

The Cognitive Loop

by

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Note

This brief overview does not pretend to answer all the questions that come up in studying the physiological and neurological bases of human thought. The nature of the *phantasm* is particularly problematic. My main purpose has been to give support and encouragement to those, including myself, who long to see once again the submission of reason to Faith and the recognition by materialists of man's rational nature, the existence of his immortal soul, and the reason for his supernatural destiny.

The Cognitive Loop

The prevailing view amongst modern scientists of biology and neurology is that the mind producing acts of abstraction, judgment, planning, memory and other “mental phenomena” is something that emerges from physical-material sources. A Special Report for The *Scientific American*, “Mind and Brain” (1992, 1994) concludes prodigiously detailed descriptions of neurological processes in the brain with these words:

Is the mind an emergent property of the brain’s electrical and metabolic activity? ... biological explanations of mental events may become evident once the component neural functions are more clearly defined. We will then have a more appropriate vocabulary for describing the emergent mind.

The question is raised and the conclusion promises answers from the physical sciences -- answers that only come from the higher sciences of epistemology and metaphysics. But, as one would expect these days, the reduction of everything to matter is based on evolution. The Report says:

... Descartes was at a disadvantage. He did not realize the human brain was the most complex structure in the known universe, complex enough to coordinate the fingers of a concert pianist or to create a three-dimensional landscape from light that falls on a two-dimensional retina. He did not know that the machinery of the brain is constructed and maintained jointly by genes and by experience. And he certainly did not know that the current version is the result of millions of years of evolution. It is difficult to understand the brain because, unlike a computer, it was not built with specific purposes or principles of design in mind. Natural selection, the engine of evolution, is responsible. (Emphases added)

It is incredible that in the face of such efficient complexity, the author of this statement can still deny the presence of purpose and design -- final and formal causes -- in the working of the brain. And even while making “Natural selection” the efficient cause of such incredibly structured complexity, including, one assumes, the author’s own brain, he is forced by his theory to deny to this “natural selection” the very realities he so easily names -- having purpose and design in mind. In whose mind? Such is the blindness of today’s scientists, not to mention their sophistry.

The author of the Report remarks that Descartes was at a disadvantage because he did not have the benefit of that superior knowledge bestowed upon mankind by the “discovery” of the theory of evolution and its god, Natural Selection. However, it is a fact of history that long before Lamarck and Darwin, men were not lacking who were determined to explain the spiritual reality of the soul and all the other operations of nature that only God could create and sustain from the beginning, and to explain them by reducing them to material causes alone.

Sir Isaac Newton (1642-1727) took a huge step down and away from traditional metaphysics when he said that space is a sensorium of God just as our brain is the sensorium of our ideas.¹

But it was John Locke (1623-1704) who revealed that God had become for him and for many but a *deus ex machina* when he reportedly said, in his famous *Essay on Human Understanding*, that “there was no contradiction in the notion that God might superadd to matter the power of thought.” (Yolton, p. xi)

The possibility of “thinking matter” is traced back to Descartes and his “animal machines” and the controversy was set up from then on between the materialists and the immaterialists, as later between the mechanists and the vitalists. But even the immaterialists of Locke’s day had gone badly astray in holding that man was a being composed of two substances, body and soul, instead of being one composite substantial form. After the triumph of Thomism, and with the decline of Scholasticism, the Platonic view of human nature as an accidental union of body and soul became

¹ John W. Yolton. *Thinking Matter: Materialism in Eighteenth-Century Britain*. Minneapolis MN: University of Minnesota Press, 1983, p. x. (Preface).

dominant and this undoubtedly hastened the rise of the new sciences.

Yolton says that the story of the thinking matter controversy in 18th century England is largely that of the reaction to Lock's remark. But like all controversies, the issues ramify into related areas and beyond, ultimately embracing an entire world view. Ralph Cudworth in his *The True Intellectual System of the Universe* (1678) showed that the real roots of the problem lay in ancient Greece. But the moderns deliberately chose to by-pass the theologians of the Middle Ages who had struggled with these same problems and resolved them in harmony with Divine Revelation and the Faith of the Apostles. By Cudworth's time, therefore, the Great Apostasy is in full swing. As John Yolton remarks:

In Locke's century, thinking matter was a notion that emerged from some of the Cartesian writings, especially over the issue of animal machines. Hobbes' form of matter and motion explanations, together with Spinoza's metaphysical doctrines, focused attention on the possibility of a materialist account of man and the world. Leibniz plays a role in the story too, as do most prominently Diderot and the philosophes. There are also social, political, and religious ingredients to the materialism-immaterialism controversy. (p. xi-xii)

Nor should we forget to mention Galileo who in 1623, in his little book "The Assayer" as if in telepathic communication with Descartes, "demonstrated" to all and sundry that all truth must be equated with geometry (back to Pythagoras) and that "tastes, odors, colors, and so on are no more than mere names so far as the object in which we place them is concerned, and that they reside only in the consciousness." ¹ Stillman Drake has this instructive note on this portion of Galileo's "Assayer" :

The ensuing passages are generally considered to entitle Galileo to credit for anticipating the fundamental concepts of the empiricist philosophy developed chiefly by John Locke at the close of the seventeenth century. The basic tenets are of course much older, belonging to the atomism of Democritus (b. 460 B.C.), a doctrine which was particularly repugnant to Aristotle. While this exposition is of no little philosophical and scientific interest (inasmuch as empiricism, rightly or wrongly, has been closely associated with the development of modern science), Galileo was no philosophical empiricist. He attached no less importance to reason than to experiment, and he had no doubt about the independent truth of mathematical propositions, the denial of which has always involved empiricist philosophers in serious difficulty with the best logicians. (*Ibid.*)

And so, Galileo is the fountainhead not only of modern cosmology but also of subjective sensism and of mathematical physics. But his doctrine of secondary qualities, as they came later to be termed by Locke, existing only in the sensing subject, is a direct attack upon the integrity of being as well as an epistemological disaster. The following pages are an attempt to begin to remedy the harm.

So we come back to the "thinking matter" of the *Scientific American* Report. The assumption is that non-material acts of the mind are effects or emergent properties of events brought about by wholly material causes operating in observed physical processes. The Report is accompanied by photographs which show that blood flow and the electrical activity of neurons in areas of the brain signal certain "mental events" as the hearing, seeing, speaking, generating of words and the intent to carry out bodily movements.

Dr. Erich Christian,² an Engineer in the field of Communications, has written papers that raise the problems of epistemology, physiology and ontology alluded to already. He says of the response to his work:

The theologians insist that one cannot consider soul and body in any living being separately. That would be "non-Aristotelian". True, but one can most certainly attribute different observations to either the soul or the body. My comparison is a childish toy -- an automobile

¹ *Discoveries and Opinions of Galileo*. Translated and with introduction and Notes by Stillman Drake. New York: Doubleday Anchor, 1957, p. 274.

² Dr. Christian may be reached at 5704 Edgedale Drive, Raleigh NC, 27612. A reprint of his paper "Quo Vadis, Scientia?" is available from *The Remnant*, 2539 Morrison Avenue, St. Paul MN 55117.

running on battery power, where the flashing lights are attributed to the battery and the motion to the mechanical parts. At least one theologian accepted this comparison, provided that the soul is considered to be on an ontologically higher level than the body. "Biologists", on the other hand, admit only the material world, only what is accessible to our senses and can be subjected to scientific studies.

But there lies the problem. If the soul were on the same ontological level as the body, then there should exist a similar materialistic cause-and-effect relation between the two, with the possibility for scientific studies. If not, then one must arrive at its existence by other means. Such other means arise when processes in the material world can no longer be explained by the laws of physics alone, when practical experience contradicts the very facts promoted by science.¹

The following pages constitute an attempt to address the questions raised by Dr. Christian in conjunction with the views of the neuro-scientists, and to acknowledge the validity of his analogies and expositions. It is clear that Dr. Christian has highlighted the fact that the modern scientists, especially the biologists, have it all backwards, for they would have higher principles proceeding from lower ones and spiritual realities emerging from the merely material. They acknowledge a cause-and-effect sequence but it never rises above nor comes out of the merely material causalities. This, by the way, was also the complaint of Aristotle about his predecessors. The moderns in so many areas have deliberately chosen to regress to paganism.

