THE FUNCTION OF THE HUMAN HEART AS IT RELATES TO THE SOUL ACCORDING TO THE THOUGHT OF THOMAS AQUINAS

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Ad Majorem Dei Gloriam

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF ABBREVIATIONS

DMC	*De Motu Cordis*
DeCM	*In libros Aristotelis De caelo et mundo expositio*
In DA	*Sententia libri De Anima*
In Meta	*In duodecim libros Metaphysicorum Aristotelis expositio*
In Phys	*Commentaria in octo libros Physicorum Aristotelis*
QDA	*Quaestiones Disputatae de Anima*
QDCS	*Quaestiones Disputatae de Creaturis Spiritualibus*
QSDA	*Questiones super De Animalibus (Albertus Magnus)*
ST	*Summa Theologiae*

INTRODUCTION

Have you ever received or given a candy heart with a message on it for Valentine's Day? Perhaps you have told a good friend or a loved one that you "love them with all your heart." Or the tragic loss of a friend or the unfortunate ending of a relationship has left you feeling "heartbroken." We have all had "heart to heart" conversations in which we have spoken with a trusted confidante so candidly that we say we have spoken "from the bottom of my heart." Indeed, the language of the "heart" permeates contemporary conversations regarding depth of feeling and emotion. An image of the heart is often used to represent love. It is clear that, colloquially, when we speak of the heart, we are not speaking merely about the physical organ that pumps blood throughout the body. Certainly we are speaking about the organ itself, but we also seem to be speaking about more. We seem to be alluding to a connection to something deeper than the physical organ - to our emotions, feelings, hopes, dreams, and desires. In this sense "the heart," as used in our vernacular, can denote one's "innermost character, feelings, or inclinations"[1] - the core of a person.

Contemporary American culture is not alone in its conception of the heart as representative of the innermost part of a person or animal. Indeed, after men of the Iroquois tribe killed Jean de Brébeuf, the Catholic, Jesuit missionary who displayed incredible bravery in spite of gruesome torture, they ate his heart. "When his body fell to the ground, the crazed Iroquois pounced on it and cut open his breast to get at his heart, which they proceeded to eat, believing they would, in this way, have a share in his indomitable courage."[2] Why is it that the Iroquois

[1] "Heart." *Merriam-Webster*, Merriam-Webster, 29 Oct. 2019, www.merriam-webster.com/dictionary
[2] Joseph Tylenda, SJ, *Jesuit Saints and Martyrs,* Chicago: Loyola Press, 1998. 78

supposed that it was through eating the heart of Jean de Brébeuf that they would have a share in his courage?

Although not as gruesome, a remnant of this ritual of eating the heart exists today in American hunting culture. It is not uncommon for Americans to eat a part of the heart of the first deer that they successfully kill. Why do hunters choose to eat the heart as opposed to some other organ?

In addition to these cultural practices, the Jewish and Christian religions are replete with allusions to the heart. The word heart appears more than 800 times in the Christian Scriptures.[3] Jesus says that the greatest commandment is to "love the Lord your God with all your heart, with all your soul, with all your strength, and with all your mind."[4] Jesus is citing the Jewish *shema* prayer from Deuteronomy which goes on to say: "And these words which I command you this day shall be upon your heart."[5] Why is it that the Jewish people and subsequently Christians are told to love the Lord "with all their heart" and that these words shall be "upon your heart"? Additionally, the images of the Sacred Heart of Jesus and the Immaculate Heart of Mary have formed key elements of Roman Catholic devotion since at least the 17th century. The usage of heart in Scripture and the devotion to images of the hearts of Mary and Jesus seem to indicate that the heart is at least representative of something more than a material organ - it points to the core of the person.

In all these cases, from our vernacular usage of the term, to Valentine's day hearts, to the brutal ritual of the Iroquois men after witnessing a martyr's courage, to ancient and contemporary Jewish and Catholic religious practices, it is clear that our intuitions regarding the

[3] Strong's Greek: 2588. Καρδία (Kardia) -- Heart, biblehub.com/str/greek/2588.htm.
[4] Luke 10:27 Revised Standard Version Catholic Edition (RSVCE)
[5] Deut. 6:7 RSVCE

heart indicate that it is representative of something more than a mere physical organ. A complete and robust exploration of this intuition as it relates to the actual organ of the heart would require fluency in contemporary anatomical science, research into eastern philosophical and religious traditions, and a more in-depth study of western philosophical thought on the topic. Such an exploration is outside the scope of a master's thesis. Nevertheless, I hope to shed light on common human intuitions regarding the actual organ of the human heart through a thorough examination of the thought of Thomas Aquinas as it relates to the topic.

The body of work of Thomas Aquinas, a 13th century Roman Catholic priest of the Dominican "Order of Preachers," serves as the backbone for the philosophical and theological understanding of the Catholic Faith even today, almost 750 years after his death. In his encyclical on the restoration of Christian Philosophy titled *Aeterni Patris,* written 600 years after Thomas's death, Pope Leo XIII states:

> Among the Scholastic Doctors, the chief and master of all towers Thomas Aquinas, who, as Cajetan observes, because "he most venerated the ancient doctors of the Church, in a certain way seems to have inherited the intellect of all." The doctrines of those illustrious men, like the scattered members of a body, Thomas collected together and cemented, distributed in wonderful order, and so increased with important additions that he is rightly and deservedly esteemed the special bulwark and glory of the Catholic faith … like the sun he heated the world with the warmth of his virtues and filled it with the splendor of his teaching.[6]

Indeed, Thomas Aquinas seems to have been uniquely suited to the work and mission that his time required of him. A man of deep faith, strong convictions, humility, and purity, he possessed both the intellectual wherewithal and the virtue to spend himself entirely on the never-ending task of synthesizing the thought of Aristotle as it emerged from Arabic philosophers with the Catholic tradition already present to him from the Fathers of the Church.

[6] Leo XIII, *Aeterni Patris,* encyclical letter, Vatican .va, sec. 17

Albert the Great, his teacher and close friend, had begun such a synthesis with regard to the natural world through his incorporation of Aristotelian thought with that of Galen and other natural philosophers. In Albert's master work, *De Animalibus,* he seemed to unify all previous scholarship on animals.[7] Thomas used Albert's same method of synthesis but, building upon Albert's work regarding the animal world and anatomy, Thomas turned his attention to metaphysical and theological questions.

By his intellectual gravity grounded in his Catholic faith, Thomas built a philosophical and theological system so robust that almost all of the Church's doctrines and dogmas rest secure today in the safety of his intellectual framework. In his biography of the Italian saint, G. K. Chesterton wrote:

> St. Thomas's work has a constructive quality absent from almost all cosmic systems after him. For he is already building a house, while the newer speculators are still at the stage of testing the rungs of a ladder, demonstrating the hopeless softness of the unbaked bricks, chemically analyzing the spirit in the spirit-level, and generally quarreling about whether they can even make the tools that will make the house. Aquinas is whole intellectual aeons ahead of them … He has thrown out a bridge across the abyss of the first doubt, and found reality beyond it and begun to build on it.[8]

The mere intellectual gravity of Thomas and his place of prominence in Western and Christian thought suggest that an examination of his view on the organ of the heart would provide a sturdy foundation for any further inquiry into the topic. Additionally, Thomas's focus on metaphysics and the composite nature of human beings, i. e. both the form (soul) and the matter (body), helps to shed light on the function of the organs it relates to that same composite.

In addition to his intellectual gravity and exposition of the composite nature of the human person with an emphasis on the soul as reasons to explore Thomas's view on the heart, there is

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[7] Albertus Magnus, *De animalibus*, Translated by Irven Resnick and Kenneth Kitchell, Jr. Baltimore: Johns Hopkins University, 1999 xviii.
[8] G. K. Chesterton, *Saint Thomas Aquinas,* New York: Doubleday, 1956. 156

another reason to be interested in Thomas's view. That is that the heart itself seemed to be interesting to Thomas. In the last years of his life, Thomas wrote a letter to a certain Master Phillip, a professor at Bologna and later Naples, regarding the motion of the heart - *De Motu Cordis.*[9] That Thomas would dedicate his time to this treatise near the end of his life demonstrates not only his desire to assist a brother professor, but also his opinion that the topic was sufficiently important to warrant his attention and exposition. Indeed, if we accept the position of Mandonnet that Thomas completed this work in 1273, the only other works from Thomas in that year are his uncompleted *Tertia Pars* of the *Summa Theologiae,* another letter to the same Master Phillip on the Mixture of the Elements, and Lenten sermons on the Our Father, Hail Mary, Creed, and Ten Commandments. So popular was Thomas's short letter *De Motu Cordis* that it survived in 126 manuscripts and 33 printed editions.[10]

On account of Thomas's standing in the Western and Christian philosophical tradition, on account of his focus on the composite nature of human beings, and on account of his own demonstrated interest in the topic, his thought provides a solid foundation for a preliminary exploration of our common intuitions regarding the heart as "one's innermost character, feelings, or inclinations."[11] Precisely the question I hope to answer in order to serve as a preliminary excursus on the topic is, "What is the function of the organ of the human heart as it relates to the soul according to the thought of Thomas Aquinas?"

In order to answer this question I will look primarily to Thomas's treatise on the topic itself, *De Motu Cordis.* I will then use this document as a lens through which to view Thomas's

[9] Vincent R. Larkin, "St Thomas Aquinas on the Movement of the Heart," *Journal of the History of Medicine and Allied Sciences* XV, no. 1 (1960): 22, doi:10.1093/jhmas/xv.1.22.
[10] Jean Pierre Torrell, *Saint Thomas Aquinas His Person and His Works,* Translated by Robert Royal. (Washington: The Catholic University of America, 2005), 213
[11] "Heart." *Merriam-Webster*, Merriam-Webster, 29 Oct. 2019, www.merriam-webster.com/dictionary

discussion of the heart in his other works - specifically in his commentary on Aristotle's *De Anima.* Lastly I will bring these works into conversation with other works of Thomas that elucidate the depth and significance of the role of the heart in the human being. These include significant portions of the *Summa Theologiae* as well as Thomas's commentary on Aristotle's *Physics* and *Metaphysics.*

It is important to note that, while the breadth of secondary commentary on the *corpus Thomisticum* is extensive, there is little secondary literature that treats the function of the actual organ that is human heart. Eleonore Stump describes our heart's desires as "in the central core of the web of desire in our will."[12] Deitrich Von Hildebrand, a 20th century Catholic phenomenologist who studied under Edmund Husserl, relates the heart to the affective sphere and describes it as one of a triad of "spiritual centers."[13] Both of these views cohere with common intuition regarding our colloquial usage of the term, and both in some way speak to important aspects of the heart according to Thomas's view. Neither, however, is a sufficient exposition of the heart as Thomas understood it. Indeed, the heart *is* an organ of the body. It is not merely a function of the intellectual or sensitive soul. In this paper I hope to demonstrate the centrality of the organ of the human heart to understanding questions about the human composite according to Thomas's view.

[12]Eleonore Stump, *Wandering in Darkness: Narrative and the Problem of Suffering*, Oxford: Clarendon, 2013. 419

[13] Dietrich von Hildebrand, *The Heart: an Analysis of Human and Divine Affectivity,* South Bend, Indiana: St. Augustine's Press, 2007. 19

CHAPTER 1 - THE PHYSICAL MOTION OF THE HEART

1.1 An Objection

Before I treat the notion of the heart according to Thomas, it will be helpful to understand the philosophical milieu in which Thomas was writing. At the emergence of the thought of Aristotle in the West in the early 13th century, Christian theologians began to investigate his work in an attempt to synthesize it with Divine Revelation as received through Scripture and Tradition. Two Christian thinkers known for their examination of Aristotelian thought in relation to the Christian tradition are Thomas Aquinas and Bonaventure. The two were contemporaries in Paris and indeed good friends, compared by some to the archetypal friendship of David and Jonathan.[14] Despite their friendship, they held contrasting views of Aristotelian philosophy and its place in the Christian religion. Bonaventure, on the one hand, sought to preserve the Christian and Augustinian tradition passed to him by Alexander of Hales from the independent and purportedly pagan philosophy of Aristotle. Key to this philosophical and theological tradition was the view that "there is only one order that permits us to reach this [Christian] wisdom … It is the path that Christ indicated to us"[15] This was known as the "illuminative path" and is best described in Bonaventure's *Itinerarium* - "The Journey of the Mind to God." The philosophy of Aristotle was viewed as counter to, or incompatible with such a path. Thomas, on the other hand, following the course set by his teacher Albert the Great, held that the sensible world could be known not only through divine illumination, but also through reason. That humans learn primarily through material things by reason and not divine illumination distinguished Thomas's view from Bonaventure's.

[14] Chesterton, *St. Thomas Aquinas*, 51
[15] Etienne Gilson, *Studies in Medieval Philosophy,* Translated by James G. Colbert. Eugene, Oregon: Cascade, 2019. 72

In light of this difference in philosophical approach, Bonaventure provides a useful objection to Thomas's notion of the human composite as it is relevant to the organ of the heart. According to Bonaventure, for the human soul to achieve its ascent to God, it must be substantially separable from the body. In order for the human soul to be immortal, it must be able to exist *substantially apart* from the body. In order to maintain the substantial separability of the human soul from the body after death, Bonaventure maintained that the soul is an individual substance. "Since a soul that is capable of blessedness has to be immortal, it follows that the soul is united to a mortal body in such a manner that it can be separated from it. Hence it is not only a [perfecting] form, but also an individual substance [*hoc aliquid*]."[16] On account of this view, Bonaventure says "The body was so conformed to the soul that, just as the soul was innocent yet capable of falling into sin, so the body was without pain and yet able to fall under punishment … It was able to be full and able to have needs; to obey the soul, and also to rebel and rise up against it."[17] Bonaventure furthers his substantial distinction between soul and body in his discussion of the powers of the human composite.

> Our first parents were given a double range of senses, an inner and an outer: one in the mind and the other in the flesh. They were given a double movement, the commanding power of the will and the executive power of the body. They were given a double good, one visible and the other invisible. They were given a double command, namely one of nature and the other of discipline…[18]

Etienne Gilson elaborates on Bonaventure's conception of the human composite:

> When the soul is united to the already organized body and gives it its highest form, the soul certainly yields to the desire to perfect and finish the body, but we are not in the presence of an incomplete substance, which would look to the body for the possibility of being completely realized. We are in the presence of an already complete and higher substance that intimately penetrates an already complete but lower substance, seizes it from within, and animates it in some

[16] Bonaventure, *Breviloquium,* Translated by Dominic Monti. St. Bonaventure, New York: Franciscan Institute Publications, 2005. 86-87
[17] Bonaventure, *Breviloquium,* 92.
[18] Bonaventure, *Breviloquium,* 93.

> measure as God animates the soul … If the soul is a substance by itself, the body is one also. This keeps Bonaventure from affirming the unity of forms in the human composite at the very moment when he most strongly affirms the unity of the composite.[19]

It is clear that Bonaventure desired to confirm the intimacy of body and soul, but his greater desire to maintain the substantial separability of the soul from the body undermined the nature of the human person as a true composite according to his view.

In order to affirm philosophically the substantiality and thereby the immortality of the soul, Bonaventure posited some type of "spiritual matter" proper to the soul itself. "In this view Bonaventure understands the spiritual matter that enters into union with the human form to be the sheer capacity or potency for form. The matter in the soul is the *principle of its existing*; the soul has its stability of being from matter as the receptacle or foundation of the substantial form."[20]

Having elucidated Bonaventure's position that the soul has in itself the matter to serve as potency for its own actuality, *spiritualis materia,* we will begin our examination of Thomas's thought regarding the organ of the human heart. Contrary to Bonaventure's desire to maintain the substantial separability of the soul from the body which was informed by his Illuminative Path, Thomas sought to confirm that a human person is a true composite. The composite nature of the human person gets significant mention in the *Corpus Thomisticum,* but it is in his treatment of the organ of the heart where the metaphorical "rubber meets the road." While Thomas would agree with Bonaventure that the human soul does need some matter as a principle of existence, rather than posit "spiritual matter" in the soul itself, Thomas posits the human body itself as the completion of the human composite and the matter which is the principle of existence of the

[19] Gilson, *Studies,* 98-99.
[20] Cullen, Christopher M. *Bonaventure,* New York: Oxford University, 2006. 52 (empahsis mine)

soul. And while the soul is the form of the whole body, it is the form "principally of the heart"[21] according to Thomas. This claim of Thomas, that the soul is "the form of living the body, and principally of the heart" is the central claim of his brief treatise *De Motu Cordis.* I will now examine his argument in favor of that position.

1.2 Thomas's Conception of Motion

Before going any further it is important to state the obvious - that the material organ of the heart moves. This is a fact easily accessible to all of us. We've felt this movement in a surge of emotion, after a bit of challenging exercise, when we sing the national anthem with our hands over our hearts, or in the embrace of another. Thomas's introductory question in De Motu Cordis is: "What moves the heart, and exactly what kind of movement does it have?"[22] Thomas's answer to this question will significantly help us to understand his view on the function of the human heart as it relates to the soul.

However, before one can delve into how it is that the heart moves and what the significance of that movement is, it is important first to have an understanding of Thomas's thought on motion in general. Motion, which today has become almost entirely sequestered to the realm of contemporary engineering and physics, received a great deal of attention from Thomas philosophically. He significantly wrote about motion in his commentaries on Arisotle's *Physics*, *Metaphysics*, and *De Caelo et Mundo.*

While motion today is generally considered only with regard to change of place, Aristotle initially used the term more broadly. He defined it as "the fulfillment of what exists potentially

[21] Thomas Aquinas, *De Motu Cordis* - (*DMC)*
[22] *DMC*

insofar as it exists potentially."[23] This broad definition required Aristotle to distinguish different types of motion. Thomas first tracks Aristotle's broad definition of motion, and then tracks the distinctions he makes in this regard. Thomas comments regarding Aristotle's definition of motion in the *Physics* that, "when Aristotle defined motion, he took it as being common to all species of change."[24] The specific types of change that Aristotle included in his definition of motion are "what is alterable qua alterable - alteration," "what is increased and its opposite, what can be decreased," "what can come to be and pass away - generation and corruption," and "what is carried along - local motion."[25] Thomas establishes the primacy of local motion amongst the different types of motion established by Aristotle:

> For other motions are not required for the existence of local motion. For in order that a thing be moved with respect to place it need be neither increased nor altered, because a body that is in local motion does not have to be subject to generation and corruption, and we know that growth and alteration affect only things that are generated and cease to be.[26]

The type of motion that is of interest for the sake of this paper is this local motion, or change with respect to place. For Thomas this is the most basic motion and that motion which precedes all others.

That motion itself held a place of primacy in the thought of Thomas we can infer from his use of *motion* as the "first and more manifest way to prove the existence of God."[27] In this argument we find a concise accounting of Thomas's account of motion that is helpful in our discussion:

> It is certain, and evident to our senses, that in the world some things are in motion. Now whatever is in motion is put in motion by another, for nothing can be in motion except it is in potentiality to that towards which it is in motion;

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[23] Thomas Aquinas, *Commentaria in octo libros Physicorum Aristotelis - (In Phys)* Bk 3, Lect 2
[24] *In Phys* Bk 5, Lect 2
[25] *In Phys* Bk 3, Lect 2
[26] *In Phys* Bk 8, Lect 14
[27] Thomas Aquinas, *Summa Theologiae, (ST),* Prima Pars (I), *ST* I, Q 2, Art 3

> whereas a thing moves inasmuch as it is in act. For motion is nothing else than the reduction of something from potentiality to actuality. But nothing can be reduced from potentiality to actuality, except by something in a state of actuality. Thus that which is actually hot, as fire, makes wood, which is potentially hot, to be actually hot, and thereby moves and changes it. Now it is not possible that the same things should be at once in actuality and potentiality in the same respect, but only in different respects. Or what is actually hot cannot simultaneously be potentially hot; but it is simultaneously potentially cold. It is therefore impossible to say that in the same respect and in the same way a thing should be both mover and moved, i. e. that is should move itself. Therefore, whatever is in motion must be put in motion by another. If that by which it is put in motion be itself put in motion, then this also must needs be put in motion by another, and that by another again. But this cannot go on to infinity, because then there would be no first mover, and, consequently, no other mover; seeing that subsequent movers move only inasmuch as they are put in motion by the first mover; as the staff moves only because it is put in motion by the hand.[28]

First, in this statement, Thomas makes clear that nothing can be put in motion except that it be put in motion by another.[29] Having established this, Thomas describes the relationship between the moving thing and the mover. He states, "nothing can be in motion except it is in potentiality to that towards which it is in motion." To elaborate on this relationship between mover and moved, or that in potentiality and that toward which it is in potential, Thomas describes the relationship of wood, which is potentially hot, towards fire, which is actually hot. The fire, which is actually hot makes the wood which is potentially hot to become actually hot. Thus the wood is in potential to the fire with regard to heat, and it is actually hot only in the extent to which it is reduced from potentiality for heat to actuality for heat.

[28] *ST* I, Q 2, Art 3

[29] The proof for this Thomas discusses in his commentary on Aristotle's Physics. In Chapter VII he tracks Aristotle's argument that: "Nothing that is being moved by itself rests from its motion on account of some other mobile's resting. (He [Aristotle] takes this as per se evident). From this he further concludes that if a mobile rests on account of the rest of another, then the mobile is moved by another. On this ground he concludes that. necessarily whatever is being moved is being moved by some other." While contemporary physicists would not hold the same proof, Newtonian physics confirms that whatever is being moved is being moved by some other.

The same is true of motion. A thing moves only inasmuch as it is in potentiality towards that which moves it, and only inasmuch as it is reduced from potentiality to actuality by the thing towards which it is in that same potentiality for motion. In this sense a moving thing, something being reduced from potentiality to actuality, is in actuality towards that which moves it as long as it is moving. Because a moving thing is in actuality Thomas can say that "a thing moves inasmuch as it is in act." Therefore, if something is moving, it is in act. It can only be made so by that thing towards which it is in potentiality for motion.

For Thomas the relationship between the thing in potentiality and that towards which it is in potentiality, i. e. the moved and the mover, is so close that they are said to be "together." Again from his commentary on the *Physics* we read:

> He [Aristotle] says therefore first that mover and moved are together. But something is said to be "moved" in two senses. In one sense as the end moves the agent, and such a mover is sometimes distant from the agent it moves; in another sense as that moves which is the actual beginner of the motion. It is of this latter that Aristotle speaks, and that is why he adds "not as that for the sake of which, but as that from which the source of motion is."
>
> Again, a mover as principle of motion can be immediate or remote. Aristotle speaks of what causes motion immediately and calls it the "first mover" which refers not to what is first in the series of movers but to a mover that is immediate to the mobile.
>
> And because in Book V he had said that things in the same place are together, one might, conclude from that and from the statement that mover and moved are together, that when one body is moved by another, they must both be in the same place. Therefore, to prevent this misunderstanding, he adds that "together" is not taken here in the sense of being in the same place, but in the sense that nothing is intermediate between the mover and the moved. It is in this sense that things in contact, or things that are continuous are together…[30]

First he states that the mover and the moved are "together," and then he elaborates on what is meant by "together." He begins by discussing the two senses in which a thing can be said to be

[30] *In Phys* Bk 7, Lect 3

moved - in one sense the mover is distant from the agent it moves, and in another sense, it is that "which is the actual beginner of the motion." He clarifies that it is in this second sense that Aristotle is discussing. That is that Aristotle is not using "mover" metaphorically; but, rather, he means "that from which the source of motion is."

