

# Neuroscientific findings in the light of Aquinas' understanding of the human being

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**Abstract.** Neuroscience is one of the most propulsive of all sciences and very often, directly or not, it tries to answer the question: What is man? However, neuroscientific research does not acknowledge the concept of man as a unity of body and soul. The modern scientific research paradigm therefore rests on physicalism, while theologians are turning towards non-reductive physicalism. In this paper, we will highlight a few key points of the theory of philosopher and theologian Nancey Murphy, which is based on the deconstruction of Aquinas's thought about the human soul and its reduction to the physical. We aim to show that she neglected the full scope of Aquinas teachings. In the second part of this paper, for the scientific paradigm of humans we shall propose *new-old* hylomorphism, and try to complement certain points of such a system with modern neuroscientific views. The aim of this work is to offer advice for the interdisciplinary cooperation between neuroscience, philosophy and theology alongside the guidelines of Aristotelian-Thomistic hylomorphism.

**Keywords:** Thomas Aquinas; Nancey Murphy; hylomorphism; physicalism; neuroscience.

## Introduction

Are we the witnesses of the final overcoming of the concept of the soul thanks to neuroscientific studies of the brain? Do the fascinating neural structures reveal the complete truth about the human being? Or does it happen to be another hastily made conclusion, as all too often happens with scientific expectations?

Neuroscience is one of the most propulsive of all sciences that explores the brain and the nervous system, and very often, directly or not, tries to answer the question: What is man? However, neuroscientific research does not acknowledge the concept of man as a unity of body and soul. Even theological attempts at interpretation and integration of neuroscientific empirical findings avoid hylomorphism. The very thought that the man be seen as a unity of body and soul is labelled as dualism – an already surpassed philosophical attitude that has no place in science. First, how shall we explain the effect of a non-material soul on the material body? If energy is required to transfer information from the soul to the body, from where does the immaterial soul draw that energy? In other words, dualism calls into question the basic physical law of conservation of energy. Secondly, if the occurrence and effects of all human activities, including the greater spiritual abilities, can be explained and understood based on bodily structure and functions, with the central role of the brain, then the soul is an unnecessary addition, a relic of times gone past. The modern scientific research paradigm therefore rests on physicalism, while theologians are turning towards non-reductive physicalism.

Not infrequently we can find that in neuroscientific texts Saint Thomas Aquinas is cited as an example of speaking about man as “composed of a spiritual and corporeal substance” (Aquinas 1947, I<sup>a</sup>, q. 75 pr), and whose presentation was clear and admirable for its time, but today has been overcome. In the first part of this paper, based on an example of one such study that builds a new image of man as pertains to the criticism of Thomas Aquinas, we will expose the critical reflection of the American philosopher and theologian Nancey Murphy. Neither will we go into detail or herein

interpret her facts, but we will highlight a few key points of the theory that is based on the deconstruction of Aquinas's thought. In the second part of this work, by pointing to gaps in the understanding the teachings of Thomas Aquinas as well as pointing to the possibility of different interpretations of neuroscientific research, we will show how the physicalist framework within which Murphy operates is not sufficient if we want to understand the human being in all its dimensions. So, we must ask ourselves: Is there another frame besides physicalism and Cartesian dualism that is convenient for an understanding of human beings, without being therein reduced to a certain characteristic or organ?

Therefore, in the third part on the scientific paradigm of humans we shall propose *new-old* hylomorphism, and certain points of such a system to try to complement it with modern neuroscientific views. The aim of this work is to offer suggestions for the interdisciplinary cooperation between neuroscience, philosophy and theology alongside the precept of Aristotelian-Thomistic hylomorphism.

## 1. Nancey Murphy and non-reductive physicalism

Nancey Murphy, who does research on the relationship of science and theology, is a prominent figure concerning non-reductive physicalism. When investigating relations between the soul and the brain, she retains that Aquinas is still important, but, thanks to the influence of neuroscience, it is becoming increasingly clear "that the functions and attributes once attributed to the soul or mind is better understood as functions of the brain" (Murphy 2006, 40/56). It is considered that a challenge to the Christian faith does not come as much from Darwin's theory of evolution as from the development of physics and neuroscience, which significantly influences the formation and understanding of the human nature. Yet, Murphy believes that a study of the brain will never be able to establish proof that besides the body an immaterial soul does not exist. However, she holds that Biblical studies and neuroscience point towards a physicalist understanding of the human person. "Humans are not hybrids of matter and

something else, they are purely physical organisms” (Ibid. 69). Of course, this is not a new position concerning Biblical studies (Brajčić 1976, 226). What is new is that this understanding of man is now defended with the help of neuroscientific views. For a number of available sources that could serve as a counter-argument, I suggest article from Paul Flaman, which takes into account Murphy’s position and neuroscience research, and defends the position that man has an immortal soul (Flaman 2008). Also, it should be noted that Murphy does not question the existence of God and believes that neuroscientific research will never give evidence to the question of whether God exists or not (Ibid. 68).

As for Aquinas’s understanding of soul, Murphy says that the soul is first and foremost “the life principle”. But what makes something alive in modern science is a question that biology deals with, which, as well as the other sciences, grasps things in the universe “as fitting (them) into a hierarchy; not as a medieval chain of being, but rather a hierarchy of complexity” (Ibid, 56). Murphy also remarks that in the early 20th century there was a philosophical dispute between Vitalists and Emergentists. The first followed Aristotle’s understanding of reality and argued that there must be one vital force that directs the formation of the body and thus is credited for the organism that is alive. The other considered that the proper functioning of a suitably complex entity was enough for it to be alive. “Life is an emergent property that is dependent on complex organization, not on an additional entity or non-material stuff. So this was the last gasp of the ancient and medieval idea of the soul as a life force” (Ibid. 57).