One of Dr. Christian's favorite examples of the controlling higher operations of *anima*, of the mystery of memory and its storage of numberless pieces of information, is that of the pianist:

... some persons have the talent to play a piece on the piano that has been recorded in memory without ever having seen the score. In addition, they can not only play the basic melody with one finger, for instance, but with all ten fingers; they can transpose it to a different key or even change it from major to minor mode.

He reminds us also of the fact that we can recognize a piece of music heard long ago without any present sensations until they are re-presented. Recognition occurs when the soul operates through the memory. Likewise, a word in context is understood as having but one meaning though it is capable of several, as the word "Washington" recognized in a certain context as the first president of the U.S.A, the city named after him or the State on the West Coast. Such operations of the mind cannot be the effects of merely material causes, because matter is simply incapable of giving rise to spirit. This calls up the first principle known as the law of causality, one of the most important in metaphysics and physics. An effect cannot be greater than its cause. This is a self-evident given.

To understand perfectly and truly all that goes on in the activities described by Dr. Christian, especially those of memory and recognition, one must understand the entire process of knowing, from the first sensations received from objects outside the mind to the production of the universal concept by the intellect and the judgment of its truth, that is, of its conformity or non-conformity with extra-mental reality which includes the realities of the Supernatural Order, the truths of Faith.

This is the loop of cognition, the cognitive loop that overlays and controls the evolutionist's biological circuitry of cognitive neuroscience. It begins with the physical properties of individual beings outside the mind, with integral individual beings that impinge on our sense organs. Unless deprived as by blindness, deafness, or other sensory deficiencies, we never perceive things by only one sense alone. The author of the *Scientific American* Report recognizes this:

A tennis player who wanders to the net from time to time will be alarmed to learn that the movement, color and shape of a tennis ball are processed in different cortical visual centers. Separation of these information streams begins in the retina; they remain segregated in the lateral geniculate nucleus and the primary visual cortex *en route* to the higher visual centers.

An analogous situation has been found in the auditory system ...

¹ This quotation is taken from a paper entitled "Quo Vadis, Scientia? -- Apologetics" which is to say, in defense of.

Where is the information reassembled? When does the subject become aware of the approaching ball? ...

The evolutionary physiologists and neuroscientists will never be able to answer these questions within the boundaries of their own sciences which are concerned with the physical processes of sensation. But it would be most advantageous if they would acknowledge the presence and higher principles of epistemology and metaphysics, for then they could cease looking for right answers in the wrong places.

Because man is a composite of soul and body, of spirit and matter, the operations of his being penetrate both the higher grades of spirit and the lower grades of corporeality. Indeed, since the grades of being rise as well as fall, man gathers into his being the powers of all below him insofar as they serve his intellectual soul and is able to lift them up into the ultimate transformation of Divine Grace.

St. Thomas says:

The intellectual soul contains essentially whatever belongs to the sensitive soul of brute animals and to the nutritive soul of plants. (ST, I, Q 76, a 3)

And again:

The (intellectual) soul as it virtually contains the sensitive and nutritive souls, so does it virtually contain all inferior forms, and itself alone does whatever the imperfect forms do in other things. The same is to be said of the sensitive soul in brute animals, and of the nutritive soul in plants, and universally of all more perfect forms with regard to the imperfect. (ST, I, Q 76, a 4)

Because of this relationship, there is an interpenetration of matter by spirit and of spirit by matter, though the latter is in the nature of a material cause whereas the former is in the nature of an agent-efficient, formal and final cause. (Cf. ST, I, Q 84, a 7)

“Man is placed on a frontier where the world of spirits and the world of bodies meet. The powers of both must necessarily belong to him.”¹

There is strong evidence from neurological studies that the electrical impulses called by scientists (paradoxically) “action potentials” operate on the cutting-edge of this interface between spirit and matter. The Report says that “all neurons (nerve cells) conduct information in much the same way (as other specialized cells)... Information travels along axons in the form of brief electrical impulses called action potentials, ...” It is a component of this neural machinery that becomes dis-ordered in schizophrenia. I suggest that it is possible and most probable that this is also the precise physiological juncture at which demonic activity can intervene, with God’s permission, to torment certain souls with these special afflictions we call mental illness.

Our sense organs are organs of the body and the body is for the sake of the soul. The organs of sense are ordered to the use of the soul by means of its powers or faculties. The powers of the soul exist and operate in an hierarchical order based on the nature of the object of each. At the same time, there is the universal principle that whatever is received is received according to the mode of the receiver. Therefore, since the external reality in which we must live and function is a world of beings composed of matter and form (though in the case of the Angels, only potency and act), there must be in man powers of soul fit for receiving both matter and form, both potency and act. And there are.

The moderns, like Democritus of old, confuse sensation with sense knowledge, believing the senses receive an efflux of matter from things outside the mind. The senses are affected, indeed, modified, by the material forms of light, color, shape, sound waves, and other physical properties of individuals conveyed to our senses by molecules of various kinds. It is the science of Physics that describes these properties and effluvia of bodies. But these material forms only cause sensations in

¹ Etienne Gilson. *The Christian Philosophy of St. Thomas Aquinas*. Transl. by L. K. Shook. NY: Random House, 1956, p. 200. Hereafter referred to as Gilson.

our organs. They are not able to cross the threshold into knowledge because they are material and knowledge is immaterial. Gilson says:

... although all things can be in the soul under an immaterial mode of being, there are degrees of immateriality in the mode in which they come into it. (p. 202)

There are five basic operations of the sensitive powers of the soul. These deal with the physical sensations that come to us through the five senses. The following Thomistic principle is most important to keep in mind:

Contrary to what is generally imagined, these species (i.e., sensible impressions) are not taken into the sense in a material form -- otherwise the sense would become sensible itself, the eye would become color and the ear sound. Yet, some types of sensation are accompanied by very definite organic modifications in the animal which experiences them. (p. 203)

We begin from the principle that the senses receive sensible species (i.e., sensible representations, "images") denuded of matter. We classify them according to the increasing immateriality of the modifications they undergo. First there is the sense of touch which St. Thomas says is the basis of all the other senses and has a direct relationship to a person's degree of intelligence (ST, I, Q 76, a 5). It is also that sense whose organ, the skin, undergoes the most material modifications in its response to heat, cold, dryness, humidity, etc. Gilson says:

First of all we find some sensibles whose species, although received immaterially into the sense, modify materially the animal which experiences them. Such are the qualities presiding over the transmutations of material things themselves: namely, heat, cold, dryness, humidity, and the like.

It is important to emphasize that contrary to what Galileo taught and all scientists and philosophers have taken up after him, there are no "primary" quantities in things apart from "secondary" qualities in our senses. Individual beings are integral in their nature and color is just as much in the object as it is in our sense of sight. In fact, there would be no color in our sense of vision if the objects we see were not colored objects. The properties of temperature, color, sound, taste and odor are properties first of all residing in and emanating from individual objects themselves. Galileo separated quantity from quality in an outrageous manner, sundering the being of the object in its very composite existence as well as divorcing the human mind from its proper object which is the entire being, the whole composite nature with all of its qualities and quantities intact. We must preserve the integrity of being. Gilson continues:

Since sensibles of this kind (touch) produce material impressions in us, and since every material impression is made by contact, such sensibles must touch us in order that we may perceive them. Hence the sensitive power which apprehends them is called touch. (p. 203)

It is interesting that the New York Public Library *Science Book Reference* (1995) does not list touch as one of the conventional five senses but rather describes the skin alone with the other systems such as the nervous system, the skeletal system, etc. (See p. 177) Gilson continues with the sense of taste:

There is a second kind of sensible (i.e., sensation) whose impression does not itself modify us, but yet it is accompanied by an accessory material modification. Sometimes this supplementary modification affects both the sensible and the sense organ. This is the case with taste. Although, indeed, flavor does not modify the organ which perceives it to the extent of making it itself sweet or bitter, still it cannot be perceived without both the flavored object and the tasting organ being modified in some way. Both the tongue and the object seem to require moistening. This is not like the action of heat which warms the part of the body on which it acts. We simply have here a material transmutation which conditions sensible perception but does not constitute it. (p. 203)