He then notes that the mover is a "principle of motion" and, as such, it can be either "immediate or remote." He indicates that a remote principle of motion is one that is the first in a series of movers that eventually causes the motion of the mobile. On the other hand, an immediate principle of motion is that which is the immediate cause of motion or "source of motion" of the mobile. From this language we can infer that when Thomas is using the language of mover and mobile, he is not using it in a metaphorical sense. Rather, he is using the language in an actual sense such that the mover is the "principle of motion" of the mobile.

Last he completes his thought on what is meant by saying that the mover and the mobile are "together." He notes that this doesn't necessarily mean that the mover and the mobile are in the same place. Rather, it indicates the intimate relationship between the two. By "together" he means that the mover and the mobile are "in contact" with each other, or that they "are continuous together." Thomas's discussion of the "togetherness" of the mover and the mobile makes clear that the mover, as an immediate principle of motion, is the immediate source of motion of the mobile.

Having described what it is to be a principle of motion, Thomas makes a further distinction regarding the location of the principle of motion in relation to the mobile. He notes that the principle of motion of a moving thing can be either intrinsic to it or extrinsic to it. Thomas further labels that motion which results from an extrinsic principle as "violent motion"

and that motion which results from an intrinsic principle as "natural motion." He elaborates on this distinction in his commentary on Aristotle's *De Caelo et Mundo*. Here Thomas agrees with Aristotle that "natural and violent motions differ with respect to their principles … nature is a principle of a motion existing in that which is moved," whereas "a power that causes motion violently, is a principle existing in another, as it is other."[31] Thomas discusses natural motion further in *De Motu Cordis*, "For in all natural things, both common and specific properties in them result from an intrinsic principle. Natural things, by definition, have their principle of motion in them."[32] In contrast, "A motion is violent when no principle of the motion is from within but only from without, as when a man throws a heavy body upward, in which body there is no natural aptitude for such motion."[33] We can see from this distinction that, for Thomas, when the principle of motion is intrinsic to the mobile, the resultant motion is called natural motion.

Regarding local motion Thomas follows Aristotle as dividing "the ways in which something is moved by something else into four: pushing, pulling, carrying and twirling."[34] We will focus specifically on pushing and pulling. For Thomas and Aristotle, these are the two most basic movements to which the other two, twirling and carrying, reduce. With regard to pushing, Thomas discusses Aristotle thus:

> First he [Aristotle] explains pushing as that which occurs when the mover makes a mobile be distant from him by moving it. Pushing is of two kinds: pushing on and pushing off. Pushing on occurs when the mover pushes a mobile but does not desert it but rather accompanies it to the place it is going. Pushing off

[31] Thomas Aquinas, *In libros Aristotelis De caelo et mundo expositio,* (*DeCM)* Bk 3, Lect 7
[32] *DMC*
[33] *DeCM* Bk 3, Lect 7
[34] *In Phys* Bk 7, Lect 3

> (expulsion) occurs when the mover moves a mobile in such a way that it deserts and does not accompany it to the very end of the motion.[35]

Aristotle's notion of "pushing" as elucidated by Thomas seems intuitive here. It is, nevertheless, important to note the distinction that is made between "pushing off" and "pushing on." Pushing off, which Aristotle will later term "projection," entails a motion similar to that which is the action of a catapult. In this motion the mover "deserts," or is separated from, the mobile. This is contrary to the action of the mover that "pushes on." This motion can be conceived of as the action by which someone moves a sofa across a rug. The mover, i. e. the person, pushes on the sofa to begin its movement. She then continues pushing, "accompanying" the sofa to the place its place of rest. We can see that the contact between the mover and the mobile in the action of "pushing on" is persistent. Indeed it is this accompaniment of the mobile by the mover through which the movement is achieved. This notion of "pushing on" coheres well with the earlier statement that the mover and the mobile are "together."

We will now examine Thomas's commentary on Aristotle's account of a "pulling" motion with respect to local motion. Thomas describes Aristotle's account thus:

> In a third way something is said to pull something else, because it moves it to itself in respect of local motion only. And it is in this sense that Aristotle here defines "pulling," i.e., in the sense that one body pulls another in such a way that the puller accompanies what it pulls.
>
> This, therefore, is what he says, namely, that pulling occurs "when the motion of what pulls something toward itself or toward something else is swifter but not separated from what is pulled." And he says, "toward itself or toward something else," because a voluntary mover can use something else just as itself; hence such a mover can both push something from something else as from itself, and pull something toward something else as toward itself. However, this does not

[35] *In Phys* Bk 7, Lect 3

> happen in natural motions, where a natural push is always away from the pusher and a natural pull is toward the puller.[36]

In this account of pulling we can see that the togetherness of the mover and the mobile is maintained: "the puller accompanies what it pulls." In a different place Thomas says that "pulling occurs, 'when the motion of what pulls something toward itself or toward something else is swifter but not separated from what is pulled.'" He notes that in all pulling motions, the puller is not separated from that which is pulled. The two remain intimately together as mover and as mobile. He does note, however, that a puller can nevertheless pull something towards something else, as in voluntary motion; or towards itself, as in natural motion.

Having discussed the nature of pulling and pushing motions, Thomas provides a distinction between the two. He states, "And note that pulling differs from pushing, because in the latter the mover is related to the mobile as *terminus a quo* of its motion, whereas in pulling he is related as the *terminus ad quem."* He also says that, "a motion derives its species from its terminus."[37] Thus we can see that the thing that specifies a motion is its *terminus*, and that the *terminus*, or end, of the motion, is related to it as the mover is to the mobile. It then seems that the end of all local motion, of which all types are reduced to either pushing or pulling, has its origin in the mover. The end of a pulling motion is the "end towards which" the motion is directed; and the end for a pushing motion is the "end from which" the motion is directed.

At the end of the discussion of the different types and ends of local motion, Thomas provides a helpful synopsis:

> What remains is that every local motion caused by a mover is reduced either to a push or a pull. Hence it is evident that if the mover and moved are together in

[36] *In Phys* Bk 7, Lect 3
[37] *In Phys* Bk 7, Lect 3

> the motions of pulling and of pushing, so that the pusher is together with what is being pushed, and the puller with what is being pulled, then it is universally true that there is nothing between the mover, in respect of place, and what is moved.[38]

Here Thomas confirms that all motion in respect to place is either a push or a pull. These two motions form the foundation of all other local motions. In that sense they are the most basic local motions. Additionally Thomas confirms that there is a continuous togetherness, or intimate connection, between mover and moved in these motions. "The mover and the moved are together," and "there is nothing between the mover … and what is moved." Thomas leaves no doubt that it is indeed the mover, and only the mover, that in an immediate way moves the mobile. The mover moves the mobile as an "end from which" or an "end towards which" the motion is directed.

The next consideration with regard to Thomas's account of motion as it relates to the motion of the heart is his account of what motion is continuous, and what the implications of this continuous motion are. Again, in his commentary on Aristotle's *Physics*, he states:

> And he [Aristotle] says that whatever is moved locally is moved with either a circular motion or a straight one or in a motion that combines these two, e.g., a motion through a chord and an arc. Hence it is clear that if either of the two simple motions, namely, the circular or the rectilinear, cannot be infinitely continuous, much less their combination. Therefore one must omit the latter and attend to the simple ones.[39]

Above he states that while there are many different paths of a mobile, each mobile path has as its base either a rectilinear or a circular path. Because these are the two basic paths of moving

[38] *In Phys* Bk 7, Lect 3
[39] *In Phys* Bk 8, Lect 16

things, they are the only two paths that will be considered in the discussion of which motion is continuous.

He then rejects the rectilinear path as a possibility for continuous motion:

> He [Aristotle] shows that a rectilinear motion upon a straight and finite magnitude cannot be infinitely continuous and that consequently no rectilinear motion can be infinitely continuous unless an actually infinite magnitude is assumed—and this was proved impossible in *Physics* III.[40]

Simply put, because no rectilinear path can go on to infinity, there can be no continuous motion that is just along a rectilinear path. Thomas last considers the possibility of motion that is reflected along a rectilinear path. While initially it seems as if such motion could appear continuous, he follows Aristotle's extensive argument that reflected motion would necessarily require a rest at some point in its movement.

> … From all these things it is clear that a reflected motion, whether it occurs along a circular or a straight magnitude, cannot be continuous, but a rest intervenes, because the same point is actually the end of the first motion and beginning of the reflexed one. But in a circular motion the mobile does not use any point as an actual beginning and end, but each point is used as an intermediate. Therefore, a circular motion can be continuous.[41]

He thus concludes that only a circular motion can be continuous.

Last we will briefly consider the implications of a motion that is continuous and therefore circular:

> Now, the perpetuity of motion is better saved if motion is continuous; moreover, it is a greater thing, if it be continuous rather than successive, because the former possesses more unity and perpetuity, and in nature we ought always to take what

[40] *In Phys* Bk 8, Lect 16
[41] *In Phys* Bk 8, Lect 16

> is more noble, if possible. But it is possible that there be a motion that is infinitely continuous, provided it be a local motion.[42]

Here Thomas establishes that a continuous motion is more noble than one that is successive, or not continuous. As he states, the former possesses more "unity and perpetuity," and it is therefore, "a greater thing." Because it possesses more unity and perpetuity, and because it is more noble, a continuous and circular local motion seems to be prior to any other motion.

From the above discussion of motion based Thomas's commentary on Aristotle's *Physics*, we can distill some key aspects that will be helpful in understanding Thomas's view on the motion of the organ of the human heart. First, from the "first way" argument for the existence of God, Thomas tells us that motion occurs when something is reduced from potentiality to actuality so as to say that, for a material thing, to move is to be in act. He states that every motion is caused by a mover, and that the thing that is moved and the mover are "together." He goes on to say that "natural things" have their principle of motion in themselves - it is intrinsic to them. He states that the first motion is local motion, and that all local motion can be reduced to either a push or a pull. He goes on further to say that mover is "together" with the mobile in push and pull motions, and is in relation to it as *terminus a quo* or *terminus ad quem.* So the mover is the end of all local motion. Last he states that most noble form of motion is continuous, and that the only local motion that can be continuous is circular motion.

1.3 The Motion of the Heart

In his description of the motion of heart, Thomas first notes that it consists in what he terms "opposite types of movement: push and pull."[43] From our discussion above we recall that

[42] *In Phys* Bk 8, Lect 14
[43] *DMC*

push and pull are most basic movements, and that, in each movement the mover is "together" with the mobile. Additionally, because the mover is the *terminus a quo* of a push and the *terminus ad quem* of a pull, identifying the *termini* of the push and pull movement of the heart will identify the mover.

Thomas then asks if it is possible that the principle of this "push and pull" motion could be extrinsic to the animal, that is, could it be a "violent motion." While it may seem so, because the motion of the heart consists in opposing types of movement (push and pull), Thomas replies: "to say that the motion of the heart is violent is irrational. For obviously if we do away with this motion, we end up doing away with (i.e., killing) the animal, but nothing violent preserves a nature. Indeed, the heart's motion must be most natural, since animal life is inseparably united to it."[44]

Thomas's position that the motion of the heart is natural entails that the principle of motion of organ of the heart is intrinsic to the animal itself. Thomas reiterates this position in response to a question if the motion of the heart arises from some outside intelligence:

> In addition, when the motions in lower bodies are caused by a universal nature, such motions are not always present in them. Take, for example, the ebb and flow of ocean tides, which result from the motion of the moon and change in accord with it. But the motion of the heart is always present in the animal. Therefore, the heart's motion does not result from a separate cause but from an intrinsic principle.[45]

[44] *DMC*
[45] *DMC*

From the above it is clear that Thomas takes the motion of the heart to be caused by a mover intrinsic to the animal. This mover is “together" with the moving heart as the *terminus a quo* of the push motion and as the *terminus ad quem* of the pull motion.

Having established that the motion of the heart consists in a “push and pull,” it will be helpful to look in greater detail at Thomas’s account of this motion. In *De Motu Cordis* Thomas continues:

> It had to have a movement that is like a circle, but not exactly circular, composed namely from a push and pull. And so the Philosopher says in the third book of *On the Soul*, "A natural and organic cause of motion is both the source and termination of the motion. Now since all things are moved by pushes and pulls, it is necessary that something exists in a nearly circular state and that motion arises from it.
>
> We can also say it is a continuous movement as long as the animal lives, unless it is necessary to have a rest in between the push and pull (for it is not a perfectly circular motion)[46]

He states that it, the heart, “had to have movement that is like a circle, but not exactly circular.” The importance of the circular, or nearly circular, movement of the heart is made apparent by the next line, that “it is a continuous movement as long as the animal lives.” If the movement of the heart is continuous, we can recall from our previous discussion on continuous motion that it must necessarily be circular.

Additionally, that the motion of the heart is nearly circular resolves another potential difficulty raised by the “opposite types” of motion, push and pull, that are characteristic of the motion of the heart. This potential difficulty is how it is that the heart has only one mover if it is moved with opposite types of motion? Could it be possible that the heart is pushed by one mover

[46] *DMC*

as a *terminus a quo* and then pulled by another mover as a *terminus ad quem*? That the motion of the heart is circular addresses this possible concern. He says:

> From all this it is clear that a circular motion which is not composed of two, and which is not destroyed when it comes to a terminus (*for its beginning and terminus are identical*), is simpler and more perfect than a straight motion.[47]

Thus, by describing the motion of the heart as "like a circle" Thomas posits that the *terminus a quo* of the push motion of the heart is the same as the *terminus ad quem* of the pull motion. There is, therefore, a single mover for the continuous local motion of the heart.

Of course, Thomas posits that the movement of the heart is not eternally continuous, but continuous "as long as the animal lives." Here he implicitly links the continuous motion of the heart to the life of the animal. He does so explicitly later in the treatise:

> Doctors distinguish vital functions from animal functions and say that even when the animal functions cease, the vitals may remain. They call the vitals those functions that are immediately related to the heart's motion, such that when they cease life ceases. This position is reasonable. For to live for living beings is to exist, as is said in the second book of *On the Soul*: the existence of anything is from its own form.[48]

Here Thomas first notes a distinction made by doctors between "vital functions" and "animal functions," and notes that "vital functions" are those "immediately related to the heart's motion." He thus explicitly links the continuous motion of the heart to the living of the animal. He confirms this in his next point "that when they [the vital functions] cease, life ceases." So, the living thing ceases to live when those functions immediately related to the heart's motion cease. He then equates living to existing for living things, "For to live for living beings is to exist." Thomas thus explicitly links the motion of the heart to the life and the existence of the living

[47] *In Phys* Bk 8, Lect 19 (emphasis mine)
[48] *DMC*

being. He finishes this paragraph by quoting from Aristotle's *De Anima* that "the existence of anything is from its own form." Here he makes a connection between the motion of the heart and the form of the living thing - the soul.

In order to more fully grasp the link between the motion of the heart and the life and existence of the living thing as it relates to the soul, it is important to return briefly to Thomas's conception of motion as it relates to potentiality and actuality. We recall that Thomas states in the "first way" argument to prove the existence of God:

> Now whatever is in motion is put in motion by another, for nothing can be in motion except it is in potentiality to that towards which it is in motion; whereas a thing moves inasmuch as it is in act. For motion is nothing else than the reduction of something from potentiality to actuality.[49]

Thus a moving thing is being reduced from potentiality to actuality as long as it is moving. Similarly, if a material thing is not moving, it is just in potentiality. We also recall from Thomas's description of motion that the first motion is local motion, and it is from local motion that alteration, increase and decrease, and generation and corruption proceed. Now, the organ of the heart is clearly a material thing that is in local motion continuously. And "whereas a thing moves inasmuch as it is in act," the heart is therefore continuously in act.

The significance of the continuous act of the heart as it relates to the existence of the living thing is elucidated in Thomas's discussion of the union of the body and soul in the *Summa Theologiae*. He states:

> Matter is in potentiality to all manner of acts in a certain order, what is absolutely first among the acts must be understood as being first in matter. Now the first among all acts is existence. Therefore, it is impossible for matter to be apprehended as hot, or as having quantity, before it is actual. But matter has actual existence by the substantial form, which makes it to exist absolutely.[50]

[49] *ST* I, Q 2, Art 3
[50] *ST* I, Q 76, Art 6

He states that the first among all acts is existence, and that this act must be understood as first in matter. Thomas has established that the heart, by its continuous motion, is, by the definition of motion, continuously being reduced from potentiality to actuality. It is continuously in act. Additionally he established that this act, or motion, of the heart is "vital" to the entire living thing so that when it ceases, life and therefore existence of the living thing cease. Moreover he states above that "matter has actual existence by the substantial form, which makes it to exist absolutely." Thus we can conclude that it is by the substantial form of the human that the heart is continuously reduced from potentiality to actuality. It is the substantial form of the human being towards which the heart is in continuous motion.

Thomas discusses what this substantial form of the human being is in his treatment of the union of body and soul.

> Of one thing there is but one substantial being. But the substantial form gives substantial being. Therefore of one thing there is but one substantial form. But the soul is the substantial form of man. Therefore it is impossible for there to be in man another substantial form besides the intellectual soul.[51]

Here Thomas posits that human beings can have only one substantial form, and that substantial form is the soul. Thus it is the soul that is the thing towards which the organ of the heart is in continuous motion. The soul is the thing by which the heart is continuously reduced form potentiality to actuality. The soul which serves as the *terminus a quo* and the *terminus ad quem* of the push and pull motion of the heart. The soul is "together" with the heart as a mover is to the mobile, so that "nothing is intermediate between the mover and the moved."[52]

Understanding the relationship of the soul to the organ of heart as that of mover to mobile is helpful in grasping the significance of Thomas's response to the question he poses at the

[51] *ST* I, Q 76, Art 4
[52] *In Phys* Bk 7, Lect 3

beginning of *De Motu Cordis*: "Since everything that is moved must have a mover, the problem arises: What moves the heart and exactly what kind of movement does it have?" He responds: "Thus, the motion of the heart is a natural result of the soul, the form of the living body and principally of the heart."

According to Thomas's view, the motion of the heart is the natural result of the soul. Notable in his response above is that he states that the soul is the form of the living body, and *principally of the heart.* That the soul is the form "principally of the heart" we can deduce from what has been said above. Because "whereas a thing moves inasmuch as it is in act," and "what is first among all acts is existing," and "matter has actual existence by the substantial form, which makes it to exist absolutely," it is clear that the heart, which is the only organ of the human body that is continuously in act, is the one that is primarily receptive of the form of the body that is the soul. Thus it is the in motion of the organ of the heart, continuously in act toward the soul, that the existence of the composite is primarily realized.

Returning to Bonaventure's position of spiritual matter in the soul will help to elucidate the significance of Thomas's view on the heart. Christopher Cullen elaborates Bonaventure's position thus: "Bonaventure understands the spiritual matter that enters into union with the human form [the soul] to be the sheer capacity or potency for form. The matter in the soul is the *principle of its existing*; the soul has its stability of being from matter as the receptacle or foundation of the substantial form."[53] Bonaventure intuited that there must be some matter that is completely receptive of, or in potential to, the human form. Indeed this matter that is just receptive of the human form must be the matter by which the form is able to exist. Out of concern for the substantial separability of the soul from the body, and out of concern for

[53] Cullen, *Bonaventure,* 52 (emphasis mine)

maintaining God as the only being who is pure form or act, Bonaventure posited that this matter that is merely in potency to the form of the human soul is in the soul itself.

Thomas writes against such a position explicitly.

> The soul has no matter … First, from the notion of a soul in general; for it belongs to the notion of a soul to be the form of a body. Now, either it is a form by virtue of itself, in its entirety, or by virtue of some part of itself. If by virtue of itself in its entirety, then it is impossible that any part of it should be matter, if by matter we understand something purely potential: for a form, as such, is an act; and that which is purely potentiality cannot be part of an act, since potentiality is repugnant to actuality as being opposite thereto. If, however, it be a form by virtue of a part of itself, then we call that part the soul: and that matter, which it actualizes first, we call the "primary animate."[54]

Here Thomas draws on the distinction between potentiality and actuality and notes that "potentiality is repugnant to actuality as being opposite thereto." He concludes, therefore, that the immaterial soul, which "is an act," cannot contain any matter.

While he argues against Bonaventure's position of spiritual matter in the soul, Thomas nevertheless confirms Bonaventure's intuition that there must be some matter which is receptive of the form of the soul as the "primary animate" and by which the composite exists.

> The soul communicates that existence in which it subsists to the corporeal matter, out of which and the intellectual soul there results unity of existence; so that the existence of the whole composite is also the existence of the soul.[55]

While Thomas maintains that the soul exists substantially everywhere in the body as its form, based on the continuous local motion of the heart, he states that the soul is the form "principally of the heart." Indeed, it is on account of this motion that the body is continuously in act as receptive of the form of the soul. On account of the primacy that Thomas attributes to the motion

[54] *ST* I, Q 75, Art 5
[55] *ST* I, Q 76, Art 1

of the heart as continuous, nearly circular, local motion, we can say that, for Thomas, the motion of the heart is the first motion of the body and the vital motion of the human composite.

CHAPTER 2: ANATOMY - THE HEART AS THE PRINCIPLE OF MOVEMENT OF THE BODY

2.1 That the heart is the principle of movement of the body according to Thomas

Thomas posits that the "motion of the heart is the natural result of the soul, the form of the body and principally of the heart." Indeed, we have demonstrated above that the motion of the heart is the first motion of the body and the vital motion of the composite. In order to gain a deeper understanding of how it is that the heart is the organ of which the soul is "principally" the form, it is important to discuss Thomas's conception of the relationship of the organ of the heart to the rest of the body. We will first discuss Thomas's conception of this relationship as he elaborates it in *De Motu Cordis,* in his *Quaestiones Disputatiae de Anima,* and in his commentary on Aristotle's *De Anima.* We will then turn to the science of Albert the Great to provide the anatomical underpinning of Thomas's conception.

In *De Motu Cordis* Thomas elucidates his conception of the relationship of the organ of the heart to the rest of the body:

> I myself say that the motion of the heart is a natural motion of the animal. As the Philosopher says in *On the Motion of Animals*, "We should consider the animal as if it was a city under good and legitimate governance. For in a city with this kind of stability of order, there is no need for a separate ruler for each and every event, but instead everyone does everything as planned, and things proceed according to custom. The same thing happens in animals naturally. For every part of the animal is naturally equipped to perform its own special function, so that there is no need for a soul in each and every part as a cause of motion. Rather, with the soul present in the principle of the body, the other parts live and perform their own special work as nature made them."[56]

[56] *DMC*

In the *Summa Theologiae* Thomas provides part of this quote from Aristotle's *De Motu Animalium* as an objection to his own position on the union of the soul to the body as its substantial form.[57] He indeed refutes Aristotle's position in this quote that the soul need only be present in the principle of the body. While Thomas does differ from Aristotle on this certain aspect of the heart as it relates to the soul, specifically that the soul according to Aristotle is present only in the heart and not in the other parts, he does agree with Aristotle's analogy of the body as a "city under good and legitimate governance." He links the motion of the heart to this analogy, implying that the organ of the heart is the "good and legitimate" governor of the city that is the body.

In another part of *De Motu Cordis* Thomas explicitly states what is implied in the city analogy above. "And so even though the movements of all the other parts of the body are caused by the heart, as the Philosopher proves in *On the Motion of Animals* (703a14), these movements can still be voluntary, while the first movement, that of the heart, is natural." Here he confirms that the motion of the heart is involuntary and natural, as was discussed above. He significantly also agrees with Aristotle that "all the other parts of the body" are moved by the heart.