Murphy then moves on to the interpretation of the teachings of Thomas Aquinas on the soul. The first is *the vegetative soul* which has three powers: growth, feeding and reproduction (Aquinas 1947, I<sup>a</sup>, q. 78, a. 2 co). But, biologists have shown the powers attributed to the vegetative soul to be on the physical level of the individual. Murphy then moves on to *the animal or the sensitive soul*, which has the following powers: locomotion, appetite, sensation, and emotion. All powers Murphy breaks down in a manner that is based on physical structure and its requirements for the individual to survive, and particularly emphasises the role of the brain and the branched

nervous system (Murphy 2006, 59–60). Concerning consciousness, according to Murphy, the interaction of the human nervous system to the rest of the body and the environment is “the seat of consciousness” (Murphy 1998, 131).

Murphy further points out that Aquinas, along with citing the five external senses (sight, hearing, smell, taste, and touch) (Aquinas 1947, I<sup>a</sup>, q. 78, a. 3 co), also stated the four interior powers of the “sensitive part” (*sensus communis*, *phantasia*, *vis aestimativa*, and *vis memorativa* – “The common sense, the imagination, and the estimative and memorative powers.” Aquinas 1947, I<sup>a</sup>, q. 78, a. 4 co), by which the medieval author explains the cognitive skills like a contemporary scientists and neuroscientists. Murphy points out that in neuroscience the important issue is how the brain recognizes when some event/person/pattern is repeated (Murphy 2006, 62). For Murphy, it is this knowledge that is important for an understanding of Aquinas’s *phantasia* in such a way that it represents “the re-activation of such an assembly that accounts for the memory of the original set of stimuli” (Ibid. 63). The next contact point between Aquinas and neuroscience is achieved through *sensus communis*, which in science is called “the binding problem”. The binding problem refers to one of the central features of the structure of consciousness – the unity. “We experience objects and events in consciousness. These events and objects are composites of different stimuli and their various features. [...] How is such a ‘unity of phenomenal contents’ of consciousness constituted?” (Northoff 2014, 119–120) Unlike neuroscientists, philosophers are concerned about “a unity that is prior to and occurs independently of the contents” (Ibid. 120). Aquinas was also aware of this *problem*, but he did not postulate a faculty of consciousness, but a faculty where all information comes together – the *sensus communis*. (Pasnau 2004, 199).

The rational soul, which is characteristic of human beings, belongs not only to the passive and active intellect, but also the will. As for the powers of the intellect, they are not now so well understood in the neuroscience. Murphy claims that these powers are dependent on the phenomenon of language, for which the neural patterns are very well researched (Murphy 2006, 66).

Murphy holds that the will is the centre of the moral abilities that are in turn connected to select areas of prefrontal cortex. On this basis, Murphy concluded that “what Thomas described as the ‘appetite for the good’ appears to depend directly on localizable brain functions” (Ibid. 67). She sees the problem of morality as closely connected with rationality: how it came to be that humans reach decisions based on moral principles (Ibid. 73). In the end, Murphy suggests “that what we really want when we want free will is some measure of autonomy from biological drives and social forces. But not a great deal.” (Ibid. 109) Murphy thinks that our brain processes, which are developed, organized, and strengthened with symbolic language and inclusion in society, enable powers that are far greater than in any animal, and guide us toward goals of rationality, morality and freedom (Ibid. 109).

In terms of the soul, as a part of a man that after death first goes to heaven, Murphy believes that Christians should think about the future life rather in the context of the resurrection of the body, as opposed to in a context where the soul goes to heaven. To enhance evidence for such a belief, she asks “what characteristics your soul would have to retain for it to be recognizably you who gets to heaven. Your consciousness, your memories, your likes and dislikes, perhaps? But, as we have just seen, these are all the provinces of brain studies” (Murphy 2006, 69). Murphy dissociates herself from the reductionist error that all human capacity is reduced to “nothing but” ongoing processes in the brain, and represents the position of non-reductive physicalism. While in reductionism, even more higher human capacities reduce to “neural firing”; on the other hand, non-reductive physicalism, by claiming that there is no existing soul, attempts to explain the more complex human abilities, not only with the help of brain processes, but also through human social relationships, influences of culture, and also through our relationship with God (Ibid. 69).

## 2. Critical review

We have briefly presented Murphy’s view, but we will try to show why she failed to fully grasp Aquinas’s understanding of the human being as a unity

of body and soul. Also, we aim to show that Murphy's neuroscientific overturning of Aquinas's understanding of the human being is not convincing proof that the soul very likely does not exist. Tom Wolfe also considers that the future does not bring Nietzsche's "God is dead", but "the soul is the dead" (Wolfe 2000). Furthermore, maybe we can use such an undertaken neuroscientific overturning, reverse it and interpret it differently – in favour of Aquinas's hylomorphism.