Of the sense of taste the *Science Desk Reference* says:

Taste is closely related to the sense of smell; taste buds, located on the tongue, detect flavors. There are four kinds of taste buds, each located on a specific part of the tongue. These buds

distinguish four types of flavors: sweet, salty, sour, and bitter. Note that the same substances can give rise to sour sensations in one person and sweet in another, depending on the dominant receptors on each person's tongue. (p. 168)

St. Thomas describes the senses of smell and hearing, more as a .physicist than a physiologist, more from the action of the object than of the impressions on the sense organ. Gilson continues :

Sometimes, again, the material transmutation associated with sensation only affects the sensible quality itself. It can consist in a sort of alteration or decomposition of the sensible, such as is produced when bodies give off odors, or are reduced to a simple local movement, as is the case which we perceive sound. Hearing and smell suppose no material modification in the sense organ. They perceive from a distance, and across an exterior medium, the material modifications which have affected the sensible object. (p. 204)

Today we are much more aware of the physical reactions in the sense organs. The *Science Desk Reference* says:

Smell. The olfactory organs are responsible for the sense of smell.

We must interject that there would be no sense of smell in the sense organs if there were not first of all an object outside the mind and brain whose integral being is perfectly suited to emanate those physical waves, molecules, etc., which cause the sense organ to perceive. In a note to this section, Gilson has this very instructive explanation:

The action of bodies on the senses is explained by the radioactivity of forms into the space around them. Each form radiates an emanation resembling itself. This emanation contacts the sense organ and causes sensation. The activity of the form depends on the fact that it is an act and, naturally, a cause: "*Omnis forma, inquantum hujusmodi, est principium agendi sibi simile ; unde cum color sit quaedam forma, ex se habet, quod causat sui similitudinem in medio.*" (In II *de Anima*, 14; ... p. 471 in Gilson)

So it is not primarily the olfactory organs that are responsible for the sense of smell, as modern scientists would have us believe. There must first be an object giving off molecules perfectly suited to be received by the olfactory organs of all animals. The *Science Desk Reference* continues:

Receptor cells, located in two clefts in the upper part of the nasal passages, have *cilia* that project down into the nasal cavity. The receptors respond quickly to minute quantities of smell-producing chemicals, but they also adapt so that half the intensity is lost within a second. The receptors produce electrical impulses which are carried to the brain by the olfactory nerves.

Those smell-producing chemicals come from the object. But notice, too, how our organs are created by God so perfectly that they adapt to reduce a greater intensity that might harm us. And as we will notice in all sense responses at the physical level and just at the cutting edge, there are electrical impulses travelling along the nerves to the brain.

Of hearing the *Science Desk Reference* has this:

Hearing is the ability to detect and interpret sound waves.

That is precisely where the mystery begins: in the ability to detect and interpret sound waves! And that is where the modern scientist, the neuro-physicist is obliged to stop and question, for his science cannot answer the questions as to how and by what power this detection and interpretation take place. The *Reference* continues with the physical process:

Mammals have the most highly developed ears in the animal kingdom. The ear is the major organ used for hearing. The outer ear captures the sound, which then travels down the auditory canal. The sound waves strike the eardrum, transmitting the waves to the ossicles, then to the cochlea. The cells in the cochlea then translate the sound to the otic nerve, which carries the information to the brain.

All sense impressions are carried to the brain by electrical impulses. That is the physical process,

albeit mysterious enough, but what happens in the brain is yet more so. Gilson continues with St. Thomas' description of the sense of sight:

Finally, we have a last class of sensibles which act upon the sense without any corporeal modification accompanying their action. These are color and light. The process by which such species emanate from the object to act upon the subject is totally spiritual. Here, with the noblest and most universal of the senses, we achieve an operation very similar to intellectual operations properly so-called. Numerous, indeed, are the comparisons which can be drawn between intellectual knowledge and sight, between the eye of the soul and the eye of the body. These, then, are the five external sensitive powers. ... (p. 204)

The material modifications accompanying the act of seeing are certainly the least material because light, the cause of seeing, is the least physical or material of all God's creatures below the angels. The *Science Desk Reference* has this:

Sight. Though most animals do not see in the same manner as we do, most have light-sensitive cells grouped into organs called eyes. In humans, the eyes are one of the most complex organs in the body. Light entering the pupil is focused by the lens. The image is projected on the retina, at the back of the eyeball, where the light energy is converted to electrical nerve impulses. The impulses are carried by the optic nerve to the brain, where the brain interprets the image.

This does not begin to do justice to the sense of sight. This sense is also the most marvelously mysterious because of the way it enables us to perceive the most important physical properties of the object -- its shape and color, from which yet other properties, such as weight and agility, may be inferred. Thus we speak of "body language". But what is most remarkable is that all these properties are made known to us by the activity of physical light. And corresponding to each point or particle of light is a photoreceptor cell in the retina. The number of such specialized cells is in the millions. The *Scientific American* Report speaks of cells in a monkey's visual system that respond only to light from faces. Other experiments with animals reveal yet further cell specializations.

The sensitive processing of visual information that begins in the retina is completed in the cerebral cortex by way of the optic nerve and its synapses or connections. The marvel is that by means of light striking specialized cells -- created for this purpose of seeing -- eyes perceive the object as it exists in reality with its physical properties of shape and color. There is no physical image projected onto our retina as the analogy of the camera leads us to believe. The reality is far more mysterious and marvelous. By means of light alone we are enabled to see what is before us! This makes the analogy with spiritual seeing much closer, for it is precisely by the light of God's Grace that we are enabled to see with certitude the Truths of Faith. And this is far more wonderful than the natural light of creation that enables us to see things as they are outside the mind.

And so it is with all the senses. Speech confirms the objectivity of our sense knowledge and the integrity of being. For we say "What a beautiful painting!" Or "What an insufferably ugly exhibit Sensation was!" We praise the beauty of a Sonata or Concerto but condemn the ugliness of Rock "music" and its intolerably incessant beat. We exclaim "What a delicious cake!" and cringe at the bitterness of a medicine. We gladly inhale the sweet fragrance of a flower but hold our nose when assailed by the stench of putrefaction. The child learns the pain of burning from the hot stove and the coldness of ice from the cubes in the refrigerator. And so on. Galileo was terribly wrong and his influence has been disastrous. He helped Satan set the stage for the Grand Apostasy with his lying cosmology and deceitful senses that refuse to accept the reality of Creation.

Our five senses are called external because they operate so as to receive the material impressions from objects outside the mind. Each particular sense receives its own particular sensible impressions. There is no confusion between these particular sense impressions fitted to each sense. The ear does not recognize light or color and the eye does not recognize sound. Yet we know that we see and hear and feel and smell and taste. It is the composite human person who knows that he sees, hears, and so on. What causes this distinction in the unity of perception and personality? St. Thomas calls it the common sense or better, in the Latin, the *sensus communis*. (It is not to be confused with the later meaning of "horse sense" or ordinary judgment.)

The *sensus communis* is a power of the sensitive soul that we share with animals and is the first of the four internal senses.

The second internal sense is the imagination. In order to live perfectly in a world of sensibles, both man and animal must be able not only to apprehend sensibles while they are present in sensation but we must be able also to represent these same sensibles to ourselves when they are absent, but in a totally immaterial way. Gilson says:

The objects apprehended by the animal determine what its movement and actions will be. Thus it would never make a move toward satisfying its need if it could not represent these same objects to itself even in their absence. Thus the animal's sensitive soul must be capable, not only of receiving sensible species but also of holding and preserving them within itself. Now, it is easy to observe in bodies that it is not the same principles which receive and which preserve. What is moist, for example, receives readily but preserves badly; while what is dry receives badly but preserves quite well what it has received. Since, therefore, the sensitive power of the soul is the act of a corporeal organ, it must have two different powers, one to receive the sensible species, the other to preserve them. This power to preserve is called *fancy* or *imagination*. (p. 205)

Of course, over all the powers of the sensitive soul in man is the rational soul including the will, so that at every minute, split-second step in the total process of sensation to intellect and back again to the world (the "cognitive loop") there is the power of the will to intervene, whether by overt action followed by internal choice or by internal choice alone. Unlike the animals, we can control what images we receive and preserve, we can accept or reject them.

