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NATURAL SCIENCES AND/IN MORAL THEOLOGY:
THE CASE OF FREE WILL

1. INTRODUCTION

Moral theology – and the largely overlapping discipline of theological ethics – use a variety of methods in order to gain insight on various aspects of our human engagement with the world and with ourselves. While theological methods (should) remain central to a Christian reflection on matters of moral conduct, this strand of theological thinking remains particularly open to other modes of (gaining) knowledge.

The issue of free will and moral responsibility, being central and almost axiomatic in Catholic moral theology, is then in a particular way situated at the methodological crossroads of theological and non-theological disciplines. Because of its connection to philosophy and, in recent years, also to natural and empirical sciences, the topic gains growing interdisciplinary attention. As a fundamental anthropological problem, the question of *whether, how* and *to what extent* human beings exercise free will becomes also the validating measure of personalist claims, including Christian philosophical and ethical personalism(s). The most important among these claims is the idea of personal moral responsibility and accountability, which could simply not exist without human beings acting freely. Apart from being yet another hot topic in cross-disciplinary scientific endeavors that tackle concepts traditionally belonging to the humanities (and therefore becoming an interesting case for the philosophy of science and for science-theology dialogue) the issue at stake is also one of high theological, anthropological, and ethical significance.

The inherent interdisciplinarity of the free-will problem lies thus not only in it being part of holistic picture of a human person – in her physical, psycho-biological and spiritual dimension. What matters is also its direct connection to the fundamental ethical realm: the embodied human agency that claims to exhaust the criteria of freedom and responsibility. In addition to that, what is considered

to be free and to be subject to moral evaluation is inextricably linked with human agents following a certain ethical *rationale*. Knowledge of (moral) ends that guide our willing and acting,¹ be they based on reason- or/and on Revelation, can only be gained (or processed) by means of evolutionary developed (neuro)biological characteristics, many of which are shared by non-human organisms.

All these aspects make free will an excellent example of how the variety of theological methodologies, and the corresponding theological type of knowledge and insight,² (i) could possibly relate to insights acquired by other disciplines and (ii) what epistemic value can be granted to theological interpretations of scientific findings. Addressing these two questions has as its goal gaining a possibly truthful and complete picture of the embodied human condition, both in its constitutive and interactive aspects.

This article attempts to offer an overview of the most important issues surrounding the interdisciplinary debate on free will, with the goal of addressing an epistemic and methodological openness of fundamental theological ethics and assessing ways in which scientific knowledge can be relevant for theological anthropology. The proposed vision may be applied specifically to the theological study of free will, but also to the epistemic fundamentals of theological thinking in general.

First, the author will summarize the most interesting points in the dynamically developing science of volition, together with their philosophical and ethical interpretations. After discussing the famous Benjamin Libet's experiment, a variety of new paradigms will be analyzed. Several aspects of free agency highlighted by contemporary neuroscience and neurobiology will be brought into conversation with fundamental positions in moral theology. Finally, the possibility of integrating scientific knowledge into theological anthropological and ethical discourse will be assessed, and some conclusions will be proposed on the possible consequences and the importance of this exercise for Catholic theological ethics.

2. LIBET'S PARADIGM AND FREE WILL AS AN ILLUSION

Free will is a typically unequivocal concept, the exact meaning of which has been shifting along with the philosophical developments and spirit of the time. The 'will' as such, signifying something of an internal principle of end-oriented agency, is arguably an older and broader notion. This has been the case at least within the

¹ Cf. Thomas Aquinas, *Summa Theologiae*, I-II^{ae}, 6, 1-2.

² Since theology as a discipline is sometimes described as systematically trying to say something about the things one cannot actually 'know' – at least not in a positivistic sense of 'knowing' – it might be better to talk about gaining theological 'insight' instead.

ancient and medieval philosophical traditions, largely accommodated by Catholic theology and ethics. According to the traditional Thomistic vision the will – being the ‘rational appetite’ of a person – remains created and good-oriented (theonomic), and therefore only in a certain sense free. Through thinking and willing, a person is eventually capable of freely electing and employing the means for his or her ends, which comes closest to what is usually meant by acting with ‘free will.’³

Western modernity associated human willing with the (absolutized) idea of ‘free choice’ (the Augustinian *Liberum arbitrium*) and with the idea of conscious ‘intentions’ directly causing our behavior. The will and intentionality were either associated with the Cartesian mind or soul pulling the strings of one’s actions, or – especially in later periods – rejected altogether by opting for reductive materialism and ontological determinism. That is the reason why the alleged reification of one’s intentions as ‘mental states’ leads to identifying them – and their causal efficacy – with the (free) will itself.⁴

This is clearly visible in the ‘causal theory of action,’ the position still popular among many philosophers of action. According to the causal theory, only those doings that are “properly caused” by one’s intentions can be regarded as intentional – possibly testifying to human beings having free will.⁵ Partially due to the straightforwardness of this formulation, ‘conscious intentions’ as mental states became objects of early neuroscientific and neuropsychological studies of human volition and are one of the most frequently invoked terms in contemporary discussions on free will. As a result, what is often (or until recently) being empirically tested is the supposed causality of mental states categorized as intentions, a category which in itself often remains unspecified.⁶

Cognitive neuroscience tries to associate mental states and processes with those happening in the brain. Accepting the *hypothesis* about intentions being mental states that cause freely willed actions, some neuroscientists went on (i) to find the neural correlates of this process and (ii) to empirically test its causal efficacy. This meant falsifying a correlation between our subjective experience of intending and acting – and therefore of the free will as such – and a number of brain signals

³ Cf. Thomas Aquinas, *Summa Theologiae*, I-II^{ae}, 8, 2. J. Bourke, *Ethics: A Textbook in Moral Philosophy*, New York: The Macmillan Company 1951, pp. 59-60, 78; T. O’Connell, *Principles for a Catholic Morality*, New York: Seabury Press 1978, p. 51.