First, let us consider the question of consciousness, which is certainly one of the most difficult and most stratified questions of all. It should be noted that the issue of consciousness is an extremely important question of theological reflection, and is closely related to the soul. "The Church affirms that a spiritual element survives and subsists after death, an element endowed with consciousness and will, so that the 'human self' subsists. To designate this element, the Church uses the word 'soul', the accepted term in the usage of Scripture and Tradition." (Sacred Congregation for the Doctrine of the Faith, *Letter on Certain Questions concerning Eschatology*) Murphy has briefly noted indications of a possible physicalist solution, and although it is not yet scientifically clear in which way consciousness arises from its material basis, for Murphy it's only a matter of time.

Does the fact that neuroscientists seek neural correlates of consciousness put Murphy in the right when she argues that this question will be solved? Is the problem of consciousness only a neuroscientific problem? What about the fact "that most of our brain operates non-consciously" (Card. Cottier and others 2013, 306) and that only "through self-observation, we develop some degree of explicit self-knowledge" (Ibid. 307), which implies that the subject and his unique verbal reports are of utmost importance in understanding consciousness as it appears to us in our everyday life? And even if one day neuroscientists demonstrate the neural processes involved in the manifestations of the sense of the unity of consciousness, it is still far from an understanding of consciousness as a specific human phenomenon, which is extremely more complex than the phenomenon of being conscious, which is what neuroscientists reduce consciousness to in their investigations; such is the case with, for example, director of the

Max-Planck-Institute for the brain research in Frankfurt, neuroscientist Wolf Singer. “Since consciousness is so difficult to define an attempt will be made to avoid this term and rather use the adverb ‘consciously’ and the adjective ‘conscious’ in order to further specify particular brain states or aspects of a perceptual process. Also, no attempt will be made to address the hard problem of consciousness research, the problem to explain the phase transition from neuronal processes to the qualia of subjective experience (Chalmers, 2000).” (Singer 2013, 54) Also, neuroscientist Stanislas Dehaene defends the hypotheses that empirical research can completely explain consciousness, starting from three basic notions: vigilance, attention and conscious access. “Once we clarify how any piece of sensory information can gain access to our mind and become reportable, then the insurmountable problem of our ineffable experiences will disappear.” (Dehaene 2014, 17)

Contrary to these approaches, philosophers and theologians provide a more comprehensive view. Philosopher David J. Chalmers differentiates the so called “easy problems” and “hard problems”. Easy problems of consciousness address the issues, such as, “How does the brain process environmental stimulation? How does it integrate information?” (Chalmers 1996, XI–XII) Chalmers holds that these are all important questions, but an answer to them does not solve a difficult problem: “Why is all this processing accompanied by an experienced inner life?” (Ibid. XII) Furthermore, Karol Wojtyła holds that in a “reflexive” consciousness the core of consciousness itself is revealed as “that in and through what each person experiences himself or herself as the originator of new being, that is, as a free agent, endowed with self-determination, self-governance, and self-possession”. (Schmitz 2001, 31) There are also interesting attempts that try to take into account neuroscience and philosophy, such as one from Georg Northoff and “the neurophenomenal hypothesis of consciousness” (Northoff 2014, XXXVII). These briefly stated theories show that a reductive account of consciousness that relies only on brain studies falls short, and that we need to address further issues such as the role of the whole body and environment (including God) in understanding consciousness as a specific human phenomenon.

Although Thomas Aquinas did not directly talk about consciousness as it is used in contemporary literature, it is certain that when following St. Augustine he had a certain understanding (Aquinas 1955–1957, lib. 3, cap. 46, n. 8) So, concerning consciousness, it is an extraordinarily complex question, which requires interdisciplinary collaboration and viewing the human being as a whole, considering the strong and unavoidable notion of the unity of consciousness.

Second is the question of passive and active intellect. As relates to highly complex mental powers, Murphy puts them in direct dependence on the phenomenon of language, which is at the centre of numerous neuroscientific works. First, it should be noted that some neuroscientific theories observe certain forms of human thought that are not dependent on language (Kraft, Gulyás and Poppel 2009, V). Also, there exists a clear attitude towards on how biological and philosophical fields think of intellect, which is not contradictory, but rather these attitudes are complementary and go together in inquiring about the functions of thinking and the meaning of thought itself. Among neuroscientists is alive the idea that human thought is the “crown” of evolutionary sophistication and that it is fundamental to answer to the question “What is a man?” (Ibid. VI) And Aquinas himself had described the human soul, because of the activities and capabilities of the mind, as the *ultima in nobilitate formarum*. “Now the human soul is the highest and noblest of forms. Wherefore it excels corporeal matter in its power by the fact that it has an operation and a power in which corporeal matter has no share whatever. This power is called the intellect.” (Aquinas 1947, I<sup>a</sup>, q. 76, a. 1 co) In conclusion, the question of the human intellect is still open.

Third is the question of free will. This is an issue to which Murphy pays a lot more attention in her research area than any other power of the soul. However, her position is that free will is associated with certain functions of the brain, and how on this issue human beings should be satisfied with only a certain *measure of freedom*. This position is also fundamentally determined by the horizon of non-reductive physicalism. As a counter-argument, together with Haefffner, we can note that in human life there is no free self-determination without a share of natural determination. However,

concerning this natural determination of human behaviour, we need to think of it “as open for the possible self-determination” (Haeffner 2003, 180), open towards Aquinas’s notion of beatitude as the *causa finalis* of human beings. Murphy starts from neuronal foundations and builds on this, while Haeffner takes an approach from the perspective of “the wonders of freedom” as irreducible to the laws of cosmic genesis, phylogeny and ontogeny. Neural processes and structures represent natural determinism in the subject, which precedes and enables the subject, nevertheless remaining just that. In return, the subject takes its assumptions for free self-determination and “in the horizon of good, which forms a separate, higher order, in which for what was assumed (*i.e., natural determinism*) gets included and overcome” (Ibid. 182).

