Landas 34:2 (2020) 39–75

HUMAN SENTIENT INTELLIGENCE IN THE PHILOSOPHY OF XAVIER ZUBIRI

Marcos Louis D. Catalan, Jr., S.J.

Introduction

From the perspective of evolution, comparative studies between human beings and apes (gorillas, chimpanzees, and orangutans) reveal a number of similarities.[1] Biologically, human beings inherited some of their fundamental characteristics, such as color vision, frontal eyes, development of the neo-cortex, and high manual dexterity, from members of the ape family. Behaviorally, human beings share with them the capacity to utilize tools for a variety of tasks, the use of vision and hearing to interact with the environment, a well-structured social life, sexual and reproductive behavior, and complex forms of intra-specific intercommunication. Genetically, 98 percent of the chimpanzee's genome is identical to the human genome. Due to these similarities, human beings have often been called the "naked ape," following the title of the successful book by the English biologist Desmond Morris.

Yet, in comparison to other mammals, human beings are extremely vulnerable. They do not have sharp claws or fangs, their skin is not as thick, and they have few hairs that protect their bodies. They are

[1]S. Shettleworth, *Cognition, Evolution, and Behavior* (New York: Oxford University Press, Inc., 1998), 497–511.

https://publications.lst.edu/

extremely handicapped as far as their abilities to run, jump, and swim are concerned. Unlike other mammals, then, they do not have the physiological resources that they need to shield themselves from the hostilities of their environment. But amazingly, they have managed to survive the harshest of conditions and have been able to conquer all kinds of environments, including outer space. What has made human survival possible?

The answer to the preceding question is usually the traditional Aristotelian definition of the human being as a "rational animal": Human beings alone are endowed with the capacity for abstract thought and reflection by which they have been able to survive the various vicissitudes of their environment. However, for Xavier Zubiri, it is not rationality but intelligence that defines what a human being essentially is:

> [The human being] is not a rational animal, but an intelligent animal, that is, an animal of realities. They are two completely different things, because reason is just a special and specialized type of intelligence: and intelligence does not consist formally in the capacity for abstract thought and for full conscious reflection, but simply in the capacity to apprehend things as realities. Intelligent animal and rational animal are thus different things; the latter is only a type of the former.[2]

Zubiri does not agree with the traditional definition of the human being as a rational animal; for him, the human being is an intelligent animal. Intelligence is not rationality but consists simply in apprehending reality; rationality itself is founded on this basic apprehension of reality. And this apprehension of things as real is the act of the human faculty that Zubiri refers to as *sentient intelligence*.

This essay is an exposition of Zubiri's understanding of the human faculty of sentient intelligence and its development in relation to the nervous system. In explaining what this faculty is, he contrasts it with the non-human animal's faculty of sensibility (or pure sensing). He emphasizes that there exists an *essential* difference between sentient

[2]X. Zubiri, "El origen del hombre," in G. Argote, ed., *Siete Ensayos de Antropología Filosófica* (Bogotá: Universidad Santo Tomás, Centro de Enseñanza Desescolarizada, 1982), 40. All translations of quotations taken from Zubiri's works are by this essay's author.

https://publications.lst.edu/

intelligence and sensibility. The essay begins with Zubiri's discussion about the difference between the psyche and its faculties, and about the importance of the psyche's formation and not just that of its faculties.

Part One: Morphogenesis of the Psyche and Its Faculties

1.1. Cell Differentiation in the Germinal Plasma

Zubiri describes the morphogenesis of the psyche and its faculties within the context of the genetic processes that take place in the human embryo. Zubiri does not always use the word *embryo*; he prefers instead to use the phrase *germinal plasma* because he thinks that the latter is able to express better what he considers as the two essential moments that constitute the human embryo: the cell, which is the organic moment, and the psyche.[3] Part of the genetic process that the germinal plasma goes through is *cell differentiation*, which leads to the development of the germinal plasma's different organs.

Zubiri maintains that the process of cell differentiation does not have an organic aspect only, i.e., it is not only about the formation of various physiological structures. Cell differentiation also has a psychic aspect because

> in this formation are being formed "at the same time" in the psyche some capacities of a distinct character…: a psyche that is sickly, robust, healthy, rich, infirm, etc. But, also, and this is what is decisive, the psyche goes on acquiring in the morphogenetic process what [are] usually called "faculties."[4]

Strictly speaking, then, the morphogenesis of the psyche refers not only to the formation of a psyche, which will eventually possess a particular

[3]X. Zubiri, *Sobre el Hombre* (Madrid: Alianza Editorial, 1998), 50. Cited henceforth as SH.

[4]SH, 496.

https://publications.lst.edu/

character, but also to the formation of the faculties in the psyche. Two observations are in order regarding the preceding quotation.

1.2. Psyche and its Faculties

The first observation is that Zubiri distinguishes between the *psyche* and its *faculties*. The latter are *activities of the psyche*, and Zubiri uses the word *psychism* to refer to the faculties in order to contrast them with the psyche.[5] As activities of the psyche, these faculties include sensibility, intelligence, feeling, volition (will), etc. and are in the psyche. Zubiri insists that the psyche is something distinct from, and more radical than, its faculties. He gives the following example to emphasize the difference:

> not to see things well because of not knowing how to look at them is not the same as to have badly-formed eyes. The good or bad formation of the eyes is "prior" to the exercise of vision. This latter corresponds to psychism; the former corresponds to the psyche itself.[6]

For Zubiri, the quality of the exercise of a faculty depends on the character of the psyche that will be formed. For example, the quality of intelligence will depend on whether the psyche, which exercises the intellective activity, is weak, robust, healthy, etc. For this reason, the formation of the psyche is distinct from the formation of its faculties. Thus, for Zubiri, "there is then a strict *morphogenesis of the psyche*. As I see it, this idea of a *morphe* is essential, of a form of the psyche itself and not only of psychism."[7]

1.3. Psycho-Organic Morphogenesis of the Human Person

The second observation is that the psyche and its various faculties are developed *in* the genetic development of the germinal plasma—as

[5]SH, 488.

[6]SH, 488.

[7]SH, 489.

https://publications.lst.edu/

it acquires its various organs and parts, so too does the psyche acquire its different faculties. This means, then, that "in this initial moment [that is, the germinal plasma], there is only one and the same integral psycho-organic activity."[8] There are no two separate and parallel activities, only two constitutive moments of a single morphogenesis of the human being: one moment is organic; the other moment, psychic. Although these two moments are not identical, their respective developments transpire within the single morphogenetic process present in the germinal plasma. This morphogenesis is not organic *and* psychic, as asserting so would give rise to the erroneous understanding that there exist two independent processes; rather, there is only one process which is unitarily psycho-organic. The development of the psyche and its faculties is only one of the two constitutive moments of the one morphogenesis of the human being.

How does the formation of the psyche and its faculties take place? The cell differentiation process and the other genetic processes that the germinal plasma goes through from the moment of fertilization and even after birth are purely biochemical in nature. While there is solid scientific basis for the assertion that these biochemical processes serve as support for the psyche's exercise of its faculties, it must be emphasized nonetheless that, unlike these processes, the faculties themselves are not biochemical. How, then, are the psyche and its faculties formed concretely in and through these exclusively biochemical processes?