Also, the imagination in man differs from that in animals by its power to make new images. Even though it is strictly bound and limited by association with images previously received, still the artist can make a new landscape, a Charles Schulz can make a new character such as Charlie Brown, Snoopy, etc., and the composer can make new melodies and arrangements with just the seven whole tones and five half-tones of the scale. (It's a human version of the generational variation with kinds of Genesis One!) Only humans can do this, thus imitating God in ways that the animals cannot! And it is due to the spiritual power of imagination (sometimes called *fancy*, after the Latin-from-Greek *phantasm*) operating in concert with the higher powers of the rational soul and the other powers of the lower sensitive soul, especially the memory.

The third internal sense is also different in animals and in man. Gilson says:

The sensible knowledge of a living being must, in the third place, be able to discern a number of properties in things which the sense, left to itself, would be unable to apprehend. All sensibles, perceived by the animal, are not equally worth preserving. Some are useful, others harmful. Man can compare his particular knowledge, reason about it and thus come to distinguish the useful from the harmful. This he does by means of what is called his particular reason or his cogitative reason.

But the animal, which has no reason, must apprehend immediately the useful and harmful aspects of objects, even though these are not, strictly speaking, sensible qualities. It must have, therefore an additional sensitive power. It is by this power that the sheep knows it must flee when it sees the wolf, and by which the bird is advised to pick up the wisp of straw. The sheep does not avoid the wolf, nor the bird glean the straw because the shape and color of these objects are pleasing or displeasing, but because they perceive them directly as either opposed to their nature or in accord with it. This new power is called the estimative power. It makes possible the fourth internal sensitive power, memory. (p. 205) (Most emphases added)

The estimative power in animals is today called instinct. Usually, though, today's biologists attempt to attribute powers of reasoning to animals and do all they can to close the gap between animals and man. That is why it is especially necessary to stay with St. Thomas and keep the rational powers of man, even when operating over the sensitive powers, clearly, not only distinct but separate from the sensitive powers of the animal soul.

For the fourth and last of the internal senses, Gilson must be quoted in full to ensure accuracy:

The living being needs to be able to recall for actual consideration species that have been previously apprehended by the senses and interiorly preserved by the imagination. Now although it may seem so at first, the imagination is not itself adequate for this purpose. It is, in some way, the treasury in which the forms apprehended by the senses are stored,

But we have just noted that the particular sense is unable to apprehend all aspects of the sensible. The useful and harmful as such escape it. Hence a new power is required in order to preserve their species. Moreover, it must be conceded that different movements suppose different motive principles, that is, different powers which determine them. Now, in the imagination movement proceeds from things to the soul. These objects are impressed first in the particular sense, then in the common sense in order that the imagination or fancy may preserve them. But it is not the same with the memory. Here movement begins in the soul and is terminated in the species evoked.

With animals, it is the recollection of the useful or harmful that causes the representation of previously perceived objects to arise. Here we have a spontaneous restoration of sensible species which depend upon the memory, properly so-called.

With man, on the contrary, there has to be a searching effort in order that the species stored by the imagination may again become the object of actual consideration. Here we have no longer merely memory, but something that is called reminiscence. Let us add that in both cases, the objects are presented again in the character of something past -- quite a different quality, indeed, than the particular sense, left to itself, could attain.

It is to be seen in the preceding discussion that the examination of the highest sensitive power of the soul brings us to the very threshold of intellectual activity.

In man the power of reminiscence corresponds to that of memory in the animal.

Similarly, corresponding to the estimative power by which animals apprehend the harmful or useful, there is in man what we have called the particular reason; or, as it is sometimes called, passive intellect. It is not here a question of an intellect, properly so-called. The passive intellect remains a power of the sensible order, because it only receives particular knowledge, while the characteristic mark of the intellect is its power to apprehend the universal.

In the same way reminiscence differs from the spontaneous resurrecting of the recollections which specifies animal memory. It supposes a sort of syllogistic dialectic by which we move from one recollection to another, until we reach the one desired. But this search only has to do with particular representations. Here too the universality required for intellectual knowledge is completely wanting.

It can be affirmed, then, that the sensitive powers of the soul are of exactly the same nature in animals and in men, if only what is properly sensitive in them is considered.

Their higher efficacy in man comes from the intellect with which they are in contact, in relation to which their operations are ordered, and whose higher dignity seems to flow down into their operations.

We shall now take an important step, and move up to a consideration of the intellectual powers of the soul. (pp. 205-206)

This is all extremely important and I feel that if St. Thomas were alive today, he would be constrained to emphasize more of the differences between man and the animals. I just glanced out the window and let my gaze rest upon the pear tree coming into bloom. How is my simple sense-apprehension of this spring-time event different from that of my cat? First, I notice that the blossoms on the pear tree precede the leaves. There are as yet no leaves to surround the white blossoms. My cat couldn't care less about this even if she noticed. Secondly my cat does not know "spring-time" in the same way that I do. She knows it only as a pleasantly-felt alteration in temperature. At least that is what I surmise. Perhaps she does not really care about the differences in temperature, between green grass and snow, etc. But most importantly, she has no appreciation of the pear tree's beauty,

or the marvel of the recurring seasons. Examples could be multiplied. This is how the rational soul of man penetrates the sensitive and transforms it. Examples from psycho-somatic psychology and medicine could also be brought up to show how the rational soul influences the nutritive as well. Animals surely have been known to sicken and die from the loss of a master. But they are spared the increase in suffering, the spiritual torment caused by the human will's rejection of the Cross and other emotions of the rational soul such as anger and despair which relate directly to our origin and supernatural destiny. On the other hand, the Saints prove to us the truth of the axiom that "Holiness is Wholeness"; and that "Saints are not sad" indicates that there is definitely a most intimate relationship between the rational soul of intellect and will and the nutritive powers in the composite of soul-body that is man.

Only the Angel is a pure intellect, a pure spirit of intellect and will. But the human soul, because it exercises the sensitive and vegetative operations of the body, cannot rightfully be called an "intelligence" or a "spirit". We can only say that the intellect is one of the powers of the human soul. Because of his connection with the body, man as a rational animal, is the lowest in the hierarchy of rational beings; but as a corporeal being, he is the highest because of his intellect and free will which constitute his rational nature. Man is thus situated between the angels and the animals, sharing intellect and free will with the angels and sensitive-vegetative powers with the animals and plants.

And of intellects, man's is the lowest because of its need to arrive at knowledge through the material senses. In its humblest aspect, therefore, the intellect of man is a passive power. The term passive here must be rightly understood. It comes from the Latin verb *pati* which means to suffer, to undergo, to be patient. Applied to the intellect of man it means that it must pass from potency to act in order to achieve the perfection of its nature in the possession of the universal idea. The perfection of our nature in Grace is achieved in our union with God Who then possesses us rather more than the converse.

St. Thomas always begins the description of anything with God, then the Angels, then man and lastly the animals, plants and inanimate being. God's Intellect is infinite and perfect Actuality. There is no need, no imperfection, no deprivation, no lack of any kind in God. He is all Act. But no created being can be like God in this. The Angels, who are the nearest in likeness to God, while being composed of potency and act, exist in a mode which is one of continuous actuality. They do not need to go through any mediating or material process in order to know or to act, for they are pure spirits and are in act as they think and in place as they will to be.

The human intellect is thus the lowest kind of intellect. Gilson says:

The human intellect, however, last in the order of intellects and as far removed as possible from the divine intellect is in potency to intelligibles not only in the sense that it is passive in relation to them when receiving them, but also in the sense that it is naturally deprived of them. This is why Aristotle says that the soul is at first like a blank tablet (*tabula rasa*) on which there is nothing written. We are forced, then, to posit a certain passivity at the source of our intellectual knowledge because of the extreme imperfection of our intellect. (p. 208)

However, only "prime matter" is pure potency and this does not have any real existence in itself, for all potency is ordered to its proper act.