⁴ Various contemporary schools of Catholic moral theology partially share this problematic perspective. A close look at contemporary neuroscience, neuropsychology and evolutionary biology might prompt one to consider a careful reformulation of such simplified vision of human freedom.

⁵ However, this is not evident. An alternative view is, for example, the one proposed by Donald Davidson (cf. *Actions, Reasons, and Causes*, “The Journal of Philosophy” 60 [1963] no. 23, pp. 687, 693) who argued that one can explain intentional action simply by referring to our *reasons* that are formed by the desires-believes pairs.

⁶ Cf. L. Asma, *Consciousness in Intentional Action*, Amsterdam: Vrije Universiteit 2018, p. 26.

(or in fact with the statistical averaging of measurements of the recorded signals).⁷ The first serious attempt of that sort was the well-known study conducted by Benjamin Libet in 1983-1985.⁸ Using EEG scalp electrodes Libet and his colleagues measured electric pre-movement potentials in the brain and compared them with the self-reported times of conscious intention (also referred to as decision, desire or urge) as well as with the actual onset of the (intended) movement. The major findings showed that the change in the electric signal believed to typically precede our actions (the movement of a finger) – the so-called Readiness Potential (RP) – happens approximately 350 milliseconds earlier than (what was thought to represent) our conscious intention to move.

The interpretation of Libet's study was quite straightforward: (i) it is not us, but our unconscious brain that makes decisions on whether and when to act, long before we even know it; and (ii) conscious control is limited to a 'veto' power that our intentions can exercise until the point of no return (about 10 milliseconds before muscles contract).⁹ Although Libet felt obliged to leave space for "philosophically real individual responsibility and free will" and thought that the conscious veto-control was enough for it, he also suggested that even complex decisions may ultimately depend on the same unconscious mechanism.¹⁰ His results opened a Pandora-box of seeing free will as an illusion, mainly because conscious initiation of an action (at least in some form) was commonly seen as essential. The so-called Libet's paradigm threatened the two main philosophical conditions of free will: being the causal source of one's actions (sourcehood freedom) and being able to do otherwise under identical conditions (leeway freedom).¹¹

A lot of methodological and philosophical criticism has been issued on Libet's work as it triggered a great deal of interest in the topic. Many recipients became convinced that science was able to, and in fact did disprove the existence of free will.¹² Others were inspired to repeat the experiment in a methodologically better way and a good number of improved or broadened studies has been conducted.

⁷ Cf. T. Bayne, *Libet and the Case for Free Will Scepticism*, in: R. Swinburne (ed.), *Free Will and Modern Science* (British Academy Original Paperbacks), Oxford: Oxford University Press 2011, pp. 39-40.

⁸ Cf. 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*, "Brain" 106 (1983), pp. 623-642; B. Libet, *Unconscious Cerebral Initiative and the Role of Conscious Will in Voluntary Action*, "The Behavioral and Brain Sciences" 8 (1985), no. 4, pp. 529-566.

⁹ B. Libet, *Time of Conscious Intention*, p. 640. B. Libet, *Unconscious Cerebral Initiative*, pp. 536-537.

¹⁰ Cf. B. Libet, *Unconscious Cerebral Initiative*, pp. 532, 536, 538-539.

¹¹ According to Libet's interpretation, the most one could do is – up to a certain moment – choose not to act at all.

¹² See e.g.: D. Pereboom, *Hard Incompatibilism*, in: J. Fisher et al. (eds.), *Four Views on Free Will*, Oxford: Blackwell 2007, pp. 99-102. J. Verplaetse, *Zonder vrije wil: een filosofisch essay over verantwoordelijkheid*, Amsterdam: Nieuwezijds 2011.

Importantly, however, most of them used essentially the same methodology and followed the same assumptions about the nature of free will.¹³ While some of the follow-ups on Libet put his idea in question, other formulated even stronger anti-free will conclusions based on choice-related predictive information found in the brain long in advance of one's conscious decisions.