1.4. Dominance: Passivity and Actionality

Zubiri's response lies in his concept of *dominance*, the manner by which the moments of an activity contribute to the entire activity itself; it is the mode of operation by the different moments within the single activity to which they all belong. The terms that express concretely the concept of dominance are *passivity* and *actionality*. These are moments present in every type of activity: "A moment of passivity belongs

[8]SH, 486.

https://publications.lst.edu/

essentially to every activity. And passivity is *passive activity*—passive, but activity. Action, however, is *actional activity*, in a manner of speaking."[9]

With regard, then, to the one psycho-organic morphogenetic activity in the germinal plasma, the organic moment of the activity is actional because the biochemical processes are what dominate in the germinal plasma; the psyche, on the other hand, is in passivity. To highlight the passivity of the psyche, Zubiri asserts that the psyche not only does nothing but also that it cannot do anything, i.e., the psyche does not and cannot exercise its faculties. In the germinal plasma, then, the psyche does not think, sense, will, feel, etc.[10]

However, despite its passivity, the psyche is also in activity. Zubiri explains that these same biochemical processes also shape the character of the psyche as well as the psyche's different faculties. In this sense, then, the psyche is active, although it is a passive activity: the psyche and its faculties are formed not by means of the acts that the psyche exercises—since it cannot perform such—but in and through the action of the biochemical cellular processes. This action will culminate in the configuration of a psyche that is healthy, weak, strong, etc. As these processes shape the character of the psyche, they also begin to form the faculties of intelligence, feeling, volition, etc. that are in the psyche and which the psyche will exercise at a designated moment in the psycho-organic development of the human being.

The succeeding parts of this essay will present the manner by which sensibility and sentient intelligence are formed *in* the organic processes that develop the physiological structures in the germinal plasma. Part Two deals with the formation of the faculty of sensibility. In the case of the human being, the faculty of sensibility will be structurally united with the intellective potency, leading to the formation of the faculty of sentient intelligence. The formation of this faculty will be discussed in Part Four.

[9]SH, 486.

[10]SH, 486–487.

https://publications.lst.edu/

Part Two: Faculty of Sensibility

2.1. Biological Liberation of Stimulation

Immediately after the sperm fertilizes the egg, a rapid succession of divisions occurs the result of which is the formation of certain sections in the human embryo. These sections contain specific cells that will eventually differentiate, leading to the formation of different organs and body parts. There is a stage in this cell differentiation process that Zubiri describes as the "moment in which the embryo makes of stimulation a specialized function."[11]

For Zubiri, the capacity to be stimulated is an essential character of all living beings: "The capacity to be affected by stimuli is a character that belongs essentially to every living being insofar as it is alive."[12] Zubiri refers to this essential character as *susceptibility*. The scientific equivalent of susceptibility is *irritability*, which is a natural property of *all* cells. However, while all cells are naturally irritable or susceptible to stimulation, there is a particular class of cells the specific function of which is to facilitate the rapid transmission of electro-chemical impulses—generated by the stimulation of a sense organ—to that part of the body that will be used in responding to stimulation. This particular class of cells is comprised of none other than the *nerve cells*. The formation of these nerve cells is precisely what Zubiri refers to as the moment when the embryo makes of stimulation a specialized function.[13]

The embryo not only makes of stimulation a specialized function; it also makes autonomous the natural property of susceptibility possessed by all cells. Zubiri here refers to the development of the various structures of the nervous system in which will be centralized

[11]SH, 498.

[12]SH, 497.

[13]SH, 498.

https://publications.lst.edu/

the activities of apprehending and responding to stimulation.[14] The nervous system itself will become specialized in the reception of stimulation and in the transmission thereof to the pertinent parts of the body, making possible the production of a response to stimulation. For Zubiri, the development of, and specialization by, the nervous system is constitutive of the faculty of sensibility: "sensibility is the biological liberation of stimulation."[15]

It will be noted that Zubiri uses the word *liberation* in his description of the faculty of sensibility. In making stimulation its specialization, the nervous system simply disengages the property of irritability or susceptibility that is natural to all living cells. For this reason, the nervous system is *not* the creator of the faculty of sensibility.[16] The nervous system only appropriates as its specific and exclusive task the reception and transmission of stimulation, although other cells are also naturally capable of the same reception and transmission due to the character of susceptibility that they naturally possess.

2.2. From Sentiscence to Sensibility

This liberation of stimulation has three differential grades, thereby showing that the faculty of sensibility undergoes a gradual process of development over the course of evolution. The first grade is susceptibility. Below are the other grades related to the development of sensibility:

> In primitive animals, it was a kind of diffused sensibility that I would call *sentiscence*. In animals already more developed, we find a nervous system more or less centralized, but always in increasing centralization: the *sensibility* properly speaking. Susceptibility, sentiscence, [and] sensibility are the three differential grades of stimulation.[17]

---

[14]X. Zubiri, *Inteligencia sentiente: inteligencia y realidad* (Madrid: Alianza Editorial, 1998), 96. Cited henceforth as IS.

[15]SH, 498.

[16]SH, 498.

[17]X. Zubiri, "El hombre, realidad personal," in Argote, ed., *Siete Ensayos de Antropología Filosófica*, 63. Cited henceforth as HRP.

https://publications.lst.edu/

The grade of sensibility that an animal possesses depends on the degree of development that its nervous system has attained. Biology recognizes two general types of nervous system that have developed over the course of evolution: diffused and centralized types. In the diffused type of nervous system, which is found in lower invertebrate animals, there is no brain and the nerve cells are distributed throughout the body. In the centralized type of nervous system, which is found in higher invertebrates and vertebrate animals, some parts of the nervous system have a dominant role in coordinating information and directing responses. This centralization culminates in vertebrates, which have a well-developed brain and a spinal cord.[18]

The relationship between the formation of the faculty of sensibility and the development of the nervous system emphasizes Zubiri's position about the morphogenesis of the psyche's faculties—that the formation of these faculties takes place not independently of but *in* the biochemical processes that develop the germinal plasma's physiological structures. In the case of the faculty of sensibility, its formation occurs in the development of the animal's nervous system; if not for the cellular processes that lead to the development of the nervous system, the faculty of sensibility would not be formed. Thus, Zubiri writes:

> It is not that the psyche had by nature the "visual potency" and that it needed eyes in order to exercise its acts, but that the psyche not only does not execute "acts" of vision without eyes, but that without eyes, it does not have the "visual faculty."[19]

2.3. Specification and Formalization

As the development of the nervous system progresses, leading to the formation of various receptors or sense organs, so, too, are formed in the psyche the corresponding *sensitive* faculties such as the sense of sight, hearing, taste, touch, etc. Zubiri refers to this stage in the formation of the faculty of sensibility as the dimension of *specification*. There is a second dimension that is also strictly related to

[18]T. Lentz & S. Erulkar, "Evolution and Development of the Nervous System," *Britannica*, available at https://bit.ly/3GEuf9n (accessed October 17, 2021).