Before we consider non-reductive physicalism as a framework within which Murphy considers the question of man, we need to briefly present that there are two ways to approach the body/soul problem: dualism and monism. “Dualism defines the union between these two elements, the body and the spirit, which we considered equals, as a product of a kind of a connection between them, which is being thought either as of mutual causality, of any such identity in a deeper union or as coordination. The solution of monism consists in the fact that only one of these of the two elements – the body or the consciousness – is being attributed the true reality. The other element is then ontologically reduced and declared as a mere phenomenon.” (Haeffner 2003, 197) Dualism that observes the body and soul as two complete realities has the problem of explaining the interaction between them. The causality that overcomes the gap between the two entities “shall not follow nor merely spiritual and psychological nor merely physical laws, but still they need to be causally linked to one another – the realities of these two orders. To us such causality otherwise has not been known.” (Ibid. 197)

As for monism, if the body is reduced to a phenomenon, then we are talking about idealism. If the spirit is reduced, then we are dealing with materialism. Presently, the materialistic attitudes are enjoying great popularity in an attempt to reduce “phenomenal duality of mental and physical

in man to a single physical reality as the only 'true' reality" (Ibid. 198). The physical is what is physically examined and researched, but it's not purely physical research. Haeffner therefore notes that one can be physicalist, without much understanding of physics, as well one can be the physicist, and would not be able to be a physicalist. Therefore, "physicalism" represents the metaphysical statement representing that the "physics is only reasonable and exhaustive theory of reality." (Ibid. 198) Today, the problem of the body and the soul is narrowing down to the form of naturalism *versus* anti-naturalism. In other words, whether physical theory is about to fully understand the essence of man or must we assume that alongside the body there is essentially a different soul (consciousness)? Or on the other hand, no such presumption should (and must not) be in order. There are numerous physicalist solutions.

Haeffner makes a point in claiming that when we think of the relationship of the soul and the body there appears a certain darkness that stands against the scientific desire to shed light on and understand everything. "Man cannot live in an excessive light in a completely scientifically interpreted world." (Ibid. 204) The darkness that occurs at the limits of the human spirit is not the limit to be overcome, but it envelops and carries the human spirit. "In this way, non-solvability of the metaphysical problem of the soul and the body might prove to be something of an essence of a man." (Ibid. 204)

Furthermore, as for monism, here we've listed Patrick Becker's review, who divided it on the mental and physical. Mental monism conceives the physical as a mental construct or believes that the physical results from the mental. As for physical monism, which gives priority to the physical world, it is branched into: a) Reductive physicalism – mental can be reduced to physical; b) Eliminative materialism – mental simply does not exist, it is an invention of the brain; c) Non-reductive physicalism – the mental cannot be reduced, and goes beyond the physical, thus, the consciousness is recognized with certain autonomy, which includes an independent causal efficacy.

Non-reductive physicalism uses the idea of the emergence to clarify how from the physical has formed some kind of awareness with its own laws. Besides the monistic and dualistic positions, Becker stated *the overcoming of*

*the dualistic thinking.* It is an attitude which respects the question of whether the problem of the brain and consciousness is at all solvable for people – is it simply beyond our means? So it seems that the problem of knowing the natural, non-dualistic solution is one that cannot be found. Therefore, Becker believes that no single approach can answer all philosophical and/or natural science issues, and that maybe we should re-examine the very conditions of the debate. (Patrick Becker 2015, 43–87)

Having stated that, we return to Murphy and non-reductive physicalism where the basic assumption is that mental processes are caused by or emerge from a physical process during evolutionary processes. But, non-reductive physicalism faces several difficulties. First, we may speak of the violation of a fundamental principle of causality which posits that no effect can be greater in perfection than its cause: “the greater is not brought about by the lesser, for nothing acts outside its species” (Aquinas 1947, III<sup>a</sup>, q. 79, a. 2 ad. 3). In other words, the neural structures, processes, impulses and chemical reactions in the brain, cannot cause higher mental properties. In his critique of non-reductive physicalism, Derek S. Jeffreys rightly directs us to Norris Clarke, who claims “that the mere fact that a higher level of being does, in fact, emerge in a time sequence after a lower level, and at least in part out of it, in no way implies that the later is fully explained by the earlier. This would be to fall into the famous fallacy: *post hoc, ergo propter hoc* (after this, therefore because of this). This is most important when seeking a philosophical explanation of evolution in our cosmos.” (Clarke 2001, 194) The causal principle permits the occurrence of emergent properties, but Jeffreys points out that although lower-order entities can produce certain characteristics of a system, these same qualities cannot qualitatively exceed such lower-order entities in perfection. “Unless we show that events at the neurological level have the adequate efficient causality to produce mental activity, no amount of research in neuroscience and cognitive science will advance Murphy’s research program.” (Jeffreys 2004, 205–225. For Murphy’s response: Murphy 2004).

