an extreme interpretation of Mendel's laws of inheritance, Galton's eugenicist contribution to psychometrics, the biomedical interpretation of criminality provided by Lombroso and the Italian positivist school of criminology, and a mixture of secondary, theoretically extreme perspectives such as phrenology, craniometry, and anthropometry. The latter were pseudo-scientific proposals, but they flourished in this propitious environment and soon gained a large following among eugenicists, most of whom were neurologists, neurohistologists, physiologists, physicians, psychiatrists, and psychologists. By the beginning of the twentieth century, the theory that the mental life of individuals could be explained in purely determinist and materialist terms was taken for granted in many contexts of biomedical, psychiatric, and psychological research. Of course, as this was the general scientific trend, it would ultimately become the basis for sociopolitical discourse (López-Muñoz & Pérez-Fernández, 2020a).

Along the same lines, starting with the physiological approaches proposed by Ivan P. Pavlov (1849-1936) and Vladimir Bechterev (1857-1927), and including the behaviorism of John B. Watson (1878-1958), the proposals that would become firmly rooted in the emerging field of psychology would soon come up against the medicalized approaches to psychiatry of Wilhelm Griesinger (1817-68), Richard von Krafft-Ebing (1840-1902), and Emil Kraepelin (1856-1926) (López-Muñoz, 2015a). The same applied to the more radically eugenic proposals which, beginning with the more theoretical approaches of Benedicte-Auguste Morel (1809-73) and Cesare Lombroso (1835-1909), would later culminate in the biotypologies of Ernst Kretschmer (1888-1964), Earnest Hooton (1887-1954), and William Herbert Sheldon (1898-1977). Consequently, trends in legislation and governance such as social Darwinism, which were accepted in many parts of the world with slightly different nuances, and which have never completely vanished from the collective imagination or from certain ideological discourses, were not something perverse that appeared out of nowhere, but ideologies that, although debatable, were reasonably constructed on popular interpretations at the frontlines of scientific research (Sandín, 2000).

In reality, much of this development was deeply rooted in a yearning for the past that was merely a kind of scientific and technical reformulation of age-old cultural traditions, such as humorism. The first attempts at a positive approach to understanding psychic life came in various forms, but there is no doubt that the most successful took morphological studies of individuals as a starting point in order to unravel the "mysteries" of their personalities. First Giovani Batista della Porta (d. 1615) and then Johann Caspar Lavater (1741-1801), authors of the most successful publications in the field of physiognomy, would lay the foundations of this path towards somatization of the psychic, which would later be consolidated with the celebrated phrenological works of Franz Joseph Gall (1758-1828) and his protégé Johann Caspar Spurzheim (1776-1832). Phrenology sought to deduce the basic personality traits of subjects by means of cranioscopy, a thorough examination of the cranial surface (López-Muñoz & Pérez-Fernández, 2017).

In this context of reductionist frameworks to explain the human condition, the explosion of evolutionary theory proposed by Charles Darwin (1809-82) came to revolutionize the field of biology and by extension related sciences. Although the theory of evolution was by no means a novelty in the Western intellectual arena, Darwin's great discovery was to propose a theory that, for the first time in history, gave an account of the process without apparent gaps, based on empirical data and on premises that were as reasonable in theory as they were powerful in practice. The fact that Darwinian theory proved to be so solid and difficult to discredit was what provoked the panic of the most conservative and traditionalist sectors and furious attacks which lasted for decades, the vast majority of which were spurious. And no wonder, because the theory of creationism, as a once-and-for-all divine act, was dealt a blow from which it would never recover (Darwin, 1984; Young, 1998). Religion, however, was not the most important issue

here. The critical contribution of Darwinism turned out to be epistemological, as it consolidated the possibility of analyzing and understanding biological phenomena, at all levels, in materialist terms. It was Darwin's *The Expression of the Emotions in Man and Animals*, published in 1872, that opened up completely new expectations in this field, as it introduced evolutionary criteria to the mental sphere: it was not only biological mechanisms that had changed to adapt to the environment in a slow process of millions of years, but also behaviors and, predictably, souls. Indeed, only by understanding behavior as something that is in some ways also biologically inherited, and therefore capable of being shaped by the action of natural selection, does it make sense to question observable "behavioral differences" among human beings that go beyond metaphysical criteria of substance (Carpintero, 2003; Sáiz Roca, 2011; López-Muñoz & Pérez-Fernández, 2020b).