[19]SH, 498.

https://publications.lst.edu/

the development of the structures of the nervous system; Zubiri refers to this dimension as *formalization*.[20]

Briefly described, formalization is a function of the nervous system that enables the animal to apprehend a stimulus as a unity or as a whole and respond to it also as a unity.[21] Zubiri always discusses formalization in relation to the animal's exercise of its faculty of sensibility, i.e., to its capacity to sense. For Zubiri, sensing is a unitary process composed of three constitutive moments individually affected by formalization. For a better understanding of how formalization concretely affects these moments, the next section will discuss the sensing process; this will be followed by the section on formalization.

2.4. Constitutive Moments of the Process of Sensing

For Zubiri, all living beings possess a measure of independence with respect to their environment and exercise some degree of control over it.[22] Independence means that the animal is able to function well and execute vital operations—within the limits of the possibilities offered by its physiological structures—in view of its survival and for the overall maintenance of its well-being. Control over the environment is a logical corollary of possessing independence. The animal manifests such control in its response to whatever its environment presents to it. In the face of a threat, for example, the animal may respond by facing the aggressor or fleeing away from it; on other occasions, the animal may adapt to changes in the living conditions of its environment. It can be said that the animal, to the extent that it is able to respond adequately to the vicissitudes of its environment, exercises some degree of control over it.

---

[20]SH, 500.

[21]I. Ellacuría, "La idea de estructura en la filosofía de Zubiri," in *Realitas: Seminario Xavier Zubiri Trabajos I 1972–1973* (Madrid: Sociedad de Estudios y Publicaciones, 1974), 73–77. In this article, the author discusses Zubiri's concept of formalization and the structural characteristics of the stimulus as formalized in the apprehension of the organism.

[22]HRP, 56–57.

https://publications.lst.edu/

The animal exhibits its independence from, and control of, the environment within which it is situated through the exercise of its faculty of sensibility. As already mentioned in the preceding section, Zubiri understands sensing as a unitary process. The sensing process is composed of three constitutive moments: arousal, tonic modification, and response.

Moment of Arousal and Sensible Apprehension. This is the moment when the animal is awakened, in a manner of speaking, by the stimulus apprehended by one or more of its sensory organs. Since what this apprehension sets in motion is the sensing process itself, determining consequently the succeeding moments of the process, Zubiri qualifies this apprehension as *sensible apprehension*. To be aroused is to apprehend sensibly the stimulus that causes the arousal. Now apprehending sensibly is apprehending *impressively*, i.e., by means of impression. For Zubiri, "sensible apprehension consists formally in being impressive apprehension."[23] To sense impressively, or to have an impressive apprehension, constitutes the faculty of sensibility.

Structure of Impressive (Sensible) Apprehension. Impression has a structure comprised of three constitutive moments.[24] The first moment is when the animal's senses are affected by a stimulus; this is the moment of *affection*. The second is the moment of *otherness*—the stimulus that affects the senses presents itself as other than, or distinct from, the animal so that the latter does not confuse itself with the former or with other stimuli that may have also caused the arousal. The final moment is the *force of imposition*; this is the moment when a stimulus impinges itself on the animal's senses, triggering the moment of arousal and consequently setting in motion the sensing process.

Affection, otherness, and force of imposition are the three essential moments of impression; as such, they form an indispensable unity. To understand the nature of impression is to take seriously the unity of these three moments. For Zubiri, failure to do so is precisely the

[23]IS, 31.

[24]IS, 32–34.

https://publications.lst.edu/

grave error of ancient and modern philosophy as these limit the understanding of impression to the moment of affection only. For this reason, Zubiri undertakes to explain further the moments of otherness and force of imposition.[25]

Note and Formality in the Moment of Otherness. With regard to the moment of otherness, the stimulus presents itself to the animal as an *other* under two aspects.[26] The first is in the form of a *note*; by this, Zubiri refers in general to the various qualities or properties of the stimulus that impress themselves on the animal's sensory organs. The first moment of the sensing process, the moment of arousal, happens precisely when these various notes impinge themselves on the animal's senses, thereby making it possible for the animal to have an impression of the stimulus affecting it. These notes have their respective specific content, such as color, weight, temperature, and the like; these are what the animal immediately notes or observes about the stimulus the moment it impresses itself on the senses. Because of the specificity of a particular note's content, it will not be possible for the animal to confuse this note with the other notes of the stimulus that may have also impressed themselves on the animal's other sense organs.

The second aspect concerns what Zubiri calls *formality*. Since each note has its own specific content, each note makes itself present as distinct from the animal. Formality refers to the independence that each note possesses relative to other notes and to the animal. For this reason, the animal cannot confuse one note with another note because each note has its own specific content. The animal also cannot confuse itself with a particular note precisely because of the autonomy that the note enjoys with respect to the animal.[27] Formality refers to the independent manner by which the stimulus and its notes present themselves to the animal.

[25]This essay will focus on "otherness" since it will be relevant to the succeeding discussions.

[26]IS, 34–35.

[27]IS, 35.

https://publications.lst.edu/

Moment of Tonic Modification. Every animal possesses a vital tone at every moment of its life. This vital tone refers to the animal's internal state of equilibrium which it seeks to maintain to ensure the normal functioning of its vital processes. Now it is the animal's vital tone that is altered by the moment of arousal; more precisely, the animal's internal state of equilibrium is disturbed when the animal is "awakened" by the stimulus. For Zubiri, the moment of tonic modification results in the animal's experience of tension,[28] moving or bringing the animal to determine and execute a response to the stimulation that has disturbed its internal state of equilibrium.

Moment of Response. What is the purpose of the animal's response? Since the maintenance of the internal state of equilibrium is essential for the sustained functioning of the animal's vital processes, "the response to an arousal is the restoration of the equilibrium lost because of the arousal."[29] A variety of responses are available to the animal which are "made possible and assured by its own biological structures."[30] Thus, the response in the form of fleeing away from, or confronting, the source of stimulation will depend on the resources made available to the animal by its own physiological structures. Nonetheless, whatever form the animal's response takes, it will be judged adequate if the response is able to restore the animal's previous state of internal equilibrium or vital tone that was altered by the moment of arousal.

Sensing, then, is a process. More importantly, Zubiri asserts that "it is *strictly unitary*: it consists in the intrinsic and radical unity, in the indissoluble unity of its three moments, of arousal, tonic modification, and response."[31] Zubiri insists that it is a grave error not to understand sensing as a unitary process by limiting it to the moment of arousal only, and by considering the moments of tonic modification and response

[28]HRP, 58.

[29]X. Zubiri, *Estructura dinamica de la realidad* (Madrid: Alianza Editorial, 1989), 171. Cited henceforth as EDR.

[30]HRP, 59.

[31]IS, 30.

https://publications.lst.edu/

merely as consequences of the first moment. On the contrary, the three moments in their indissoluble unity strictly constitute the sensing process. Sensing does not take place if one of its essential moments is absent.

2.5. Formalization

Since sensing is a unitary process composed of three constitutive moments, formalization affects all three moments: "formalization does not concern only the moment of apprehension [that is, the moment of arousal], but the entire sensing process as such."[32] The manner by which the function of formalization affects each of the three constitutive moments of the sensing process is as follows:

Formalization and the Moment of Arousal. It will be recalled that this is the moment when the notes of the stimulus awaken the animal by impressing themselves on its senses. According to Zubiri, "in this order, formalization is that function because of which the impressions and stimuli that reach the animal from its external and internal environment, are organized forming in a certain manner outlines of autonomous unities.…"[33] Formalization, then, makes it possible for the animal to apprehend the stimulus as a whole composed of its various notes. A concrete example will serve to elucidate this point.