At first glance, this seems to be a remarkable claim from Thomas, and appears to be inconsistent with common Thomistic conceptions of how it is that the composite functions. Indeed, Thomas states:

> But the soul is a substantial form; and therefore it must be the form and the act, not only of the whole, but also of each part. Therefore, on the withdrawal of the soul, as we do not speak of an animal or a man unless equivocally, as we speak of a painted animal or a stone animal; so is it with the hand, the eye, the flesh and bones, as the Philosopher says (De Anima ii, 1). A proof of which is, that on the withdrawal of the soul, no part of the body retains its proper action; although that which retains its species, retains the action of the species. But act

[57] *ST* I, Q 76, Art 8

> is in that which it actuates: wherefore the soul must be in the whole body, and in each part thereof.[58]

It seems clear from this passage that Thomas intends that it is indeed the soul that is the act of each part of the body particularly. For just as the function of the eye is to see, then it is also the function of the hand to move. In both cases the organs are in act in accord with their specific function, and the soul is the source of act in each case. According to this view, the arm is in potential to the soul with regard to motion such that, when one wills to raise his arm, the soul acts on the arm so as to raise it.

While Thomas does posit that the soul is present in each part of the body and that each part of the body is somehow in act in relation to the soul; he is also clear that, with regard to motion, each part of the body is moved by the organ of the heart. Thomas's *Quaestiones Disputatiae de Anima* provides an excellent summation of his thought on this topic:

> And the more perfect that living bodies are, so much the more diverse must their parts be in view of their greater perfection. Therefore, since the rational soul is the most perfect of natural forms, there is found in man the greatest diversity of parts because of his different operations. Furthermore the one soul performing these operations confers substantial existence in a manner befitting the operations of the parts themselves. An indication of this fact is that, when the soul ceases to animate the body, neither flesh nor eye remains except in an equivocal sense. But since there must be an order of instruments in keeping with the order of operations, and since there is a natural precedence among the different operations which flow from the soul, one part of the body must be moved to perform its operations by another part. Thus a medium intervenes between the whole body and the soul as the mover and principle of its operations. For after a certain primary mediating part of the body has been moved, that part moves the other parts to perform their operations. So it is that the soul, *by means of the heart*, moves the other members of the body to perform their vital operations. But since the soul gives to the body its act of existing, it immediately gives to all parts of the body their substantial and specific mode of existing. And this is what many assert, namely, that as a form the soul is united to the body without an intermediary, but that as a mover it is united to the body through an intermediary.[59]

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[58] *ST* I, Q 76, Art 8

[59] Thomas Aquinas, *Quaestiones Disputatae de Anima,* (*QDA*), Art 9 (emphasis mine)

Thus we can see that, while the soul is present in all parts of the body as a form, it is present as a mover through an intermediary. It is based off of this that Thomas responds to the objection from Aristotle's *De Motu Animalium* that "It is not necessary for the soul to be in each part of the body; it suffices that it be in some principle of the body causing the other parts to live, for each part has a natural movement of its own." Thomas's response is that "The Philosopher is speaking there of the motive power of the soul." In light of this objection and response we can see that Thomas considers the heart to be the "good and legitimate" governor of the city that is the body, as the "certain primary mediating part of the body … that moves the other parts to perform their operations."

Having established Thomas's view that the organ of the heart serves as the "primary mediating part" of the body that "moves the other parts to perform their operations," it is important to account for how it is that Thomas could have arrived at such a conception. Such an account must necessarily be anatomical. While Thomas himself does discuss the motion of the heart in his short treatise on the topic, and while he does briefly discuss other aspects of human anatomy in other parts of his body of work, he himself does not provide an in-depth anatomical account of how it is that the organ of the heart is the "primary mediating part" of the body. In order to understand how Thomas could have understood the organ of the heart as actually functioning in such a way, we will turn to the thought of his teacher and mentor, Albert the Great, whose anatomical science does provide such an account.

2.2 Albert the Great and Thomas

It is helpful to briefly describe Albert's own approach to natural philosophy in order to more fully grasp the depth of his anatomical understanding. Etienne Gilson says of Albert:

> In the view of Albertus Magnus, the universe interpreted by Aristotle has just become weightier and more real. For Albertus, things are no longer the transparent gauze that scarcely disguises the face of God. Nature is no longer simply a book analogous to Holy Scripture, a second system of symbols whose meaning in equivalent to revelation. Albertus Magnus is interested in what things are before being interested in what they represent …
>
> Moreover, Albertus Magnus was not merely an erudite seeker of book learning. He was also informed and inquisitive about direct observations and things … Albertus Magnus declared that he had taken long trips to find minerals with which wanted to experiment.[60]

Indeed, so revolutionary was Albert's approach at the time he was working that Gilson writes, "This theologian-naturalist must have appeared a living paradox to the Augustinian theologians."[61] The breadth of Albert's synthesis of the works of natural philosophy that came before him is truly remarkable.

Albert's synthesis of previous works of natural philosophy in his voluminous work *De Animalibus* came shortly after the recovery of the thought of Aristotle in the Christian West.

1500 years prior to Albert, Aristotle had offered a cardiocentric view of anatomy. Galen, however, working 300 years after Aristotle, posited a cerebrocentric view based on a greater understanding of the brain and nervous system. Galen's cerebrocentric view retained prominence in Europe until the recovery of Aristotle around the 12th century. The translated works of Aristotle, coupled with the extensive *Canons of Medicine* of the Islamic philosopher Avicenna, precipitated the reemergence of a cardiocentric anatomical view. Albert, in a method very similar to Avicenna, maintained the cardiocentric view of Aristotle while simultaneously acknowledging the significant role of the brain and nervous system in human operations.[62]

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[60] Gilson, *Studies,* 104
[61] Gilson, *Studies,* 106
[62] C.U.M. Smith, "Cardiocentric Neurophysiology: The Persistence of a Delusion." *Journal of the History of the Neurosciences*, vol. 22, no. 1 (2013): 6–13. doi:10.1080/0964704x.2011.650899

With this historical context in mind, we will discuss the plausibility of Thomas's own knowledge of and reliance on Albert's anatomical science in the forming of his own conception of the centrality of the organ of the heart as it has been elucidated above. Thomas arrived in Paris to begin studies of his Master of Theology in 1245, at the age of twenty. It was there that he first encountered his would be teacher and mentor, Albert the Great. Albert was a German by descent. He was in his forties and had been a Dominican friar for about 25 years, and had just begun teaching in the Dominican chair of theology. In Paris Thomas first heard Albert lecture, and he was immediately taken with the Master's "wondrous depth of wisdom."[63] Indeed, so great was Thomas's respect for his teacher that he maintained a collection of his lectures on various topics with him throughout his life. Thomas stayed with Albert in Paris for three years, and then accompanied him to Cologne in 1248 in order to establish the first *studium generale* in Germany. Thomas would stay with Albert in Cologne for four more years, before returning to Paris in the fall of 1252.[64] James Weisheipl, OP asserts that, during his time with Albert in Cologne, "Thomas became Albert's Bachelor, responding to disputations, lecturing cursorily on the Bible, and assisting the Master in all his preparations."[65] Indeed, so close would the two become that after Thomas's death, Albert was said to be inconsolable. According to Brother Hugh of Lucca who testified at the First Canonization Inquiry of Thomas in 1319, "Albert had been Thomas's master; and he wept much when news came that his pupil was dead, and afterwards whenever he

[63] James A. Weisheipl, "Thomas d'Aquino and Albert His Teacher," in *The Gilson Lectures on Thomas Aquinas,* ed. James Reilly (Toronto: Pontifical Institute of Mediaeval Studies, 2008), 4
[64] Wieshiepl, "Thomas d'Aquino and Albert His Teacher," 6-7
[65] Wieshiepl, "Thomas d'Aquino and Albert His Teacher," 7

was reminded of him, calling him the flower and beauty of this world … Albert could never hear Thomas named without shedding tears."[66]

In addition to sharing a close bond as master and pupil, there are also indications that Thomas was directly familiar with Albert's extensive labors in work natural philosophy, especially his positions on anatomy. Weisheipl relates that after two years as bishop of Regensburg Albert walked to Viterbo, arriving in July of 1261, and accepted a position in the papal curia. There he rejoined Thomas who held the position of lector in the Dominican Priory of that place. Albert stayed in Viterbo for two years during which he completed his renowned *De Animalibus* which he had begun while bishop of Regensburg. He also completed his work *De motu progressivo animalium* during this time. He left Viterbo in 1263 at the behest of Pope Urban IV to preach a crusade. His time in Viterbo was the last extended period of time that he would spend near Thomas. After preaching the crusade, Albert spent most of the rest of his life in Wurzburg.[67]

From various accounts of the closeness of Thomas to Albert, it is almost certain that each was aware of the thought of the other on various topics. Most salient about their different periods of time together as it relates to Albert's position on anatomy, however, is that they were together in Viterbo as Albert was finishing the *De Animalibus,* his major synthesis of the scholarship of natural philosophy up to that point. While it is intriguing to speculate about the various topics of conversation between the two during that time, Weisheipl asserts that Thomas's knowledge and use of Albert's work is more than mere speculation. Indeed, he states "It turns out that many

[66] Kenelm Foster, *The Life of Saint Thomas Aquinas: Biographical Documents*, London: Longmans, Green, 1959. 112 - 113
[67] Wieshiepl, "Thomas d'Aquino and Albert His Teacher," 4

instruments of Thomas's research were in fact *tabulae* excerpted by Thomas's secretaries from the *libri naturales* and *Ethics* of St. Albert. There can be little doubt now that Thomas kept himself well-informed of Albert's views."[68]

Clearly Thomas did not agree with every aspect of his master's work. There were, in fact a number of disagreements. However, Thomas often made these disagreements with his master matters of exposition and explanation in his own work. That Thomas had no such exposition or explanation in his own corpus regarding animal anatomy makes safe the inference that, based on his closeness to Albert and his reliance on Albert's work for his own research, the anatomical position of Albert nearly represents Thomas's own view on the topic. It is then Albert's careful and well-documented study of animal and human anatomy that provides the foundation for understanding how Thomas would have conceived of the organ of the heart to anatomically be the "primary mediating part" of the human body.

2.3 How the Heart is the Principle of Movement Based on Albert's Anatomy

In his *Quaestiones super De Animalibus* Albert poses the question "Whether all animal members lead back to single member." His response to this question helps us to understand why it is that there must be some principle organ among all animal organs. He responds to the question thus:

> The lesser world imitates the greater world. But all the parts in the greater world lead back to a single thing. For individual things receive these from a first, that is, from a first cause. Therefore, it will be the same in the lesser world, which is the human, and in every other animal that is part of the world.
>
> One must say that in every animal there is one first member, which is first by generation and causality, and from which all others receive influence and power

[68] Wieshiepl, "Thomas d'Aquino and Albert His Teacher," 12

> because in all things ordained to one end it belongs to the same agent to establish order among them. But all the members of an animal are ordered to one end - to the preservation of the species - and ordered by the same agent, which is the power in the seed. This is why it is necessarily required that the members be ordered among themselves. But it belongs to things that are ordered to reach a first principle, for otherwise the process would be infinite, a thing which neither nature nor art nor reason nor science endures.[69]

Albert posits that there must be some ordering organ in the body. He says that, if this were not the case, there would be an infinite regress of causes in the body. Additionally he states that this ordering organ is "first by generation and causality." That the ordering organ is first in generation and causality will provide the lens through which its functioning in relation to the human body will be discussed.

However, before we can discuss how the ordering organ is first among other organs in generation and causality, we must first examine what specific organ, according to Albert, is the ordering organ. Albert himself asks this question: "What is that first thing to which all the animal members lead back?" His response is worth quoting at length.

> Further one asks what is that first thing to which all the animal members lead back?
>
> It seems to be the brain. Because, although the senses are what make an animal an animal, these senses have their origin from the brain.
>
> But it also seems to be the liver. Because that member seems to be the principal one through which all the members are preserved and conserved and in which things that have been lost are restored. But this is accomplished by the liver, in which the nutritive power flourishes.
>
> But it also seems to be the testicles. Because that member appears to be the principal one through which a thing acquires being. But this happens through the generative members as is clear.

[69] Albertus Magnus, *Questiones super De Animalibus*, Translated by Irven Resnick and Kenneth Kitchell, Jr. Washington: Catholic University of America, 2008. 73- 74 (Bk 1, Q 54)

> To the contrary. Life is animals first act. Therefore, that which in life first exists is the first animal member. But according the Philosopher life takes root in the heart, and he's says that the heart is first to live and the last to die, and Avicenna says that the heart is the first root of the powers. Therefore the heart is the principal member.[70]

In the above discussion of which organ is the "principal member," Albert attributes various powers to various organs. He attributes sense power to the brain, the nutritive power to the liver, and the generative power to the testicles. He quotes from both Aristotle, to whom he applies the appellation "the Philosopher," and from Avicenna, the Islamic philosopher considered by many to be the most authoritative medical mind of the medieval period. After regarding the opinions of these two, and having considered other organs in the body, he concludes that "life is animals' first act." Taking into account the views of Aristotle and Avicenna that "life takes root in the heart" and that "the heart is the first root of the powers," Albert asserts that "the heart is the principal member."

Having made this assertion, Albert goes on to describe in greater detail the controversy among physicians and philosophers regarding the assertion of the heart as the principal organ of the body.

> One must reply that the animal body is divided into four regions. One is of the animal parts in which the sensitive and motive powers exist, and this is the head region. Another is of the natural parts in which the powers serving nutrition exist, like the power of the stomach, liver, veins, kidneys, and things of this sort. A third region is that of the spiritual parts, to which the heart and the lungs and the trachea belong. And a fourth region is that of the members suitable for generation. Thus an animal is considered in four different ways and in this sense there are various principal members positioned in the human. For some consider him from the standpoint of generation, and these have to posit that the members in which the semen exists, that is the testicles, are principal. Others consider him from the standpoint of nutrition, and these have to establish the liver as the principal member. Others consider him from the standpoint of sense and motion, and these posit that the brain is the principal member. And some consider him

[70] Albertus, *QSDA,* 75 (Bk 1, Q 55)

> from the standpoint of spiritual members, and these posit that the heart is the principal member. Therefore, there is no small controversy between the physicians and the Philosopher. For the physicians claim that the brain is the principal member because they pay attention to the senses and because they are workers on things that are sensible. But the Philosopher posits the heart alone. And Avicenna says that the physicians must follow the Philosopher because he speaks more truthfully.[71]

In the quote above Albert delineates how it is that the body can be considered in four different ways according to the precedence given to each function, that is to the nutritive, the generative, the sensitive and motive (or animal), and to the spiritual function. He notes that the physicians claim that the brain is the principal member of the body because they are concerned with the senses. On the other hand, he again cites Aristotle and Avicenna as maintaining that the heart is the principal member, in support of his position as he asserted it before.

After his delineation of the four different regions of the body based on their functions and his conclusion that the heart, as the principal member of the spiritual members, is the principal member of the body, Albert provides a conceptual overview of how it is that the heart functions as the principal member of the body:

> For the heart is located in the middle of the animal just like a prince in his kingdom, and, just as the prince sends his commands and rules the individual parts of his kingdom through his ministers, so does the heart send life and power to the individual members by means of their organs. Now it sends sensation to the eyes and the ears through the brain as if through a minister, and it sends motion to the hands and feet similarly through the brain. But on each member it bestows the power of digesting, expelling, and attracting by using the liver just as if it were a bailiff. But it gives the power of reproduction to another external member by means of the seminal vessels. And therefore, according to the truth of the matter, the heart is the principal member.[72]

[71] Albertus, *QSDA,* 75 (Bk 1, Q 55)
[72] Albertus, *QSDA,* 76 (Bk 1, Q 55)

In Albert's likening of the heart to a prince, we likely see an allusion to Aristotle's description of the body as a "well-governed city" in *De Motu Animalium*. This is the same analogy which Thomas cites in *De Motu Cordis*. Albert's view coheres with this notion of the body and explicitly states that the heart is the prince, or "good and legitimate" governor to use Aristotle's terms, of the city that is the body. Albert, however, is not just interested in *that* the heart is principal member of the body. He is also specifically interested in *how* it is that the heart is the principal member of the body. In the quote above he provides a brief summation of such an account, but a deeper look at his anatomical science will elucidate the actual distribution of powers from the heart to the rest of the body as he conceived of it, with the heart acting as a "prince" and the other organs acting as its "ministers." Indeed, and anatomical conception of how it is that the heart is the principal member of the body is necessary to ground Thomas's own assertion that the organ of the heart actually is the "primary mediating part" of the body.

Recalling that Albert divides the body in to four different regions, each pertaining to a specific bodily function, we will examine how Albert understood these different functions performed by various organs in different parts of the body to be in some way mediated by the organ of the heart. While it is not necessary to provide an account of the function of each organ of the body in order to understand the primacy of the heart amongst the other organs, it is important to understand how Albert anatomically accounted for the power associated with each of these different parts of the body to originate in the organ of the heart. He discusses principal organs and secondary organs, further elucidating the principality of the heart in relation to the other organs of the body.

> It is necessary for every animal, small and large, and of whatever genus, to have two other differences among its members, namely that some of its members are principal ones and others are secondary, serving the principal ones. The principal

> ones are those which effect the well-being of the single individual or of the species. Those that effect the safety of the individual are three: the heart, from which the power of life flows; the brain, from which flow sense and motion (that is, the power of sensing and moving in relation to the heart); the liver, from which, again by drinking in what it receives from the heart flows the power of nourishment. For which reason it is obvious that these three are not equally principal, but that the heart is the first principle of the others.[73]

Albert describes the heart, brain, and liver as the three principal organs that also have secondary organs, and he describes these as organs that "effect the well-being of the single individual or of the species." Examining Albert's anatomy of the sensitive, motive, and nutritive powers will help bring to light how it is that all the powers of the body originate in some way from the heart.

2.3.1 The Importance of Spirit

Key to understanding Albert's view on how it is that the body and its functions are governed is the notion of "spirit," as introduced by the Greeks and maintained by Albert in his anatomical account. Regarding spirit, Albert states:

> The spirit which is in the bodies of the animals is a vapor set free by the seminal moisture during generation. And since this moisture is made up of four humors and elements, this spirit cannot have the unmixed nature of the element of air.
>
> For since that spirit which has the form of air is the vehicle for the power and is the soul's instrument by which it forms the body and by which, once formed, it gives it life and sensation, then it is necessary that this spirit be so composed that the power which it bears clings to it. This can be done only through the power of a thick fluid, for since this alone is the principle and subject of life, it can retain the powers which it conveys to the members. Further, since spirit is the instrument of the operations of the soul, it is necessary that its substance be of the sort which can bring into the members those forms which the soul intends to bring into the members through it. This is clear by analogy. For a woodworker, who people call an "architect," does not make his saw or adze out of wool or lead. He makes it instead of iron and he arranges its teeth in a suitable row as befits the needs of its function. And since the work of nature is more sure and well-ordered than that of art, it is all the more necessary that an instrument of

[73] Albertus Magnus, *De animalibus*, Translated by Irven Resnick and Kenneth Kitchell, Jr. Baltimore: Johns Hopkins University, 1999. 71-72 (Bk I, Ch 5)

> nature be suited to its functions. Since, however, the soul leads many powers and very many forms in to the members of the body (the first of which is the form and act of life, while the next is the form of sensation) and since fineness and mobility are surely required to convey life throughout the body (for this is accomplished through the *diastole* and *systole* of the pulse), it is thus necessary that the spirit possess a great deal of airy fitness and mobility.[74]

The spirit, as Albert describes it above, is that by which the operations of the soul are brought to the rest of the body. He describes what type of characteristics such a spirit should have, that it should be "light and airy." In this description of the role of "spirit" Albert states that the soul first brings life, and then sensation to the members of the body, through the spirit. He also notes that the spirit is moved about the body through the "*diastole* and *systole* of the pulse," thus indicating some knowledge of the circulation of the blood - one of the means by which the spirit is moved. Spirit, for Albert, is the perfect natural tool by which different forms are moved throughout the body.

With a basic understanding of "spirit" as that by which the powers of the soul are distributed throughout the body, we can now turn to mechanics of how this spirit was moved throughout the body according to Albert's account. In order to understand how Albert conceived of the heart sending "spirit" to other organs as its ministers, it is necessary to discuss his account of the arteries as the pathways by which the spirit is moved. In this regard he states:

> Pulsating veins are called arteries (closed pathways, as it were) since the airy spirit pulses in them, beaten by the *dyastole* and the *sistole* of the heart, drawn to the heart either for "cooling" [*eventatio*] or drawn to be the material for voice [*vox*]. All arteries save one are composed to two tunics, and in this they differ from the veins which are pathways for nourishment. Of these two tunics, the harder one is turned toward the inside and the softer one toward the outside. The reason for this is that if the inner one were softer, it could not sustain the pulsations of the spirit and would be broken, whereupon the animal would die. … Because the arteries are pathways of the spirit and the spirit is the vehicle of

[74] Albertus, *De Animalibus*, 1363-1364 (Bk 20, Ch 3)

> life and power, the arteries are then pathways of life and of the powers which have the operation and potency of life [*operatio et potent vitae*]…
>
> It is certain that all arteries arise from the heart. For while there are two ventricles of the heart, the right and the left, the right one is turned toward the liver and has the function of attracting and working upon the nourishment which is brought to it. This is especially so according to Aristotle and all the ancient Peripatetics who say that nourishment is raised to it [the heart] where it receives potency and true form of life, by means of which it moves as nourishment to the members of the body. It does this as a result of the universal which generates the form of nourishment for the members.[75]

The above, which is a portion of Albert's detailed account of the function of the arteries, clearly demonstrates his view that the arteries are the "pathways of the spirit … the pathways of life and of the powers which have the operation and potency of life." Additionally he makes clear that "all arteries arise from the heart." Thus the heart is the origin from which the powers of life and those powers which have the operation and potency of life are moved to the rest of the body via the arteries.

The heart, as "prince" of the body, sends the spirit via the arteries to its "minister" organs. In order to more concretely understand how this governance occurred as Thomas would have conceived of it, it is important to delve more deeply into Albert's account of the principal organs of the body - those organs of the animal (sense and motion) functions, and the nutritive function.

2.3.2 The Brain and the Nerves

Albert describes the powers of sense and motion as "animal" powers, or those powers that are the distinguishing features of animals. Regarding the animal powers Albert states, "One [of the parts of the body] is of the animal parts in which the sensitive and motive powers exist,

[75] Albertus, *De Animalibus,* 190 (Bk 1, Ch 20*)*

and this is the head region." Further on the animal parts, he states "Now it [the heart] sends sensation to the eyes and the ears through the brain as if through a minister, and it sends motion to the hands and feet similarly through the brain." But, again, Albert is not speaking metaphorically when he makes such a claim. He is speaking actually. So the question persists, how is it the brain is the minister to the heart with regard to sense and motion? Albert's anatomy provides a specific account of how the brain performs this function.

> The spirit, then, insofar as it proceeds from the heart, has many powers and activities. Once, however, it has entered the liver or brain, it is adapted to the complexion of the liver or brain and it then has only the power suitable for that member. Nor is it hindered by any other power coming from the heart, for it is always adapted to the activity of this member.[76]

Albert further elucidates this notion:

> This is because something generated from blood or served by the blood is the first instrument of sensation. It is the same for the brain, because certain things are generated from the brain's power — for example the animal spirits — without which there could be no sensation. Now, the vital spirits are generated in the heart and flow through the arteries to the brain, and there, owing to the brain's coldness and the narrowness of the veins and the opposition to their motion, these become animal spirits. And then they are sent to the particular senses and this is why the animal spirits immediately proceed from the brain only to three senses: namely hearing, smell, and sight. For this reason it is said that the brain is the principle of the sense, although in a formal sense sensation is not in it.[77]

Thus the vital spirits proceed from the heart to the brain, where, due to the narrowness of the veins and the coldness of the brain, they become animal spirits.[78] After the vital spirits are

[76] Albertus, *De Animalibus*, 928 - 930 (Bk 12, Ch 7)
[77] Albertus, *QSDA,* 380 - 381 (Bk 12, Q 17)
[78] Albert has a surprising level of specificity as to how this process occurs in the brain: "Moreover, in the anterior part of the brain there are jagged [serrosae] pathways though which the spirit passes as if through cells. For the ventricles are not always wide open, especially when the spirit is meager. The spirit comes from the heart to the brain and it is digested there for animal operations, just as it is digested in the liver for the natural operations, and an irregular division is better suited for digestion than is a division into chambers." (Albertus, *De Animalibus,* 943 (Bk 12, Ch 4)

transformed into animal spirits (those responsible for sense and motion) in the brain, the question remains how it is that these spirits are moved throughout the body in order to affect both sense and motion.