Therefore, there is also an agent-active power in the human intellect. Now let Gilson explain our relation to extra-mental reality and how we come to know it.

Aristotle showed against Plato that the forms of natural things do not subsist apart from matter. Now forms which are in matter are clearly not intelligible of themselves because it is immateriality which confers intelligibility. It is necessary, then, that natures, that is, the forms which our intellect knows in sensible things, be made intelligible in act. But only a being already in act can reduce what is in potency from potency to act. An active power, therefore, must be attributed to the intellect so as to render intelligible in act the intelligible which sensible reality contains in potency. This power is called the agent or active intellect.

It can easily be seen that this fact dominates the whole structure of human knowledge. Since

sensible things are endowed with an actual existence outside our soul, it is unnecessary to posit an agent sense. This is why the sensitive power of our soul is entirely passive. But since we reject the Platonic doctrine of ideas as realities subsisting in the nature of things, we must have an agent intellect so as to disengage the intelligible from sensibles. Since, finally, there do exist immaterial substances intelligible in act, like the angels or God, we shall have to recognize that our intellect is incapable of apprehending such realities in themselves but that it must be resigned to acquiring some knowledge of them by abstracting the intelligible from the material and from the sensible. (p. 208)

St. Thomas rejects the Platonic doctrine that the forms of things exist apart from matter in a World of Ideas. He also rejects the Arabian doctrine of an active intellect for all men. Each created being bears a certain impress of God's efficient causality, a certain likeness to the Creator in its own active-agent power. Thus all living beings are called "secondary causes" under the Primary Cause of all which is God.

It is well to recall that the sensitive powers of the soul are entirely passive. The wealth of information gathered by the neuro-scientist is but a mass of material processes that are necessary to convert the physical properties of light, sound, smell, taste and touch into sensible species or forms to be received by each particular sense, distinguished and discerned as such, then unified by the *sensus communis* into a total perception, stored in the imagination, and presented to the particular reason or passive intellect.

This shows that the things existing outside the mind possess active powers thus refuting the devastating thesis of Galileo, in "The Assayer" "That only quantity exists in things and that "tastes, colors, smells, and the like exist only in the 'being which feels, which being removed, these qualities themselves do vanish." ¹

Modern physics, moreover, has proven the reality of light as waves and/or particles, of sound waves, and of all objects emanating particles or waves that actuate our sensory organs which are in potency to their influences. The subjectivist school (idealist, Platonic, etc.) is still strong in certain quarters though it reached its peak in the philosophy of Immanuel Kant and continues today in the baneful influence of the pagan East.²

We now pass on to study the operations of the intellect itself upon the data provided by the senses. St. Thomas concludes that just as the sensitive power of the soul receives and preserves sensible species or particular things determined as past, so also must the intellect preserve the intelligible species but as abstracted from all conditions which determine it to any particular mode of existence. So we have a memory proper to the sensitive soul and a memory properly intellectual which latter alone possesses the universal, the proper object of the intellect.

It is perhaps worth noting here that in many older people and even in those with a degree of senility, the sensible memory of things past seems to dominate the waking life of such individuals. Anyone who has worked in mental institutions or nursing homes has noticed this. Perhaps some have remarked in members of their own family that "she lives in the past" or some such quality of life. I remember particularly well a woman who had been a lawyer and was completely off the deep end. However, even locked away in tight rooms and other secure places, her ravings were of a remarkably intellectual nature. In her, the intellectual memory predominated.

¹ Charles Singer. *A History of Scientific Ideas*. New York: Dorset Press, 1900, 1959, p. 246. See also *Discoveries and Opinions of Galileo*. Transl with an Introduction and Notes by Stillman Drake. Doubleday, 1957, which contains "The Assayer" (1623) *in toto*.

² I know there are those who will object, based on Wisdom 11:21, that everything outside the mind is quantity or reducible to quantity. But I believe we must make a case for the existence of the whole being, with both quantity and quality in actuality. It is this integral being that our senses react to. The table at which I am sitting has an integral color of whiteness that remains whether I am perceiving it or not. The same with all other beings outside the mind.

Gilson says that "Memory as we have just defined it is constitutive of intellectual operation itself. It is not, properly speaking, a power distinct from the intellect." (p. 210-211) This is certainly verifiable on introspection. Without the constant appeal to memory, there could be no continuity in life. At the same time, it must be admitted that in the human intellect, the intelligible species is always linked in some way, however faintly and remotely, with the sensible species or the phantasm.

It is the memory with its role in the process of reasoning that delineates the specific character of our intellectual operations in contrast to that of the angels. At the same time, the reason and the intellect are not different powers:

Intellection is the simple apprehension of intelligible truth. The act of reasoning is the movement of thought from one object of thought to another in order to attain intelligible truth. The angels, for example, who possess perfectly the knowledge of intelligible truth proper to their particular degree of perfection, arrive at the knowledge of that truth by a simple act that is in no way discursive. They are Intelligences, in the fullest sense of the word. Men, on the contrary, know intelligible truth by proceeding from one object of knowledge to another. Hence they are not properly called intelligences, nor even intelligent beings, but rather rational beings.

Reason, then, is to intellection what movement is to repose or acquisition to possession. The relationship between these terms is that of imperfect to perfect. ... Now, obviously, repose and movement fall under one single power. This assertion is to be verified even in natural things where we can observe the same nature putting things into motion and maintaining them in repose. Much more, then, do the intellect and the reason depend upon one single power. Therefore, in man, the names intellect and reason refer to one and the same power. (p. 211)

What follows is important for a proper understanding of the hierarchy of being, a reality so much mis-understood and mis-applied by the philosophers and naturalists of the 18th century. The hierarchy or "Great Chain of Being" as it came to be called, is not related in any way to the Order of Generation in time but is a time-less, vertical representation of the Order of Creation. Its categories or Grades of Perfection are in no sense fluid in their relation to each other; rather, as the following explains, there is a relationship, forever fixed, of the more perfect to the less perfect, and this relationship may be seen as a faint or feeble participation of the lower in the higher or a reflection of the higher in the lower. Just as secondary causes remotely participate in the Primary Causality of God, or better, faintly reflect the Primary Efficiency of the First Cause, so do the contiguous grades in the hierarchy of being participate and reflect each other.

Thus do we find the precise point at which the human soul and the separated intelligence meet in the hierarchy of created beings. The mode of knowledge which is characteristic of man is reason or discursive knowledge. Discursive knowledge, however, must have two fixed terms, an initial term and a final one. Both of these consist in the simple apprehension of truth by the intellect. The intellection of principles opens and closes the steps of reason. Thus, although the knowledge proper to the human soul follows the way of reason, it presupposes, nevertheless, some kind of participation in that simple mode of knowing which we find in higher intellectual substances. Once more, the words of Dionysius ring true: divine wisdom always joins the end of what comes first with the beginning of what comes next. ... (p. 211)

The universal hierarchy is not based on the assumption that the lower possesses whatever the higher possesses, but on the fact that the lower has a feeble participation in what the higher possesses. Thus the animal, whose nature is purely sensitive, is deprived of reason but is endowed with a kind of prudence and natural power to evaluate which is a feeble participation in human reason. Similarly man does not possess a pure intellect permitting him to apprehend truth immediately and without discourse. But he participates in this mode of knowing by a kind of natural disposition -- the intellection of principles ... "Hence, the discursive power and the power that perceives truth are not different but one and the same ... reason itself is called understanding because it shares in intellectual simplicity, by reason of which it begins and through which it terminates its proper activity." Let us now examine this operation; that is, the manner in which human reason apprehends its various objects. (pp. 211-212)

Plato taught in the *Meno* that the soul knows all things, including corporeal being, by innate species that are in the soul by nature. What is the Catholic doctrine of St. Thomas?