When a dog sees its master coming toward it, what do its senses apprehend? The dog apprehends its master's height, sound and quality of voice, color of clothes, distinctive smell, and the like. In other words, the dog apprehends impressively the various notes pertaining to its master. Zubiri calls these *elemental notes* and refers to the apprehension of such notes as *sensation*. However, it will also be recalled that every note has not only a specific content but also a formality, i.e., every note possesses independence relative to other notes. Now the function of formalization is "the modulation of formality, that is, the modulation

[32]IS, 40.

[33]HRP, 64.

https://publications.lst.edu/

of [the note's] independence, the modulation of autonomy."[34] How does this modulation affect the independence of the various notes apprehended by the animal?

For Zubiri, "formalization constitutes precisely the 'unity' of the sensed content."[35] Formalization effectively enables the animal to apprehend the different notes not as scattered and isolated from each another but as forming a whole. This whole "can have an outline, a kind of a closure … which can have the character of autonomous unities."[36] Zubiri refers to these unities as *autonomous constellations*. He calls the apprehension of such constellations of notes *perception* in order to contrast it with sensation, which is the apprehension of elemental notes.

Because of formalization, the various notes no longer possess independence individually; rather, it is the constellation of organized notes itself that now possesses formality or independence with respect to the animal.[37] Thus, in the example of the dog seeing its approaching master, the dog not only *senses* the individual notes pertaining to its master but, more importantly, and because of the function of formalization, also apprehends these same notes as constituting an autonomous unity, making it possible for the animal to *perceive* the totality of its master.

Formalization and the Moment of Tonic Modification. According to Zubiri, "the general feeling of well-being or malaise acquires nuances because of mere formalization: a mode of feeling spiritless or full of life, spiritless in one direction but not in others, a tonality of happiness, etc."[38] In other words, an animal's capacity for formalization enables

[34]IS, 36.

[35]IS, 37.

[36]IS, 37.

[37]IS, 38.

[38]IS, 40–41.

https://publications.lst.edu/

it to experience a variety of feelings such as anger, satisfaction, and the like.

Formalization and the Moment of Response. In the moment of arousal, the animal perceives an organized autonomous constellation of notes pertaining to the stimulus. Whatever the form of response that the animal chooses to restore its internal state of equilibrium or vital tone, the animal always responds as a unity in the presence of a stimulus that it perceives also as a unity. For Zubiri, "the capacity to coordinate movements is formalization."[39] Formalization, then, makes possible a unitary response to stimulation. In the previous example concerning the dog, it may respond by jumping or running to meet its master. Such actions are not possible if the dog does not have the capacity to formalize or coordinate its different muscles and the other parts of its body.

Such, then, is the manner by which formalization affects individually each of the three constitutive moments of the sensing process. For Zubiri, it is formalization that opens up the richness of the life of an animal as it

> organizes the same sensations in various perceptions, modulates in different manners the mere vital tone differentiating it in diverse states (anger, satisfaction, etc.), and opens up a multitude of the most various responses; the same stimulus can thus determine a great variety of responses.[40]

There is one final point that needs to be emphasized regarding Zubiri's concept of formalization—that it is the exclusive function of the animal's nervous system and therefore depends on the degree of its development.

2.6. Brain as Organ of Formalization

From the preceding description of the manner by which formalization affects the sensing process, it is clear that formalization

[39]IS, 40.

[40]SH, 511.

https://publications.lst.edu/

is not a *mental* function, i.e., it is not an operation proper to the mind.[41] For Zubiri, formalization is a purely anatomico-physiological function: "This function of formalization depends on the structures of the nervous system. That is why I have always thought that it is about a physiological function, as physiological as the specification of the receptors can be."[42] To underscore formalization as an exclusive function of the nervous system, he gives two examples, the first of which is taken from David Katz's experiment involving a crab's perception of prey resting on a rock.[43]

In the crab's impressive apprehension, the rock and the prey constitute only one constellation of notes, not two. The crab perceives only the constellation "rock-prey" and would be unable to perceive if the prey were suspended from a string instead of resting on a rock; the prey, then, does not constitute a constellation of organized notes that is independent of the constellation of notes belonging to the rock. However, in the impressive apprehension of a dog which possesses a more developed nervous system, for example, there exist two different and autonomous constellations of organized notes: that of the rock and that of the prey. The same difference in formalization capacity also manifests itself on the level of response—when falling from a certain height, a cat is able to coordinate its muscles in a manner not possible for a dog such that the former is able to land on the ground unharmed.[44]

As an exclusive function of the nervous system, formalization depends on the most important structure of the nervous system—the brain. While there are animals that exhibit a capacity for formalization despite the fact that their nervous systems do not include a brain, such a capacity may not be as developed compared to that of other animals whose nervous systems have reached a degree of centralization

[41]I. Ellacuría, "Biología e inteligencia," in *Trabajos del Seminario Xavier Zubiri: Realitas III–IV 1976–1979* (Madrid: Sociedad de Estudios y Publicaciones, 1979), 302.

[42]HRP, 64.

[43]IS, 38.

[44]SH, 28.

https://publications.lst.edu/

culminating in the formation of a brain. Now there have been a number of opinions about the main function of the brain. For Zubiri, "the essential function of the brain does not lie in being an organ of mere 'integration' (Sherrington), nor in being an organ of 'signification' (Brinkner), but in being the organ par excellénce of 'formalization.'"[45]

Specialized and Non-Specialized Neurons. Zubiri gives a basis for his hypothesis about the brain as the organ of formalization.[46] The neurons of the cerebral cortex have a functional organization that shows two types of activities: first, there are neurons whose specific activity is to be specialized in reception, association, and response with regard to a stimulus—Zubiri refers to these neurons with such *specific* activity as the *specialized neurons*; second, there is another class of neurons whose activity Zubiri describes as *non-specific*.

The neurons in this second class are not specialized in reception, association, or response; rather, their function is to produce and maintain the activity of the cortex. In addition, they also maintain the brain in a state of vigilance or alertness and regulate some of its activities, including the cortex itself. The cortex also has a non-specific functional organization where neurons with shorts axons play an important role. Zubiri refers to the neurons in this second class as *non-specialized neurons*. He maintains that "in one way or another, it is in the coordination of the specific and non-specific [activities of the specialized and non-specialized neurons, respectively,] where formalization is inscribed."[47] What is the manner of coordination between these two classes of neurons?

Coordination of Specialized and Non-Specialized Neurons. The specific activity of the specialized neurons activates the non-specific activity of the non-specialized neurons. The stimulation of the brain, which is generated by the specialized neurons, sets in motion the activity of the non-specialized neurons. This means that the non-specific activity

[45]HRP, 65.

[46]SH, 523–525.

[47]SH, 524–525.

https://publications.lst.edu/

of the non-specialized neurons can be produced only in and through the specific activity of the specialized neurons. Once activated, the non-specialized neurons not only maintain and modulate the activity of the cortex; more importantly, these also orient, organize, and modulate the specific activities of the cortex's various centers so that the animal will be able to give a specific response to stimulation. It is the non-specialized neurons, therefore, that modulate and synchronize the various processes of the cortex into a single specific response.