Albert attributes the movement of animal spirits in an animal body to the nerves:

> So too does a nerve correspond to the animal power. And because the animal power consists in sense and motion — for by these we distinguish an animal from a non-animal, as the Philosopher says in the first book of *On the Soul* — this is the reason why some nerves are sensitive and some are motive nerves. Therefore, just as sense and motion are necessary in an animal, so too are the nerves…[79]

Here, in his description of why it is that the nerves are necessary, he provides an overview of their function in an animal, that they "correspond to the animal power."

In his *De Animalibus* he provides a detailed account of how it is that the nerves perform this function. He begins his account thus:

> Let us therefore say that nerve is a viscous substance which is directed from the brain throughout the body to be the means of distributing sensation and motion to it. The first use of nerve which is substantial to it is that by which, as a medium (in the same way an organ is a medium), the entire body might receive the power of sensing and moving. A use that is accidental to it [*per accidens*], as we have said, is that flesh is strengthened when it is wrapped in the reticules and pannicular-membranes of the nerves. Were this not so, it would flow out too quickly, and every power of the soul [*virtus animae*] would falter in it, and it would be deprived of its proper functioning. This is especially necessary for those members, which, like the liver, lack sensation. For if the nerves did not descend to them, they would not have nerve-filled pannicular-membranes in which their weak substances could be wrapped. And since these lack sensation, they would not sense harmful things which befall them from abscesses and swellings on them and then, since no remedy would be applied, the animal would die. As it is though, the abscess harms the pannicular-membrane, the swelling distends it, and by this means the harm is perceived.[80]

[79] Albertus, *QSDA,* 123 (Bk 3, Q 6)
[80] Albertus, *De Animalibus*, 178-179 (Bk 1, Ch 18)

In the first part of the above citation, Albert describes the nature of nerves as a "viscous substance directed from the brain" for the purpose of distributing sensation and motion throughout the body. He describes this as the substantial function of nerves. In his description of "pannicular-membranes" Albert recognizes that they provide sensation to organs which otherwise have no capability for sensation, such as the liver. He confirms the significance of these pannicular membranes by stating that, if they did not exist, the organs "would not sense harmful things which befall them from abscesses and swellings on them… As it is though, the abscess harms the pannicular-membrane, the swelling distends it, and by this the harm is perceived." From this description we can clearly see the importance that Albert places on nerves as the medium through which the body receives and distributes sensation.

His discussion of the eyes and visual perception further confirms this view.

> To the first, one must reply that although sense exists in every part in terms of participation, it nevertheless exists in one part in terms of its roots, for it flows from here to the other parts by means of specific members. For example, the power of sight flows to the eye through the optic nerve. Thus sense exists in one part only for bestowing [a power], as it does in the heart, and in another part only for receiving [a power], and in still another part it exists both for giving and receiving.[81]

Here Albert discusses the notion that sense must exist in every part of the body, and that it is distributed to different parts for their specific sense function. He elaborates on the optic nerve, stating that the sense power flows from the brain to the eye through the optic nerve. Thomas, in one of his few statements purely on anatomy, confirms his adherence to Albert's view on the anatomy of the optic nerve in his commentary on Aristotle's *De Sensu et Sensato.* There Thomas states, "out of the two eyes some one thing is made, and that there is one operation of both

[81] Albertus, *QSDA,* 124 (Bk 3, Q 6)

eyes—that is, inasmuch as the seeings of the two eyes concur, by way of certain nerves, at an inner organ of sight that is near the brain."[82]

Albert develops his discussion of nerves by describing how it is that they branch from the brain and what he calls the *nucha*, which is equivalent to a spinal cord. In this discussion he elaborates not only on how it is that the nerves branch out in the body, but he also confirms that it is not just sensation, but also motion that is distributed by the nerves.

> The fact that the brain is the point of origin for the branching of the nerves comes about in two ways. For the point of origin of some of them is the actual substance of the brain and that of the others is with the *nucha* acting as a medium. The *nucha* descends from the brain through the vertebrae and is the vicar of the brain throughout the entire length of the body. The only nerves that arise from the brain itself are those which descend into the parts of the head and face and into the viscera, endowing them with sensation and motion. All the others, which bestow sensation and motion on all the other parts of the body, arise from the vicar of the brain, the *nucha.*[83]

From the above citation from Albert's *De Animalibus* we gain a clearer sense of his own knowledge of the complexity of nerves in the body. Again, it is through this complex system that Albert posits that the animal spirits are distributed throughout the body.

With regard to how it is that the nerves affect motion in the body, we will turn once again to Albert's account in the *De Animalibus.*

> Since the operative powers, which are alternatively called motive powers, are more active, they are found more in the formal members which are non-uniform members. Examples are the cutting of food and the chewing or softening of food which has been cut. For the power moving the incisors and molars to these actions lies in the mouth as if in an organ by which its tasks are fulfilled. The power of moving from place to place lies in the feet. For although this sort may exist in the motor nerves, their tasks are still only accomplished by means of the organic, non-uniform members. This power is also present in the wings of birds

[82] Thomas Aquinas, *Sentencia libri De sensu et sensato*, Ch 18 (*DSS*)
[83] Albertus, *De Animalibus*, 178-179 (Bk 1, Ch 18)

> and in the various other members of those animals possessing progressive motion.[84]

For Albert, non-uniform members of a body, like molars, or wings on a bird, or feet on a human, are those which are primarily receptive of the motive powers as distributed by the nerves branching off from the brain. As he states, the powers exist in the motive nerves, but the operation is only accomplished by means of the "organic, non-uniform members." So, it is the motive spirits, which are transformed from the vital spirits that come into the brain from the heart, that are distributed by the nerves to then move the non-uniform members of the body so as to put them into act with regard to their specific function. That is, through the motive spirits as distributed from the brain through the nerves that the molars are reduced from potentiality to act with regard to chewing. It is through the same process that the wings of a bird are reduced from potentiality to actuality with regard to flapping, or the feet and leg muscles of a person are reduced from potentiality to actuality with regard to walking.

From the above discussion of the function of the brain and nerves as they relate to sense and motion, it is clear that Albert had an understanding of these parts of the body. Specifically he understood that both functions were linked directly to the brain by the nerves. But even with this understanding, his view was nevertheless cardiocentric. He confirms that it is the vital spirits as pumped from the heart to the brain that get transformed by that organ into the animal spirits. These spirits are then distributed by the nerves to the rest of the body to affect sense and motion. Even though Albert recognizes the importance of the brain and nerves in the sensitive and motive functions of the animal, according to his account the heart nevertheless remains the principle of motion of the body.

[84] Albertus, *De Animalibus,* 70-73 (Bk 1, Ch 5)

2.3.3 The Liver and the Veins

Just as the brain is the organ by which the vital spirits from the heart are converted into animal spirits, the liver is the organ in which the vital spirits being pumped from the heart are converted into nutritive spirits.

> The spirit, then, insofar as it proceeds from the heart, has many powers and activities. Once, however, it has entered the liver or brain, it is adapted to the complexion of the liver or brain and it then has only the power suitable for that member. Nor is it hindered by any other power coming from the heart, for it is always adapted to the activity of this member. All of this is caused by the heart.[85]

Regarding the specific operation of the liver, Albert states "There are four powers in a human: the nutritive or natural, which is in the liver; the vital, which is in the heart; the animal, which is in the brain; and the generative, which is in the parts designated to generation."[86] He elaborates a further: "The spirit comes from the heart to the brain and it is digested there for animal operations, just as it is digested in the liver for the natural operations."[87] Thus it is the liver, as the principal organ of the nutritive function of the animal, that converts the vital spirits received from the heart into nutritive spirit.

Albert provides an account of how the liver is the principal organ of the nutritive function. He first states that the liver is the organ that acts on and distributes the material substance throughout the body. As the principal organ for those things regarding the material substance of the body, the liver has what Albert calls "servant" organs. With regard to this

[85] Albertus, *De Animalibus,* 928 - 930 *(*Bk 12, Ch 7)
[86] Albertus*, QSDA,* 124 (Bk 3, Q 6)
[87] Albertus*, De Animalibus,* 943 (Bk 12, Ch 3)

relationship he states, “The preparatory servant for the liver is the stomach and the mesenterics, and the one bearing away that upon which the liver has acted is the veins.”[88]

Below is a passage from Albert’s anatomy of the liver as it is contained in *De Animalibus*:

> The liver is totally lacking in nerve fibers. But the veins that are the points of origin for those which branch off from it come to it and are dispersed below it. Above there are certain fibers, as we said in the anatomy of the quiet veins. Those that come from the *syma* divide off from the vein called the “gate” [*porta,* portal vein]. There are also mesenterics which absorb from the stomach and the intestines. When the moisture is drawn by them to the liver, the liver then decocts it into blood and sends it, via the hollow vein [*vena concava*, vena cava] which arises over its protuberance [*gilbus*], throughout its entire body to nourish it. It sends forth its wateriness from its protuberance via the two renal veins [*emulgentes*] to the kidneys …
>
> A pulsating vein also comes to it, brings it spirit, offers it its innate warmth, and tempers it with its beat. This vein penetrates into the concavity of the liver to ventilate it, since tis upper protuberance is sufficiently ventilated by the motion of the diaphragm. They chyle, which is drawn out of the stomach and intestines, is not all drawn into one, empty, hollow space in the liver. It is rather, dispersed into all the veins is the liver as well as to their branches, so that the entire power of the liver might have more effect over it divided than undivided, and so that the digestion might thus be more complete and finished more quickly.[89]

It is clear from the text above that Albert has an in-depth conception of how the liver functions. Albert buttresses this detailed anatomy of the liver with a similarly detailed account of the veins. His account of veins as they relate to the liver will aid in understanding how it is that the liver serves as the principal organ of the nutritive function of the animal.

> There are two main veins which emerge from the liver. One arises from the concave part of the liver and is called its gate [*porta*]. Its function is to bring nourishment to the liver. The second arises higher up on the liver’s convex part called the *sima*. Its function is to carry nourishment away from the liver to the

[88] Albertus, *De Animalibus,* 70-73 (Bk 1, Ch 5)
[89] Albertus, *De Animalibus,* 274 (Bk 1, Tract 3, Ch 5)

> members. This one used to be called the "vein with a belly" [vena cava] by the authors.[90]

From this account of the two main veins that emerge from the liver, Albert demonstrates that the liver is the principal organ by which nourishment is taken in, processed, and subsequently distributed throughout the body.

He goes on to discuss how the nourishment from the liver is distributed throughout the body by the veins. He states:

> Every bodily operation occurs by means of an intermediate body. But the distribution of nutriment is a bodily operation, as is clearly evident in its own right. Therefore it occurs by means of a bodily medium. But such a medium is nothing other than a vein.[91]

Albert considered the veins that transported nourishment to be "non-pulsating veins," or just veins, while he considered those blood vessels that carried vital spirit to be "pulsating veins," or arteries.[92] He goes on to state that:

> The veins are said to be the site of blood because the blood is distributed through the veins to individual members. Nevertheless, the blood seeps from the extremities of the veins to the fleshy exterior parts (that is, externally), is drunk into their pores, and nourishes them later.[93]

The veins thus play a significant role in the nutritive function of the animal according to Albert's account. In a way that is analogous to the nerves for the brain, the veins transport nourishment from the liver and the digestive system throughout the body.

It is thus the liver as the principal organ of the nutritive function which receives the vital spirit from the heart and converts that spirit into the nutritive spirit. That spirit is then active in

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[90] Albertus, *De Animalibus,* 195 - 196 (Bk 1, Tract 2, Ch 21)
[91] Albertus, *QSDA,* 113 (Bk 3, Q 1)
[92] Albertus, *QSDA,* 113 (Bk 3, Q 1)
[93] Albertus, *QSDA,* 116 (Bk 3, Q 2)

the liver and its ministering organs in the generation of nourishment. This nourishment is then transported throughout the body by means of the veins. It is only by means of the vital spirit as pumped to the liver from the heart that nutritive spirit is generated. This nutritive spirit is means by which the liver is able to organize the nutritive functions of the various organs which contribute to the nourishment of the body. In this conception of the nutritive function of the body, the primacy of the heart as the principal organ of the body is maintained.

2.3.4 The Heart as First in Generation

Above we have explained the relationship of the heart as the principal organ of the body to the brain and the liver in their respective functions as principal members of the animal and nutritive functions of the body. However, if the heart is the principal organ of the body and if its motion is the first motion of the body, then it seems as if it must also be the first organ in the order of generation of the organs of the body.

Regarding the primacy of the heart in the order of the generation of organs in a human during gestation, Albert states:

> Although all the members exist in potency in the semen simultaneously, nevertheless the agent first intends that which is more necessary, and this is why it acts more towards its production and produces it sooner.
>
> …It does not produce all members simultaneously because it needs something, since the matter is not best prepared [*disposita*] for all members. And this is why, before it introduces the form for all the members, it requires that the matter be prepared for all the members, and the agent cannot do this at the same time; rather, first it prepares [the matter] for one and then for another.[94]

[94] Albertus, *QSDA,* 502 (Bk 16, Q 15)

Here Albert makes clear that the organs are not generated simultaneously, but that they are prepared in a certain order, beginning with that which is "most necessary." He elaborates on which is organ is most necessary:

> There will necessarily be members which first bestow power on that in which the principle of movement resides. On this they bestow being, the principle of motion, as if by way of an instrument in generation. And because this is the sort of relationship the heart has to the other members, it will necessarily be prior to the other members since it holds great control over the creation of these other members. After this the members will be entire and complete with respect to the process of generation. For a member such as this, which is a principle in the way stated, will necessarily be present in the bodies of the generated animals, in whom the principle of vital movement resides. It is therefore necessary that this member be created first, before all other members. The reason it must be first is that insofar as it is moving it must be first, and it must be first also insofar as it is a "member on account of which" [*membrum propter quod*] just as all the other members exist on account of one moving.[95]

Above Albert describes how it is that the heart, because is the principle of movement of the other organs, must be generated prior to those organs. He notes that it must be first because "it is moving." Additionally Albert describes that the heart must be the first organ produced because the heart is the organ that orders the growth of the other organs. He states that "it holds great control over the creation of these other members."

Last it is important to note the specific anatomical account of the generation of the heart as the first organ generated according to Albert.

> When the sperm has conceived, the first thing that happens, as we said before, is that frothiness occurs in it, produced by the formative power acting through the vital, natural, and animal spirits that are in it. It therefore produces the frothiness when it moves each of these spirits to its first point of origin, which is the place for the heart, and to the second one, which is the place for the liver and brain. For this reason the first bubbling forth is entirely toward the center so that a place might be prepared for the heart. Then two blisters are created that cling to it and one is on the right in the vicinity of the liver. This one fills up with red

[95] Albertus, *De Animalibus ,* 1216 *(*Bk 16, Tract 2, Ch 3)

> blood. The other is above this on where the place for the brain will be and this is filled with blood that tends to a light color. Then the spirit that is in the middle of the material perforates it by blowing into it. Through these pathways it cleanses it and leads in the nourishment of the menstrual blood. The *umbilicus* is then created, for the blisters for the heart, liver, and brain precede the creation of the *umbilicus.*[96]

In this anatomical account Albert describes the first two basic separations that occur in the sperm after conception. He attributes the first and primary one to the "first point of origin," that is, the place for the heart. And to the second he attributes space for the liver and brain - the principal organs for the nutritive and animal functions of the body.

He confirms that the heart is the first organ to be formed:

> …It is necessary that the heart be created first. For from the heart comes the natural and the vital heat through which every natural, vital, and animal activity is accomplished. Without this nothing at all can be accomplished. It is necessary that it be this way, for during the first formation nourishment is not needed since the spermatic fluid suffices for this. Therefore the creation of the heart is necessary…[97]

He explains how it is possible for the heart to be formed before the liver even though the nutritive function is in the liver. Because there is nourishment in the spermatic fluid, it is possible for the heart to be formed first. Then, from the heart, the liver, brain, and their servant organs are formed. The liver and brain are ordered to the heart as their principle, and the servant organs of the liver and brain are likewise ordered to them and formed after them.

Above we have demonstrated how Thomas's good friend and mentor, Albert the Great, provides an anatomical account of how it is that the heart is the principle of movement of the body. Critical to this anatomical account of the primacy of the heart is the notion of 'spirit' as

[96] Albertus, *De Animalibus,* 850 (Bk 10, Tract 2, Ch 3)
[97] Albertus, *De Animalibus,* 851 (Bk 10, Tract 2, Ch 3)

"the soul's instrument by which it forms the body and by which, once formed, it gives it life and sensation."[98] We recall that, according to Albert, the heart pumps vital spirit to the brain and liver, its ministering organs for animal and nutritive functions respectively. The brain converts this vital spirit into animal spirit and sends it by means of the nerves throughout the body to accomplish sensation and motion. Likewise the liver converts the vital spirit to nutritive spirit, and in conjunction with its ministering organs, it generates nourishments and sends it throughout the body by means of the veins. Last we noted that the heart is the first organ to be generated in the human during gestation, and that it "holds great control over the formation"[99] of the other organs. This overview of Albert's anatomy of the heart demonstrates how, according to his view, the organ of the heart is the principle of motion of the body.

While Thomas himself states that the heart is the "primary mediating part"[100] and principle of motion of the body, the scarcity of anatomical works in the *Corpus Thomisticum* may cause one to speculate that Thomas made such a claim only metaphorically. However, by viewing Thomas's claim in light of the Albertine anatomy with which he would have been familiar, it is clear that Thomas viewed the material organ of the heart to be the *actual* medium between "the whole body and the soul as the mover,"[101] not just metaphorically or analogously so.

[98] Albertus, *De Animalibus,* 1363 - 1364 (Bk 20, Ch 3)
[99] Albertus, *De Animalibus ,* 1216 *(*Bk 16, Tract 2, Ch 3)
[100] *QDA,* Ch. 9
[101] *QDA,* Ch. 9 (emphasis mine)

CHAPTER 3: THE HEAVENS AND THE HEART ANALOGY

Thus far we have discussed Thomas's account of the motion of the heart as the first motion of the body - the local motion of a material organ continuously in act as long as the animal is alive. Additionally, through the lens of Albertine anatomy, we have seen how it is plausible that Thomas understood the organ of the human heart to be the principle of motion of the body in an actual sense, not just in a metaphorical sense. Through the lens of Albert's anatomy Thomas attributes anatomical primacy to the organ of the heart. Having demonstrated these facets of the primacy of the heart in the body, it is important now to discuss Thomas's conception of the cause of the motion of the heart.

In his treatise *De Motu Cordis* Thomas describes human beings as analogous to the universe and the motion of the heart as analogous to the motion of the first heavens. This analogy is the lynchpin which undergirds his conception of how it is that the heart is moved. Below is the analogy as found in the treatise.

> A fully developed animal, one that is capable of moving itself, is more like the whole universe than anything else. This is why man, who is the most fully developed of animals, is called by some a microcosm. Now in the universe the first motion is local motion, which causes alteration and the other motions. So we more clearly see in animals that local motion is the principle of alteration, and not the contrary…
>
> Now the most subtle form on earth is the soul, which is most like the principle of the motion of the heavens. Thus, the motion that results from the soul is most like the motion of the heavens. In other words, the heart moves in the animal as the heavens[102] [*caeli*] move in the cosmos.[103]

[102] Here I differ from Froelich's translation. I take *caeli* to mean heavens, and not just heavenly bodies as the translation he has it. This is significant because "heavens" indicates the movement of the sphere whereas heavenly body indicates movement of just a star.
[103] *DMC*

Thomas's analogy of the human to a microcosm is not unique. However, his clarification and precision with this analogy - "the heart moves in the animal as the heavens move in the cosmos" - provide the lens through which his conception of how the heart is moved becomes clear.

3.1 Thomistic Cosmology

In order to understand the significance of Thomas's analogy of the movement of the human heart to the movement of the heavens, it is important to first understand Thomas's conception of the movement of the celestial spheres. Regarding the celestial motions, Thomas held the geocentric Ptolemaic view prevalent during his lifetime. He affirms his knowledge of the Ptolemaic view in his commentary on Aristotle's *De Caelo.*

> But it seems according to this that not all heavenly bodies are in circular motion: for according to Ptolemy, the motion of the planets is in eccentrics and epicycles, which are motions, not around the middle of the world, which is the earth's center, but around certain other centers.
>
> But it must be said that Aristotle was not of this opinion, but thought that all motions of the heavenly bodies are about the center of the earth, as did all the astronomers of his time. But later, Hipparchus and Ptolemy hit upon eccentric and epicyclic motions to save what appears to the senses in heavenly bodies. Hence this is not a demonstration, but a certain assumption. Yet if it be true, all the heavenly bodies are still in motion about the center of the world with respect to the diurnal motion, which is the motion of the supreme sphere that revolves the entire heaven [totum caelum].[104]

Because the celestial bodies seemed to move at different speeds and with a number of cycles and epicycles, a number of celestial spheres was posited, one for each cycle and epicycle. These spheres all appeared to interact in some way, with the motion of each one affecting and being affected by the motion of those near to it. In this model there was, however, one sphere whose motion was not affected by any other sphere. The motion of this sphere affected the motion of

[104] *DeCM* (Book 1, L 3)

the spheres that were below it. This outermost sphere, which astronomers of that time named "the heavens," consisted in what we would commonly refer to as the stars of the night sky. It was a perfect sphere, composed of a fifth element called 'quintessence.' Each star was fixed in the quintessence of this sphere, and the sphere rotated in a uniform manner around the earth without any changes in speed. Aristotle calls this outermost sphere the "first heaven" and Thomas discusses it in his commentary on Aristotle's *De Caelo.*

> And he says that he intends here to speak of the "first heaven," i.e., the outermost sphere and of the "first carrying," i.e., of the diurnal motion by which the whole heaven is revolved, through the motion of the first mobile, from east to west. Now he speaks of this motion in particular because there is in it no irregularity either in fact or in appearance. But "in those things below," i.e., in the motion of the planets, several motions concur to move one body, either according to different shifting and revolving spheres, as the astronomers of Aristotle's time said, as is plain in *Metaphysics* XII, or according to the motions of eccentrics and epicycles according to modern astronomers. From this variety of motions is caused the irregularity which appears as to the planets, according to which they seem at one time to be moved with a forward motion, at another with a retrograde, and at still another to be at rest - although in fact no motion of the heaven is irregular. Now, the arguments which he will here adduce apply not only to the motion of the first heaven which is simple and hence gives no appearance of irregularity, but also to the motions of the planets, in which there is apparent irregularity due to the concurrence of many motions.[105]

We can thus see how Thomas conceived of the motion of the different heavenly bodies, from the outermost "first heaven" and its regular motion, to the varying motions of the planets and lower bodies. The first heaven is that sphere whose cause of motion is the unmoved mover as mediated by a single spiritual substance. This substance is the "first mobile." The movement of the "things below," however, depended on a number of factors including "different shifting and revolving spheres" or "eccentrics and epicycles." An image is helpful to understand this conception of the cosmos. See Figure 1.