In 2008, a group of scientists led by Chun S. Soon used a multivariate pattern classifier combined with fMRI to measure activity of different brain regions when subjects were performing the task of pressing a button with either their left or right finger, whenever they felt an urge to do so. The researchers claimed to have found "some predictive information" about the upcoming decision (right/left) even up to 10 seconds before the subject was aware of it.¹⁴ More recently Itzhak Fried et al. claimed to have found such information in relation to the time of decision at the level of single populations of neurons. The rise in activity of those neurons was taken to mean that the decision was coming and that it was made when the activity crossed a certain threshold.¹⁵

3. NEW INTERDISCIPLINARY SCIENCE OF VOLITION: THEOLOGICALLY REASSESSING THE FREE-WILL?

It is often argued that the aforementioned experimental results, even assuming their methodological and empirical accuracy, are not a threat to free will: neither to the common (philosophical) understanding of it, nor to the way it appears in the moral tradition of the Church.¹⁶ The main reason for this lies in a different understanding of what willing, intending, and choosing actually means, and how all these concepts relate to human freedom of action. Nonetheless, the idea of empirically disproving free will remains disturbing, unless one resolves to a kind of (epi)phenomenalism or dualism that would allow one to completely ignore the natural characteristics of human agency. Importantly, the mentioned results cannot be taken to disprove free will as such but, if anything, only what particular scientific and philosophical paradigm represents as free will. However, it could also be argued

¹³ See e.g.: P. Haggard, M. Eimer, *On the Relation between Brain Potentials and the Awareness of Voluntary Movements*, "Experimental Brain Research" 126 (1999), no. 1, pp. 131-132.

¹⁴ C.S. Soon et al., *Unconscious Determinants of Free Decisions in the Human Brain*, "Nature Neuroscience" 11 (2008), no. 5, pp. 543-545.

¹⁵ I. Fried, R. Mukamel, G. Kreiman, *Internally Generated Preactivation of Single Neurons in Human Medial Frontal Cortex Predicts Volition*, "Neuron" 69 (2011), no. 3, pp. 548-562.

¹⁶ Cf. P. Nachev, P. Hacker, *The Neural Antecedents to Voluntary Action: A Conceptual Analysis*, "Cognitive Neuroscience" 5 (2014), no. 3-4, pp. 194-196, 206.

that some aspects of voluntary agency that were otherwise taken for granted – in moral theology and theological ethics – now call for essential re-evaluation.

Acknowledging the need of such evaluation will of course depend on what type of relationship between natural (empirical) and theological disciplines one is willing to accept. A relationship of methodological and epistemic *independence*, *conflict*, *dialogue* or *integration* are among the most often listed possibilities and following one of them will largely determine the way in which scientific results inform the moral theological realm. Opting for a true integration of theological and other types of knowledge, as well as encouraging a mutual methodological dialogue, definitely opens the door for necessary adjustments (or at least for dialogue-based reformulations), also on the side of theological ethics. Importantly, however, knowledge and insight from natural science could remain theologically relevant even when methodological independence and the separation of respective epistemic domains are assumed. It could still be informative to look at whether concepts and assumptions cherished in one domain do in any way overlap and/or support those in other domains (even on a purely analogical or intuitive level). Such an approach seems particularly important in order to avoid (seeming) conflicts, especially given the scholastic principle of ‘the unity of truth’ cherished by the Catholic theological tradition.

Keeping these cautions in mind, one can address the question of whether concepts such as free will (and the way it is understood within various schools of Catholic moral theology) *could be supported* by the rapidly developing multidisciplinary science of human volition? What do contemporary natural sciences imply about human agency, and which scientific paradigms seem to be most helpful in this regard? In the end, tackling these questions calls for assessing which frameworks in moral theological and ethical reflection are best suited to accommodate the alleged implications from the natural sciences. Scientific results and theories that are relevant here go far beyond the aforementioned type of neuro-cognitive experiments and include the fast developing new paradigms in cognitive neuroscience and neuropsychology as well as in evolutionary and systems biology.

3.1. UNCOVERING THE LONG-TERM ASPECT OF WILLING

Recent years, especially the past two decades, have seen an increased interest in (neuro)philosophy and the science of free will. New scientific projects were launched within cognitive neuroscience, psychology as well as evolutionary and system biology, aimed at seeing a broader spectrum of what may underlie human voluntary agency. If there is one general trend in those projects, it could be described as moving beyond individuated neural causes of proximal movements, in favour of looking at the complexity and multiplicity of causes leading to action. This includes

the long-term and distributed aspect of willing, often transcending the domain of electric neuronal pathways, the central neural system or even the organism itself.¹⁷

Many results (some of which will be discussed below) suggest that even if conscious efforts of the will were indeed impotent in relation to one's actions now (or the ones at which they aim), they could still change the neural system in relation to future actions. This may happen regardless of the ontological status and causal origin of the conscious intentions involved in the process. Future intentional actions, then, would not need to be consciously generated and could indeed strike us as unconscious and automatic.

Importantly, however, this usually does not diminish the role played by the proximal acts of will directed at particular actions. Concrete acts of willing and intending – and the concrete acts human beings eventually perform – remain important for many scientific hypotheses on free will. This is because they either contribute to or are the very concrete exemplifications of the complex volitional process. The question to what extent one's free will can be attributed to or be dependent on those concrete efforts is a different matter that remains open for discussion.