If we add to these progressive concerns of new industrial societies, spurred on by the conflict of the emerging "social question" raised by developing market economies, and by subsequent sociodemographic questions, it is not at all surprising that eugenic thought became highly charged (Pérez-Fernández, 2002). In this context, the phrenological misconception that the craniums of the mentally ill, criminals, alcoholics, or "degenerates" could have certain special features, an idea that was later consolidated in the widespread craniometric contributions on race by the Swedish anatomist Magnus Gustaf Retzius (1842-1919), took root with great vigor in nineteenth-century psychiatry and was even accepted by leading neurologists and pathologists, including the celebrated Paul-Pierre Broca (1824-80). This acceptance could be seen as the very basis of today's anatomopathological and neurophysiological tradition (López-Muñoz & Pérez-Fernández, 2020a). For example, the Scottish prison doctor James Bruce Thomson (1810-73), who actively defended the famous theory that criminality was a hereditary evil six years before Lombroso, published the results of his psychocriminological observations in 1870, based on a study of the cranial configuration of more than 5,000 prisoners (Thomson, 1870).

ETHICAL BREAKDOWN

Bioethical reflection in fields such as psychiatry and psychology was rare at this time, if not virtually non-existent in some places, and did not emerge until the middle of the twentieth century. Little had been done in this field beyond vague, well-intentioned formulations that were not free of paternalism, such as the code proposed in 1803 by British physician Thomas Percival (1740-1804), with the publication of his *Medical Ethics or A Code of Institutes and Precepts Adapted to the Professional Conduct of Physicians and Surgeons* (Olivares & Hernández-Mansilla, 2015). The explanation is clear: If psychiatry and its parallel spheres of activity, such as health policy, forensic practices, and prisons, were a medical specialty that had only recently been systematized and tended to draw on the codes drafted for other biomedical fields, psychology was an entirely new, emerging science, seeking professionalization, in which almost everything had yet to be done. Arguably, the development of both progressed so suddenly that most of the professionals concerned could do little more than keep up to date.

It should also be noted that the psychopharmacological era began only in the early decades of the twentieth century and was not consolidated until the 1950s (López-Muñoz, Álamo, & Domino, 2014). Moreover, clinical trials as an experimental method did not become a standardized procedure until 1946, thanks to the contribution of the epidemiologist and statistician Austin Bradford Hill (1897-1991). There were no general, standardized, nosological criteria for mental disorders until the appearance of the first edition of the *Diagnostic and Statistical Manual* (DSM), published by the American Psychiatric Association (APA) in 1952. The first edition of the *International Classification of Diseases* (ICD) was published by the World Health Organization (WHO) in 1900, and already included a characterization of mental disorders, but within the logic of the time, it considered only mental disorders with a concrete, manifest organic basis. Other attempts to classify mental illness in the United States between 1917 and 1934 predated the DSM, but like the ICD they were primarily based on the criterion of organicity and had a major problem of heterogeneity in classificatory criteria and nomenclature. In fact, it was the Second World War that finally established the need for homogenization, as the complex problems of soldiers affected by the war made it clear that a common classificatory language for mental disorders was essential (del Barrio, 2009). In this context of scientific uncertainty, the ethical criteria of professionals were for decades often linked more to their own personal convictions than to standardized and shared regulation. The criticisms that John B. Watson (1879-1958) and Rosalie Rayner (1898-1935) would receive for experiments that today would be deemed unacceptable, such as one carried out on the child Albert B. at the Phipps Clinic in Baltimore in 1920, are well known (Bayona-Pérez et al., 2022).

Therefore, it would not be fair to say that no medical, psychotherapeutic, or psychometric excesses were committed until the Nazi regime came to power. As it happens, the history of mental institutions, psychotherapies, and even public policy built around the nascent field of psychometrics is riddled with all sorts of extravagances induced by the mass, uncritical acceptance of "new" materialist, biological, positivist, degenerative, and eugenicist postulates (Kraepelin, 1999; Cruz Puerto, 2020). But the lessons from history of what happened to German psychiatry during the Nazi regime, insofar as it elevated what until then had been considered exceptional, often concealed behind a veneer of