[105] *DeCM* Bk 2, Lect 8

FIGURE 1: CELESTIAL ORBS IN THE LATIN MIDDLE AGES (FASTFISSON, 1987, PG 365)

In the image the earth is at the center of the universe. There are seven spheres for the planetary bodies and for the sun and moon. Then there are three heavenly spheres. The outermost sphere is labeled as the "Decimum Coelum" and the "Primum Mobile." This is "first heavens" mentioned by Thomas and Aristotle whose movement is entirely uniform. The spiritual substance united to this sphere is the "first mobile." It, itself was moved by the unmoved mover. It, in turn, as a moved mover, moved the first heavens. The motion of this outermost sphere then contributed to the motion of the other bodies in the various lower spheres. Notable as well is that, in each sphere as represented in the image, there may have been other smaller spheres to account

for the various “eccentrics and epicycles” of the planets and their moons. Thomas likens the motion of the heart to the motion of the first heavens, the outer most sphere.

3.1.1 Spiritual Substance United to the Heavens as a Mover

In order to understand in a bit more depth Thomas’s conception of the motion of the heavens, it is helpful to turn to his *Quaestiones Disputatae de Creaturis Spiritualibus.* Much of the cosmological thought prior to Thomas attributed a soul or intelligence to each celestial sphere. This spiritual substance accounted was united to the sphere just as a mover. The matter of the heavens, as “higher things” has actual being in itself, as described below.

> It must be said that according to Averroes' view the heavens are composed of matter and form, just as an animal is among lower beings. But "matter" is nevertheless used equivocally in both instances: for in higher things it is not a potency toward actual being as in lower things, but only toward place. Hence an actually existing body is itself matter, and does not need a form to give it actual being, since it is actually a being (ens actu), but only to give it motion.[106]

Here Thomas describes the matter of the heavens as that which is so noble that it does not require an incorporeal form. By this he means that, unlike the matter of bodies on earth which require substantial forms for their configuration and existence as a “this thing,” the matter itself of the celestial spheres has being actually.[107] Thus the matter of the heavens does not require a form for its existence. Thomas elaborates on this notion thus: “It must be said that the soul which moves corruptible animals is united to them in respect of their actual being, but the spiritual substance which moves the heavenly bodies is united to them merely in respect of their being moved.”[108]

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[106] Thomas Aquinas, *Quaestiones Disputatae de Creaturis Spiritualibus, (QDCS),* Art 6
[107] That Thomas considered the “quintessence” of the heavenly spheres as matter which had being actually seems to contradict his established position that matter is merely potency for form. While I acknowledge the apparent discrepancy, to adjudicate it here is beyond the scope of this project.
[108] *QDCS,* Art 6

There is a spiritual substance that is united to the celestial spheres, but it is not united to the spheres as a substantial form. Rather, it is united to the sphere "merely in respect of their being moved," that is, as a mover. It is interesting to recall here that, while Thomas certainly maintains that the human soul is united to the entire body as a form "essentially and directly," he says that "as a mover it [the soul] is united to the body through an intermediary."[109] That intermediary is the organ of the heart. So, just as a spiritual substance is united to each celestial sphere as a mover, so to is the animal soul united to the heart as a mover, although the soul is also united to the entire body as its substantial form.

Having established that there is a spiritual substance united to the celestial spheres merely as a mover, we will now discuss the nature of these substances. Thomas describes the spiritual substances united to the celestial spheres as movers as having only those activities of the soul which are intellectual.

> For higher spiritual substances cannot have any of the activities of the soul except those which pertain to the intellect: because the other activities of life are the acts of the soul insofar as it is the form of a corruptible and changeable body; for these activities take place along with a certain change and corporeal alteration. Nor does the intellect of higher substances seem to need to get knowledge from sensible things, as our intellect does. If, therefore, none of the activities of life are in them except understanding and willing, which do not need a corporeal organ, their dignity would seem to exceed union with a body[110]

Thus the purely intellectual substances which are united to the celestial spheres are capable only of intellectual operations, specifically willing and understanding.

3.1.2 Motion of the Heavens as Caused by Desire

Thomas, in response to the position of Averroes, discusses which of these intellectual operations is in act so as to cause the motion of the celestial spheres.

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[109] *QDA,* Art 9
[110] *QDCS,* Art 6

> It must be said on this point we find that Averroes has expressed different views. For in the book *De Substantia Orbis* [1, post med.], he said that what moves the heavenly bodies as agent and as end is one and the same; and this is surely quite erroneous, particularly in relation to the view whereby he asserts that the first cause is not above the substances that move the first heaven? For on this view it follows that God is the soul of the first heaven, inasmuch as the substance which moves the first heaven as agent is called its soul. And the argument on which he made this statement is very inadequate: for because in the case of substances separated from matter the thing that understands and the thing that is understood are the same, he thought that the thing which desires and the thing which is desired are the same; and there is no parallel here. For knowledge of anything whatever takes place according as the thing known is in the knower; but desire takes place by way of a turning of the desirer toward the thing desired. Now if the good desired were present in the desirer of its very self, it would not be proper to it to do any moving toward the attainment of the desired good. And hence one should say that the desired good, which moves as an end, is something other than the desirer, which moves as an agent. And this, too, is the very same statement which the Commentator makes on XI *Metaphysica* [XII, comm. 38; 41]; for there he asserts two movers: one conjoined, which he calls the soul, and the other separated, which moves as an end. Nevertheless from all this we get nothing more than the fact that a spiritual substance is united to a heavenly body as its mover.[111]

Here Thomas discusses the motion of the celestial spheres as moved by a spiritual substance which is intellectual. Thomas rejects Averroes's position that the spiritual substance united to the celestial sphere moves it by "understanding "the unmoved mover. Specifically he states that, for separate substances, to understand something entails being identical with it. If Averroes's view were true, then the unmoved mover would be the same as the spiritual substance that is united to the first heavens as a mover. In this case that which moves an agent and that which moves as an end would be the same. If the end and the agent were the same, then the agent would seem to move itself, which we have proved to be impossible.

Desire, however, is different from understanding. Thomas states that "desire takes place by way of turning the desirer toward the thing desired." Thus, by desiring the unmoved mover,

[111] *QDCS,* Art 6

the spiritual substance of the first heavens is moved by it. But it is moved by it in such a way that it remains substantially separate from it. This movement of the soul of the first heavens - that "turning the desirer toward the thing desired" - is what causes the motions of the first heavens. Thomas proves that it is on account of desire, by which things are in relation but still separate, that motion is caused - not on account of understanding. In this distinction between desire and understanding he maintains the substantial separability between the mover which is the object of desire and the thing moved which is the agent desiring. The importance of desire for motion is critical both to Thomas's account of the motion of the celestial spheres and to his account of the motion of the heart.

Thomas elaborates further on the importance of desire as it related to the motion of the celestial spheres, and thus the heart, in his commentary on Aristotle's *Metaphysics*. it is helpful to discuss this elaboration at considerable length.

> Motion is twofold: natural and voluntary, or according to appetite. Now that which causes motion by means of natural motion necessarily undergoes motion, since a natural mover is one that begets and alters things. For both heavy and light bodies are moved locally directly by their begetter. But that which begets and alters things directly must exist in different states. Hence it has also been pointed out above (1065:C 2510) that the cause of generation and destruction acts in different ways. Now in the case of voluntary and appetitive motion, will and appetite have the character of moved movers, as is evident in Book III of *The Soul*. Hence it remains that only that which causes motion as something appetible is an unmoved mover.[112]

He first states that "will and appetite have the character of moved movers." This follows from our discussion above, that the spiritual substance united to the first heavens as a mover is moved by way of desire, not by way of understanding. Thus the first "moved mover," the spiritual substance of the first heavens, is moved as a will or appetite. He then notes that "only that which

[112] Thomas Aquinas, *In duodecim libros Metaphysicorum Aristotelis exposito, (In Meta),* Bk 12, L 7

causes motion as something appetible is an unmoved mover." Thus, something appetible, that is, and object of desire, causes motion as an unmoved mover. He continues:

> Now it is said that the first mover causes motion as something appetible because the motion of the heavens has this mover as its end or goal, for this motion is caused by some proximate mover which moves on account of the first unmoved mover in order that it may be assimilated in its causality to the first mover and bring to actuality whatever is virtually contained in it. For the motion of the heavens does not have the generation and destruction of lower bodies as its end, since an end or goal is nobler than the things ordained to it. Therefore the first mover causes motion as something appetible.[113]

Here he clarifies that the "the first mover causes motion as something appetible because the motion of the heavens has this mover as its end or goal." He then states that the motion of the first heavens is caused by "some proximate mover," that is the soul or spiritual substance united to the first heavens as a mover. This movement of the "proximate mover" is such that it may "bring to actuality whatever is virtually contained in it." Thus, it is by desiring the first, unmoved mover that the proximate mover is in actuality in its entirety. It is then through this act of desire that the proximate mover moves the entire first heavens. Thomas concludes by noting that the end of motion of the first heavens is not "the generation and destruction of lower bodies." Rather "the end is nobler than the things ordained to it." Thus, for the first heavens and for the proximate mover conjoined to them, their end is the first and unmoved mover.

Thomas then continues this discussion by describing the relationship between appetible goods and intelligible goods as objects of desire.

> Then he [Aristotle] proves the same point from the formal character of the appetible. He says that that which is good and that which is desirable in itself belong to the same class. For that which is prior in the class of intelligible things is also a greater good in the class of appetible things, or is something analogous

[113] *In Meta,* Bk 12, L 7

> to it. He says this because intelligible things are actual insofar as they exist in the intellect, whereas appetible things are actual insofar as they exist in reality; for good and evil are in things, as has been pointed out in Book VI (558:C 1240).[114]

He explains that a good thing and a thing "desirable in itself" belong to the same class. Then he states that intelligible goods are actual insofar as they exist in the intellect whereas appetible things are actual insofar as they exist in reality (*in rebus*). He says that if something is a good in the class of intelligible things, it is an even greater good in the class of appetible things. Thus, the greater good will be something which exists both *in rebus* as an appetible good and *in intellectu* as an intelligible good.

He then elaborates on this notion as it pertains to the greatest good.

> Hence, just as the concept of intelligible substance is prior to that of intelligible accidents, the same relationship holds for the goods which correspond proportionally to these concepts. Therefore the greatest good will be a simple substance, which is an actuality, because it is the first of intelligible things. It is evident, then, that the first mover is identical with the first intelligible and the first appetible good, which is the greatest good.[115]

Here Thomas states that the greatest good will therefore be something that is an intelligible good which is an actuality. As an actuality it will be an appetible good as well. But because an intelligible good is an even greater good in the class of appetible things, then it will be first amongst both intelligible and appetible goods. As such he states that "the first mover is identical with the first intelligible and the first appetible good, which is the greatest good."

Continuing in his commentary on Aristotle's *Metaphysics*, Thomas then discusses Aristotle's specific relation of the first mover to the motion of the first heavens.

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[114] *In Meta,* Bk 12, L 7
[115] *In Meta,* Bk 12, L 7

> He [Aristotle] now relates the first unmoved mover to the first sphere. He says that, since the first unmoved mover causes motion as something loved [*quasi amatum*], there must be something which is first moved by it, through which it moves other things. This is the first heaven. Therefore, since we suppose motion to be eternal, the first sphere must be moved eternally, and it in turn must move other things. And it is better to speak of it as something loved [*quasi amatum*] rather than as something desired, since there is desire only of something that is not yet possessed, but there is love even of something that is possessed.[116]

Here Thomas elaborates on Aristotle's insight that, the first mover, that is the greatest good which is both intelligible and appetible, must move the spiritual substance of the first heavens as "something loved." Thomas explains Aristotle's use of the word loved as opposed to desired - we can love something we possess whereas we cannot desire something we possess. It seems as if, for Aristotle and Thomas, once one possesses that which one desires, the desire abates. A new object of desire is determined, and the desire present the desirer turns towards this new object. However, by using the word 'love,' Aristotle indicates something more than a desire. Thomas explains Aristotle's use of the word 'love' to indicate that the first mobile can possess the first mover but still be moved by it. It is important to note that even though the spiritual substance of the first heavens loves, and therefore possesses the first mover, it does not become *the same as* the first mover. The two maintain substantial separability. Thus, the spiritual substance united to the first heavens as a mover never moves itself. It is only on account of love of the first mover, the first appetible and intelligible good, that this spiritual substance is moved. Because this love of an unchanging object of desire is itself unchanging, the motion of the first heavens that results from it is completely uniform.

[116] *In Meta,* Bk 12, L 7

3.1.3 Physical Motion of the Heavens

Having described how the first mover causes the motion of the first heavens as "something loved," it is important to discuss the physical motion of the first heavens in order to grasp the depth of Thomas's analogy of the motion of the first heavens to the motion of the heart. From Thomas's commentary on Aristotle's *Physics*, we read:

> He [Aristotle] proves with two arguments that circular motion is the first of motions. The first argument is this: Every local motion, as stated above, is either circular, or straight, or a combination of the two. But circular and straight are prior to the combination which is composed of them. But between these two, the circular is prior to the straight, for the circular is simpler and more perfect than the straight…
>
> From all this it is clear that a circular motion which is not composed of two, and which is not destroyed when it comes to a terminus (for its beginning and terminus are identical), is simpler and more perfect than a straight motion. Now the perfect is prior to the imperfect, and likewise the imperishable is prior to the perishable, in nature and notion and time, as was shown above when it was proved that local change is prior to other motions. Therefore, it is necessary that circular motion be prior to straight.
>
> He [Aristotle] gives the second argument which is this; A motion which can be perpetual is prior to one that cannot be perpetual, because the perpetual is prior to the non-perpetual, both in time and in nature. But a circular motion and no other can be perpetual, for the others must be followed by rest, and where rest intervenes, motion is destroyed. What is left, therefore, is that circular motion is prior to all the other motions.[117]

Additionally Thomas states in his Commentary on the *Metaphysics* that "the primary kind of motion, by which 'the first sphere' is moved, necessarily 'is local motion,' i.e., motion as regards place."[118] Thus it is clear that the motion of the first heavens must be local motion. It must be circular motion, and it must be motion whose "beginning and terminus are identical."

[117] *In Phys* Bk 8, Lect 19
[118] *In Meta,* Bk 12, L 7

3.2 Relating the Motion of the Heavens to the Motion of Heart

Having discussed how it is that the first heavens are moved and the physical nature of their motion, we will now turn to Thomas's discussion of the motion of the heart both in his Commentary on Aristotle's *De Anima* and in his treatise *De Motu Cordis* to understand the depth of his analogy of the motion of the first heavens to the motion of the heart. First we will treat Thomas's Commentary of Aristotle's work, and then we will examine his own treatise.

In the Commentary on the *De Anima*, Thomas discusses Aristotle's treatment of the physical motion of the heart in Book III.

> So then there must be in it [the body] something that stays still and yet initiates motion. And in this it resembles circular movement: for a body revolving in a circle is kept as a whole in the same place by the immobility of the centre and the poles. In thought it may move as a whole, but not in reality. In reality it keeps to one place. But its parts are changing their places really, and not only in thought. And so it is with the heart: it remains fixed in the same part of the body while it dilates and contracts and so gives rise to movements of impulsion and retraction. Thus it is, in a sense, both motionless and moving.[119]

Here Thomas follows Aristotle that the motion of the organ that initiates motion in the rest of the body must be such that it remains in the same place "as a whole," but its parts move in a way that resembles circular movement. This coheres with the motion of the first heavens which is "circular … simpler and more perfect." It is also similar to the motion of the first heavens in that, while the motion of the heavens is circular, they are not moved "as a whole" in relation to the other parts of the cosmos.

[119] Thomas Aquinas, *Sententia libri De Anima,* (*In DA*), Bk 3, Lect 15

Thomas elaborates on the significance of the local circular motion of the organ despite that it does not move "as a whole."

> And that the organ is both starting point and term (and therefore both motionless and moved) is clear from the fact that all animal movements consist of impulsions and retractions. In impulsion the motive force comes from the starting point, for the impelling agent thrusts itself forward against what is impelled. But in retraction the motive force comes from the term, for the drawing power draws something back to itself Thus the first organ of local motion in animals must be at once both a starting point and a term.[120]

From this passage in the commentary on the *De Anima* concerning the motion of the heart, there is a clear parallel to the motion of the first heavens. In the commentary on the *Physics* Thomas states, "It is clear that a circular motion which is not composed of two, and which is not destroyed when it comes to a terminus (for its beginning and terminus are identical), is simpler and more perfect than a straight motion." Thus the motion of the first heavens must have the same starting point and terminus, just like the motion of the heart as described in the commentary on the *De Anima.* Furthermore, we recall from our discussion of the "push and pull" motion of the heart that in a pushing motion, or "impulsion" as stated above, the mover is immediately united to the mobile as *terminus a quo.* Additionally we recall that in a pulling motion, or a "retraction" as stated above, the mover is immediately united to mobile as a *terminus ad quem.*

Thomas continues to elaborate on the importance of the organ of the heart as both "motionless and moved."

> Next, at 'Now, in short" he briefly states his view on the organ of local motion. He says that the primary organic motive-principle must be such that the movement starts and finishes in the same point, proceeding in a circle, as it were, and having a swelling out at the starting point and a concavity at the end.

[120] *In DA* Bk 3, Lect 15

> For the contractual movement draws the organ into concavity, while the expansive impulse, whence movement begins, follows a swelling out of the organ.
>
> Now, granted that this primary organ is both the starting point and term of movement, it must, as starting point, be motionless, and, as term, in movement; and both these at once. For in any movement the starting point itself does not move, all movement must proceed from the motionless,—as, for instance, while the hand is moving the arm is still, and while the arm moves the shoulder is still. However, these two factors in the organ, the motionless and the moved, though distinct in thought, are substantially and spatially inseparable.[121]

Here he again confirms the circular motion of the heart, while noting that, for the "primary organic motive-principle" movement must start and finish at the same point. He then describes the motion of the organ, noting that its swelling out and concavity resemble circular motion. Last he confirms that, in the case of the heart, the organ is both motionless and moved.

Having established the similarities between the local motion of the heart and the local motion of the first heavens, Thomas discusses the analogy between the two as it is found in Aristotle.

> Then at 'Since there are these three', he [Aristotle] interrelates three factors in movement: (1) the mover, (2) the organ by which it moves, and (3) the thing moved. Now the mover is twofold: an unmoved mover, and a mover that moves through being moved itself. In the case of animals, the unmoved mover is some actual good influencing desire through the intellect or imagination. The mover moved is the desire itself, for whatever desires is moved inasmuch as it desires, desire itself being a certain act or movement in the sense that we give to the term 'movement' when we apply it to activities that are consequent upon actuality, such as sensing and understanding. Then the thing moved is the animal itself. And the organ by means of which desire issues into movement is a part of the body; it is the primary motor-organ; hence it has to be treated along with the activities common to body and soul.[122]

[121] *In DA* Bk 3, Lect 15
[122] *In DA* Bk 3, Lect 15

In the above passage Thomas elaborates on the three factors in movement according to Aristotle's account. While the passage is from the Commentary on the *De Anima* and concerns the motion of the organ of the heart, it is almost identical to the account of the motion of the first heavens. Thomas follows this account. There is a first, unmoved mover which is an "actual good influencing desire through the intellect or imagination." This unmoved mover then moves a 'moved mover,' which is the desire itself. By 'desire itself,' Thomas is describing that part of the soul which is in actuality as desiring. He also notes that there can be different degrees of desire when he states that "for whatever desires is moved inasmuch as it desires." He then links the movement of the soul as a 'moved mover' to the motion of the animal. "Then the thing moved is the animal itself." While Aristotle does claim that there must be some bodily organ which the appetite uses to bring about motion and alludes to the heart as this organ, Thomas is more explicit. He states that "the organ by means of which desire issues into movement is a part of the body; it is the primary motor-organ." That is the heart.

In his commentary on the *De Anima*, Thomas follows and clarifies Aristotle's discussion of the motion of the heart as analogous to the motion of the first heavens. This analogy is made clear in the description of the actual physical motion of the heart as it is compared to the description of the physical motion of the heavens in the *Physics.* The analogy is further developed as Thomas discusses Aristotle's account of the three factors of the motion of the heart - an object of desire which, as an unmoved mover, causes the motion of the soul; and the soul which, as a moved mover, causes the motion of the heart. The heart, then, as the "primary motor-organ," causes the motion of the rest of the body. Thomas explicitly endorses the analogy of the motion of the heart to the motion of the first heavens found in his commentary on the

Metaphysics in his more mature treatise, *De Motu Cordis.* We recall that it is in that treatise that he states, "the heart moves in the animal as the heavens [*caeli*][123] move in the cosmos."[124]

3.3 Variance in the Motion of the Heart

While Thomas's analogy between the motion of the heart and the motion of the first heavens could not be clearer, he is also careful to note that the motion of the heart also differs from the motion of the first heavens. We recall that the first heavens are moved by the spiritual substance united to it as a mover, and this spiritual substance is moved by the first mover "as something loved." Thus the motion of the first heavens is entirely uniform. It apparent to our senses, however, that the motion of the human heart on earth is not entirely uniform. Thomas discusses this in *De Motu Cordis*:

> So, whereas the heavenly movement is always uniform, the heart's movement varies according to the different emotions and sensations of the soul. For the sensations of the soul are not caused by changes in the heart, but just the opposite is the case.[125]

It is this distinction, that the motion of the heart varies based on the different emotions and sensations of the soul, which warrants significant attention in order to more fully understand Thomas's conception of the motion of the heart and the implications of that conception.

In order to grasp the relationship of the motion of the heart to the various emotions and sensations that arise in the soul, we will first look again at Thomas's discussion of this in *De Motu Cordis*:

> Next, there is no need to say that the heart's motion arises from either sensing or desiring, although it does arise from the sensitive soul. For the heart is not caused to move by the sensitive soul's activities, but insofar as that soul is the form and nature of a particular kind of body.

[123] See note 100
[124] *DMC*
[125] *DMC*

> Now although some change occurs in the heart's motion because of different sensations and feelings, nevertheless such change is involuntary, for it does not come about through the command of the will. For as the Philosopher says in *On the Cause of the Motion of Animals*, often something will be seen which, without any command of the mind, moves the heart and private parts, the cause of which he says is the natural susceptibility animals have to physical changes. For when its parts undergo change, one part increasing and another decreasing, then naturally the whole animal moves and goes through a sequence of changes.[126]

Thomas confirms that there are changes in the motion of the heart based on "different sensations and feelings." These changes, however, are involuntary. So, while the motion of the heart is involuntary and natural, its motion nevertheless varies in accord with various sensations and feelings. This is to say that one cannot will that the motion of the heart change, but the motion of the heart nevertheless does change based on "the sensitive soul's activities." Furthermore, even though one cannot control the motion of the heart through the will, one can to some degree control the sensitive soul's activities through the will.

Thomas discusses further the how the motion of the heart can change involuntarily.

> We should note that there is a difference between the principle of the heavenly motion and the soul. The former is not moved in any way at all, neither essentially nor incidentally, but the sensitive soul, although unmoved essentially, is moved incidentally. Thus, different types of sensations and emotions arise in it. … This is why in the passions of the soul, such as anger, there is a formal part that pertains to a feeling, which in this example would be the desire for vengeance. And there is a material part that pertains to the heart's motion, which in the example would be the blood enkindled around the heart.[127]

Here again, Thomas confirms that the motion of the heart changes based on the emotions and sensations of the soul. The term 'sensations' (*apprehensiones*) indicates that Thomas is meaning a sensible object of desire. He also equates 'emotions' (*affectiones*) with desires. He states that anger is a "desire for vengeance." We can see here how it is that different objects of desire, while

[126] *DMC*
[127] *DMC*

leading to the voluntary action of certain body parts, nevertheless contribute to a change to the involuntary motion of the heart. As he states, “there is a formal part which pertains to a feeling … and there is a material part that pertains to the heart’s motion.”