The philosophical framework proposed by Alfred Mele provides a good ground for this. Mele talks about effective intentions that are not necessarily conscious themselves but exist thanks to causal contributors from the past – including conscious deliberations and volitional efforts.¹⁸ Neural antecedents of effective intentions and actions reflect our causal embodiment in nature. Intentions do not “fall from the sky” nor are they induced (by the subject) in a supernatural way.¹⁹ For Mele and for many others, the fact that whatever human beings (decide to) do at the moment of choice has some (neuro)physical causes, does not *per se* exclude causal efficacy of their own conscious willing. This counts mostly for long-term efficacy, but Mele does not exclude that consciously employing our intentions and being aware of their resolution (decision) can sometimes contribute to the specific action now.²⁰

Neuroscientist and philosopher Peter Tse developed the full-fledged theory of *critical neural causation*, based on the observation that the physical synaptic conditions for firing are subject to constant resetting. This could be susceptible to conscious operands and therefore translated to critical informational code, making our future choices more up to us. This would happen in virtue of changing

¹⁷ The latter is the case with theories of *extended cognition*. Cf. L. Shapiro, *Dynamics and Cognition*, “Minds and Machines” 23 (2013), no. 3, p. 354.

¹⁸ A. Mele, *Effective Intentions: The Power of Conscious Will*, New York: Oxford University Press 2009, p. 6.

¹⁹ Even the Thomistic account of induced theological virtues accepts that such virtues, as received qualities of our willing, work in and through the embodied natural and rational appetite. Cf. Thomas Aquinas, *Summa Theologiae*, I-II^{ae}, 51, 4. 58. 3. 63, 4; Thomas Aquinas, *Summa Theologiae*, II-II^{ae}, 23, 1. 23, 8.

²⁰ A. Mele, *Effective Intentions*, p. 6.

the neural criteria for future synaptic inputs that will make neurons fire or not.²¹ Such a neural synaptic code stands on more than electric action potentials and can include parameters such as the weights, gains and temporal integration properties of different synapses. Changes in synaptic properties can be rapid, so that our (intentional) utilization of them can matter for the far, as well as for the very near, almost immediate, future.²²

The emerging criterial neural/informational code is not algorithmic, not representational and non-prepositional. It does not specify the outcome but places constraints on possible future events. Consequently, our voluntary influence over future actions is dispositional and probabilistic.²³ It does not involve necessitation, but it (significantly) narrows down our future actions, in accordance with our intentions. It can slowly (as well as rapidly) bend them in a desired direction, also by proximal efforts of the will. Assuming that at least some of these criterial changes could not have been there without one's conscious involvement in the past, a person retains some control over her future. Proximal intentions and (attempts at) conscious choices, are thus real difference-makers: the conscious 'self' becomes an indirect causal source of one's life's direction and one's future actions (sourcehood freedom), and is indeed able to push the future in a different direction (leeway freedom).

Taking a slightly different approach, a group of scientists led by Stefan Bode argued that voluntary decisions, since they are made similarly to perceptual ones, depend on an internal "evidence-accumulator" that eventually crosses a certain threshold. If not enough cues are present, a guess must be made based on the history of previous choices and knowledge. In other words, in the absence of a best strategy, the brain has to use the history of its own choices.²⁴ According to Bode, the internally generated brain activity can both reflect choices made in the past and be stochastic in character due to random fluctuations. Apart from being the result of adaptive evolution, the latter can also be the result of individual development which includes one's own choices.²⁵

These accounts – and many others which cannot be mentioned due to space limitations – all support the central premise of classical virtue theory, namely that human beings (ideally) act from the stable character dispositions built-up by virtuous acts. Repeatedly performing virtuous actions is necessary for becoming

²¹ P. Tse, *The Neural Basis of Free Will*, Cambridge, MA – London: MIT Press 2013, pp. 11-12, 26, 180-181.

²² P. Tse, *The Neural Basis of Free Will*, pp. 12-15, 22.

²³ P. Tse, *The Neural Basis of Free Will*, p. 13.

²⁴ S. Bode et al., *Predicting Perceptual Decision Biases from Early Brain Activity*, "Journal of Neuroscience" 32 (2012), no. 36, p. 12488, 12492, 12496-12497.

²⁵ A. Lavazza, *Free Will and Neuroscience: From Explaining Freedom Away to New Ways of Operationalizing and Measuring It*, "Frontiers in Human Neuroscience" 10 (2016), p. 262, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4887467/> [accessed: 15 I 2020], pp. 6-7.

virtuous even if it seems forced at first.²⁶ Similarly, one's willing efforts *now* remain important even if they do not seem to be relevant at the moment of choice. This supports seeing virtues as qualities of a will trained to choose well, each virtuous choice being at the same time well informed and free.

3.2. MULTIPLY CAUSED, SELF-FORMING, DYNAMICAL, AND EXTENDED PROCESSES OF ACTION GENERATION

What recently receives a lot of attention is a growing realization that actions are caused by many different factors, so that our (free) will cannot be possibly associated with only one of them. Importantly, causal factors include not only the conscious, but also many unconscious and not explicitly intentional layers which can still be integral parts of our free agency. This finding is well explicated by Patrick Haggard for whom "everything, rather than nothing, is the cause of our freely willed actions."²⁷ Alternatively, free will can be seen as having little to do with the actual complex process of action production. It may reflect an apparently non-causal over-reaching control, introspection and integration, relation of authorship or ownership of the mechanism, responsiveness to reasons, or else psychological capacities for certain skills.²⁸ In all those cases, however, complex causal processes governing action generation remain an important point of reference.