Given this coordination between the activities of the two types of neurons, Zubiri sees the specific activity of the specialized neurons as being at the service of the non-specific activity of the non-specialized neurons, particularly as the latter make possible the response to stimulation: "Given a stimulating situation, the animal avails of its possible multiple responses because of the non-specific activity of its brain."[48] For this reason, Zubiri says that the richness of the life of the animal depends on the non-specific activity of these neurons.[49] He will highlight later the significant role of these non-specialized neurons in his discussion regarding the faculty of sentient intelligence.

It will be recalled that it is through the exercise of its faculty of sensibility that the animal manifests its independence from and control of its environment. Given how formalization affects individually each of the three essential moments of the unitary sensing process, it therefore influences significantly the animal's degree of independence and control—the more advanced the animal's capacity for formalization, the greater the degree of its independence and control.[50] Ultimately, this implies that an animal with a more advanced capacity for formalization has greater chances of survival within a hostile environment since its physiological structures—on which the capacity for formalization depends—assure that it will be able to respond adequately to the vicissitudes of its environment. However,

[48]SH, 524.

[49]SH, 524.

[50]HRP, 66.

https://publications.lst.edu/

as will be explained in Part Three, this implication does not apply in the case of the human animal.

Part Three: Biological Non-Specialization of Human Beings

3.1. Biological Specialization of Non-Human Animals

For Zubiri, the evolution of life is a progression in formalization.[51] Since formalization is a purely anatomical function, this progression means concretely the complexification of the physiological structures that make possible the animal's capacity for formalization. In the case of human beings, this complexification culminates in the formation of a highly developed cerebral cortex. Zubiri maintains, however, that "the functional organization of [the human being] is such that the multitude of possible responses adequate to arousal [stimulation] does not always remain assured by [the person's] functional organization."[52]

Despite their highly developed nature, the physiological structures of human beings are unable, paradoxically, to provide them with the resources that they need to survive within their environment. How is this situation to be explained? One theory that may help in clarifying this paradox is Arnold Gehlen's theory of biological non-specialization. According to D. Gracia, Gehlen's theory may have influenced Zubiri's ideas regarding this matter and, ultimately, Zubiri's own understanding concerning the primary function of the human faculty of intelligence.[53]

The following is a summary of the theory.[54] According to Gehlen, every non-human animal is equipped with a particular biological

[51]EDR, 205.

[52]SH, 28.

[53]D. Gracia, *Voluntad de verdad: para leer a Zubiri* (Madrid: Editorial Labor, 1986).

[54]J. Monserrat, *Epistemología evolutiva y teoría de la ciencia* (Madrid: Publicaciones de la Universidad Pontificia Comillas de Madrid, 1984), 237–239.

https://publications.lst.edu/

specialization that enables it to survive within its environment. Such specialization is made possible by the degree of development that the animal's biological structures have reached. A concrete example of such biological specialization is in the case of a lion as evident in the sharpness of its fangs and speed with which it moves when capturing prey or warding off any aggression. Due to the advanced degree of development of its physiological structures, the lion possesses the resources that it needs to survive within, and adapt itself to, its environment.

3.2. Survival Function of Human Intelligence

In the case of human beings, there is no evident biological specialization that will enable them to survive in and adapt to the environment within which they are situated. The human being is the only animal over the course of evolution that has not developed any form of biological specialization. Without such specialization, human beings should have been at the mercy of the hostile elements present in their environment given that their physiological structures are unable—despite the superior degree of development these have—to provide the resources needed to cope with the demands of their environment.

However, humans have survived despite their biological non-specialization by making use of their faculty of intelligence. Given that their physiological structures cannot assure them of being able to give an adequate response, they have to rely on their intellective faculty; the exercise of this faculty was—and continues to be—demanded by their survival. This faculty thus compensates for their biological non-specialization. It may even be concluded that it is precisely the human being's biological non-specialization that made the emergence of the faculty of intelligence possible.

These same ideas by Gehlen are also found in Zubiri. Despite the complexity of the human nervous system, Zubiri says that "it is not always capable in and by itself of giving an adequate response."[55]

[55]SH, 96.

https://publications.lst.edu/

The human nervous system, then, is deficient in itself as it is not able to guarantee human survival. Given the deficient character of their nervous system, Zubiri says that humans make use of an elemental operation that adults usually refer to as "taking charge of the situation," i.e., analyzing the stimulation and the situation it creates in view of choosing a form of response adequate to it. This elemental operation of taking charge of the situation is none other than the exercise of the faculty of intelligence: "The mere animal structures are not sufficient for [the human being] to respond: It is the dawning of intellection."[56]

Like Gehlen, then, Zubiri maintains that "the primary function of intelligence is strictly biological: To take charge of the situation in order to excogitate an adequate response."[57] Given their biological non-specialization, humans need to exercise their faculty of intelligence in order to survive. For Zubiri, "intelligence is a biological factor in the stabilization of the species, as it is a biological factor [in providing] an adequate response in each of the individuals."[58]

Gehlen does not explain the process by which the faculty of intelligence is formed as a result of the human being's biological non-specialization. In contrast to Gehlen, Zubiri explains this process, referring to it as *hyperformalization*. As will be discussed in Part Four, the human brain will have certain structures over the course of its development that will make possible the execution of the elemental operation of "taking charge of the situation" or the exercise of the faculty of intelligence. Hyperformalization is ultimately the development of this uniquely human faculty.[59]

---

[56]SH, 478.

[57]HRP, 67.

[58]EDR, 213.

[59]Monserrat, *Epistemología evolutiva y teoría de la ciencia*, 223–227. The author interprets Zubiri's concept of hyperformalization within the context of the hominization of knowledge and gives the essential characteristics of human knowledge resulting from hyperformalization.

https://publications.lst.edu/

Part Four: Faculty of Sentient Intelligence

4.1. Hyperformalization of the Brain

For Zubiri, hyperformalization is a result of the morphogenetic process.[60] As the process of cell differentiation in the human embryo takes place, the nervous system produces what Zubiri refers to as an *excess*, something more than what is needed for the vital activity of the nervous system.[61] This excess pertains to the number of neurons with short axons that are produced in the course of the genetic development of the human nervous system: "In the case of [the human being], the enormous richness of neurons with short axons distinguishes our species from the rest."[62] For this reason, Zubiri asks: "Would it be possible to think that a brain thus structured is precisely a hyperformalized brain?"[63]

4.2. Dynamic Subtension: Structuring of Intelligence with Sensibility

The production of an excess in the number of neurons with short axons causes the structuring of the faculty of sensibility with the intellective potency. This structuring takes place through a process that Zubiri refers to as *dynamic subtension*.[64] This structuring process consists of three moments.

Zubiri describes the first moment using the concept of *exigency*. Exigency means that one function cannot continue unless it depends on another (or second) function; the first function thus exigentially

[60]Monserrat, *Epistemología evolutiva y teoría de la ciencia*, 223–227.

[61]SH, 504.

[62]SH, 525.

[63]IS, 73.