Thomas discusses how this could be the case through the example of a lion being moved by the sight of a stag in his discussion of the voluntariness of human action in the *Summa Theologiae.*

> New movements in animals are indeed preceded by a motion from without; and this in two respects. First, in so far as by means of an extrinsic motion an animal's senses are confronted with something sensible, which, on being apprehended, moves the appetite. Thus a lion, on seeing a stag in movement and coming towards him, begins to be moved towards the stag. Secondly, in so far as some extrinsic motion produces a physical change in an animal's body, as in the case of cold or heat; and through the body being affected by the motion of an outward body, the sensitive appetite which is the power of a bodily organ, is also moved indirectly; thus it happens that through some alteration in the body the appetite is roused to the desire of something.[128]

Here Thomas uses the case of lion being moved toward a moving stag to discuss the different types of motion that cause the movement of an animal. The first is that the animal’s senses are “confronted with something sensible.” To elucidate this he mentions the movement of a stag towards the lion. The stag is the “unmoved mover” in this example, as analogous to the first mover in regard to the motion of the first heavens. He notes how the sensitive appetite is moved indirectly by the movement of this “outward body.” The “sensitive appetite” which, “is the power of a bodily organ,” (the heart) causes a physical change in the lion, that is “cold or heat.”

Thomas concludes *De Motu Cordis* by briefly describing this relationship of affections and apprehensions to the motion of the heart.

> For as the Philosopher says in *On the Cause of the Motion of Animals*, often something will be seen which, without any command of the mind, moves the heart and private parts, the cause of which he says is the natural susceptibility

[128] *ST* I-II, Q. 6, Art 1

> animals have to physical changes. For when its parts undergo change, one part increasing and another decreasing, then naturally the whole animal moves and goes through a sequence of changes…
>
> For the mind and imagination can cause a feeling of lust or anger or other passions, on account of which the heart is heated or cooled.[129]

It is important to note Thomas's connection of "something seen" to the movement of the heart, "without any command of the mind."[130] By this he means that the appetite can be moved by an object of desire as an unmoved mover. He states also that the mind and imagination can be the cause of feelings that result in the heart to be "heated or cooled." By "heated or cooled" Thomas is referring to a change in heart rate by which one feels either increased or decreased warmth near the heart.

3.3.1 The Passions and the Heart

That the involuntary motion of the heart is affected by various apprehensions and affections is made more clear in Thomas's discussion of the passions and how they affect the movement of the heart.[131] In order to understand how it is that the motion of the heart is affected by passions, it is important first to understand the nature of passions according to Thomas. He states:

> Now the soul is drawn to a thing by the appetitive power rather than by the apprehensive power: because the soul has, through its appetitive power, an order to things as they are in themselves… Consequently it is evident that the nature of passion is consistent with the appetitive, rather than with the apprehensive part.[132]

Critical to this statement is that the "nature of passion is consistent with the appetitive, rather than with the apprehensive part" of the soul. Thomas has already established in his discussion of

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[129] *DMC*
[130] "*non tamen iubente intellectu"*
[131] I am grateful to Marjorie O'Rourke Boyle for her discussion of the passions as they relate to the motion of the heart according to Thomas in her article "Aquinas's Natural Heart"
[132] *ST* I-II, Q 22, Art 2

the lion and the stag that the "sensitive appetite … is the power of a bodily organ"[133] - the heart. By stating that passion is consistent with the appetitive, rather than with the apprehensive part, Thomas is confirming that passions will affect the motion of the heart.

Thomas elaborates on this relationship of passions to the motion of the heart:

> Passion is properly to be found where there is corporeal transmutation. This corporeal transmutation is found in the act of the sensitive appetite, and is not only spiritual, as in the sensitive apprehension, but also natural. Now there is no need for corporeal transmutation in the act of the intellectual appetite: because this appetite is not exercised by means of a corporeal organ. It is therefore evident that passion is more properly in the act of the sensitive appetite, than in that of the intellectual appetite.[134]

Here Thomas states that there is a "corporeal transmutation" (*transmutatio corporalis*) that is associated with the passions. He moreover links the bodily change to the act of the sensitive appetite. It is clear from our discussion above that this "corporeal transmutation" described by Thomas as an "act of the sensitive appetite" is a change in the motion of the heart.

Thomas describes in greater detail the connection between passions and the motion of the heart. He says, "In every passion there is an increase or decrease in the natural movement of the heart, according as the heart is moved more or less intensely by contraction and dilatation; and hence it derives the character of passion."[135] Importantly Thomas admits to degrees of natural motion of the heart as based on different passions.

Let us consider the passion of love as an example of how the heart is moved by the sensitive appetite. Thomas describes the mutual indwelling between lover and beloved as the beloved being contained by the lover by means of apprehensive and appetitive powers. He states: "Because, as to the apprehensive power, the beloved is said to be in the lover, inasmuch as the

[133] *ST* I-II, Q 6, Art 1
[134] *ST* I-II, Q 22, Art 3
[135] *ST* I-II, Q.24.Art 2

beloved abides in the apprehension of the lover, according to Philippians 1:7, 'For that I have you in my heart'"[136] Additionally, with regard to the appetitive power, Thomas states:

> As the appetitive power, the object loved is said to be in the lover, inasmuch as it is in his affections, by a kind of complacency: causing him either to take pleasure in it, or in its good, when present; or, in the absence of the object loved, by his longing, to tend towards it with the love of concupiscence, or towards the good that he wills to the beloved, with the love of friendship.[137]

Of note in the above passage is that the object loved is in the lover "inasmuch as it is in his affections, by a kind of complacency." Here Thomas states that affections are in the appetitive power, the organ of which is the heart. He also uses the word *complacentia* in Latin. The obvious translation into English is 'complacency,' but it more literally can take the meaning 'the act of conciliating greatly.'[138] A more precise colloquial English translation might be 'the act of entirely taking on the affections of another.' Thus, in the love that Thomas describes above, the lover takes on the affections of the beloved. Recalling that affection is the function of the sensitive appetite, it seems that the organ of the heart must undergo some change as befits the passion of love described by Thomas.

Here Thomas discusses how these affections contribute to a change in the movement of the heart.

> But it belongs to love that the appetite is fitted to receive the good which is loved, inasmuch as the object loved is in the lover, as stated above (Article 2). Consequently the freezing or hardening of the heart is a disposition incompatible with love: while melting denotes a softening of the heart, whereby the heart shows itself to be ready for the entrance of the beloved. If, then, the beloved is present and possessed, pleasure or enjoyment ensues. But if the beloved be absent, two passions arise; viz. sadness at its absence, which is denoted by "languor" (hence Cicero in De Tusc. Quaest. iii, 11 applies the term "ailment" chiefly to sadness); and an intense desire to possess the beloved, which is signified by "fervor." And these are the effects of love considered formally,

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[136] *ST* I-II, Q.28. Art2
[137] *ST* I-II, Q. 28 Art. 2
[138] The Lewis and Short entry for *complaco* - **com-plāco**, āre, v. a., - *to conciliate greatly*: sibi judices, Tiro ap. *Gell. 7, 3, 13*. (*Lewis & Short*, perseus.uchicago.edu)

> according to the relation of the appetitive power to its object. But in the passion of love, other effects ensue, proportionate to the above, in respect of a change in the organ.[139]

Above Thomas discusses in depth how the motion of the heart is related to the reception of a good that is loved. Specifically he notes how a heart that is ready to receive the beloved softens, whereas a disposition incompatible with love is that of a heart that hardens or is frozen. Indeed, if to love means to be complacent with, or "take on the affections," of the beloved, it coheres that the bodily organ of the sensitive appetite would necessarily soften and enlarge so as to be able to take on those affections. Using love as an example, we can see that, for Thomas, there is a clear link between the organ if the heart and the relationship between the lover and the beloved. That is to say that there is a direct relationship for Thomas between appetitive power of the sensitive soul and the movement of the heart.

3.3.2 The Role of the Intellect

Having discussed how it is that the sensitive appetite contributes to the motion of the heart based on apprehensions and affections, it is important to consider the role of the intellect on the sensitive appetite. With regard to the relationship between the intellect and the sensitive appetite, we will turn again to Thomas's commentary on Aristotle's *Metaphysics.*

> But in our own case, that which causes motion as a desirable good differs from that which causes motion as an intelligible good, though each causes motion as an unmoved mover. This is particularly true in the case of an incontinent person; for according to his reason he is moved by an intelligible good, but according to his concupiscible power he is moved by something pleasant to the senses, which, while it seems to be good, is not good absolutely but only with some qualification. However, this kind of difference cannot be found in the first intelligible and the first desirable good. But the first intelligible and the first desirable good must be the same. The reason is that a concupiscible good, which is not an intelligible good, is merely an apparent good; but the first good "must be an object of the will," i.e. an object desired by the intellectual appetite. For will belongs to the intellectual order and not merely to that of concupiscible

[139] *ST* I-II Q.28 Art. 5

> appetite. And this is so because what is desired by the concupiscible power seems to be good because it is desired; for concupiscence perverts the judgment of reason insofar as something pleasant to sense seems to be good to reason. But what is desired by the intellectual appetite is desired because it seems to be good in itself. For "understanding" as such, i.e., the act of intellection, which is moved in a way by an intelligible object, "is the principle of desire." Therefore it is evident that the object of concupiscible appetite is good only when it is desired through a dictate of reason. Hence it cannot be the first good, but only that which, because it is good, moves desire and is at once both appetible and intelligible.[140]

In the above passage from the Commentary on the *Metaphysics,* Thomas describes in detail the relationship between intelligible and appetible goods. He notes that each causes motion as an unmoved mover. Using the example of an incontinent person, he states that "what is desired by the concupiscible power seems to be good because it is desired," whereas that which is desired by the intellectual appetite is desired "because it seems to be good in itself." Although Thomas only mentions the concupiscible power in the example of the incontinent person above, we can infer that that the irascible power - that other faculty that, along with the concupiscible power contains "all the passions of the soul"[141] - is similar. That is that either power can present apparent goods as objects of desire by perverting "the judgment of reason insofar as something pleasant to sense seems to be good to reason." These "apparent goods" then move the sensitive appetite to desire, and desire present in the sensitive soul then moves the heart as the "organ by means of which desire issues into movement."[142]

The intellect does, however, have a role to play in this process in the case of humans. Thomas states that "the act of intellection, which is moved in a way by an intelligible object, 'is the principle of desire.'" Indeed, it seems that the irascible and concupiscible appetites can only

[140] *In Meta,* Bk 12. L 7
[141] *ST* I-II, Q 23, Art 4
[142] *In DA,* Bk 3, Lect 15

act as unmoved movers in themselves by perverting the judgment of the intellect and presenting apparent goods.

That the concupiscible or irascible appetite can pervert the judgement of reason and cause the movement of someone to a merely "apparent good" coheres with human experience. Indeed, the apostle Paul writes in the letter to the Romans, "I do not understand my own actions. For I do not do what I want, but I do the very thing I hate."[143] This statement, representative of human experience broadly speaking, indicates an inner battle between the sensitive appetite and the intellect as it proceeds in human action according to Thomas's account.

It is important to note, however, that for Thomas, the concupiscible and irascible powers are not always at odds with the dictate of reason. They are able to present actual goods as objects of desire as well. Thomas confirms that the object of the concupiscible (and I include irascible) appetite is good "only when desired through a dictate of reason." He elaborates: "Hence it [the object of concupiscible/irascible appetite] cannot be the first good, but only that which, because it is good, moves desire and is at once both appetible and intelligible." According to our human nature we are normally only able to desire apprehensions and affections of the sensitive appetite. These objects of desire in turn affect the movement of the heart. "The heart's movement varies according to the different emotions [*affectiones*] and sensations [*apprehensiones*] of the soul."[144]

It is clear from the discussion above that the movement of the human heart can be caused either by an "apparent good," a perversion of reason presented by the sensitive appetite, or by an actual good, also presented by the sensitive appetite but desired through a dictate of reason.

Thomas also confirms in the above passage that the first good is both perfectly intelligible and desirable. "However, this kind of difference cannot be found in the first

[143] Romans 7:15, RSVCE
[144] *DMC*

intelligible and the first desirable good. But the first intelligible and the first desirable good must be the same." That the first intelligible and the first desirable good must be the same indicates that when that good is possessed, there is no conflict between "that which causes motion as an intelligible good, and that which causes motion as a desirable good." Indeed, once the first good is possessed it will be the single object of desire of the sensitive appetite perfectly desired through a dictate of perfect reason. This state is final and perfect happiness according to Thomas: "For happiness is the perfect good, which lulls the appetite altogether; else it would not be the last end, if something yet remained to be desired.."[145] In this state of happiness there will be no passions because the sensitive appetite, in which the passions are located, will be perfectly aligned to the intellectual appetite. Although this will be described in further detail later, it is important to note here that the motion of the heart in this state of perfect happiness will be most natural. That is, it will be most like the motion of the first heavens - uniform, continuous and nearly circular.

3.3.4 The Path to Happiness via Intelligible Objects of Desire

While Thomas is clear that the happiness aforementioned is only to be found in heaven,[146] he is also clear that "imperfect happiness"[147] can be had in this mortal life. "A certain participation of Happiness can be had in this life: but perfect and true Happiness cannot be had in this life."[148] On the distinction between the two he states, "In perfect happiness the entire man is perfected, in the lower part of his nature, by an overflow from the higher. But in the imperfect happiness of this life, it is otherwise; we advance from the perfection of the lower part

[145] *ST* I-II, Q 2, Art 8
[146] *ST* I, Q 12, Art 11
[147] *ST* I-II, Q 3, Art 3
[148] *ST* I-II, Q 5, Art 3

to the perfection of the higher part."[149] By "perfection of the lower part," he is relating the sensitive soul, the lower part, to the intellective soul, the higher part. He goes on to say that "the operations of the senses can belong to happiness … antecedently, in respect of imperfect happiness, such as can be had in this life, since the operation of the intellect demands a previous operation of the sense."[150] Happiness belongs to the intellect. So in the perfect happiness of heaven the intellect will overflow to perfect the body. But in this mortal life, because sense perception is necessary for operations of the intellect, the imperfect happiness possible for humans requires the use of the senses.

For man to achieve the imperfect happiness of this mortal life, he must be moved by objects of desire that tend towards the one first principle. Below Thomas describes these objects of desire as "secondary objects of the appetite" and states how they are ordered to the last end.

> Man must, of necessity, desire all, whatsoever he desires, for the last end. This is evident for two reasons. First, because whatever man desires, he desires it under the aspect of good. And if he desire it, not as his perfect good, which is the last end, he must, of necessity, desire it as tending to the perfect good, because the beginning of anything is always ordained to its completion; as is clearly the case in effects both of nature and of art. Wherefore every beginning of perfection is ordained to complete perfection which is achieved through the last end. Secondly, because the last end stands in the same relation in moving the appetite, as the first mover in other movements. Now it is clear that secondary moving causes do not move save inasmuch as they are moved by the first mover. Therefore secondary objects of the appetite do not move the appetite, except as ordained to the first object of the appetite, which is the last end.[151]

Recalling that man is moved by objects of desire as unmoved movers, and that man cannot attain his final end in this mortal life, there must be objects of desire in this mortal life that, as "moving causes," lead man nearer to his final end. These "secondary objects of the appetite," as

[149] *ST* I-II, Q 3, Art 3
[150] *ST* I-II, Q 3, Art 3
[151] *ST* I-II, Q 1, Art 6

Thomas describes them, must be perceptible to human beings. As objects of desire that lead man nearer to his final end, the objects themselves must tend "toward the perfect good." In this discussion of "secondary objects of the appetite" Thomas confirms that temporal and perceptible objects that tend toward the perfect good lead man nearer to his final end. It is by being moved by these secondary objects of the appetite that "in the imperfect happiness of this life … we advance from the perfection of the lower part to the perfection of the higher part."[152]

While these secondary objects of the appetite are desired by man "as tending to the perfect good," we recall that it is possible for man's sensitive appetite to pervert the judgment of reason and present a merely "apparent good" as a secondary object of appetite. As discussed before, the concupiscible or irascible powers can convince the intellect that an object of desire is in accord with man's last end, when in fact it is not. When such a merely apparent good moves man to action, that resultant action is not in accord with man's final end. That is to say that when man is moved to action by a merely apparent good through a perversion of the judgment of reason by the irascible or concupiscible power, his action and the desire which is the cause of it are not accord with what constitutes happiness for him.

3.3.5 Intelligible Objects of Desire and the Natural Motion of the Heart

We will now examine how secondary objects of the appetite and the degree to which they tend towards man's final end affect the motion of the heart. In *De Motu Cordis*, Thomas discusses happiness as it relates to the natural motion of the heart through intent and desire.

> Another point to consider is that animals move from place to place because of their desires or intellect, as the Philosopher teaches in the third book of *On the Soul* (433a9-b30).

[152] *ST* I-II, Q 3, Art 3

> Therefore, in animals that act only by nature and not by intent [*proposito*], the whole process of motion is natural. For the sparrow naturally makes a nest and the spider a web. But only man acts from intent and not by nature.
>
> Nevertheless, the principle of every human action is natural. For although the conclusions of the theoretical and practical sciences are not naturally known, but rather are discovered through reasoning, nevertheless the first indemonstrable principles are naturally known, and from them we come to know other things. In the same way, the desire for the ultimate goal, happiness, is natural to humans, as is the aversion toward unhappiness. Thus, the desire for things other than what constitute happiness is not natural. The desire for these other things proceeds from the desire of the ultimate goal. For the goal in acts of desire is just like the indemonstrable principles in acts of the intellect, as is said in the second book of *Physics* (200a15-25). And so even though the movements of all the other parts of the body are caused by the heart, as the Philosopher proves in *On the Motion of Animals* (703a14), these movements can still be voluntary, while the first movement, that of the heart, is natural.[153]

Thomas begins the passage by quoting Aristotle that all animal movement is based on desire or intellect. He then goes on to describe the natural motion of creatures such as spiders and sparrows. Moved by an object of desire, the spider builds a web, and the sparrow makes a nest. This is a natural movement for both creatures. That is, it is movement based on a desire present in the sensitive soul of each creature. Because the spider and the sparrow have no intellect, each can only move according to its natural desires as they are present in the sensitive soul. The building of a nest and the making of a web are natural and necessary actions for the sparrow and the spider respectively.

Thomas then compares the natural motion and desire of the spider and the sparrow with the natural motion of humans. He states that the principle of all human actions is natural. It is the desire for the ultimate goal - happiness. He also states that "the desire for things other than what constitutes happiness is not natural." Looking at this statement in light of the sparrow and spider example helps to elucidate Thomas's thought.

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[153] *DMC*

In the case of the sparrow and the spider, each must choose specific items or locations for the process of building a nest or web. A sparrow naturally knows and chooses what twigs and straw will be best for the construction of its nest. It additionally naturally knows and chooses the most safe place to build the nest in order to protect it from weather and predators. The sparrow doesn't discern these things; it knows them naturally. It then acts based on nature. The same is true for the spider. It knows what place will be best place to build a web, both in terms of catching nourishment and in terms of defending itself. The spider then constructs the web naturally, without deliberation or discernment. It is a natural process by which the spider ensures its own survival and thereby the survival of its species. For both the spider and the sparrow, a natural object of desire moves the sensitive appetite, which in turn moves the material principle of motion of the creature - the heart in the case of the sparrow. Then the body parts of the creature move to accomplish whatever action is caused by the object of desire as mediated by the sensitive soul. Because the sparrow and the spider can only act in accord with their natures, their actions are involuntary. There is never an uncoupling of their actions and their natures.

Humans, however, *can* act against our own nature. Thomas discusses how the concupiscible and irascible desires can "pervert the judgment of reason" to present objects as "apparent goods" which are not, in fact, actually good. When a merely *apparent* good as an object of desire moves the sensitive soul and thus the heart, the human is moved by "something other than what constitutes happiness." This desire and consequent action of the human is not natural. Indeed, such an unnatural action is not "ordained to the first object of appetite, man's last end." It is natural for humans to desire everything in accord with their last end. Those things that are in accord with the last end of humans are those things that are both intelligible and

appetible. When the appetite perverts the judgment of the intellect so that man desires something that is merely appetible, the desire and subsequent action of the human is not natural.

Of course, it is not as if some objects of desire are both intelligible and appetible while others are just appetible but not intelligible. Indeed, each object of desire is intelligible to some degree and appetible to some degree. Thomas describes that objects of desire can vary in their degree of intelligibility in his discussion of the proportionality of means to end regarding the love of God. He states:

> In all matters of appetite and action the measure is the end, because the proper reason for all that we desire or do should be taken from the end, as the Philosopher proves (Phys. ii, 9). Therefore the end has a mode by itself, while the means take their mode from being proportionate to the end … [and] the end of all human actions and affections is the love of God, whereby principally we attain to our last end.[154]

Thomas clarifies that all human actions and affections are measured by their proportion to the end, "the love of God." Because God is the first good - the first intelligible good and the first appetible good - the intelligibility of each object of desire varies in accord with that object's proportion to the "love of God," that is the love of the first intelligible and appetible good.

If we admit to degrees of intelligibility amongst appetible objects of desire, and if we keep in mind that man's natural end is union with God, we can say that the 'better' an appetible object of desire is intelligibly, the *more natural* is the corresponding desire caused by that object. On the contrary, the 'lesser' an appetible object of desire is intelligibly, the *less natural* is the corresponding desire caused by that object. Thomas discusses this concept in his discussion of the passions as they relate to defect with regard to the first good.

> In things relating to perfection the case is the opposite, in comparison to things that pertain to defect. Because in things relating to perfection, intensity is in proportion to the approach to one first principle; to which the nearer a thing

[154] *ST* II-II, Q 27, Art 6

> approaches, the more intense it is. Thus the intensity of a thing possessed of light depends on its approach to something endowed with light in a supreme degree, to which the nearer a thing approaches the more light it possesses. But in things that relate to defect, intensity depends, not on approach to something supreme, but in receding from that which is perfect; because therein consists the very notion of privation and defect. Wherefore the less a thing recedes from that which stands first, the less intense it is: and the result is that at first we always find some small defect, which afterwards increases as it goes on. Now passion pertains to defect, because it belongs to a thing according as it is in potentiality. Wherefore in those things that approach to the Supreme Perfection, i.e. to God, there is but little potentiality and passion: while in other things, consequently, there is more. Hence also, in the supreme, i.e. the apprehensive, power of the soul, passion is found less than in the other powers.[155]

Here Thomas clearly states that the nearer something approaches "one first principle," "the more intense it is." Recalling that, for Thomas, the principle of all of man's actions is natural - in accord with his ultimate goal - we can say that the nearer that man approaches that first principle, the more natural his action becomes. With regard to intelligibility, it seems that those objects of desire are more intelligible whose pursuit brings us nearer to the first principle. Thus, the more intelligible an object of desire is, the more intensely natural will be the action that results from it.

Just as Thomas states that "the nearer a thing approaches [one first principle], the more intense it is," he also states that "in things that relate to defect, intensity depends, not on approach to something supreme, but in receding from that which is perfect." Here he states that the further a human recedes from the first principle, the more intense will be that in the human which "relates to defect." Thomas then states, "Now passion pertains to defect, because it belongs to a thing as it is in potentiality." Thus, the more one recedes from the first principle, the more intense will be the resultant passion. Moreover, if nearness to the first principle entails the pursuit of *more* intelligible objects of desire, it follows that recession from the first principle entails the pursuit of *less* intelligible objects of desire. Thus the passions are driven by the pursuit

[155] *ST* I-II, Q 22, Art 2

of less intelligible objects of desire. The intensity of the passions corresponds to the defect of intelligibility in the object of desire so that the greater the defect of intelligibility, the more intense the resultant passion.