Furthermore, another problem with Murphy’s methodology is that she tries to understand the human being starting from individual powers and not from the understanding of a man as a whole, which is different from the

sum of parts (or organs). This approach is also known as the “mereological fallacy in neuroscience”, the error of many neuroscientific works. “Aristotle’s point is that we must not lose sight of the initially more known whole that is presupposed in all theoretical inquiries into its parts.” (De Haan and Meadows 2013, 213–230)

Did Aquinas also commit the “mereological fallacy”? Yes and no. First, “yes”. Since for Aquinas, “action belongs to the composite, as does existence” (Aquinas 1947, I<sup>a</sup> q. 77 a. 1 ad 3), the powers of the soul are known through their acts (Ibid. I<sup>a</sup>, q. 77, a. 3 co. / I<sup>a</sup>, q. 77, a. 1 ad 7). Robert Pasnau claims that this is “a key principle of Aquinas’s methodology: in understanding the soul, one works one’s way in from the external action to the internal capacity that explains the action, and eventually to the nature of soul itself”. (Pasnau 2004, 9) And this is in line with the particularity of neuroscientific investigations that deals with particular actions and underlying neural processes, but with one crucial difference – their end is not the soul or unity of the whole.

On the other hand, Aquinas did not commit the “mereological fallacy” because his “Tractatus de homine” is incorporated in *the initially more known whole* – in the broader metaphysical understanding of the human being as *imago Dei*, with his final cause – *beatitudo* (Aquinas 1947, I<sup>a</sup>, q. 2, a. 1 ad 1) and *cognoscendo et amando Deum* (Ibid. I<sup>a</sup>–IIae q. 1 a. 8 co). “When we understand the purpose of human life, we see what the essential features of a human being are.” (Pasnau 2004, 21–22) Of course, the formal cause of the human being (soul) and final cause of the human being (beatitudo) is not within the scope of neuroscientific investigations.

### 3. The Question of Soul

As the last item in this “critical review” of the paper, we deal with Murphy’s understanding of the soul as “the life principle”. “I answer that, To seek the nature of the soul, we must premise that the soul is defined as the first principle of life of those things which live: for we call living things ‘animate,’ [\*i.e. having a soul], and those things which have no life, inanimate’.” (Aquinas

1947, I<sup>a</sup>, q. 75, a. 1 co) Murphy takes the notion of “the life principle” and simply equates it with the horizon of the biological understanding of life and the conditions that are needed for it in the hierarchy of complexity. However, this is pure reductionism, because the life in us is not only biological life, but in an analogous way we also have an intellectual and moral life that presupposes biological life. “The intentional and transcendental character of our knowledge both preserves and deeply changes our biological life.” (Campodonico, at: [www3.nd.edu/~maritain/](http://www3.nd.edu/~maritain/))

Aquinas’s understanding of “the life principle” takes place opposite an understanding of the philosophers of old (*antiqui philosophi*) who believed that life has originated in a body, because only bodies are real things and so the soul is also something corporeal (Aquinas 1947, I<sup>a</sup>, q. 75, a. 1 co). Aquinas does not deny that the body cannot be the principle of life, “as the heart is the principle of life and an animal” (Ibid. I<sup>a</sup>, q. 75, p. 1), but the main assertion is that the soul was the *first* origin of life, that the soul gives a reality (*actus*) to the body. Therefore, maybe we could say that in some sense Murphy takes the position of the philosophers of old. “Aquinas thinks that these figures went wrong not just because they disbelieved in spiritual entities like God, angels, and the human soul, but – more basically – because they had the wrong metaphysics, even with respect to the natural world that was their focus. [...] Aquinas does hold that the ancients erred by postulating only a material cause (see *InMet* VIII.4.1737); it is in that sense, most properly, that we might refer to the ancients as materialists.” (Pasnau 2004, 30–31) Aquinas cites St. Augustine when he says that it’s about such individuals who hold the materiality of the soul, because they do not know how otherwise to describe any nature but with the help of imaginary pictures of corporeal things (Aquinas 1947, I, q. 75, p. 2). This is the point where comes to the fore the prominent contemporary understanding of man through the frame of non-reductive physicalism. In this context, there is no place for the soul, for the origination of mental activity; which was for Aquinas both incorporeal and subsistent. “I answer that, It must necessarily be allowed that the principle of intellectual operation which we call the soul, is a principle both incorporeal and subsistent.” (Aquinas 1947, I, q. 75, 2)

#### 4. Hylomorphism: New-old anthropology informed by neuroscientific findings

Attempts to reconcile the neurosciences, philosophy and theology have been mainly led by the image of man framed with physicalism, like in Murphy's work. If we don't want to accept physicalism, it seems that we are only left with Cartesian dualism. But, that also cannot be acceptable for catholic thinkers. It looks like we are stuck and whatever direction in investigation we take "we will be unable to articulate the metaphysical underpinnings of a philosophical anthropology that does justice both to our obvious dignity and distinctiveness as human beings and to our equally obvious continuity with other animals and, indeed, with the rest of the physical universe". (Freddoso, at: [www3.nd.edu/~afreddos/papers/soul.htm](http://www3.nd.edu/~afreddos/papers/soul.htm))

In the philosophy of mind, where the Cartesian *res cogitans* and *res extensa* (or in this case mental and brain capacities) still direct understanding of the human being, hylomorphism could be "a salutary alternative for understanding reality in neither physicalist nor dualist terms" (Gasser 2010, 48). In that context, Gasser also states that "proponents of the Aristotelian approach argue that the mind-body problem as most persistent Cartesian legacy plaguing modern philosophy can be overcome, if Aristotelian ontological categories are re-introduced in modern philosophical discussion." (Ibid. 48) Runggaldier similarly claims that Aristotelian hylomorphism, which is neither physicalistic/naturalistic nor dualistic, is an alternative that "allows for a conception of ourselves compatible with the assumption of diachronic personal identity, indexicality and agent causality" (Runggaldier 2006, 221).