pseudo-humanitarianism, to the rank of normality, prompted the need to promote bioethical reflection in the context of mental health and its introduction into public policy. The fact that one of the most internationally renowned schools of psychiatry, the German school of the 1930s, had made a significant contribution to implementing Nazi policies of racial and sociopolitical segregation set off alarm bells, to the extent that 1933 has come to be regarded as the year of the "breakdown of German psychiatry" (López-Muñoz et al., 2006). It is worth delving into the details to understand the magnitude of the subsequent hecatomb. In 1911 Germany had 16 university psychiatric clinics, as well as 187 public and 225 private asylums. All these centers were equipped with the latest diagnostic and treatment facilities of the time, and contributed to creating a unique network of research in the field of mental health that was the most prestigious in the world (López-Muñoz, Álamo, & Shen, 2015).

The underlying problem, which facilitated the historical process that culminated in the psychomedical tragedy propagated by the Nazis, was an unfortunate concatenation of materialist, determinist, and preventive assumptions. These should at the very least have prompted reflection on the future of public health policy, its medium-term implications, and the uncritical sociopolitical promotion of certain scientific assumptions for the sake of implementing ideological criteria which, a priori, might have seemed reasonable to a large part of the general population. What is certain is that when Morel published his very popular *Traité des dégénérescences* in 1857, he conveyed the idea to the emerging psychiatric profession that mental illness was "incurable," while at the same time spreading the theory that alcohol and other intoxicants, together with heredity, played a devastating etiopathogenic role with a high social cost. As a result, what was important was no longer to intervene in incurable mental problems, but to prevent or anticipate events that were not only unresolvable, but also transmissible to offspring (Caponi, 2009). The "abnormal" was as untreatable as it was potentially dangerous. Morel's theory, supported by the biopositivist, economic, and demographic conditions of the time, spread very easily to other fields, such as sociology, psychology, criminology, and anthropology. From there, it spread to the framework of public policy based on the "numerical magic" of emerging statistical techniques, such as those suggested by André-Michel Guerry (1802-66) and Adolphe Quetelet (1796-1874). We should not overlook the fact that Lombroso postulated his famous theory of atavism as a psychosocial stigma of criminals as early as 1876, at a time when all these ideas were commonplace among the intelligentsia (Pérez-Fernández, 2004).

The immediate impact of these events was a political interpretation of psychiatry that was socialized to become an active part of health and sociocultural policy, giving impetus to eugenic criteria as a form of population control and a key preventive measure. Psychiatry, in its most organicist form, suddenly emerged from the isolation of mental institutions to become an agent of power, a fashionable, thriving force, capable of justifying all manner of sociopolitical measures. As a result, it became a particularly attractive future field of medicine for many professionals, also given the relentless advances in psychopharmacology (López-Muñoz & Álamo, 2009). What is certain is that the peculiar economic and political conditions in Germany between the wars, permanently scarred by the disastrous internal repercussions of the Treaty of Versailles and the nationalist reinterpretation of the events of 1914-18, would cause eugenics to take on particularly serious totalitarian overtones, which unsurprisingly also reached academic and research contexts terrified by the specter of "proletarianization" (Stevenson, 2013). As in other areas of German life, the insecurity that reached a once privileged environment caused great discontent and facilitated the pervasive infiltration of "reformist" National Socialist policies. Where many were shut out on ideological and economic grounds, others saw an excellent opportunity for career advancement (Gay, 1968).

This result is particularly surprising given that the pre-Nazi medical profession had shown itself to be one of the most bioethically aware in the world, especially after the Neisser scandal, in which prostitutes were used to test a syphilis vaccine without their consent (Vollman & Winau, 1996; Cuerda-Galindo, Sierra-Valentí, González-López, & López-Muñoz, 2014). The issue prompted the Prussian Reich government to pass a number of pioneering regulations on human experimentation in February 1900. These were ratified and expanded in 1931, shortly before the Nazi regime came to power, when the Reich Ministry of the Interior issued its Guidelines for New Therapy and Human Experimentation. These were extraordinarily strict regulations, the now-usual principles of beneficence, non-maleficence, patient autonomy, the legal need for informed consent, and a ban on experimentation on people who were dying or in precarious psychosocial or economic situations (López-Muñoz, 2015b). However, despite a prevailing wind, the process by which Nazism managed to undermine these advances was neither rapid or sequential. It required a meticulous strategy of cultural, legislative, and propagandistic inculcation to make it possible for a large part of the always critical and well-educated German intelligentsia to slowly digest changes which, moreover, referred openly to a steady degradation of ethics (Table 1).