Thomas confirms that a passion and its magnitude affect the motion of the heart. Regarding this Thomas states:

> In the passions of the soul, the formal element is the movement of the appetitive power, while the bodily transmutation is the material element. Both of these are mutually proportionate; and consequently the bodily transmutation assumes a resemblance to *and the very nature of* the appetitive movement.[156]

In other words, the "bodily transmutation" resembles the movement of the appetitive power on account of a certain passion. The "material element" of the bodily transmutation is the organ of the heart. We recall that passion entails recession from the one first principle so as to increase in potentiality towards it. Thus a bodily transmutation, that is a change in the motion of the heart, corresponds to a movement of the sensitive appetite which results from the passions.

Returning to Thomas's statement in *De Motu Cordis*, we recall that "the desire for the ultimate goal, happiness, is natural to humans, as is the aversion toward unhappiness. Thus, the desire for things other than what constitute happiness is not natural." Because passions are caused by less intelligible objects of desire, they are caused by "things other than what constitute happiness." Thomas tells us above that the desire for these things is "not natural." Based on Thomas's statement that the "bodily transmutation assumes a resemblance to and *the very nature of* the appetitive movement," we can say that in the case of the passions, the bodily transmutation - that is the motion of the heart - is likewise not natural. The intensity of this unnatural desire and

[156] *ST* I-II, Q 44, Art 1 (emphasis mine)

corresponding unnatural motion of the heart increase as the intelligibility of the object of desire decreases.

On the other hand, because "the desire for the ultimate goal, happiness, is natural for humans," we can say that the motion of the heart is natural when the soul is moved by a natural object of desire. That is, when the soul is moved by an object of desire that is both appetible and intelligible, its corresponding desire is natural. Because the "bodily transmutation assumes a resemblance to and the very nature of the appetitive movement," the corresponding bodily transmutation - that is the motion of the heart - to a natural appetitive movement is likewise natural. The intensity of this natural desire and the corresponding natural motion of the heart increase as the intelligibility of the object of desire increases.

Put a different way, the motion of the heart is more natural as it is moved by more intelligible objects of desire. As these objects of desire more nearly approach the "one first principle," the motion of the heart becomes more intensely natural. Similarly, the motion of the heart is less natural as it is moved by less natural objects of desire. As these objects of desire more distantly recede from the "one first principle," the motion of the heart becomes more intensely unnatural.

It is possible to think of Thomas's view in terms of a resonant frequency that is the frequency of man's final end. Anything that moves according to its nature moves in accord with this frequency. Humans, because we have an intellect and thus a will, can choose whether or not to move in accord with this frequency. When our sensitive appetite is moved by a natural object of desire, our heart moves in a way concordant with this resonant frequency. Conversely, when our sensitive appetite perverts the judgement of reason and is moved by an unnatural object of desire, our heart moves in a way discordant from this resonant frequency.

Thomas's claim, then, is that the naturalness or un-naturalness of the motion of one's heart indicates whether or not one's desires are leading one closer to or further from his natural end - love of God. The intensity of the natural motion of the heart increases as man is moved by more intelligible objects of desire; it decreases as one is moved by less intelligible objects of desire.

3.3.6 Perfect Happiness and the Motion of the Heart

It follows that, if man continues to approach his first principle via more intelligible objects of desire, man will eventually obtain his last end, that toward which all of his desires are ordained. In the Christian and Thomistic conception, man can only reach perfect happiness - the "vision of the Divine Essence"[157] - after death. Indeed, once a human possesses God in eternal happiness, he will have attained the source of all his earthly desires. Thomas says:

> Two things are needed for happiness: one, which is the essence of happiness: the other, that is, as it were, its proper accident, i.e. the delight connected with it. I say, then, that as to the very essence of happiness, it is impossible for it to consist in an act of the will. For it is evident from what has been said (Articles 1 and 2; I-II:2:7) that happiness is the attainment of the last end. But the attainment of the end does not consist in the very act of the will. For the will is directed to the end, both absent, when it desires it; and present, when it is delighted by resting therein.[158]

Thus, once man has attained his last end, his desire will have ceased. For, indeed, Thomas says that one cannot desire what one possesses. At the attainment of the last end, man's intelligible appetite is "delighted by resting therein." It is then that the motion of his heart should be like the motion of the first heavens, moved by the first mover "as something loved … [for] it is better to

[157] *ST* I-II, Q 3, Art 8
[158] *ST* I-II, Q 3, Art 4

speak of it as something loved rather than as something desired, since there is desire only of something that is not yet possessed, but there is love even of something that is possessed."[159]

The question arises, then, whether a human heart will be moving when man attains his last end, and what kind of motion it will have.[160] Thomas confirms that the heart of a glorified human body after the resurrection of the dead will move. He states:

> The soul united to a glorified body is more like to God than when separated therefrom, in so far as when united it has more perfect being. For the more perfect a thing is the more it is like to God: even so the heart, the perfection of whose life consists in movement, is more like to God while in movement than while at rest, although God is never moved.[161]

Thus, once man has attained his last end, his heart will move perfectly naturally - like the motion of the first heavens. The heart's motion in this state will be perfectly uniform. It will be caused by the unmoved mover as something loved, because only in heaven does man *possess* his last end. It is then, in a glorified body in which the soul possesses its last end and delights in it, that the hearts of those who have been made for God will find the tranquility of purely natural motion.

[159] *In Meta,* Bk 12, L 15
[160] I am grateful to Alex Coffey, SJ for discussing this possibility in conversation.
[161] *ST* Suppl, Q 93, Art 1

CHAPTER 4: CONTEMPORARY RELEVANCE - POSITIVE EMOTION AND COHERENCE

Based on the account of Thomas's conception of the material organ of human heart as given above, it is clear that Thomas ascribes primacy to the organ of the heart and to its motion. According to Thomas the heart is the only organ of the body that is in local motion as long the living thing is alive. For Thomas, the motion of the heart is the first motion of the body, and it is the body's only purely involuntary local motion as receptive of the form of the soul. Additionally, according to Thomas's view as seen through the lens of Albertine anatomy, the heart is the principle of motion of the body. Indeed Albert provides an anatomical account of how it is that the heart is "the organ by means of which desire issues into movement."[162] Last, according to Thomas, the heart is moved by an object of desire as an unmoved mover which is mediated by the desire itself as present in the soul. Furthermore, the natural motion of the heart indicates that the human is pursuing his natural end, and the more intensely natural that motion is, the closer towards his natural end is the human.

While it would undoubtedly be difficult or impossible to prove this view through contemporary science - to do so would require proof for the existence of man's last end, union with God - Thomas's view does provide an interesting philosophical lens through which to view contemporary findings in neurocardiology. In order to elucidate the relevance of Thomas's view to contemporary topics, I will discuss his view on the heart as it relates to the extensive research done in neurocardiology by Rollin McCraty and the HeartMath Institute.

The HeartMath Institute began in 1991. According to their mission statement they seek to "help people bring their physical, mental and emotional systems into balanced alignment with

[162] *In DA* Bk 3, Lect 15

their heart's intuitive guidance. This unfolds the path for becoming heart-empowered individuals who choose the way of love, which they demonstrate through compassionate care for the well-being of themselves, others and Planet Earth."[163] In order to further their mission, the HeartMath Institute and their director of research, Rollin McCraty, have done a number of experiments assessing the motion of the heart, its relation to emotion, and its effect on processes in the body. Their findings interestingly relate to Thomas's own account of the motion of the heart as discussed above.

At the center of the work of the HeartMath Institute is understanding the role of the heart in establishing "psychophysiological coherence."[164] This coherence is defined as "a state of optimal function, characterized by increased synchronization, harmony, and efficiency in the interactions within and among the physiological, cognitive, and emotional systems."[165] HeartMath's findings indicate that "a harmonious state of sustained, self-modulated positive emotion" which is "marked by a district change in the rhythm of heart activity" is a "primary driver" of psychophysiological 'coherence' as they describe it.

4.1 Heart Rate Variability Coherence and Positive Emotion

Perhaps the most salient aspect of HeartMath's research as it relates to Thomas's account of the heart is their research on the relationship between sustained positive emotion and the physical motion of the heart. At the beginning of their research they discovered that "the *rhythmic pattern of heart activity* was directly associated with the subjective activation of distinct emotional states, in that it covaried with emotions in real time."[166] The specific measure

[163] "Mission and Vision." *HeartMath Institute*, www.heartmath.org/about-us/hmi-mission/.
[164] McCraty, Rollin, et al, "The Coherent Heart: Heart-Brain Interactions, Pyschophysiological Coherence, and the Emergence of System-Wide Order," *Integral Review*, 5, no. 2, (December 2009): 10–115.
[165] McCraty et al., "The Coherent Heart," 15
[166] McCraty et al., "The Coherent Heart," 20

of the "rhythmic pattern of heart activity" that corresponds to a given emotional state according to McCarty is *heart rate variability* (HRV). Heart rate is the number of heart beats in a given period of time, often given in beats per minute (bpm). For example, someone may have a resting heart rate of 70 beats per minute. That doesn't mean, however, that each of those 70 beats is evenly spaced throughout the 60 seconds in which all 70 beats occur. Indeed, during that minute it is likely that the time between individual heart beats varies considerably. Thus, the individual's heart rate given in beats per minute could vary significantly throughout the minute. Heart rate variability (HRV) is the measure of the change in heart rate over time.

Using HRV as a measure, McCraty states that a coherent heart rhythm is one that has a "stable, sine-wave-like pattern in the heart rate variability waveform." He summarizes his findings on the association of HRV to distinct emotional states by stating that "sustained positive emotions such as appreciation, care, compassion, and love generate a smooth, sine-wave-like pattern in the heart's rhythms," whereas "negative emotions such as frustration, anger, anxiety, and worry lead to heart rhythm patterns that appear *incoherent*—highly variable and erratic."[167] The graphs below of HRV associated with different emotions are helpful in understanding McCraty's findings.

We can see in Figure 2, a distinct sine-wave-like pattern of heart rhythm is clear when the subject in McCraty's study intentionally maintained focus on a positive emotion, in this case, appreciation. An incoherent or erratic pattern of heart rhythm is evident in the case of the individual who was asked to reflect on a negative experience over the last few days which led to frustration. The distinct sine-wave-like pattern of the HRV graphs of the person experiencing appreciation demonstrates an HRV which McCraty calls "coherent." On the other hand the more

[167] McCraty et al., "The Coherent Heart," 21

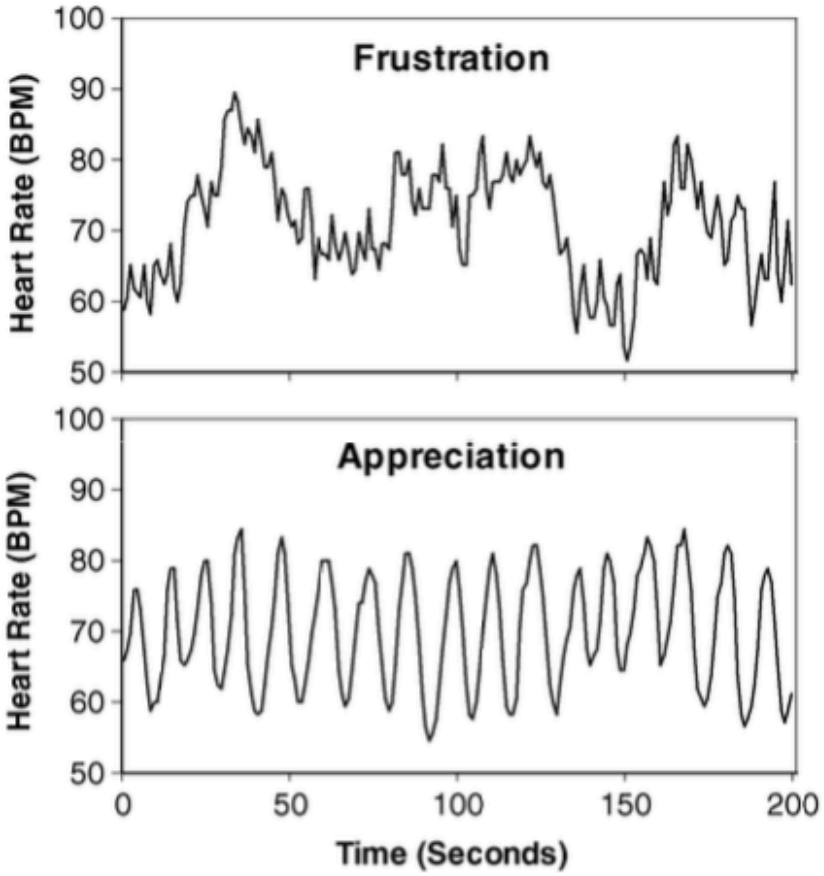

FIGURE 2: HEART RATE VARIABILITY AS ASSOCIATED WITH FRUSTRATION AND APPRECIATION RESPECTIVELY. (MCCRATY ET AL. 2009. PG 22)

erratic pattern of the HRV graph of the person experiencing "frustration" demonstrates an HRV which McCraty describes as "incoherent."

With a basic understanding of HRV and how its coherence is related to positive or negative emotion, it is important to discuss one other aspect of heart rhythm coherence that is important for McCraty's research. Using a mathematical technique called a "fast Fournier Transform" (FFT), McCraty is able to conduct a power spectral analysis of an HRV plot. This analysis allows McCraty to identify the component frequencies of a specific HRV waveform and

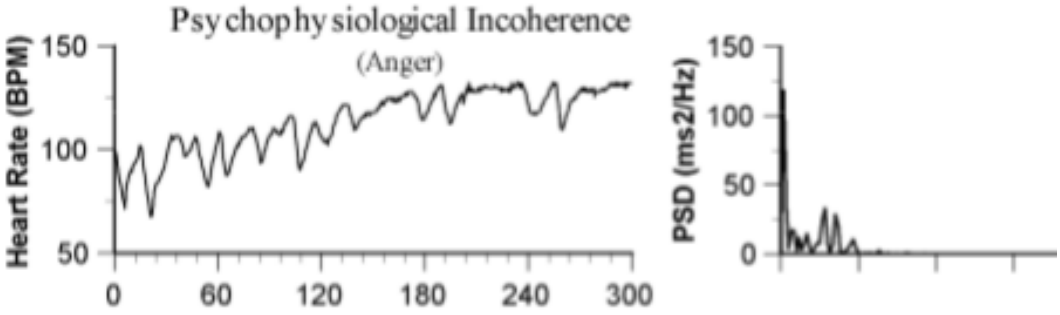

FIGURE 3: HRV AND CORRESPONDING POWER SPECTRAL ANALYSIS PLOT FOR ANGER. (MCCRATY ET AL. 2009, PG 74)

to find the corresponding power of those component frequencies. Below are two HRV plots (left) and a corresponding plot of their power spectral density (PSD) (right).

If we look first at the anger HRV plot in Figure 3, we can notice the erratic HRV pattern present. Then, looking over at the PSD plot to the right, we see the component frequencies of the HRV pattern and their corresponding powers. In the case of anger specifically we notice that the component frequencies of the HRV waveform all seem to be between 0 and 0.1Hz on the x-axis. Additionally, the frequency with peak power is near 0.0Hz, the y-axis. We additionally notice component frequencies with smaller but not insignificant power amplitudes. The two most prominent of these are near 0.05Hz and 0.06Hz.

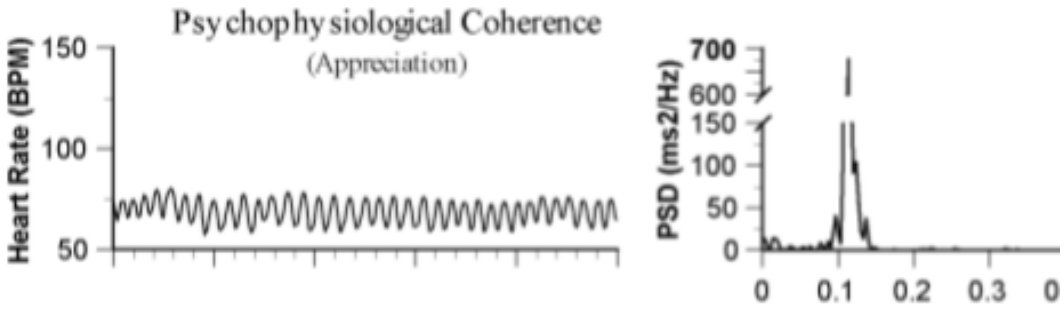

FIGURE 4: HRV AND CORRESPONDING POWER SPECTRAL ANALYSIS PLOT FOR APPRECIATION. (MCCRATY ET AL. 2009, PG 74)

In contrast to the erratic HRV waveform and distributed frequencies of the PSD plots of the person experiencing anger, we can see the HRV waveform and PSD plots of the person experiencing appreciation (Figure 4). The harmonious sine-wave-like HRV pattern is evident in the HRV plot on the left. Looking at the PSD plot on the right, apart from a small frequency bump near 0.01Hz, we notice that the nearly singular component frequency of the sine-wave-like HRV pattern is 0.1Hz. Additionally we notice a large peak amplitude of that singular frequency. The above figures[168] demonstrate the contrast between the power and unity of the frequency of the sine-wave-like rhythmic activity of the heart of the individual focused on a positive emotion (appreciation) and the lesser power and unity of the frequencies that contribute to the more erratic rhythm of the heart of the individual who is focused on a negative emotion (anger).

According to McCraty, "A coherent heart rhythm can therefore be defined as a relatively harmonic (sine-wave-like) signal with a very narrow, high-amplitude peak in the [low frequency]

[168] McCraty et al., "The Coherent Heart," 74

LF (0.04-0.15Hz) region of the HRV power spectrum."[169] McCraty describes this frequency, around 0.1 Hz, as "the resonance frequency of the human cardiovascular system … determined by the feedback loops between the heart and brain."[170]

The work of McCraty coheres broadly with the notion in contemporary neurocardiology that a positive emotional state can have a stabilizing effect on HRV which in turn can positively affect different measures of mental and physical well-being. Fay Gieser, et al. confirmed that "HRV was positively associated with cheerfulness and calmness, and these effects were mediated by executive emotion regulation."[171] Marcello Campos, using HRV as an indicator of autonomic nervous system (ANS) function, views it as a potential measure of one's overall well-being.[172] In addition to linking HRV to positive emotion and well-being, variations in HRV can also be linked to mental illnesses such as depression.[173]

While it is interesting that HRV is indicative or related to one's overall well-being, what makes McCraty's work specifically relevant to our discussion of Thomas's conception of the motion of the organ of the heart is McCraty's claim that 'coherent' HRV is *driven by* positive emotion. In this claim, supported by the work of Geisler, et al., McCraty takes an emotions prior approach to maintaining and sustaining coherent HRV. Rather than stating that a coherent HRV merely indicates a positive emotional state, McCraty's research indicates that an intentional

[169]McCraty et al., "The Coherent Heart," 23
[170] Doc Lew Childre, et al., *Science of the Heart: Exploring the Role of the Heart,* Boulder Creek, California: Institute of HeartMath, 2001. 19
[171] Fay C. Geisler, et al., "The Impact of Heart Rate Variability on Subjective Well-Being Is Mediated by Emotion Regulation," *Personality and Individual Differences*, 49, no. 7 (2010): 723–728, doi:10.1016/j.paid.2010.06.015.
[172] Marcelo Campos, "Heart Rate Variability: A New Way to Track Well-Being," *Harvard Health Blog* (24 Oct. 2019), www.health.harvard.edu/blog/heart-rate-variability-new-way-track-well-2017112212789.
[173] Hartmann, et al, "Heart Rate Variability as Indicator of Clinical State in Depression," *Frontiers* (13 Dec. 2018), www.frontiersin.org/articles/10.3389/fpsyt.2018.00735/full.

focus on positive emotion *causes* a coherent HRV. The intentional focus on positive emotion comes first.

More specifically regarding coherence, McCraty says that "Using a positive emotion to drive the coherence mode appears to excite the system at its resonant frequency, and coherence emerges naturally, making it easy to sustain for long periods."[174] Moreover, in order to maintain this "positive emotion," McCraty instructs subjects to "focus on sincerely feeling appreciation or a similar positive emotion toward *someone.*"[175] Thus it is by focusing on *someone* and "sincerely feeling" appreciation, love or compassion towards that person that one is able to "drive the coherence mode" so that "coherence emerges *naturally*." As McCraty says above, this other-focused positive emotional state sustains HRV coherence.

It is helpful here to recall Thomas's view on the motion of the heart to compare it with the findings of McCraty. Specifically Thomas states that the motion of the heart is caused by an object of desire as an unmoved mover. This object of desire, in turn moves the soul to desire in actuality. The soul, as a moved mover, moves the heart. Thomas also states that the motion of the heart is more natural in proportion to the intelligibility of an object of desire as an unmoved mover. That is to say that the motion of the heart is more natural the more the object of desire coheres with man's natural end, union with God.

We will now briefly examine how Thomas's view converges with the findings of McCraty. It is important to note that the three positive emotions that McCraty frequently describes as "drivers of coherence" are appreciation, love, and compassion. Each of these positive emotions is transitive. That is to say that, regularly conceived, each requires an object: I

[174]McCraty, "The Coherent Heart, " 26
[175] Rollin McCraty, et al, "The Effects of Emotions on Short-Term Power Spectrum Analysis of Heart Rate Variability," *The American Journal of Cardiology*, 76, no. 14 (1995), 1089, doi:10.1016/s0002-9149(99)80309-9. (emphasis mine)

am appreciative *of something*, I love *something*, and I feel compassion *for something.* Indeed, when instructing subjects on how to intentionally maintain positive emotion, McCraty tells them to "focus on sincerely feeling appreciation or another positive emotion toward *someone.*"[176] It is clear that, for McCraty, positive emotion is directed towards an object. This object - the someone towards whom a subject feels positive emotion - relates to Thomas's view that an object of desire serves an unmoved mover of desire in the soul.

McCraty states that when the subject focuses on sincerely feeling positive emotion toward someone, the feeling is to be felt toward someone in the present, "in contrast to mentally recalling or visualizing a past positive experience."[177] It is noteworthy that McCraty does not go into significant detail beyond what has been said about *how* someone focuses on this 'sincere feeling of positive emotion toward someone.' However, from what he does say, it is clear that this focus on sincerely feeling a positive emotion is intentional and voluntary. Utilizing a Thomistic conception, we can say that this "focus on sincerely feeling a positive emotion" is an operation of the will. It is an intellectual and, therefore non-corporeal process.

In addition to alignment between McCraty and Thomas that emotion is driven by an object of desire, the specific emotions that McCraty cites as being "drivers of coherence" - appreciation, love, and compassion - align with Thomas's notion that the motion of the human heart is more natural when it is moved by a more intelligible good. In order to sincerely feel any one of these emotions it seems that the subject must focus on a truly good aspect of the person towards whom she is sincerely feeling positive emotion. Even when someone loves another "despite her flaws," it seems that the good aspects of the person are what make the flaws lovable. It seems then, that what Thomas would consider an intelligible object of desire drives the

[176] McCraty, "Effects of Emotions," 1089 (*emphasis mine*)
[177] McCraty, "Effects of Emotions," 1089

positive emotions of appreciation, love, or compassion. These positive emotions then drive the motion of the heart into HRV coherence. Thomas's view, that the motion of the heart will be more natural the more intelligible and object of desire is, aligns with McCraty's findings that a focus on sincerely feeling positive emotion such as appreciation, love, or compassion drives HRV coherence.