The idea of the fundamental unity of man, known as hylomorphism, for Calvo has been *ignored for centuries*, even though it is the understanding of unity "which needs not to be explained in terms of an addition or interaction of elements, but which explains the elements in terms of the line of reciprocal reflection (*horizon*) of two metaphysical conditions that cannot be thought of apart from each other (i.e. matter and form). This is the only serious attempt in the whole history of the mind-body problem that comes close to an evaluation of the inner spiritual principle of man without

a priori separating it from the body, or reducing it to a sheer outcome of brain processes.” (Calvo 1992, 158) There are different understandings of hylomorphism, just to mention the one defended by Jaworski. “Hylomorphism claims that individuals consist of materials that are structured or organized in various ways. You and I are not mere collections of physical particles; we are collections of physical particles with a certain organization or structure. That structure is a basic ontological and explanatory principle.” (Jaworski 2011, 269) Unlike Jaworski’s *structure principle*, following Aristotelian-Thomistic hylomorphism, we hold that this principle in the human being is the soul (*anima forma corporis*), incorporeal and subsistent, which is created by God (Aquinas 1947, I<sup>a</sup>, q. 75, a. 6 ad 1).

In opening discourse on the natural sciences applying hylomorphism, we support Jacques Maritain’s claim that there is a distinction between philosophy as a dianoetic science and the experimental sciences as perinoetic sciences. But, we don’t think that hylomorphism, as dianoetic knowledge for Maritain, has any reception to gain from the scientific community (Savard 2007, 43). Similarly, Etienne Gilson thought that it is not possible to propose to modern science the truth of hylomorphism as a hypothesis that is scientifically valid (Ibid. 44). Contrary to Maritain and Gilson, we hold that hylomorphism has something to offer to modern science. As opposed to developing the “anthropology of the cerebral subject” (Vidal 2007, 4), where in the centre of focus is a man reduced to capabilities and functions of the brain, in what follows we will try to rethink the hylomorphic notion of the human being. We have a true opportunity in the human history, as is rightly put by Sorondo, because we have a truly human possibility to connect and complement two sides: neuroscientific studies of neuronal structures and functions, and philosophical self-reflecting descriptions of our own experience (Sorondo 2007, 154–155).

We claim that certain philosophical anthropologies have already pre-determined the horizon of research and, therefore, neuroscience achievements, if understood in these terms, in advance have a limited field of interpretation. Our further agenda in this paper is to provide evidence that a different initial anthropological framework or just being open to

different frameworks, probably would have offered a different interpretation of the neuroscientific research findings. Here are two examples involving Aquinas. First, the article from Larrivee and Gini dealing with “habitus operativus bonus” and neuroplasticity, in which authors concluded that “in his unified view of nature Aquinas offers landmarks circumscribing lower level events, the broad outlines of which serve in clarifying what the details must conform to, but not identifying the materials by which the paths to these landmarks are structured” (Larrivee and Gini 2014, 3 / For more interesting multidisciplinary approaches from neuroscience and philosophy, see also: Bernacer, Lombo and Murillo 2015). Second, American biologist, theoretical neuroscientist and philosopher Walter J. Freeman in 2008 published an article of surprising title: “Nonlinear Brain Dynamics and Intention According to Aquinas”. In brief, nonlinear dynamics is derived from chaos theory, which seeks to understand the complex behaviour in certain systems. Here it is tried to reconcile two apparently contradictory behaviours: randomness and determinism (Hilborn 2001, 3). It is precisely that nonlinear brain dynamics deals with the self-organization in complex systems, where constantly appears the new activity patterns (Freeman 2000, 6). Freeman believes that people and animals continuously raise and maintain an understanding of the world by using small pieces of sensory information. Studies of nonlinear brain dynamics have shown that this takes place in such a way that the brain imagines future opportunities, then seeks and use sensory stimulations to choose from between them the one option that will take them to the previously decided actions. “All that we know we have constructed within ourselves from the unintelligible fragments of energy impacting our senses as we move our bodies through the world.” (Freeman 2008, 207) Freeman believes there is no better a philosophical system than that of Thomas Aquinas, which responds to new discoveries in domain of the brain nonlinear dynamics. Our author finds a key element in Aquinas’s Question 79 (Aquinas 1947, I<sup>a</sup>, q. 79), in which he emphasized the unity of the self, and reiterated that the form in material things is replaced by the structures in the brain (Freeman 2008, 222). The very process of the transition from the material to the phantasm for Freeman is the key for

understanding why Aquinas's notion of intention is important for nonlinear neural dynamics. Freeman points out that he does not know of any other philosophical system that so effectively depicts "the neurobiological substrates interface between matter and mind" (Freeman 2008, 222).