[64]X. Zubiri, *Sobre la esencia* (Madrid: Alianza Editorial, 1998), 363–365.

https://publications.lst.edu/

demands the second function for its own sake. Now it will be recalled that the human nervous system is incapable by itself of assuring that the human being can provide an adequate response to stimulation. In order, then, to enable the human being to respond adequately, the nervous system needs the agency of another function distinct from itself; this function is the intellective function.

The intellective function, then, is an exigential demand of the human being—of the human nervous system, specifically—because the intellective function assures the normal functioning of the nervous system. Without the agency of the intellective function, it will not be possible for the nervous system to comply with its task of enabling the human being to respond adequately to stimulation.[65] For Zubiri, it is precisely the production of an excess in the number of neurons with short axons over the course of the development of the human brain that makes possible the entrance in action of the intellective function that the nervous system needs for the sake of its own normal functioning.

The second moment in the dynamic subtension consists in the following: although the purpose of the second function is to ensure the normalcy of the first function, the latter is maintained in the core of the second function, formally and intrinsically sustaining it. In human beings, brain activity sustains intellective activity as it is brain activity that keeps human beings in a state of vigilance or alertness, placing them in a situation that forces them to exercise their intellective activity as well as other activities of the psyche to enable them to respond to stimulation. The brain is the organ that facilitates the adjustment of human responses according to the stimulation itself.[66]

As for the third moment, the first function formally and intrinsically modulates, in variable measure, the qualities that the second function is going to exhibit. In the human being, brain processes modulate the exercise of intellective activity by conferring on it certain qualities, such as a greater or lesser amplitude, a greater or lesser clarity, etc. They

[65]SH, 96.

[66]SH, 510.

https://publications.lst.edu/

also modulate the rhythm of intellective activity, which is adversely affected in cases of a pathological disease. In other words, the quality of the exercise of the intellective activity depends on the quality of brain activity that sustains it.[67]

4.3. Intelligence Not Created by the Brain

Brain hyperformalization, understood in reference to the excess in the number of neurons with short axons, thus causes the structuring of sensibility with intelligence through the process of dynamic subtension. Zubiri clarifies, however, that the hyperformalization of the brain should *not* be understood to mean that the brain is the organ that produces the intellective faculty. It does not follow necessarily that there is no intelligence without the brain. Such an understanding would mean that intelligence is attached to the brain itself.

For Zubiri, intelligence is attached *not* to the brain but ultimately to the germinal plasma: "the psyche is in the [germinal] plasma in passive activity, and intelligence is in the psyche as a moment of this passive activity."[68] Recall that a) the psyche is a constitutive moment of the germinal plasma, b) there is a morphogenesis of the psyche and its faculties, and c) the morphogenesis transpires *in* the biochemical processes that develop the various physiological structures of the germinal plasma.

In the case of the intellective faculty, its formation takes place *in* the course of the development of the brain. This is why, for Zubiri, just as the development of nerve cells and of the structures of the nervous system is the moment of the liberation of stimulation, which is a constitutive moment in the formation of the faculty of sensibility, so too is the hyperformalization of the brain the moment of the *liberation* of intelligence that is attached primarily to the germinal plasma.[69] Like

[67]SH, 512.

[68]SH, 502.

[69]SH, 501.

https://publications.lst.edu/

in the case of the faculty of sensibility, the nervous system is *not* the creator, therefore, of the faculty of intelligence.

Zubiri underscores the attachment of intelligence to the germinal plasma by maintaining that it is already present in the germinal plasma as *potency* and not as a faculty. Contrary to Aristotle's position that potency and faculty are the same, Zubiri maintains that there is a difference between them. Unlike a faculty, potency is incapable of producing its own acts. It will be capable of such production only when it becomes a faculty. Thus, all faculties are potencies but the reverse cannot be maintained. Sensibility is an example of a potency that is also a faculty.[70]

In the case of human intelligence, it is present in the germinal plasma as potency; it will be capable of producing its own acts once it becomes a faculty. And intelligence becomes a faculty only at that moment when it is structurally united with sensibility.[71] For Zubiri, this structuring moment occurs precisely in the development of an excess in the number of neurons with short axons that are produced over the course of the human nervous system's genetic development, specifically that of the brain.

The brain, then, is not the organ that produces the faculty of intelligence; rather, it is the organ which, because of its hyperformalization, makes possible the entrance in action of intelligence that already exists as potency in the germinal plasma. The genetic development of the brain, specifically the production of an excess in the number of neurons with short axons, makes possible the liberation of intelligence that is undergoing its own formation *in* the developmental process of the brain. And when intelligence finally emerges, it does so no longer as potency but as faculty because of its structural unity with sensibility. And the result of said structuring is precisely the faculty of sentient intelligence.

[70]IS, 90–91.

[71]SH, 503–504.

https://publications.lst.edu/

4.4. Contrast Between Pure Sensing (Sensibility) and Sentient Intelligence

How should the faculty of sentient intelligence be understood? Generally speaking, human sensibility, in contrast to animal sensibility, is intellective; human intelligence is a mode of sensibility that is essentially distinct from that of the animal.[72] To explain better the faculty of sentient intelligence, Zubiri compares it with the animal's faculty of pure sensing (sensibility). The comparison that Zubiri makes between pure sensing and sentient intelligence shows that the essential difference between the two faculties lies ultimately in the difference between the formalities proper to animals and to human beings.

Pure Sensing and the Formality of Stimulus. Under the formality of stimulus specific to the animal, the stimulus presents itself as an *other*, i.e., as something independent of the animal. Such independence is what Zubiri refers to as *objectivity*. However, this objectivity is only in relation to the animal's sensing process. This means that the animal apprehends the stimulus only as a stimulus or as merely stimulating and nothing else; the stimulus is apprehended only as a sign for the animal to respond to stimulation. Herein lies what Zubiri calls the *signitivity* of the stimulus.[73]

Once the animal gives its response, the stimulus ceases to be a stimulus. The objective character of the stimulus as merely stimulating is exhausted once the animal responds to stimulation. This shows that the objectivity of the stimulus forms a constitutive part of the animal's sensing process. Zubiri thus writes:

> Had there been no stimulation, there would not have been objective independence; the stimulus is exhausted in the stimulation. To apprehend something as mere stimulus is to apprehend it as an objective aspect of sensing, that is, as something independent, only, in sensing.[74]

[72]IS, 84.

[73]IS, 49.

[74]SH, 459.

https://publications.lst.edu/

Given that the animal apprehends something under the formality of stimulus, i.e., merely as a sign directing it to make a response, Zubiri says that the animal has *pure sensing*.[75] Since what constitutes sensing is the apprehension of something by way of impression, the animal, then, has an *impression of the stimulus*.[76] To apprehend something under the formality of stimulus means to have this type of impression. For Zubiri, what constitutes the animal's pure sensing is this impression of the stimulus.

Zubiri's description of the animal's pure sensing and of the formality of stimulus helps in explaining the automatism or the instinctive nature of the animal's behavior in the presence of a stimulus. Although it is true that the degree of automatism may be less in some animals as evident in their capacity to learn new forms of behavior—a dog being trained to perform some tricks, for example—it is still an undeniable fact that animals in general are governed by, and act according to, their instincts. Due to the formality of stimulus proper to animals, the stimulus that is apprehended merely as stimulus triggers automatically the animal's instinct to give a response to stimulation. Thus, it is the stimulation itself which is, in a manner of speaking, "in charge" of the animal, determining it to respond automatically.