First of all, there is the need for positing at the source of our intellection the divine light which enables us to grasp the first principles which are called self-evident and given. This grasp of first principles is a created, participated resemblance of God's uncreated light. The Psalmist sings: "The Light of Thy Countenance, O Lord, is signed upon us." (Psalm 4:7) And St. Augustine says, "If we both see that which thou sayest is true, and if we both see that what I say is true, where, I ask, do we see it? Certainly not I in thee, nor thou in me, but both in the unchangeable truth itself, which is above our minds." (Gilson, p. 214)

It is by this divine light that we are able to grasp the first principles such as that things exist, that being is, that a thing cannot be and not be at the same time, that the whole is greater than the part and that every effect must have a cause. And, St. Thomas teaches, our grasp of these first principles begins immediately from sensible experience. These first principles... are the first intelligibles which our intellect conceives starting immediately from sensible experience. The actual intellection of principles is no more innate in us than are the conclusions of our deductive reasoning. But while we discover the former spontaneously, we have to acquire the latter at the price of our research.

These principles are the first source and the guarantee of all our certain knowledge. It is from them that we set out to discover truth; and we have noted that reason is always in the end referred back there in order to verify its conclusions. (p. 216)

Here is the cognitive loop in its perfection according to the human mode: first principles grasped in immediate sensible experience and referred back there for verification.

Thus we have posited that there must be an intellectual light coining from God Himself, and that this light, reduced to its own resources, is impotent. Here we have, in fact, determined the necessary and sufficient conditions of human knowledge. The conclusion to which we are continually returning is that intellectual knowledge begins from sensible things: *principium nostrae cognitionis est a sensu*. The one problem which we have still to resolve is, therefore, to determine what is the exact relationship between the intellect and the sensible within knowledge. (p. 216)

After refuting the materialist conceptions of Democritus, and having already rejected the Platonic doctrine, Gilson, expounding St. Thomas, concludes:

It is clearly impossible that corporeal matter should succeed in impressing its mark upon an incorporeal substance like an intellect and modifying it. Merely the impression of sensible bodies could never produce an operation like intellectual knowledge, and is not enough to explain it. We must appeal to some nobler principle of operation without however turning to the separated intelligences of Plato. This is what we come to if we take the middle trail which Aristotle blazed between Democritus and Plato, that is, we posit an agent intellect capable of extracting the intelligible from its sensible by means of an abstraction whose nature we shall now analyze in some detail. (p. 217)

Let us go back now to the five senses and begin with the sensible body that has impressed its image in the *sensus communis* -- a perception unified but one in which the particular senses may be distinguished. It is by the *sensus communis*, for example, that it is I who can say I see, or I hear, etc. This image impressed in the *sensus communis* is designated by the term *phantasm* (*phantasma*). And the phantasm is material.

The modification of our sense organs results in a modification of the brain, and the product of both modifications is the sensible representation or phantasm. According to St. Thomas, the phantasm is the likeness of a particular thing, an image of the individual. It is a representation, mental not physical, of an object perceived by the senses, or perceptible by the senses. It is material both as to object and as to organ, for its remote source is the sensible thing with its individual properties; and its immediate source is sensation, once experienced or often

repeated.¹

As Gilson points out, in the phantasm we still do not have the total and perfect cause of intellectual knowledge. In fact, we do not even have its sufficient cause. But we do have the matter on which this cause works.

What, indeed, is a *phantasm*? It is the image of a particular thing: *similitudo rei particularis*.

While going through this explanation, let us keep in mind what the Special Report in the *Scientific American* demonstrated as to the parallel pathways along which the neurons travel on their way to the brain. But let us also remember what was said before, that the images of things are not taken into the sense in a material form, otherwise the sense would become light, the ear become sound, etc. But some types of sensation are accompanied by very definite organic modifications. The principle that is important, however, is that the senses receive sensible species denuded of matter. (Gilson, p. 203)

Gilson continues his explanation of the *phantasm*:

Still more accurately, phantasms are images of particular things, impressed or preserved in corporeal organs: *similitudines individuorum existentes in organis corporis*. In brief, we are here in the domain of the sensible both from the point of view of the object and the subject. Colors, for example, have the same mode of existence whether in the matter of an individual body or in the visual power of the sensitive soul. In both cases they subsist in a determined material subject. [The mode of existence is accidental, i.e., that of an accident not a substance.] This is why colors are by nature able by themselves to impress their resemblance in the organ of sight. But for this same reason, it is to be seen that, from this stage on, the sensible as such -- and this holds for phantasms -- will never penetrate into the intellect.

Sensation is the act of a corporeal organ suited for the reception of the particular as such; that is, the universal form existing in an individual corporeal matter. The sensible species, or medium through which it passes, and the sense itself are realities of the same order since they fall, all three, into the genus of the particular. The same is true of the imagination, in which phantasms reside. But it is not the same when it comes to the possible intellect. As intellect, it receives universal species. The imagination, on the contrary, contains only particular species. Between the phantasm and the intelligible species, the particular and the universal, there is a difference of genus: *sunt alterius generis*. And this is why phantasms, which are necessary requisites for intellectual knowledge, only constitute its matter and serve it, so to speak, as instruments. (p. 217)

Can the phantasm be related to or located in the information supplied by the *Scientific American* Special Report? The author says that progress is slow in their investigations but important generalizations have emerged. One of these is "that sensory systems are arranged in a hierarchical manner. That is, neurons respond to increasingly abstract aspects of complex stimuli as the distance -- measured in numbers of synapses from the source -- grows." Another important principle is that information does not travel along a single pathway. Rather, different features of a single percept are processed in parallel pathways." The author then asked, "Where is the information reassembled" and we answered in the *sensus communis*. It would seem that all the neuro-scientists can discover by their empirical methods are the organic modifications that accompany the reception of sensible species on the part of a sense organ, for the sensible species are not taken into the sense in a material form.

In what, then, does the image consist? Of what nature is the mental but not physical representation that is the phantasm? It seems to be situated precisely at that interface of the possible intellect with the phantasm itself, for the sensible species passes through the medium of the

¹ Sister Mary Anastasia Coady, S.C.N. *The Phantasm According to the Teaching of St. Thomas*. A Dissertation ... for the Degree of Doctor of Philosophy. Washington, D.C. The Catholic University of America, 1932, p. 30.

phantasm, the mental but not physical resemblance of the object. The phantasm is the medium, the instrument between the sensation and the sensible species or form, within which is embedded the intelligible form, which is the object of the intellect. I wonder if the electrical impulses do not have more of a role to play in these processes than we are willing to imagine?

In any case, the sensible as such, such as colors, sounds, etc., including the phantasm itself, the resemblance, the image of the sensible form -- cannot penetrate into the intellect. They are of the order of the sensible.

The proper object of the human intellect is *quiddity* -- that is, the nature of a thing. And in this way, the intellect may be said to penetrate into matter.

Thus it is not ours to know the idea of stone, but the nature of such and such a determined stone. This nature is the result of the union between a form and its proper matter. Similarly, the abstract concept "horse" is not presented to our mind as an object. It is the nature, rather, of a horse that has been realized in a given, determined, concrete horse. In other words, it is easy to discern in the objects of human knowledge a universal and intelligible element which is associated with a particular and material element. The proper operation of the agent intellect is to dissociate these two elements in order to furnish the possible intellect with the intelligible and universal which lay implied in the sensible. This operation is abstraction. (p. 218)

As always, St. Thomas locates man in his place in the hierarchy of being, between the animals below and the angels above. And so, he finds three degrees of faculties for knowing:

1) Sensible knowledge is the act of a corporeal organ. The object of all the senses is a form existing in corporeal matter. And since matter is the principle of individuation, the powers of the sensitive soul are incapable of knowing anything but particular objects. This is the kind of knowledge enjoyed by the animals.