There is a risk that the exploitation and proletarianization of academic and research life may be repeated with unforeseeable ethical consequences in the future, though by the path of dubious policies based on politically controlled criteria of "productivity" and "knowledge transfer." In this regard, it should be remembered that it was during the Second World War that the concept of "science policy" emerged. This concept has now been assimilated by most democratic governments and has led to very close rela-

tionships between science and the powers that be: not only governments, but also commercial and industrial powers (López-Muñoz, 2022).

> "The capitalization of universities and the de facto libertarian model for developing them, dictated from above by state bureaucracy, is something so grotesque that the great liberals—above all the liberal economists and political thinkers—never dreamed of it. It is academic capitalism without freedom, a kind of technocratic and bureaucratic tyranny imposed in the name of freedom and progress. At the same time it is a technocratic simulacrum of the free market, in which competitiveness is fabricated from criteria chosen tendentiously to ensure the benefit of certain favored institutions.… What does academic freedom mean for the bureaucracy, a political class that is symbiotically tied to it? Nothing more than an impediment to achieving a form of technological social control that requires lecturers and researchers to submit to standardized reports of their activities, reports that provide the basis for distributing and spending public funds. Academics who do not kowtow and believe they have no obligations to anyone are kept in ignorance and subjected to permanent pressure to make them understand who controls the situation and to pay their debt to the university, the program, or the department for the privileges or benefits they have received. Then they duly become vassals and pages and forget all the rhetoric of freedom and autonomy." (Bauman & Donskis, 2015, p. 173)

Today we are facing another set of ethical threats that make the future uncertain. On the one hand, we have the enormous proliferation of structures for disseminating science—publishing houses, journals, and scientific congresses—predatory structures whose sole objective is to benefit financially from the need for scientists to publish in order to promote themselves academically, stemming precisely from the scientific policies mentioned above. And on the other hand, there are certain interest groups of an economic or political nature whose interference in the funding of major research projects is becoming increasingly apparent (López-Muñoz, 2022). For example, lobby groups sponsored by large corporations from various sectors have recently been found to fund activities and statements by so-called scientists who reject the role of human actions in causing climate change, contrary to the vast majority of the scientific community.

NEUROIMAGING, MODULARITY, AND "CEREBROCENTRISM"

It is well known that the breakdown of German psychiatry and its consequences in the context of public health resulted in the unification of ethical and preventive criteria in

Table 1
Elements of Psychiatric and Psychopharmacological Abuse during the Nazi Regime

1. Mass introduction of eugenics discourse into psychiatric ethics.	1920s. With the systematic participation of renowned professionals such as Ernst Rüdin (1874-1952) and Alfred Hoche (1865-1943).
2. Legal provisions for racial segregation and "protection of the race."	Nazi rise to power (1933): • Gesetz zur Verhütung erbkranken Nachwuchses ("Sterilization Act"). • Gesetz gegen gefährliche Gewohnheisverbrecher ("Dangerous Criminals Act").
3. Nuremberg Laws.	1934-35. Legislation aimed at "purifying the blood" of the German people. Direct involvement of the medical profession in its implementation.
4. Aktion T4 program.	September 1939. The euthanasia of "incurable patients," "inferior beings," "deformed children," and others was established. This set in motion the Aktion T4 program, the prelude to the Holocaust, led by physician-psychiatrist Karl Brandt (1904-1948). It was cancelled in August 1941 because of public protests and the invasion of the Soviet Union.
5. Experiments on patients designated for euthanasia programs.	Carried out at hospitals and universities. For example: • Two projects with patients suffering from "mental retardation" and epilepsy led by the psychiatrists Carl Schneider (1891-1946) and Hans Heinze (1895-1983). • Extraction of the brain from euthanized patients for subsequent pathological examination. Project led by Julius Hallervorden (1882-1965).
6. Experiments with psychotropic agents on healthy prisoners.	Concentration camps became an ideal location for all kinds of experiments, including psychopharmacological ones. Many of them were paid for by the pharmaceutical corporation I.G. Farben, which even had its own facilities at Auschwitz.
7. Use of psychotropic drugs as a homicidal tool.	During the Aktion T4 program and afterwards, as its public cancellation did not mean that it ended in hospitals; trials involving euthanasia continued, in many cases behind closed doors. These activities were common in concentration camps for experimental purposes and as part of the extermination policy.