Now we need to address Aquinas's understanding of the human being andhylomorphism. The unity of the whole human being is a central issue for Aquinas. The human being is not primarily seen as a complex physical system plus a soul, but as a *unum simpliciter*. The human being is a unity that acts as a whole – the soul and body as one. That is why to understand a living organism we need to comprehend it on a higher level, where an organism is seen as a unified substance (Pasnau 2004, 99). The soul is something more than "a placeholder for whatever it is that gives life to living things" (Ibid. 99), more than a collection of powers. "Beyond these discrete functions of nutrition, sensation, and intellection, the soul has the more basic function of accounting for the unity of a living organism." (Ibid. 99) Another angle of looking at the notion of the soul and unity is *the openness* of the human being to the world. Here we follow Aristotle in saying that "the soul is in a way all existing things" (Aristotle 1931, 431b 21). To be all...for a human being means to have the possibility to relate and to know everything that surrounds him. Relating and knowing is not made possible only by the brain and neuronal networks. All the parts of the body (hands, legs, neck, organs...) in their unity enable openness and in this openness the unity of the organism is grounded. Openness opens the relation between the organism and the world. This relation is fundamentally dynamic because humans and world mutually affect each other. This relational dynamism, on the part of the human being, is enabled by the soul that unites all the parts of an organism. We can know and relate to things only as a united being. Furthermore, following Ratzinger, we have capacity for an open existence and we can relate to God, and this relatedness "constitutes what is deepest in man's being. It is nothing other than what we call 'soul' (Ratzinger 1988, 155)." The more open we are, the more are we ourselves. „A being is the more itself the more it is open, the more it is in relationship. And that in turn will leads us to realize that it is the man

who makes himself open to all being, in its wholeness and in its Ground, and becomes thereby a 'self,' who is truly a person." (Ibid. 155) What also needs to be put forth, in our effort to open a dialogue with the natural sciences, is Aquinas's initial statement in opening lines of "Tractatus de homine": that there are three things to be found in spiritual substances: essence, power, and operation (Aquinas 1947, I, q. 75, Prooemium). Aquinas clearly states that a distinction should be made between the essence of the soul and its powers (Ibid. I<sup>a</sup>, q. 77, a. 1 co). It is the "essentia" which Murphy bypassed, while her research focuses on "virtus et operatio" (power and operation). What is the range of the achievements of understanding "virtus et operatio" of the soul, if thinking of "essentia" is reduced solely to the physical, as in the case with Murphy? What she neglected is the metaphysical level of the human nature. "Metaphysics should not be seen as an alternative to anthropology, since it is metaphysics which makes it possible to ground the concept of personal dignity in virtue of their spiritual nature." (John Paul II. 1998, number 83)

But, can we even use Aquinas's hylomorphistic image of a man, having in mind his theological purpose? In other words, is human body acknowledged as such? Aquinas states that "the theologian considers the nature of man in relation to the soul; but not in relation to the body, except in so far as the body has relation to the soul." (Aquinas 1947, I<sup>a</sup>, q. 75 pr) That is why Aquinas considers the human physical body, including the brain. Understanding the role of brain in the human being was important for medieval thinkers. Although they accepted Aristotle's philosophy; Albertus Magnus and Thomas Aquinas had a completely different answer for the anatomical and physiological role of the brain in connection with psychological activity. "Aristotle thought that the centre of the psyche was the heart; the Scholastics, following Avicenna, believed that the brain was the organ of sensible psychic functions and the tool of intellective ones. They assigned in the brain centres various functions, which they localized in the central part and more precisely in the ventricula, which they supposed to be of three parts. The front one was taken to be the centre of sensibility and imagination; the rear one, the centre of memory; and the middle one, connecting the

other two, was considered as the seat of the *sensorium commune* or sensible consciousness.” (Marcozzi 1992, 125)

The man as a most perfect being (Aquinas 1949, a. 8 co) has a body that is organized exactly for its purpose. Aquinas also stated that when we look at the size of the brain and the size of the body, among the animals men has the largest brain. The reason for this is greater freedom of the inner powers necessary for intellectual action, and also for the lower temperature of the brain necessary for regulating the heat of the heart, which is needed so that man would stand up straight (Aquinas 1947, I<sup>a</sup>, q. 91, a. 3 ad 1). The position of the brain is necessarily in a good place so that the powers of the soul could function (Aquinas 1949, a. 8 co. Also: Aquinas 1947, I<sup>a</sup>, q. 91, a. 3 ad 3). Also, Aquinas explicitly claims that the soul cannot directly understand itself or anything else, if the brain is damaged. “If certain corporeal organs have been harmed, the soul cannot directly understand either itself or anything else, as when the brain is injured.” (Aquinas 1949, a. 2 ad 7) Furthermore, the human body organs exist because of the powers of the soul, rather than vice versa. Therefore, nature formed bodies in order for them to align with the powers of the soul! “For the powers are not for the organs, but the organs for the powers; wherefore there are not various powers for the reason that there are various organs; on the contrary, for this has nature provided a variety of organs, that they might be adapted to various powers.” (Aquinas 1947, I<sup>a</sup>, q. 78, a. 3 co) Furthermore, “as nature does not fail in necessary things” (Ibid. I<sup>a</sup>, q. 78, a. 4 co), in the case of the human being and his formal and final cause, nature has shaped the human brain harmonized with the powers of the soul and her function of accounting for the unity.

Although the human brain is in an advanced state and is developed by its fundamental shape and functions, neuronal structures never stop changing. If our lives are guided by our intellectual and volitional powers, then we can say that the rational soul animates the cerebral structures and simultaneously affects the behaviour of our physical basis, i.e. that the “spirit acts on matter” (Lejeune 1992, 24). Aquinas also believes that there is no obstacle against idea that some powers of the soul could be a physical reality (Aquinas 1947, I<sup>a</sup>, q. 76, a. 1 ad 4).