2) At the opposite extreme we find knowledge which is neither the act of a corporeal organ nor bound to or dependent upon such an organ in any way. Such is angelic knowledge the proper object of which is form subsisting outside of matter but not in some Ideal World of Forms such as Plato envisioned. Even when angels apprehend material objects, as they do, they only perceive them through immaterial forms that they have received at creation and so are connatural or inborn to them; or they perceive them in God Himself. St. Thomas says (ST, I, Q 55, a 2) that the angels receive from God the species (forms) of things known together with their intellectual nature. Furthermore, the higher the angel, the more universal is his knowledge (ST, I, Q 55, a 3). At the moment of their creation, the Word of God impressed the forms of all things, both corporeal and spiritual, in every angel, yet in each of these spiritual creatures the forms are received according to his own immaterial species, for each angel constitutes a specific grade of perfection in himself, since there is no matter to individuate him. Hence each angel occupies a distinct place in the total hierarchy of being. It is not so with human beings.

3) The human intellect occupies an intermediate position between the angels and the animals, sharing some of the qualities of each by way of participation. In man, the soul is the form of the body, so that man is a composite unit of spirit and matter. This is why it is proper to his intellect to apprehend forms that exist in matter but without taking into account this individual matter. This latter is what the phantasm does. The intellect abstracts the form from the individual matter represented by the phantasm. By this power of the soul, we are able to consider what constitutes the essence, the nature of man without being hindered by what distinguishes any one given particular individual man. The same with all other forms. Whatever the senses apprehend and present to us in the phantasm, we are able, by the power of the intellect, to abstract the universal nature from it even while contemplating it in all its particularity. I know my cat as a cat in her nature as that kind of animal at the same time that I know her as this particular pet of mine I call *Puff*. This is abstraction at its simplest level. (Gilson, pp. 218-219) The cognitive loop is not yet complete in all its details.

The intellect consists of two powers both of which are necessary for abstraction. In order that the sensible species of a thing may become the intelligible form of the possible intellect, the agent

intellect must illumine the phantasms. "This illuminating of the sensible species (phantasms) is the very essence of abstraction." (Gilson p. 219.) The agent intellect abstracts the intelligible form from the phantasm and impresses this form upon the possible intellect which is thus brought into act and expresses the universal concept.

"But there is no psycho-physiological mechanism to be included in the description of this act of knowing." (Gilson, p. 219) We have left the order of the sensible for the order of the intelligible form proper only to that power of the soul we term the intellect. And this is precisely what the biological, the physiological and the neurological scientists of today refuse to admit. They continue to search for the act of knowing in the order of the psycho-physiological, the sensible. Of course, they will never find it there. Even in the animals, they are forced to recognize powers of the sensitive soul which cannot be equated with mere matter or material processes. As Gilson says, the explanations of St. Thomas agree with "the principle of continuity governing the universe." (p. 219) For in the animals we see that "feeble participation" in the higher rational powers of the human soul, just as in the human soul, we see a "feeble participation" in the higher powers of knowledge that characterize the angels. The plants, in their turn, show a "feeble participation" in the powers of the sensitive animal soul when they respond to light and nutrition with certain movements.

The relation between the intelligible form in act and matter requires to be explored in more detail.

The sensible, the phantasm, is the union of an intelligible form with determined matter. Therefore, it contains in potency some intelligible but an intelligible determined in act to a given mode of particular being. In other words, the phantasm contains the intelligible in potency but the individuating particulars in act, and this is properly characteristic of all sensible being. In man we find something intelligible in act, namely, his intellect, but this intelligible lacks the particular determination that characterizes the phantasm. The intellect of man is a light that needs certain kinds of objects that are related to it by creation in the beginning. This proper relation between our mind and external reality is found in the sensible which is determined in act and the intelligible in potency to that specific act. It is because of these unique conditions that St. Thomas admits the existence of a possible intellect and an agent intellect in one and the same individual substance that is man. The agent intellect is necessary to act upon the intelligible potential in the phantasm and the possible intellect is necessary for the reception of the intelligible that it may be brought to act in the expression of the concept. As Gilson explains it:

The soul has intelligibility in act but determination is wanting. Phantasms have determination in act but intelligibility is wanting. The soul confers intelligibility on the phantasms, and in this is an agent intellect; it receives determination from them and in this is a possible intellect. For the operation to be realizable, one condition is required -- a metaphysical condition based upon the exigencies of order -- and it is this: the action of the agent intellect which makes phantasms intelligible must precede the reception of this intelligible into the possible intellect: ... The sensible as such cannot penetrate the intelligible as such; and so it is our intellect which aspiring to receive determination from the sensible, begins by rendering its action possible in raising it up to its own dignity. This is the price of knowledge; and this was the only problem to be resolved: "the tiny intelligible light which is connatural to us is enough for our knowing." (p. 120)

But this "tiny intelligible light which is connatural to us" is never enough for today's scientists. On the side of empiricism, they immerse themselves in the sensible, seeking there the knowledge that only angels can have, and on the side of mathematical physics, they soar far beyond the sensible world of corporeality and construct their own invisible realms of certitude and relativity. Gilson, however, in his exposition of the doctrine of St. Thomas seems bent upon recalling us to a proper humility in our desire to know, even and especially in our search for truth in the natural sciences. And how vulnerable our condition is!

Serious injury to common sense, imagination or memory removes at the same time phantasms and knowledge of intelligibles corresponding to them. This conclusion also enables us to learn how the human soul knows itself, as well as how it knows objects above itself. We now know the

conditions of such an act. The human intellect, as it carries on in this present state of life, can only know by turning toward the material and sensible. It only knows itself in the measure in which it passes from potency into act under the influence of species abstracted from sensible things by the light of the agent intellect. (p. 220-221)

... Our soul only comes to knowledge of itself because it first apprehends other things ... It knows first its object, then its operation, and finally its own nature. ...

Whether the object of our seeking is reality above us, such as God and the angels, direct apprehension of the intelligible as such is completely impossible for man. We can claim no more than to form some very imperfect representation of the intelligible from sensible nature or quiddity.

Hence just as the soul does not know itself first, neither is God the first object of its apprehension. It has to begin with the consideration of material bodies; and it will never advance farther in its knowledge of the intelligible than the sensible from which it sets out will allow it to go. (p. 221)

How humbling this is! For we are constantly seeking to go far beyond the sensibles of this world. Only by the infused knowledge of the Gifts of the Holy Ghost and other Gifts of Divine Grace, can our weak human minds rise above the sense knowledge to which we are bound by our natures. We may speculate from this, too, how glorious was our first parent Adam, and his spouse Eve, before the Fall, when they enjoyed the fullness of sanctifying grace and the preternatural gifts that flowed from it.

But now, in our fallen state, all is quite different. Because of this limitation of our present state, our being bound to the sensible, St. Thomas finds herein the complete justification for his method of demonstrating God's existence and analyzing His essence and nature. The creature bears the impress, however faint, of the Creator's agency. This point needs emphasizing because it is precisely the natural method of arriving at certain natural spiritual truths that the modern scientist has rejected.

Dr. Erich Christian in his paper "It Is About Time" (also on audio-cassette) takes the reader-listener step by step through the processes by which a person hears and responds to a piece of music, specifically Beethoven's 5th Symphony, the 4th Movement. He shows most persuasively, especially for one who has any knowledge of recording, how utterly impossible it would be for the physical brain to store "the ocean of data" that is a Beethoven Symphony -- or even "*Fur Elise*"!

And yet, the memory of man -- that faculty of the spiritual soul -- is able to pick out the melody, discern the various harmonic notes to form chords, play the melody on the piano quite apart from the time of actual hearing, and even transpose that melody into a different key!

He concludes that "there is not even the faintest possibility for a mechanism by which to explain the astounding features of our mind and memory" that are demonstrated by the musician. In addition, he notes the instantaneity of perception, recognition and dexterity of reproduction on the part of the pianist whereas the "electrochemical processes in the brain are very slow, totally inadequate to perform the described processes."

All of this points irrefutably to the existence of the spiritual soul and its biological function, for first, we would not be alive without it, and secondly, we would not be humanly alive and functional without it.

Why do not the scientists see this truth and proclaim it? There is only one answer: we are in the midst of the spiritual darkness that St. Paul, in Second Thessalonians, describes as the Great Apostasy -- a great falling away from the Truth. And in the last analysis, it is a willful rejection of the Man-God Who is Truth in Person and of His saving divine Revelation, from Genesis to Apocalypse.