Source: Compiled by the authors from López-Muñoz et al. (2008).

the form of the Nuremberg Code, issued in August 1947. The first international code of ethics governing research on human beings based on the Hippocratic precept of *primun non nocere* ("first, do no harm"), the Nuremberg Code never became a specific legal regulation, and was never officially adopted by any nation or body, but it has had a profound influence on the advancement of humanitarian and bioethical considerations, and has inspired other national and international legislation, regulations, and codes that have adopted many of its precepts, with particular emphasis on obtaining the voluntary consent of the research subject (López-Muñoz et al., 2007). However, the ethical aberrations that reached their peak in Nazi medical practice were to be repeated later, primarily but not exclusively under totalitarian regimes, such as in the former Soviet Union and the People's Republic of China. They took place mainly in relation to political and religious repression, but also in a purely ideological context, such as the scientific suspension of Mendelian genetics by the Soviet Communist Party in 1949 as "bourgeois and reactionary," and accompanied by the purging of its advocates. The risk of denaturalizing scientific and academic discourse in the context of political action is thus very real, particularly in the current climate, where the exaggerated reiteration of scientific "argument" and "pretext" in the digital immediacy of the present, and the subsequent temptation to stretch science to solidify potentially dangerous ideas, has never gone away and should keep the scientific community on its guard. The risk of breakdown is more alive than ever.

To return to the main theme of this article, the trend toward reductionist-materialist interpretations of psychic life, which are not bad as epistemological options per se and which function cyclically in the scientific context, carries an intrinsic risk of being used for dubious purposes if these interpretations are not preserved, expressed, and disseminated to the public with the necessary precautions. In this regard, research professionals must not forget that very often the reinterpretation of the meaning and scope of their work means that it is not always properly understood outside specialist settings. After all, if there is one clear conclusion to be drawn from the historical evolution of eugenic and degenerative approaches, it is that doing science, for better or worse, is not the same as talking about science or talking from a scientific perspective, and that the strategies used to shift the scientific debate to the public can have consequences that are as excessive as they are undesirable (Lorente, 2015). This phenomenon is magnified, if that is possible, by today's digital mass society, in which the widespread and popularized consumption of supposedly scientific content has become commonplace. It is often forgotten that scientists are people like any others, with all the shortcomings and virtues imaginable, and that beyond the margins of experimentation that may at some point involve human beings or animals, or the need to abide by certain generally accepted methodological guidelines, there is no Hippocratic Oath that obliges them to work ethically, for the benefit of humankind, or to worry about the repercussions of their theories and findings (Baggott, 2013). There is nothing even remotely similar for the scientific communicator beyond what they themselves might deem "ethical." Consequently, to assume that there is nothing but good intentions and honest interests behind every assertion advanced by basic science, or behind every dissemination of its findings, is nothing more than a naïve preconception with no basis in reality.

In today's world of the "neuro-something," which is basically just another successive iteration of reductionism, everything now seems to be explained by a "cerebrocentric" logic that replaces the old traditional soul-body or mind-body distinctions with brain-subject, brain-consciousness, or brain-identity distinctions (López-Muñoz & Pérez-Fernández, 2020b). Ultimately, it is often more a question of semantics, the type of discourse one is willing to take on in the context of contemporary science, than a question of substance. In other words, it has more to do with the kind of "scientific explanation" one is willing to accept than with the scope and effectiveness of science in and of itself (López-Muñoz & Pérez-Fernández, 2020a). For example, it has become customary to illustrate the explanation of psychic life in terms of the brain through the use of elaborate graphics with "colored brains" that offer a modular image of brain activity that magically corresponds to the progression of specific mental states. This type of illustration gives the general impression that it is possible to perfectly identify a psychic state with the activity of a specific material substrate, and that it would thus be enough to activate or deactivate that brain area to provoke all kinds of behavioral, personal, identity, and other changes in an individual. It is only one step from there to assuming that in the near future it will be possible to explain, predict, and control a person's entire psychic life—the dream of organicist alienism from the time of the man-machine proposed by Julien Offray de La Mettrie (1709-51) (López-Muñoz & Pérez-Fernández, 2022)—with all the ethical consequences that this entails. But what is certain is that this is a misleading perception of the problem, based on the way it is presented to the public, to which a certain skepticism must be applied (Shermer, 2012).