Interestingly, the idea of "self-forming actions" was used by the free will philosopher Robert Kane, for whom it supported libertarian free will in a form of "event-causal" (as opposed to "agent causal") libertarianism. According to Kane, "self-forming actions" (SFA) take place when agents experience two competing options (and intentions) so that their will is divided between two neural networks which, while competing, produce an *effort* which leads to an undetermined choice.²⁹ From the philosophical point of view Kane's account is problematic and it seems difficult for science to account for this kind of truly (ontologically) undetermined action generation.

An example of a more recent and scientifically more feasible hypothesis is represented by Aaron Schurger et al. Criticizing the common focus on intentions as mental states, they argue that intentional actions do not originate in any concrete

²⁶ Cf. Aristotle, *Nicomachean Ethics*, trans. H. Rackham, Cambridge, MA: Harvard University Press 1990, 1103b.

²⁷ P. Haggard, *Does Brain Science Change our View on Free Will?*, in: R. Swinburne (ed.), *Free Will and Modern Science* (British Academy Original Paperbacks), Oxford: Oxford University Press 2011, p. 23.

²⁸ Cf. H.G. Frankfurt, *The Problem of Action*, "American Philosophical Quarterly" 15 (1978), no. 2, p. 160; A. Lavazza, *Free Will and Neuroscience*, pp. 10-11.

²⁹ See e.g.: R. Kane, *Libertarianism*, in: J. Fisher et al. (eds.), *Four Views on Free Will*, Oxford: Blackwell 2007, pp. 24-27, 37.

location, or even any specific process(es) but “emerge from a causal web in the brain.”³⁰ The dynamics of brain activity are studied by Schurger et al. through the mathematics of dynamical systems. According to the widely endorsed *stochastic decision model* (SDM), a *spontaneous voluntary movement* (SVM) is the result of a process called bounded integration: neural activity arising from internal noise and external stimuli builds up to a certain threshold, that when crossed results in a motor response. When there is no external stimulus, it is the internal noise that determines the initiation of an SVM.³¹

Schurger’s studies conclude that the RP does not reflect processes leading up to a decision, but a general ebb and flow of background noise, triggered by many factors. Signals such as the RP can be to some extent predictive of a decision, but they represent an agent’s tendency towards an action, not the final (relatively late) commitment to it.³² Importantly, for Schurger and like-minded scientists the multiple and covert origin of actions includes also the predictive feedback from the muscles and motor specifications of a movement. This means that (human) voluntary agency reaches beyond the central nervous system and in some way involves interaction with the environment, an idea endorsed by the proponents of *extended cognition*.³³

Schurger’s account represents a more general trend of neuroscience that looks critically at its traditional computational tools and turns to models of *dynamical systems* that look at the overall change of the system in time. It is at that level of organization – or in fact functionality – where dynamical theories of cognition hope to find information about our cognitive functions. They see cognition as a continuous process, as opposed to a sequence of discrete steps in time. Where computational neuroscience focuses on mental *events* realized by neural events that have a beginning and an end, dynamical approaches look at the rate, duration, and the dynamical flow of *change* between those events. While the former paradigm accepts spatially located mental *representations*, dynamical theories usually reject that notion and refer instead to ‘equilibrium points’ and ‘critical attractors’ as possibly underlying higher order phenomena, including volition.³⁴

³⁰ A. Schurger, S. Uithol, *Nowhere and Everywhere: The Causal Origin of Voluntary Action*, “Review of Philosophy and Psychology” 6 (2015), no. 4, p. 761.

³¹ A. Schurger, M. Mylopoulos, D. Rosenthal, *Neural Antecedents of Spontaneous Voluntary Movement: A New Perspective*, “Trends in Cognitive Sciences” 20 (2016), no. 2, pp. 77-79.

³² A. Schurger et al., *Neural Antecedents of Spontaneous Voluntary Movement*, pp. 77-79; A. Schurger, S. Uithol, *Nowhere and Everywhere*, pp. 767-768.

³³ A. Schurger, S. Uithol, *Nowhere and Everywhere*, pp. 771-773.

³⁴ Cf. L. Shapiro, *Dynamics and Cognition*, pp. 354, 358-359.

3.3. FROM TOP-DOWN CONTROL TO FREE WILL AS NATURAL AUTONOMY

If action generation is a matter of multiple, dynamic and possibly extended causation, what kind of action-control can it allow for? Stochastic decision models such as Schurger's imply that consciousness is neither necessary for (intentional) action control, nor for the actual decision of which one can become conscious within a reasonable delay.³⁵ For Schurger action control emerges "through the interaction of these processes," because none of the concrete brain processes can solely account for subsequent behavior.³⁶ Partially predictive antecedent activity increasingly disposes a person towards action yet does not determine it.

In order to find support for direct conscious control one can look to the so-called "field theories of consciousness." Field theories identify consciousness with the electromagnetic field generated by the entirety of the ongoing electric activity of the brain.³⁷ Johnjoe McFadden writes about the CEMI (conscious electromagnetic information) field, generated by the brain. Such field is not only a physical correlate and substrate of the conscious experience, but it can also causally influence the brain's own neural firing, opening the way for a conscious free will.³⁸

In their recent work McFadden and Al-Khalil defend the idea of an upcoming age of the "quantum biology,"³⁹ which is remarkable since the implications of quantum theory were often used to defend, albeit in an arguably non-convincing way, libertarian free will based on the existence of undetermined alternative options.⁴⁰ McFadden argues that quantum processes are involved in many living systems, but unlike many other accounts of quantum amplification he does not see them as supporting human cognition in any major way. Quantum probabilistic events could underlie a certain flexibility and apparent indeterminacy at the basic level of life, which could be utilized by organisms in order to exhibit flexible and at the same time goal-oriented behavior.⁴¹

However, one does not need quantum uncertainty to see natural flexibility and growing self-determination as a feature of life in general. Theories of natural or biological autonomy account for those essential features of organisms in terms of

³⁵ A. Schurger et al., *Neural Antecedents of Spontaneous Voluntary Movement*, p. 79.