Gilson continues with more cautionary words:

It is impossible to insist too much upon this truth because it dominates the whole of philosophy. Failure to grasp it fully makes us assign objects to the human intellect which it is by nature incapable of grasping, and so we mistake the proper value and limits of our knowledge. (p. 221)

Mathematical physicists should take note, for to hold that the particles and aggregates of modern

physics constitute “a second ontological domain” and “an imperceptible and hitherto unknown stratum of cosmic reality” is to posit an inferred knowledge of reality quite beyond and separate from the sensible world of corporeality. Whatever else one may say of the domain of modern physics, we must admit it is not in accord with Thomistic epistemology and metaphysics. (Cf. Wolfgang Smith, “The Extrapolated Universe” in *Sophia*, July 2000)

As Gilson says, “Before the highest intelligibles” our intellect is blinded and confused like the eye of an owl unable to see the sun in front of it.

Thus we have to be content with the tiny intelligible light which is ours by nature and sufficient for the needs of our knowledge. We must be careful not to ask of it more than it can give. We only know the incorporeal by comparing it with the corporeal. Each time we aspire to some knowledge of intelligibles, we have necessarily to turn to the phantasms which bodies put in us even though there are no phantasms of intelligible realities. Acting in this way, we behave like the very low intellects we are and we accept the limitations imposed upon our knowing faculty by our place in the hierarchy of created beings. (p. 222)

We do not complete the cognitive loop until we arrive at an appreciation of the union of forms achieved in the act of knowing, of the formation of the *verbum mentis*, the interior word or concept expressed by the intellect and the judgment of conformity with reality that is resting in the truth.

... to know is to be in a new and richer way than before, ... to know a thing is a kind of becoming that thing. (Gilson, p. 224)

But we must emphasize that we are not speaking of a subjective “reality” -- the nauseous contemporary platitude that whatever you believe, is true for you -- No. This is a most deceptive saying and must be resisted with the real truth which is not a “virtual reality” but a relation of conformity between the mind and reality outside the mind, whether of material things or of meaningful objects pointed to by propositions or formulations of the Truths of Faith: “Jesus Christ, True God and True Man” and “One, Holy, Catholic and Apostolic Church.”

The manner of existence or mode of being which things have in the thought assimilating them is called “intentional being.”

This, if we only think about it, is a profound transformation of concrete datum by the mind receiving it. Experience furnishes a particular man, form and matter; the senses, and after them, the intellect, receive a form more and more released from every material mark; that is, they receive its intelligibility. (p. 229)

This is the work of *anima* and its powers upon the data provided by the senses. The neuroscientist is not even able, by his photographs of electrical impulses in the brain, to appreciate what the senses provide for the intellect to work upon. We can see by now how very limited is his knowledge of how and what we know because he does not recognize the presence and the activity of *anima*, of the soul and its powers. Gilson continues:

But this is not all. The act of knowledge is further liberated from the object in a still sharper way when the interior word or concept is produced. The name “concept” is given to what the intellect conceives in itself and expresses by a word.

This shows the extremely close relationship between the intellect and the spoken word of language. Nouns and verbs refer to the concepts in the mind whereas the other parts of speech signify the relationships between things in a construct that resembles the reality of being as closely as possible. Gilson continues:

The sensible species and then the intelligible species, by which we know but which we do not know, is still the form itself of the object. The concept is the similitude of the object which the intellect brings forth under the action of the species. This time, therefore, we are in the presence of a substitute for the object. This substitute is no longer either the substance of the knowing intellect nor the thing known itself, but an intentional being **incapable** of subsisting outside of thought, which the word designates and which later will be fixed by the definition.

We now have some idea of how complex a relation unites our knowledge with its object. ... (p. 229)

Yes, indeed, but such complexity need not hinder our appreciation of the operations of the intellect, that power of the soul, to abstract the nature of things and to hold them in intentional being for use in achieving and resting in, not only temporal truth but eternal truths, and Truth Himself.

The next and final question to be discussed here is how to guarantee the fidelity of the concept to its object. Gilson says:

The concept is not the thing; but the intellect, which conceives the concept, is truly the thing of which it forms itself a concept. The intellect which produces the concept of book only does so, because it has first become the form of a book, thanks to a species which is but such a form. [Form here refers to the immaterial nature of book, not some picture of a book; nevertheless, a "picture" of the book is that from which the immaterial form is abstracted by the agent intellect impressed upon the passive intellect, and thus expressed by the intellect as a concept.] Hence the concept necessarily resembles its object.

The operation by which the intellect engenders in itself the concept is a natural operation. In accomplishing it, it is doing what it is its nature to do. Since the process of the operation is as we have described it, we can conclude that its result is naturally unerring. An intellect which only expresses the intelligible, if the object has first impressed it in it, cannot err in its expression. Let us give the term "quiddity" to the essence of the thing thus known. We shall be able to say that the quiddity (i.e., the nature) is the proper object of the intellect, which never errs in apprehending it. If, to simplify the problem, we abstract from accidental causes of error capable of falsifying the experience, we shall see that this is indeed the case. By rights, and almost always in fact, a human intellect confronted by an oak forms in itself the concept of tree, and confronted with Socrates or Plato forms in itself the concept of man. The intellect conceives essences as infallibly as hearing perceives sounds and sight colors.

Thus the concept is normally in conformity with its object. Nevertheless, its presence in the intellect does not yet constitute the presence of a truth. All that can be said of it thus far is that it is there. ... (p. 230)

In order that this conformity of the concept to the object become something known and take the form of truth in consciousness, the intellect must add something of its own to the exterior reality which it has just assimilated. Such an addition begins when, not content just to apprehend a thing, it makes a judgment upon it and says: this is a man, this is a tree. Here the intellect brings something new -- an affirmation which exists in it alone and not in things. Of such an affirmation we can ask whether it corresponds with reality or not. The definition of truth is an adequation between the thing and the intellect, *adequatio rei et intellectus*, is a simple expression of the fact that the problem of truth can have no meaning unless the intellect is regarded as distinct from its object. ... Truth is only the agreement between reason which judges and reality which the judgment affirms. Error, on the other hand, is but their disagreement. (p. 231)

It is obvious that an existential metaphysics underlies Thomistic epistemology, for truth depends upon reality being capable of being known, through the senses, and an intellect created specifically to know reality through sensible things. "The commencement-principle of the philosophy of St. Thomas is the sensible perception of actually existing concrete beings." (p. 233)

This is the only possible keystone of a Thomistic theory of knowledge. The adequation of the intellect to the real, which is the definition of truth, is legitimately affirmed in a doctrine in which the intellect reflects upon itself and finds that it is capable of becoming reality:...

As Gilson points out somewhere else, and as Father Denis Fahey was fond of saying, this "becoming reality" does not mean that reality conforms to us and our will, but rather, that we conform to reality and to God's plan of order for the world.

From the moment when the intellect, which judges things, knows that it can only conceive them

at the price of its union with them, [i.e., union of the phantasm containing the intelligible form] no scruple can prevent it from affirming as valid the judgments in which the content of its concepts becomes explicit. The initial factor in knowledge ... is the direct grasping of intelligible reality by an intellect served by a sensibility. (p. 235)

Thus the cognitive loop is complete. It begins with the senses and ends with the intellectual knowledge of the reality of the sensible-material universe. Though we know the world in an immaterial way, because our minds are spiritual entities, we know it by reflection as material. But this corporeality is also intelligible because God has created our minds capable of seeing-becoming the intelligible form. He has created in all of His works and creatures.

This analysis of the cognitive loop also provides a very sound argument in favor of geocentrism. Physicists and cosmologists only arrive at a heliocentric or a-centric model of the universe by first abandoning the evidence of the senses. The gravity of such a rejection should be obvious to all and sundry.

In conclusion, the accompanying diagram may serve as an overlay for all the physical processes that the neuro-scientists and physiologists show us. These men are blind to the essential operations of the soul and its powers of intellect and will in all our acts of knowing, from the first sense impressions to the expression of the concept and the mind's judgment of truth. We must therefore supply what is wanting and correct their false conclusions and orientations.

January 2000 AD

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