The Thomistic view, then, is that when man is moved by an object of desire that is appetible and intelligible, his corresponding desire is a natural desire for him. That is, it is a desire which moves him closer to his natural end, union with God. This natural desire present in the soul as either an emotion or sensation moves the heart. As Thomas says in *De Motu Cordis,* "the heart's movement varies according to the different emotions and sensations of the soul."[178] Reading the results of McCraty's research in light of Thomas's view on the motion of the heart, we can see how the two outlooks are similar. McCraty states:

> Thus we have found that sustained positive emotions such as appreciation, care, compassion, and love generate a smooth, sine-wave-like pattern in the heart's rhythms … As is demonstrable by quantitative methods, heat rhythms associate with positive emotions such as appreciation are clearly more *coherent* - organized as a stable pattern of repeating sine waves - than those generated during a negative emotional experience such as frustration.[179]

Thus, if we use HRV as a measure of the motion of the heart such that the heart is moving naturally when its rhythm is in a "smooth, sine-wave-like pattern," McCraty's account of heart rhythm pattern coherence as caused by positive emotion aligns with Thomas's view that the heart moves more naturally when its motion is caused by an object of desire that is an actual good.[180]

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[178] *DMC*
[179] McCraty, "The Coherent Heart," 21
[180] The term "most natural" is used in the context of "this mortal life." Ultimately, the heart's perfectly natural motion will occur in the glorified bodies of those in heaven after the resurrection of the dead. (See pg 92)

4.2 Emotional Quiescence and Uniform Motion of the Heart

While McCraty's research on emotion and the motion of the heart bears similarity to Thomas's view on the motion of the heart, there are other ways in which his research and Thomas's account of the motion of the heart seem to converge.

In his description of various emotional states, McCraty discusses one "hyper-state" which he terms "emotional quiescence." He describes the state thus:

> Between the four states of extreme hyper-arousal and extreme hypo-arousal in the mid-range of emotional arousal, are two other states of extraordinary emotional experience. On the positive side, there is the state of wholly self-less spiritual love in which the individual experiences a deep feeling of all-embracing "big love"—*Agape*, as defined by the dictionary: a love that is open to and non-judgmental about all perceptions, cognitions, and intuitions. To enter this hyper- state requires a deep, heart-focused, self-less love, which can be associated with contemplative introspection.[181]

McCraty describes this state of "all-embracing 'big love'" or "*Agape*" as "in the mid-range of emotional arousal." That is to say that it is an extremely intense positive emotional state that is neutral with regard to arousal. It is the coherence state taken to an extreme. McCraty asserts that entering this "hyper-state" requires a "deep, heart-focused, self-less love, which can be associated with contemplative introspection."

The description of the hyper-state "emotional quiescence" as being immersed in an "all-embracing" love is not dissimilar to the descriptions of mystical experiences had by various Catholic saints. Christians believe that God is love,[182] and the word *Agape* has special significance for Christians as denoting the particular type of God's love - a selfless love. Below is a description of mystical experience from Teresa of Avila, a 16th century Catholic mystic:

[181]McCraty, "The Coherent Heart," 33
[182] 1 John 4:16 RSVCE

> And then my soul, in such a state that it could not endure so much joy, went out from itself, and lost itself for its own greater gain. It abandoned its meditations, and, as it heard that Divine language, which seems to have been that of the Holy Spirit, I fell into a deep rapture, which caused me almost to lose my senses, though it lasted but for a short time.[183]

The ecstatic state seems to be almost as near to union with God, or happiness according to Thomas, that one can enter while on earth.

McCraty, relying on studies with practiced meditators who claim to have experienced the hyper-state of emotional quiescence, notes that, in this hyper-state, "either the sympathetic and parasympathetic outflow from the brain to the heart is substantially reduced, or an energetic control acting at the level of the heart itself is activated to such a degree that beat-to-beat oscillations in the HRV waveform become nearly zero."[184] Below is an HRV plot of a subject experiencing that hyper-state (Figure 5).

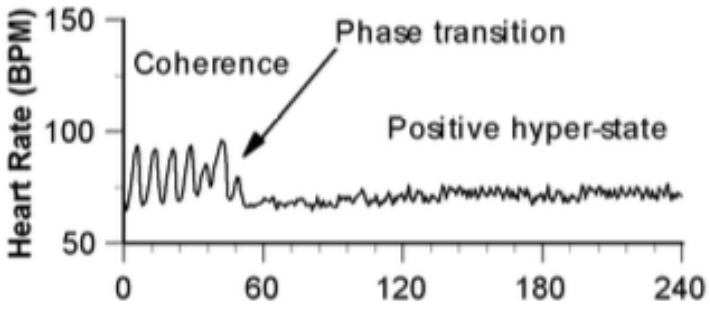

FIGURE 5: HRV PLOT OF TRANSITION FROM COHERENCE TO EMOTIONAL QUIESCENCE (MCCRATY ET AL. 2009, PG. 80)

On the left side of the plot is the familiar, nearly sine-wave-like harmonious HRV plot of the coherence phase. However, after the subject shifts to emotional quiescence, HRV essentially

[183]Teresa, *Autobiography of St. Teresa of Avila*, trans. E. Allison Peers, Mineola, New York: Dover Publications, 2010. 198

[184] McCraty, "The Coherent Heart," 80

flattens. HRV goes to almost zero, and the heart maintains a steady rate at approximately 70 beats per minute. While it would seem that, if HRV is taken as measure of the motion of the heart such that the heart's natural motion is shown by a harmonious sine-wave-like signal, the corresponding HRV plot for emotional quiescence - a state of ecstatic nearness towards *Agape* love, or God in the Christian conception - should resemble the plot for coherence, only with increased amplitude.

However, in light of Thomas's analogy of the motion of the heart to the motion of the first heavens, the flattened HRV plot for the emotional quiescence phase is the logical outcome in an ecstatic state. It is important to remember that HRV is the measure of the *change* in heart rate over time. In the motion of the heavens according to Thomas's view, there is no change in rate. Indeed, in *De Motu Cordis* he states, "the heavenly movement is always uniform."[185] Thus, as a human has an experience of "all embracing 'big love' - *Agape,"* that the motion of the heart would more closely mirror the motion of the first heavens in its uniformity aligns with Thomas's own conception of the motion of the heart as it nears true happiness, or union with God. It is important to note that this state of emotional quiescence is an extraordinary state which is short term. The sine-wave-like HRV pattern of the psychophysiological coherent state is the optimal HRV condition for human beings in this mortal life according to McCraty. The near zero HRV pattern of emotional quiescence is suboptimal for regular human activity on earth.

4.3 HRV Coherence and Psychophysiological Entrainment

In addition to the HRV plot of the hyper-state of emotional quiescence as described by McCraty, there is one other way in which his findings and Thomas's view converge. Specifically we recall that Thomas maintained that the heart was the principle of movement of the body. As

[185] *DMC*

presented in the anatomy of Albert the Great, the heart pumps vital spirit to the brain and to the liver, and the vital spirit is then transformed into animal spirit and nutritive spirit and distributed throughout the body. The heart in this way plays an essential role in various bodily functions for Thomas.

McCraty clearly presents no findings that support the specific anatomical views of Albert and Thomas; however, taken more broadly, the view of Albert and Thomas that the heart is in some way a principle of bodily function, does align with some of McCraty's findings.

The most clear example of this is alignment is in McCraty's study on the heart's role in the entrainment of various physiological systems when the heart rhythm is in a coherent pattern. With regard to physiological entrainment, McCraty states:

> Entrainment occurs when the frequency difference between the oscillations of two or more nonlinear systems drops to zero by being "frequency pulled" to the frequency of the dominant system. As the body's most powerful rhythmic oscillator, the heart can pull other resonant physiological systems into entrainment with it. During the psychophysiological coherence mode, entrainment is typically observed between heart rhythms, respiratory rhythms, and blood pressure oscillations; however, other biological oscillators, including very low frequency brain rhythms, craniosacral rhythms, and electrical potentials measured across the skin, can also become entrained (Bradley & Pribram, 1998; Tiller et al., 1996).[186]

The visual depiction in Figure 6 of the rhythms of different bodily functions before and during entrainment is helpful to understand the notion.

[186] McCraty, "The Coherent Heart," 24

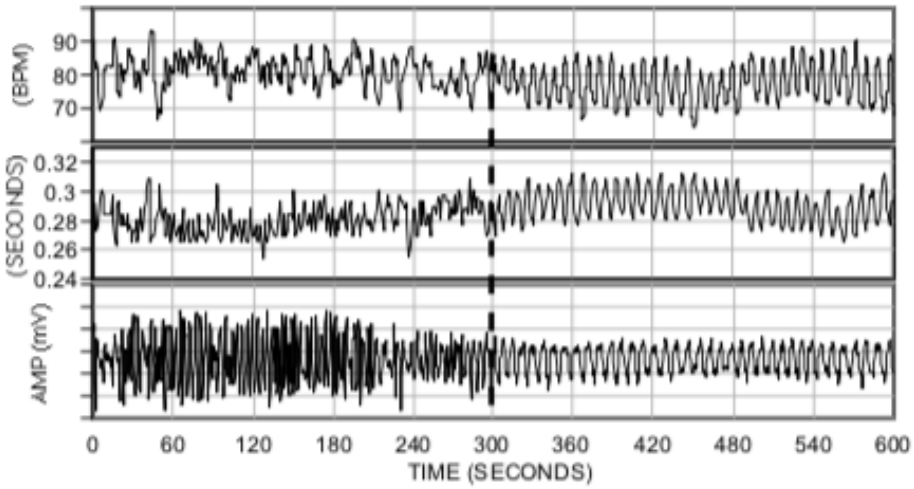

FIGURE 6: HEART RATE VARIABILITY, PULSE TRANSIT TIME, AND RESPIRATION RHYTHMS OVER A 10-MINUTE PERIOD. (MCCRATY ET AL, 2009

The above figure demonstrates the effect of psychophysiological coherence mode with regard to HRV and its effects on pulse transit time and respiration rhythm. After the first five minutes of the ten-minute test, the subject was told to focus on sincerely feeling a positive emotion toward someone. The result was a coherent HRV pattern as demonstrated in the HRV plot at the top of Figure 6. Interestingly, once HRV coherence was achieved, respiration rhythm and pulse transit time both achieved a similar sine-wave-like harmonious pattern. Moreover, as demonstrated on the PSD plot in Figure 7 (below), before HRV coherence was achieved the frequencies of the three physiological variables appeared erratic and unrelated. However, after HRV coherence was achieved, respiration rhythm, pulse transit time, and HRV were all entrained on the same frequency, 0.12 Hz. It is important to recognize that, while a conscious effort to control breathing can have an effect on heart rate, in this experiment, a positive

emotional state as a driver of HRV coherence is what led to the psychophysiological coherence demonstrated.

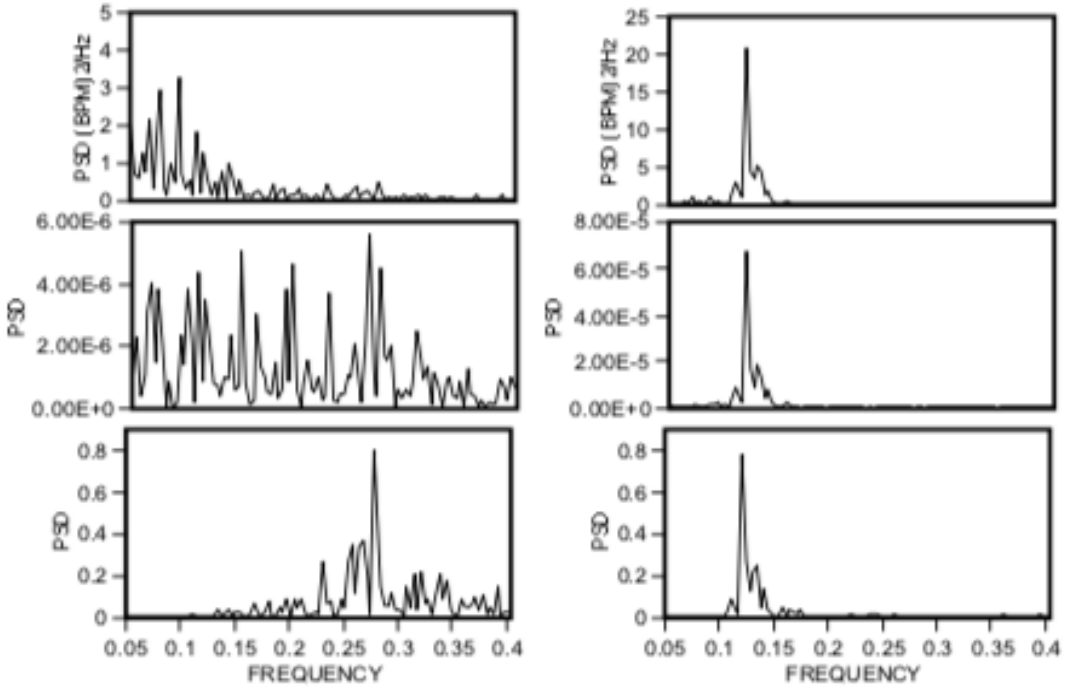

FIGURE 7: POWER SPECTRUM ANALYSIS PLOTS CORRESPONDING TO HRV, PULSE TRANSIT TIME, AND RESPIRATION RHYTHM. (MCCRATY ET AL. 2009, PG 25)

McCraty expounds on the central role of the heart with regard to generating psychophysiological coherence through an in-depth analysis of vagal afferent traffic (nerve signals traveling from the heart to the brain), pain perception, emotional processing, biochemical interactions, biophysical interactions, and electromagnetic interactions. Through his study of these different interactions, McCraty posits that "as the most powerful and consistent generator of rhythmic information patterns in the body, and possessing a far more extensive

communication system with the brain than other organs, the heart is in continuous connection with the brain and other bodily organs and systems through multiple pathways."[187]

Based on these connections the resultant interactions of the heart with various bodily systems, McCraty concludes:

> When the heart's rhythmic activity shifts into coherence, synchronization and harmonious interaction and within and among systems is the result. This, in turn, produces optimal states of health, physical activity, and cognitive performance. Thus, the heart is a critical nodal point in the psychophysiological network: it acts as the conductor in the human symphony, setting the beat that binds and synchronizes the entire system.[188]

This conclusion of McCraty's, while quite different from Thomas's conception based on Albertine anatomy *how* the heart is the principle of motion of the body, does align in some way with the anatomical primacy given to the heart in the views of Albert and Thomas.

The finding of McCraty that emotion as caused by an object or memory drives the motion of the heart as measured by HRV aligns with Thomas's view that the human heart is moved by an object of desire as mediated by the intellective and sensitive souls. Moreover, that a positive emotion such as appreciation, compassion, or love drives the heart into coherence according to McCraty further aligns with Thomas's own conception that the motion of the human heart will be natural in proportion to the intelligibility of an object of desire. Additionally, McCraty's research into HRV patterns in the hyper-state of emotional quiescence - that ecstatic state in which one is embraced by an A*gape* love - aligns with Thomas's view that when one is in the presence of God the motion of her heart will be most like the motion of the first heavens - uniform. Last, McCraty's conclusion that the heart is the "conductor of human symphony," while

[187] McCraty, "The Coherent Heart," 46
[188] McCraty, "The Coherent Heart," 60

not aligning with Thomas's specific anatomical conception based on the science of Albert as to *how* the heart is the principle of movement of the body, does align with Thomas's conception *that* the heart is principle of movement of the body.

While there is alignment between McCraty's research and Thomas's conception of the motion of the heart, there are also areas where more work would be required to more fully examine the extent of this alignment. For example, a key part of generating positive emotion for McCraty, in addition to focusing sincere feelings of positive emotion toward someone, is to focus one's attention on the organ of the heart itself. It seems that Thomas would argue that just a focus on an appetible and intelligible object of desire (and the resultant positive emotion in the soul) would cause the more natural movement of the heart. Additionally, in *De Motu Cordis*, Thomas states that the heart is moved by emotions *and* sensations. McCraty does not discuss the motion of the heart with regard to sensations; he only discusses it in relation to emotions. Last, McCraty is unclear in his research on what he conceives to be the locus of emotion in the human person. It is clear that, for Thomas, the emotions of appreciation, compassion, and love are caused by an operation of the will in intellective soul. While McCraty does postulate the existence of the soul and its relationship to the heart in some of his research[189], any discussion of it does not figure prominently in his work.

To fully examine Thomas's conception of the organ of the heart from a neurocardiological perspective is outside the scope of this project. However, a brief look at McCraty's research indicates that there is some alignment between contemporary neurocardiology and Thomas's own conception of the organ of the heart. While contemporary medicine has made an almost infinite number of advances in terms of describing "how" the body

[189] Childre, et al., *Science of the Heart,* 51

functions as it does, Thomas's conception of the motion of the heart may be relevant in describing "why" the body functions as it does.

CONCLUSION

In the preceding pages we have discussed Thomas's conception of the organ of the heart. We first noted that its motion is fundamentally local motion, that is, motion with regard to place. Moreover, its motion consists in a push and a pull. It is almost circular, and it is continuous for as long the animal is alive. The starting and end point of its motion is the same, and its motion is simple. Because, for Thomas, to move is to be in act, and the heart is the only organ in the body that is continuously and involuntarily moving as long as the animal is alive, it is the only animal organ that is continuously in act. Additionally, because to be in act for a material thing is to be receptive of a form, the heart is the organ of the body that is continuously receptive of the form of the soul as a mover. Thus the motion of the heart is the first motion of the body and the vital motion of the animal.

Having established that the motion of the heart is the first motion of the body and the vital motion of animal, we then turned to the anatomy of Thomas's friend and mentor, Albert the Great, to provide an account of how it is that Thomas could have conceived of the heart as the principle of motion of the body. Albert's anatomical synthesis posited that the heart pumped vital spirits to the brain and liver, and those vital spirits were there converted into animal (sensitive and motive) spirit and nutritive spirit. We discussed Albert's position that the heart was the first organ to be generated in the growth of an animal and that it was the organ from which other organs would have been generated. This analysis of Albertine anatomy provided an account of how could have plausibly conceived of the heart as the principle of motion of the body. It confirmed the anatomical primacy of the heart according to Thomas.

We then turned to Thomas's analogy of the human to a microcosm and of the motion of the heart to the motion of the first heavens in order to elucidate how, according to Thomas, the

heart is moved. Our examination of Thomas's conception of cosmology demonstrated that Thomas conceived of the first heavens as being moved by a spiritual substance which itself was moved as a moved mover by the unmoved or first mover as something loved. The heart, whose motion is the first motion of the body and the principle of the other motions of the body, is moved in an analogous way. Specifically, according to Thomas, the heart is moved by the soul; and the soul, as a moved mover, is moved by an object of desire as an unmoved mover. We moreover examined Thomas's account of the natural motion of the heart to conclude that, for Thomas, the naturalness of the motion of the heart will be in proportion to the actual goodness of an intelligible object of desire as an unmoved mover.

Last, having examined in great detail Thomas's conception of the motion of the heart, we turned to contemporary neurocardiology to briefly discuss the relevance of Thomas's view to contemporary science. Relying heavily on the research of Rollin McCraty and the HeartMath Institute, we found that Thomas's view does in some way align with contemporary research on the significance of the motion of the heart. McCraty's research indicates that a focus on sincerely feeling a positive emotion such as appreciation, compassion, or love toward someone drives heart rate variability to a harmonic, sine-wave-like pattern which he terms *coherence.* This aligns with Thomas's view on the natural motion of the heart as caused by an intelligible object of desire. Additionally, McCraty's research of the near zero HRV of those in the hyper-state of emotional quiescence - the ecstatic state of feeling embraced by an *Agape* love - aligns with Thomas's analogy of the motion of the heart to the motion of the first heavens. Last we explored how McCraty's studies of system-wide psychophysiological coherence caused by the entrainment which results from HRV coherence aligns with Thomas's own conception of the anatomical primacy of the heart as the principle of motion of the body. It seems as if Thomas's conception of the motion of the heart can provide a philosophical substratum for understanding the "why" behind the findings of McCraty.

Having elaborated on the above topics it is important to state some potential implications of these views. The first and rather obvious implication of Thomas's view is what it tells us about animal, and therefore human life. Recalling that Thomas states that the heart is in motion because it is receptive of the form of the soul, we can state that the motion of the heart is not vital just because it is the organ that pumps blood, and blood seems to be necessary for life. Rather we can say that, in normal cases, the motion of the heart is vital because it is that motion which indicates that the soul is still acting on the body. Indeed, if we maintain that the human person is a composite, then the human being ceases to live (and therefore exist, according to Thomas), when the body is no longer receptive of the form of the soul. That the motion of the heart, as the only organ that is continuously in act as receptive of the form of the soul, indicates the act of the soul in the body provides a substantial reason as to why the heart is the vital organ of the body and the motion of the heart is the vital motion.

Another implication of Thomas's view on the organ of the heart as we have described it is an ethical one. From our discussion of Thomas's conception the motion of the heart, it is clear that, for Thomas, the heart is moved by an object of desire as mediated by desire in the soul. Moreover, Thomas maintains that the naturalness of the motion of the heart is in proportion to the intelligibility of an appetible object of desire. That is to say that our hearts are moved more naturally when we are focused on objects of desire that are more intelligible. These are those objects of desire that are in accord with our natural end, happiness or union with God. According to this view, it seems that the motion of the organ of the heart provides a physical indicator as to whether or not one is on the path to beatitude - union with a God who is love. Thus, if one is focused on objects of desire that are *actually* good, the motion of the heart will be natural. On the contrary, as one focuses on objects of desire that are less intelligible, the motion of the heart becomes less natural.

In the beginning of the paper we discussed the objection presented by Bonaventure to Thomas's conception of the human person as a true composite. Specifically Bonaventure posited that there must be some "spiritual matter" within the soul which serves as the primary recipient of the form of the soul. He stated that the soul, while substantially separable from the body, was intimately united with the body so as

to fully animate it. This position, regardless of the intimacy between soul and body, leads to dualism. Thomas, on the other hand, maintained that the human is a true composite of form and matter. Rather than posit spiritual matter as the primary recipient of the form of the soul, Thomas posited the organ of the heart as the matter that is primarily receptive of the form of the soul.[190]

If we take Thomas's view of the human being as a true composite and expand it more broadly, it follows that there would be a material effect that results from a human's actions that are in accord with his natural end. Specifically, it coheres that, as a human flourishes with regard to his natural end conceived as union with God, his material nature would similarly flourish - allowing him to progress more fully to that natural end. Thomas's view on the organ of the heart as the principle of movement of the body which is moved naturally by an intelligible object of desire in accord with a human's final end indicates that a human's proper pursuit of his natural end does have a material effect on his body. Thus, if intelligibility or actual goodness is the form of natural human desire, and if a human's natural end is union with God; the natural motion of the heart is the material effect that corresponds with this form. So, from Thomas's view, as one progresses along the intelligible path to God, the motion of the organ of the heart will become more natural until, ultimately it will move with the same tranquil uniformity as the first heavens, in the vision of the Divine Essence.

In his biography of Thomas Aquinas, G. K. Chesterton wrote of Thomas that "He has thrown out a bridge across the abyss of the first doubt, and found reality beyond it and begun to build on it."[191] My hope is that this paper has in some way shed light on Thomas's edifice.

[190] We recall Thomas's statement in *De Motu Cordis* that the soul is "the form of the body, and *principally of the heart."*
[191] Chesterton, *Saint Thomas Aquinas*, 156

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