³⁶ A. Schurger, S. Uithol, *Nowhere and Everywhere*, p. 767.

³⁷ Cf. S. Pockett, *Field Theories of Consciousness*, "Scholarpedia" 8 (2013), no. 12, p. 4951, http://www.scholarpedia.org/article/Field_theories_of_consciousness [accessed: 26 I 2017].

³⁸ J. McFadden, *The CEMI Field Theory: Closing the Loop*, "Journal of Consciousness Studies" 20 (2013), no. 1-2, pp. 153, 166.

³⁹ J. McFadden, J. Al-Khalili, *Life on the Edge: The Coming of Age of Quantum Biology*, New York: Crown Publishers 2014.

⁴⁰ See e.g., Roger Penrose and Stuart Hameroff's "Orchestrated Objective Reduction" (ORCH OR) model of quantum reduction in the microtubules; S. Hameroff, R. Penrose, *Consciousness in the Universe: A Review of the 'ORCH OR' Theory*, "Physics of Life Reviews" 11 (2014), no. 1, pp. 43-44.

⁴¹ J. McFadden, J. Al-Khalili, *Life on the Edge*, pp. 20-23.

self-contained regimes of *autopoiesis* or *causal closure*.⁴² The resulting patterns of organization and regulation stimulate the growth of *autonomy*, understood as maintaining and putting constraints on its own boundary conditions, which enables functionality and finally agency.⁴³ The natural flexibility of organismal behavior can be described in terms of a random walk (exhibited already by bacteria and fruit flies) and lawfully selecting among random non-stimulus driven actions, or of an open-ended exploration of strategies coupled with commitment and adaptation.⁴⁴ Interestingly, stochastic decision models such as Schurger's share the same underlying mechanisms with rats and even crayfish, whose background neuronal activity exhibits readiness discharges that proceed spontaneous behaviors and display a similar time course to the human RP.⁴⁵

Being already present at the somatic and behavioral level of organisms, natural autonomy benefits from human cognitive abilities which supplement it with some extra yet crucial qualities. Those qualities help human agents explore their options in a more efficient way, by using for instance imagination, and to exercise more (conscious) control by using the mechanisms discussed in previous paragraphs. For a higher-level description of will and intentionality the natural autonomy approach means a deeper integration and appreciation of the somatic, affective, and extended-ecological aspects of agency. Such appreciation is recently advocated by some Thomistic accounts of volition and is one of the tenets of contemporary Christian virtue ethics.⁴⁶

Indeed, cognitive abilities relevant for human autonomy could enable unconstrained and undetermined choices made by the unified faculty of a conscious will. But one could also see them as reflecting things like reason-responsiveness (often listed as a necessary condition for free will), counter-factual thinking, planning and deliberation or, importantly, moral sensitivity and normative reasoning. Grounded in a cognitively enhanced natural autonomy, human free will can be seen as a set of biological and psychological capacities by which we are able to both pursue our sophisticated (abstract, moral, relational) goals and indirectly control our (moral) actions.

⁴² F. Varela, *Principles of Biological Autonomy*, New York: North-Holland 1979, pp. 58-60; A. Moreno, M. Mossio, *Biological Autonomy: A Philosophical and Theoretical Enquiry* (History, Philosophy and Theory of the Life Sciences 12), Dordrecht: Springer 2015, <http://link.springer.com/10.1007/978-94-017-9837-2> [accessed: 9 V 2017], pp. 20-21.

⁴³ A. Moreno, M. Mossio, *Biological Autonomy*, pp. 70-71, 89-90.

⁴⁴ M. Heisenberg, *Is Free Will an Illusion?*, "Nature" 459 (2009), no. 7244, pp. 164-165; B.N. Waller, *The Natural Selection of Autonomy*, Albany, NY: State University of New York Press 1998, p. 7.

⁴⁵ K. Kagaya, M. Takahata, *Readiness Discharge for Spontaneous Initiation of Walking in Crayfish*, "Journal of Neuroscience" 30 (2010), no. 4, pp. 1348, 1358-1361.

⁴⁶ Cf. E. Stump, *The Non-Aristotelian Character of Aquinas's Ethics: Aquinas on the Passions*, "Faith and Philosophy" 28 (2011), no. 1, pp. 29-43; G.S. Harak, *Virtuous Passions: The Formation of Christian Character*, Eugene, OR: Wipf & Stock 1993, pp. 7-11, 27-30.

What emerges is a possibility of integrating, actively weighting and strengthening (as well as inhibiting) different causal vectors, up to a point of their *de facto* dominance.⁴⁷ One's attentive processing and explicit voluntary efforts – as well as long term character formation – might play an active role in this, but the actual neurocognitive mechanisms supporting it are yet to be uncovered.