For the activity of the rational soul, Aquinas considers that there is no need for a material organ to be expressed through it (Ibid. I<sup>a</sup>, q. 78, a. 1 co). But mental ability still is going on in matter, because the soul represents the form of the body. “It is separate indeed according to its intellectual power, because the intellectual power does not belong to a corporeal organ, as the power of seeing is the act of the eye; for understanding is an act which cannot be performed by a corporeal organ, like the act of seeing. But it exists in matter so far as the soul itself, to which this power belongs, is the form of the body, and the term of human generation.” (Ibid. I<sup>a</sup>, q. 76, a. 1 ad 1) On one side there is the strict dependence of the human soul on matter, while on the other side, the soul is not involved “so completely in matter that it loses its real nature. The soul is not intelligence, but it is a principle of intellectual knowledge” (Gilson 2002, 231). We believe this is precisely *the central essence* of the relationship betweenhylomorphism and neuroscientific research: a rational soul which does not need a material organ to express itself, and that intellectual ability itself occurs in matter that never stops changing.

This is also an interesting idea for the field of neuroplasticity; namely, the way in which the brain as an organ develops is enabled by the astonishing ability of its neuroplasticity. Neuroscientists state that there is a clear case of conformation of possible extensive neuroplasticity. “The brain changes induced by education are made possible by the remarkable adaptivity that characterizes the developing brain. It results from the fact that brain development is associated with a continuous formation and removal of neuronal connections, whereby experience determines which connections get consolidated.” (Battro and others 2013, 233) Neuroplasticity allows for development of a biological basis for the realization of the ability of reason. Ultimately, the whole body will be triumphed by the mind and the will (Aquinas 1947, I<sup>a</sup>, q. 76, a. 8 ad 4). Neuroscientists have a lot of data about the “how” of the neuronal processes in the brain, but they still do not know “what overall purpose they serve” (Northoff 2014, XI). So, the final cause of the human being, Aquinas’s notion of beatitude, “with its connotations of meaning, fulfilment, and openness to infinite and transcendental being

does not appear capable of resolution at anything less than an integrationist account of the whole neural platform” (Larrivee and Gini 2014, 3).

The rational soul of the human being grips on the whole body and all its functions. As the soul is more perfect, the more numerous and diverse organs are needed, and therefore the organism is more complex. “For from this principle (the soul) which is the richest of embodied forms, spring many different activities, so that it requires, in the matter informed by it, a full equipment of different organs.” (Aquinas 1951, lib. 2 l. 1 n. 20) It is about a principle which, as Henrici has rightly observed, is supported by comparative studies of the brain (Henrici 1992, 131). On the other hand, as the soul is more perfect, and the organism more diversified, and the unity of the whole is stronger. “Because the greater the mastery of form over matter, the greater is the unity of that which is made from it and matter.” (Aquinas 1955–1957, lib. 2, cap. 68, n. 6) It is the principle of increasing “centro-complexity”, which Herbert Spencer and Teilhard de Chardin assumed as a parameter of evolution (Henrici 1992, 131).

The dynamical unity of the whole, enabled by the soul, could be the path for further development toward an understanding of consciousness (the binding problem), knowledge and self-knowledge in the frame of hylomorphism. Thanks to neuroimaging techniques, we can see what parts of our brain are active when we think or when we pray, i.e. when our soul expresses itself. Furthermore, when we engage in these actions we have a clear and strong notion of the self, to whom the possibility of these actions belongs. Neuroscience must not and cannot avoid the principle of the self-reflecting unity of the whole human being, which is profoundly understood and described in Aristotelian-Thomistic hylomorphism.

## Conclusion

“Videtur quod” (“*it would seem that*”) is a vastly wide river dividing the bank of natural sciences from the other bank of river, that of understanding of the nature of man in the works of Thomas Aquinas.

Do we even have the right to attempt to establish the medieval image of man as a guiding light leading contemporary sciences, from which we expect great progress? However, on the other hand, do such sciences possess the exclusive right to answer the question: Who is man? Also, can one build a philosophical and theological image of man without considering modern neuroscientific findings?

Such questions will lead us in the direction of the necessity of an interdisciplinary approach. What we have shown through the presentation and critique of Murphy's research has revealed to us a few important points for further consideration. They offer guidance to us in the construction of the new-old hylomorphic image of man that is informed by the results of neuroscientific research:

1. We must not forget the fact that the man, created in the image of God, is a mystery and even scientific enlightenment is unable to fully illuminate all corners of the human being. The absolutist demand of science reveals its facilities in too strong a light, which dazzles, and we lose sight of numerous shades of the spectrum of the human beings.
2. Neuroscientific investigations should be complemented with the philosophical and theological understanding of the functioning of the dynamic unity of the human being, not losing sight of the final purpose of human beings. We have seen how areas such as consciousness and the human intellect cannot even be accessed without the complementary approach.
3. For the purposes of a complementary approach, physicalism cannot meet such demands and that is why we propose Aristotelian-Thomistic hylomorphism, which can offer a sufficiently broad framework for the mystery of the human being.
4. Although the soul is the first principle of human beings, in terms of the brain as an organ we need to recognize its fascinating structure and function that needs to be seen in a light that illuminates the precedence of man and human dignity in line with created creatures.

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