Animal of Distancing. Despite the fact that human beings have instincts like animals, their response to a stimulus is not usually automatic. Unlike in the case of the animal, there is a *distance* between the human being and the stimulus, and it is this distance that explains the non-automatism of human behavior in the presence of a stimulus. This is why the human being, for Zubiri, is the *animal of distancing*. This means that human beings apprehend the stimulus as so independent that they experience it as completely detached from them. This total and complete detachment of the stimulus from the human being is the meaning that Zubiri gives to the "hyper" in hyperformalization.[77]

[75]IS, 52.

[76]IS, 53.

[77]IS, 70.

https://publications.lst.edu/

According to Zubiri, the complete detachment of the stimulus means that the stimulus is apprehended as more than just a sign of response; he refers to this as the *rupture in the stimulus's signitivity*. The stimulus continues to stimulate but the human being apprehends the stimulus as more than merely stimulating, i.e., as more than just a sign directed to the immediate production of a response. It is this rupture in signitivity that gives rise to the distance between the human being and the stimulus that is apprehended. This rupture enables the human being to plan and choose the response adequate to stimulation instead of merely responding to it instinctively or automatically. Unlike in the case of an animal, then, it is the human being who is *in charge* of the stimulus and the situation that it creates. For Zubiri, this distance between the human being and the stimulus caused by the rupture in the stimulus's signitivity means that the stimulus no longer presents itself under the formality of stimulus but under a new formality—the formality of reality.[78]

Sentient Intelligence and the Formality of Reality. The human being apprehends the notes of the stimulus as properly belonging to the stimulus (*en propio*) or as its own (*de suyo*). The stimulus does not cease to stimulate and therefore is something to which the human being should give a response. Unlike an animal, however, the human being apprehends the stimulus as being more than a mere stimulus, i.e., as being more than just a sign that elicits an immediate response. Instead of apprehending the stimulus merely as stimulus, the human being apprehends it in its character as reality, as something *de suyo*. And, for Zubiri, "reality is formally the 'de suyo' of what is sensed.…"[79] To contrast it with the formality of stimulus under which animals apprehend a stimulus merely as stimulus, Zubiri calls the *formality of reality* this new formality under which the human being apprehends the same stimulus as real.

Zubiri explains that the character of reality is not exhausted in the apprehension of the stimulus and, therefore, is not a constitutive part

[78]IS, 71.

[79]IS, 57.

https://publications.lst.edu/

of the human sensing process. For an animal, the stimulus ceases to be a stimulus once the animal has given its response precisely because it apprehends the stimulus merely as a sign for response. Now, granting that no human being was present to apprehend the stimulus, there would still be reality, i.e., the stimulus would remain being real.[80] Zubiri explains this point by saying that the stimulus is already what it is *de suyo* even prior (*prius*) to its apprehension by the human being.[81]

Given that human beings apprehend stimuli as being real, Zubiri says that they have an *impression of reality* in contrast to the impression of stimulus that animals have:

> When what is apprehended is reality, then the sensible impression is precisely and formally what I have called *impression of reality*. The impression of the animal is *impression of the stimulus*. [The human being] apprehends in impression the formality itself of reality.[82]

According to Zubiri, to apprehend something as real in impression is formally constitutive of intelligence. Apprehending reality is the exclusive, elemental, and radical act of intelligence; all its other acts, such as judging, conceiving, etc., are merely modes of apprehending reality and are therefore founded essentially on the act of apprehending something as real.[83] Now to have an impression is an act of the faculty of sensibility; to sense is to apprehend impressively. Since what is apprehended in impression is reality itself, the impression of reality, then, is an act *simultaneously* of sensibility and of intelligence. There are not two acts but two moments of only one and the same act: the sentient (sensible) moment is "impression" while the intellective moment is "of reality."[84] And this single act composed constitutively of the sentient and intellective moments is the act of the human faculty of sentient intelligence.

---

[80]SH, 460.

[81]IS, 62.

[82]IS, 63.

[83]IS, 77–78.

[84]IS, 81.

https://publications.lst.edu/

To understand further why the impression of reality is only a single act but with two moments, it will be recalled that every stimulus has a content and a formality. For Zubiri, content and formality are not the same. Content is always specific while formality is non-specific.[85] For example, a book, a stone, a house, a person, etc. each has a different content. Yet, despite differences in their content, their formality is the same—they are all real since their properties pertain to them *en propio*. Therefore, in apprehending a content, one also apprehends its formality of reality and vice-versa. Thus, instead of two, there is only one impressive apprehension—that of a stimulus with a specific content under the formality of reality, which is non-specific.[86]

Unlike animals, then, human beings have an impression of reality. There is no difference in the content of the stimulus that a human being and an animal apprehend; rather, the difference lies in the formality under which the stimulus is apprehended. In animals, the stimulus is apprehended under the formality of stimulus; in human beings, the stimulus is apprehended under the formality of reality. It will be recalled that such an impression of reality is made possible because of the hyperformalization of the human brain, i.e., because of the formation of an excess in the number of neurons with short axons, which are non-specialized neurons with a non-specific activity. For Zubiri, "this is equivalent to admitting that if our activity has a richness incomparable to that of the rest of the animals, this is because our non-specific neurofunctional activity is much richer than in the rest of the species."[87] Now, Zubiri maintains that there is a correlation between these neurons and the human being's impression of reality. What this correlation consists in is the content of the next section.

[85]IS, 113–114.

[86]IS, 63–64.

[87]SH, 525.

https://publications.lst.edu/

4.5. Correlation Between the Impression of Reality and Non-Specialized Neurons

Before explaining the correlation that Zubiri maintains between the neurons with short axons and the human being's impression of reality, it will be helpful to recall some points discussed previously regarding the two classes of neurons in the cerebral cortex and the coordination that obtains between their respective activities.

First, neurons with short axons are not specialized for reception, association, and response; their activity is non-specific in this regard, like that of other neurons whose activity is the maintenance of the brain in a state of alertness or vigilance and the organization and modulation of the centers of the cortex and its various activities. These neurons are responsible for the production of a response to stimulation. Zubiri refers to this class of neurons as *non-specialized neurons* whose activity is *non-specific*. There is another class of neurons, referred to by Zubiri as *specialized neurons*, whose *specific* activity involves reception, association, and response with regard to stimulation.

Second, there is close coordination between the activities of these two classes of neurons. The specific activity of the specialized neurons is indispensable for the non-specific activity of the non-specialized neurons since the latter's activity is produced only in and through the former's. And without the activity of the non-specialized neurons, the animal will be unable to provide a response to stimulation. The specific activity of the specialized neurons, then, is at the service of the non-specific activity of the non-specialized neurons. This coordination between the two classes of neurons exists in both humans and animals.