The above stated vision of autonomy and control supports a distributed yet *de facto* broader notion of moral responsibility. Such an understanding may offer a way out from the moral-theological dilemmas about moral nature of particular acts *versus* subjective intentions and fundamental attitudes. Agreeing that one may be morally responsible for many aspects of personal development, which in different ways lead to our actions, can support various positions on the traditional-revisionist spectrum of moral theology. The intrinsic morality of acts – and our responsibility for choosing to perform them or not – may still be argued based (i) on their role in the entire (long-term) process, and (ii) on a degree of choice-related flexibility of natural alternatives. The moral value of the underlying dispositions, and even of a fundamental moral attitude (fundamental option), could also be supported by natural flexibility of living agents, as well as by end-orientedness and flexibility of their own evolution and agency. A crucial assignment for fundamental moral theology would then lie in discerning the nature of morally relevant first-person contributions to the process, both in their short- and long-term dimension. Such a contribution should be the one that makes human agency truly voluntary and free, to the extent that justifies moral responsibility and testifies to the free will.

4. NATURAL SCIENCE AND (MORAL) THEOLOGY ON FREE WILL: POSSIBILITIES OF MUTUAL INTEGRATION AND DIALOGUE

Drawing on the implications coming from the aforementioned scientific ventures, several points can be made about possible integration of scientific knowledge with moral theological and ethical notions of free will. Libet-style hypotheses about freedom of action being dependent on a single brain signal and on the (in) efficacy of proximal conscious intentions do imply *conflict* with the widespread modern-libertarian notion of free will. While this post-Cartesian understanding was and is present also in moral theology, Libet-style science does not strike as being

⁴⁷ Understanding autonomy as 'flexible integration of multiple causal vectors' might then be a necessary reformulation of causal theory of action; S. Bonicalzi, P. Haggard, *From "Freedom From" to "Freedom To": New Perspectives on Intentional Action*, "Frontiers in Psychology" 10 (2019), article 1193, pp. 10-11, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6546819/> [accessed: 15 I 2020].

at odds with the more original Thomistic intuitions about the created, teleological, and causally entangled willing. Christian ethical personalisms too, in their emphasis on general agential autonomy and fundamental moral attitudes, should not in principle suffer from any scientific evidence (i) against absolute causal efficacy of proximal conscious intentions to act now, or (ii) against their supposed undetermined character (as *causa sui*).

Contrary to that, neuroscientific evidence supporting long-term efficacy of intentional thoughts and acts – and its striking compatibility with the central premises of (theological) virtue ethics – allows us to consider *integrating* these descriptions with ethical and theological categories of disposition, virtue, and character. Such integration would then also include higher-order descriptions of will, choice, and intention, as these remain important in classical virtue theories. Since some of the scientific accounts, such as those of Tse, do not exclude short-time (criterial) action control, certain aspects of the traditional view of free choice might also be integrated with it, albeit in a slightly modified way.⁴⁸

Dynamical systems approaches, (quantum) field theories of action control, and the notion of natural autonomy open a new way of seeing free will: as an overarching capacity of the acting person (or a person in becoming), something that can be well integrated in nearly all theological accounts. However, certain aspects of free will (such as the self-forming character of spontaneous voluntary movements) may challenge traditional assumptions about freedom of choice or the Thomistic notion of willing as endogenous and individually controlled.⁴⁹ A close dialogue is therefore needed to clarify the ontological status of particular moral decisions and the possibility of grounding them in the evidence-accumulation or the stochastic-decision-models (SDM). Furthermore, seeing human free will as an instance of organismal autonomy invokes the question of the animal-human boundary. What is needed is a careful assessment of autonomous features that make human agency unique, in a sense of being subject to moral reflection and judgment and being congruent with the theological idea of the *Imago Dei*.

⁴⁸ Still, mutual *dialogue* remains not only possible but also highly advisable, for example, when it comes to the essence of voluntary (internal) control and responsibility, and the way it relates to a criterial vs. 'normal' causal influence.

⁴⁹ This important characteristic of the will as faculty is sometimes referred to as 'freedom of exercise'. It means that, even though the object of willing could in several ways be seen as pre-determined, the subject retains freedom to 'will' or 'not to will,' as well as to freely stop the process at any point. In Schurger's account, however, whether an action gets performed or not depends either on the accumulation of internal noise, or on some external imperative in the form of sensory evidence. Cf. V. Bourke, *Ethics*, p. 80.

5. CONCLUSION

Interdisciplinary theological engagement with natural (empirical) sciences (as well as integrating scientifically acquired knowledge into theology) becomes most evident in addressing fundamental anthropological notions. If the human embodied relationship and interactive engagement with the world makes scientific knowledge highly relevant, its value for Christian theology is most clearly visible when fundamental ethical concepts, such as free will, enter the stage.

In this regard, growing towards a constructive and methodologically refined exchange with natural, especially neurobiological sciences, theological ethics might be coming closer to the truth about what having/experiencing free will actually entails for an embodied human person. As a result, some light can be shed on an ongoing struggle of Catholic moral theology (and Christian ethics in general) to reaffirm its traditional assumptions that support moral responsibility and accountability in relation to our actions, to ourselves, and to our Creator.