First, a neuroscientific experimental laboratory or a functional magnetic resonance imaging (fMRI) machine are not exactly the most appropriate places to study the functioning of the brain. It is not just that it is a profoundly unnatural and contrived place to record normal brain activity; it is that, as an organ under powerful evolutionary pressure and strong environmental selection, the brain is not equipped to function properly in such a context. Second, any form of measurement of brain activity is always indirect, as the machinery uses processes to establish its measurements that enhance the effect of certain neurochemical

and bioelectrical activities to the detriment of others. Third, presenting images of "brain activity" in color magnifies the visual impact of that activity by providing a metaphor of a "Christmas tree," which does not reflect the real thing and gives the misleading idea that the organic functioning of the brain is modular. Fourth, images of colored brains do not portray the brain at a given moment in time, but are statistical compilations of hundreds or thousands of images of the same brain taken over a specific period of time and subjected to corrective criteria. In other words, they are statistical, not real-time images. And lastly, it is well known that different brain areas are activated for different reasons at different times, and contribute in different ways to the corrective courses of various brain activities, so it is often quite difficult to determine exactly what they are doing at any given time. All this means is that it is not possible, however materialist one may be, to determine that a state of mind has a specific brain locus (Mora, 2004). All of these forms of argument about the psychic life of people, uncritically transferred to other fields of research and dissemination, are nothing more than a banal and simplistic expression of scientific knowledge.

FINAL THOUGHTS: ON MATERIALISM AND MORALITY

At the end of the last century, Benjamin Libet (1916-2007) and his team published an experiment that theoretically called into question the existence of something like what we know as "free will" (Libet et al., 1983). The idea behind the experiment was that almost a third of a second before a subject "voluntarily decided" to lift a finger, an alert potential was registered in their brain activity. In other words, the person's brain would have already decided to lift the finger on its own before he or she was aware of the decision. The experiment, which was cleverly sold as the death knell of free will, caused rivers of ink to flow. Subsequent experiments, which further extended the temporal delays Libet initially found, convinced the proponents of materialist reductionism that conscious psychic life was indeed nothing more than an epiphenomenon and that, at last, at the culmination of the age-old dream, the organ had defeated the mind (Soon et al., 2008). More than a few people were convinced that, in effect, mental control and selection were, to all intents and purposes, a done deal. Consequently, there was a shift from biological determinism, based on eugenic criteria, which was the driving force behind Morel's work at the time, to neural determinism, based on the influence of genetic criteria.

There was no shortage of theoretical and methodological criticism of these experiments, starting with the fact that there was no way of arguing that this recorded non-conscious activity was really linked to will, a question that still remains unresolved (Romero Sánchez, 2016). But this did not prevent a veritable avalanche of researchers and intellectuals determined to attack free will by proposing ideas, even dangerous ones—such as the idea that legal systems are confused by judging the offender based on the criterion of free will, that a preventive criminal law approach was possible based on the idea that that criminals could not choose not to be criminals—and that the eugenicists and degenerativists were right (Schleim, 2009). The response from the legal world, which is used to dealing with this kind of argument, has tended to be philosophical: responsibility is an "ascriptive," not a "prescriptive" concept, that is, something that by definition is attributed to people as moral-ethical subjects, not something that can be demonstrated in a scientific experiment. Therefore, moral, law-abiding behavior is to be expected from individuals to the same extent that the vast majority of people generally choose to abide by the law. In other words: free will and responsibility are matters of principle and thus not proven, but presupposed. Moreover, it is metaphysically quite impossible to demonstrate that a pattern of neural excitation has been able to produce one action or another in the same way that conscious activity can and does redirect or interrupt a previously designed behavioral program at an organic level (Schleim, 2009).

The presence of these kinds of arguments in a scientific context, and their mass dissemination, should keep researchers and academics in a permanent state of alert at a time which is not particularly kind to all aspects of the profession—in particular if we bear in mind the worrying rise in ideological extremism, where certain theories, ideas, and experiments, if not properly assimilated and disseminated, could set in motion a repetition of past failures and tragedies.

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The authors declare they have no conflicts of interest.

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