How does Zubiri explain the correlation between the human being's impression of reality and the excess in the number of neurons with short axons? Although Zubiri himself says that the non-specific activity of neurons with short axons is *not* the impression of reality itself, he thinks that the impression of reality is made possible perhaps by the non-specific activity of neurons with short axons. This activity may be the reason why humans apprehend something not under the formality of stimulus—as is the case with animals—but under the

https://publications.lst.edu/

formality of reality. Since the same coordination between specialized and non-specialized neurons exists in both humans and animals, and since the difference between the brain of the human being and that of the most superior of animals is due to the excess, present only in the human brain, in the number of neurons with short axons, then perhaps it is because of these neurons that the human being has an opening to reality. This is why the human being, for Zubiri, has a *cerebral* aperture to reality in the non-specific activity of these neurons with short axons. For this reason, he maintains that brain activity is a constitutive moment of human intellective activity.[88]

The intellective activity, however, is also a constitutive moment of the activity of the brain. Recall that for Zubiri, the radical act of intelligence is apprehension (of reality) and that apprehension leads to arousal, which is the first moment of the sensing process. There is arousal only when there is stimulation. Now the reception of stimulation is the specific activity of the specialized neurons. As already mentioned, this specific activity sets in motion the non-specific activity of the non-specialized neurons that are in charge not only of maintaining the brain in a state of alertness but also, and more importantly, of coordinating the activities of the cortex so that the animal will be able to make a response to stimulation. Without stimulation, then, none of the vital activities of the brain will be set in motion. For this reason, and given that the radical act of intelligence is the apprehension of stimulus (as reality), Zubiri says that the intellective activity determines *intellectively* the processes of the brain.[89]

It is clear, then, that Zubiri correlates the human brain's advanced degree of development with the impression of reality and with the faculty of sentient intelligence. Without the formation of an excess in the number of neurons with short axons, human beings would have had no access to reality. Without the hyperformalization of the human brain, the intellective potency would not have been liberated from its attachment to the germinal plasma. And had the intellective

[88]SH, 525.

[89]SH, 525.

https://publications.lst.edu/

potency not been liberated from the germinal plasma, the faculty of sentient intelligence would not have emerged as it was the structural unity of sensibility with the intellective potency that gave rise to this human faculty.

4.6. Misconceptions about the Intellective Activity and Brain Activity

Zubiri, however, is aware that the correlation that he establishes between the genetic development of the brain and the formation of the faculty of sentient intelligence might lead to certain misconceptions about the relationship that obtains between the intellective faculty and the brain. What follows are three possible erroneous interpretations that Zubiri himself anticipates and the clarifications that he makes in response to each error.

First Error: Intellective Activity as a Brain Function. Intellection depends on the functions or processes of the brain and such dependence of the intellective activity on the brain results from the dynamic subtension structuring process. This dependence is such that intellection is not possible without the brain, although it does not follow necessarily that the intellective activity is itself a brain function because of this dependence: "Intellection is something that depends on the brain, but it is not formally a brain function, which are two different things."[90]

Second Error: The Brain as Organ of Intellection. Brain processes do not think, make decisions, feel, etc. and no organic process of the brain is capable of coming up with a creative idea. For Zubiri, "the electroencephalograms of a genius and of an 'ordinary' [human being] are in principle the same."[91] Moreover, to say that the brain is the organ of intellection is to say that intelligence is attached primarily to the brain. As previously explained, Zubiri maintains that the faculty of intelligence is attached to the germinal plasma and that the formation of this faculty takes place *in* the course of the development of the brain.

[90]SH, 527.

[91]SH, 493.

https://publications.lst.edu/

Third Error: Intellection as Merely the Most Complex Brain Process. To make such an affirmation is to admit that there is no difference between the intellective activity and the processes of the brain such that the former is ultimately reducible to the latter. For Zubiri, there is an *essential* difference between them which lies in the difference between the formality of stimulus and the formality of reality. The faculty of sensibility makes it possible for animals to apprehend only the specific dimension of the stimulus. In the case of human beings, they apprehend not just the specific dimension of the stimulus but also its non-specific dimension, i.e., the stimulus's character as real, because of their faculty of sentient intelligence. The difference between the two formalities is not merely gradual but *essential* because "there is no complexification of stimuli that produces by itself the sensing of these stimuli as realities, because the impression of reality is constitutively non-specific in contrast to the impression of the stimulus that is always specifically determined."[92] For this reason, the intellective activity cannot be merely the most complicated of brain processes and is therefore not reducible to the latter.

The intellective activity, then, is not a brain function or the most complex of brain functions; neither is the brain the organ of intellection. For Zubiri, rather, the brain is the organ that makes possible, because of its hyperformalization, the entrance in action of intelligence which already exists as potency in the germinal plasma. The unitary psycho-organic activity of the germinal plasma produces *simultaneously* the organic shaping of the brain and the entrance in action, or at least the possibility of the entrance in action, of the faculty of sentient intelligence.[93] And because of the dynamic subtension process that structures sensibility with the intellective potency, intellective activity is a constitutive moment of brain activity and brain activity is a constitutive moment of intellective activity.

[92]SH, 515.

[93]SH, 510.

https://publications.lst.edu/

Conclusion

As stated in the Introduction, Zubiri does not agree with the Aristotelian definition of the human being as a rational animal. For him, it is not rationality but intelligence that essentially defines the human being. Human intelligence, however, is sentient. Zubiri relates the formation of the faculty of sentient intelligence to the genetic development of the nervous system. The first stage begins with the development of nerve cells and the progressive centralization of the nervous system, all of which are constitutive of the faculty of sensibility.

The next stage is the production of an excess in the number of neurons with short axons, which causes the structuring of the faculty of sensibility with intelligence already existing as potency in the germinal plasma. The result of these two stages is precisely the faculty of sentient intelligence. Thus, without the development of the nervous system, this human faculty would not have been formed. For this reason, Zubiri says that the formation of sentient intelligence should be understood as the genetic product of the unitary psycho-organic activity present in the germinal plasma.[94]

The animal apprehends the stimulus under the formality of stimulus, i.e., as merely stimulating the animal to provide a response automatically or instinctively. In the case of the animal, the production of an adequate response to stimulation is assured by its physiological structures. In the case of human beings, however, they do not have such an assurance because their nervous system is deficient, despite the superior degree of development it has reached, in providing an adequate response to stimulation.

This deficiency is why human beings need to exercise their faculty of sentient intelligence in order to survive. By means of this faculty, the human being apprehends a stimulus under the formality of reality. To apprehend a stimulus as real is the primary biological function of

[94]SH, 505.

https://publications.lst.edu/

sentient intelligence because it enables the human being to plan and choose the form of response appropriate to the stimulation instead of merely responding automatically to it. For this reason, Zubiri says that although the formality of reality is irreducible to the formality of stimulus, there is no break in the course of evolution from the animal to the human species.[95]

Finally, Zubiri says that just as the faculty of sentient intelligence is a genetic product of the psycho-organic activity of the germinal plasma, so too are the human faculties of feeling and volition (will). These faculties correspond to the moments of tonic modification and response, respectively, of the animal's sensing process. In the human being, "feeling is the sentient affect of the real; volition is a determining tendency in the real."[96] And the essential difference between the animal's tonic modification and response and the human being's feeling and volition is due to the impression of reality: "Only because there is sentient apprehension of the real, that is, only because there is impression of reality is there feeling and volition."[97] Zubiri says that because of the impression of reality, the human being is essentially the *animal of realities*. This access to reality, made possible by an intelligence that is sentient, ultimately distinguishes the human animal from the rest of the animal species.

[95]HRP, 68.

[96]IS, 283.

[97]IS, 283.

https://publications.lst.edu/