Although providing a handful of valuable implications, up to date neurobiological sciences cannot be said to have ‘proven’ that some kind of free agency and free will does actually exist. One may even conclude that providing empirical evidence for concepts that clearly escape empirical methodology remains in principle impossible and/or undesirable. Still, what can be said with due certainty is that contemporary science does not exclude some form of intentional, voluntary and free human agency – and may support a corresponding notion of free will. What can also be said, is that many recent scientific developments uncover or postulate mechanisms that could be part of such voluntary agency. As much as possibly supporting the actual existence of free will, scientific results provide important insights into the way in which free will might actually work.

Such knowledge is indispensable for theological ethics, which can neither eliminate notions that are deeply rooted in human experience and in moral theological tradition, nor let them depend solely on the changing turnouts and the epistemic status of empirical sciences. Rather, by integrating knowledge about the human neurobiological condition, theological ethics – but also theological anthropology and possibly other theological disciplines – are set to gain more accurate and more complete understanding of their own fundamental concepts.

NAUKI PRZYRODNICZE WOBEC/W TEOLOGII MORALNEJ:
KWESTIA WOLNEJ WOLI

Abstrakt

Pojęcie wolnej woli, wspierające odpowiedzialność moralną w różnych ujęciach katolickiej teologii moralnej, w szczególności sposób sytuuje się na skrzyżowaniu dyscyplin teologicznych i pozateologicznych. Wczesne badania nad wolą w neuronauce poznawczej, zainspirowane eksperymentem Libeta (1983), sugerują, że wolna wola jest iluzją, ponieważ nasze świadome intencje nie powodują odpowiadających im działań: działanie te są inicjowane wcześniej przez nieświadome procesy mózgowie. Choć wydaje się to sprzeczne z podstawowymi założeniami antropologicznymi i etycznymi, bliższe przyjrzenie się tej tezie ukazuje, że jest ona niedojrzała. Jednocześnie nowe osiągnięcia multidyscyplinarnej nauki o woli zwracają uwagę na kilka aspektów wolności i sprawczości, które mogą mieć kluczowe znaczenie dla sposobu, w jaki ludzie podejmują działania i kontrolują swoje życie. Implikacje wynikające z tych badań mogą sprowokować pewne przeformułowania po stronie etyki teologicznej. Mogą też wskazać na niektóre szkoły i tradycje, takie jak chrześcijańska etyka cnót, jako teologicznie preferowane.

Słowa kluczowe: wolna wola, nauki przyrodnicze, neuronauki, kognitywistyka, teologia moralna, etyka cnoty, metodologia teologiczna.

NATURAL SCIENCES AND/IN MORAL THEOLOGY:
THE CASE OF FREE WILL

Abstract

The notion of free will, which supports moral responsibility in various accounts of Catholic moral theology, is in a particular way situated at the intersection of theological and non-theological disciplines. Early studies on volition in cognitive neuroscience, inspired by Libet's experiment (1983), suggested that free will is an illusion because our conscious intentions do not cause corresponding actions: these are initiated beforehand by unconscious brain processes. Although this seems to contradict basic anthropological and ethical assumptions, a closer look at this thesis renders it immature. At the same time, new developments in the multidisciplinary science of human volition draw attention to several aspects of freedom and agency that may be central to the way people take action and control their lives. The implications of this research may provoke some reformulations on the side of theological ethics. They may also point to certain schools and traditions, such as Christian virtue ethics, as theologically preferable.

Keywords: free will, natural science, neuroscience, cognitive science, moral theology, virtue ethics, theological methodology.

NATURWISSENSCHAFTEN GEGENÜBER/IN DER MORALTHEOLOGIE:
 DIE FRAGE DES FREIEN WILLENS

Abstrakt

Die Frage der Willensfreiheit, die in verschiedenen Darstellungen der katholischen Moraltheologie die moralische Verantwortung stützt, befindet sich an der Schnittstelle zwischen theologischen und nicht-theologischen Disziplinen. Die frühe Willensforschung in den kognitiven Neurowissenschaften, die durch das Experiment von Libet (1983) inspiriert wurde, legte nahe, dass der freie Wille eine Illusion ist, weil unsere bewussten Absichten nicht zu entsprechenden Handlungen führen: sie werden vorher durch unbewusste Gehirnprozesse ausgelöst. Dies scheint zwar grundlegenden anthropologischen und ethischen Annahmen zu widersprechen, aber bei genauerer Betrachtung erweist sich eine solche These als unausgereift. Gleichzeitig lenken neue Entwicklungen in der multidisziplinären Wissenschaft des Willens die Aufmerksamkeit auf verschiedene Aspekte von Freiheit und Handlungsfähigkeit, die für die Art und Weise, wie Menschen handeln und ihr Leben kontrollieren, von zentraler Bedeutung sein können. Die Implikationen dieser Forschung könnten zu einigen Reformulierungen in der theologischen Ethik führen. Sie können auch auf bestimmte Schulen und Traditionen, wie die christliche Tugendethik, verweisen, die theologisch vorzuziehen sind.

Schlüsselwörter: freier Wille, Naturwissenschaft, Neurowissenschaft, Kognitivistik, Moraltheologie, Tugendethik, theologische Methodologie.

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