



# Foundations of the Principles of Non-Contradiction and Identity

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## ABSTRACT

Aristotle finds “why a thing is itself” to be “a meaningless inquiry,”<sup>1</sup> (Aristotle, 2000, VII - 17) Hume says about the propositions that express that one thing is identical with itself, “we really should mean nothing”<sup>2</sup> (Hume, 2019, p. 230) and, according to Wittgenstein (1922), they say nothing<sup>3</sup> (5.5303). However, I would like to ask how it can be self-evident for a healthy adult who has no idea about science, mathematics or logic that one thing is not another but the thing itself? I believe that the tautology, A is not non-A, but A, or short expressed “A is A,” seems so obviously true that it may help to find the origin of so-called “the laws of thought” through the medium of the clues that are given by its self-evidence.

This work aims to claim that the principles<sup>4</sup> of identity and non-contradiction are based not on human reasoning or thought but on the biological foundations<sup>5</sup>, namely reception, sensation and perception, which every known living being has. To begin, these principles and then their origin, the discerning faculty, will be explained from the point of view of John Locke. After that, with the help of some examples from biology, it will be indicated that not only the human but also every known life form that doesn't have such cognition as a human possesses has this fundamental faculty in its perception and thereby can discern its perceptibilia<sup>6</sup>. Finally, due to this fact, the biological roots of these principles will be demonstrated.

## 1. PRINCIPLES OF NON-CONTRADICTION AND IDENTITY

AS mentioned philosophers think, Locke (2000) considers that identical propositions are trifling and don't increase our knowledge (IV – VIII – 1-3). However, he inquires into the reason for the clearness of two general maxims, which are called in logic the principles of non-contradiction<sup>7</sup> and identity<sup>8</sup>. He expresses them as follows:

“it is impossible for the same thing to be and not to be” and “whatsoever is, is,” or in short, “that the same is the same, and the same is not different” (IV – VII - 4). Apart from the ontological aspect, but taking into consideration of epistemological manner,<sup>9</sup> the truth of these general maxims is self-evident. It means that we don't need any other proposition than themselves to affirm or negate them.

<sup>1</sup> Although Aristotle questions tautologies regarding substance, I would like to indicate their foundation here. He says,

Now 'why a thing is itself' is a meaningless inquiry (for (to give meaning to the question 'why') the fact or the existence of the thing must already be evident e.g., that the moon is eclipsed but the fact that a thing is itself is the single reason and the single cause to be given in answer to all such questions, such as why the man is man, or the musician musical', unless one were to answer 'because each thing is inseparable from itself, and its being one just meant this'; this, however, is common to all things and is a short and easy way with the question). (Aristotle, 2000, *Metaphysics* VII, 17)

<sup>2</sup> “For in that proposition, an object is the same with itself, if the idea expressed by the word, object, were no ways distinguished from that meant by itself; we really should mean nothing” (Hume, 2019, p. 230).

<sup>3</sup> “Roughly speaking, to say of two things that they are identical is nonsense, and to say of one thing that it is identical with itself is to say nothing” (Wittgenstein, 1922, 5.5303).

<sup>4</sup> In this text, since the concept of law can lead to a misunderstanding of these principles as laws of nature, such as physics laws, etc., instead of “law,” the term “principle” will be used.

<sup>5</sup> The discerning faculty is inquired about philosophical and biological aspects in this text. However, the chemical and physical backgrounds on which this faculty depends, like molecular recognition, shouldn't be ignored for its further analysis.

<sup>6</sup> (plural of perceptibilia): those things which can be perceived.

<sup>7</sup> The principle of non-contradiction is defined in *A Dictionary of Logic* as follows: “The semantic thesis according to which no proposition may be both true and false simultaneously” (Ferguson & Priest, 2016). It is also described in *A Dictionary of Philosophy* as follows: “The conjunction of a proposition and its negation. The law of non-contradiction provides that no such conjunction can be true: not (p & not-p)” (Blackburn, 2016).

<sup>8</sup> Identity is widely accepted in logic as “a binary relation, usually denoted by ‘=,’ which only holds between an object and itself” (Cook, 2009). It is also described as “everything is what it is and not another thing” (Blackburn, 2016).

<sup>9</sup> In this text, the concept of identity will be discussed not ontologically but epistemologically.

According to Locke, the self-evidence of a proposition lies in the immediate perception of the agreement or disagreement with its ideas (IV – VII – 2-3). By idea, he means “Whatsoever the mind perceives in itself” or “the immediate object of perception, thought, or understanding” (II – VIII – 8). Thus, these general maxims are affirmed or negated by not doing anything other than immediately comparing their ideas that have been already known. Moreover, this self-evidence actually appertains to all distinct ideas. He says, “two distinct ideas, when they are in his [everyone’s] mind, are there, and are not one and the same idea” (IV – VII – 4). Everyone perceives his distinct idea to be the same with itself and to be different from another one. Therefore, Locke associates the root of self-evidence with “the mind’s having distinct ideas” (IV – VII – 4).

For this very reason, to Locke’s way of thinking, we have as many self-evident propositions as our distinct ideas. In other words, self-evidence is a characteristic not only of these maxims but also of all other propositions –even of particular ones– regarding identity and diversity because their self-evidence depends on having distinct ideas. He says,

whenever the mind with attention considers any proposition, so as to perceive the two ideas signified by the terms, and affirmed or denied one of the other to be the same or different; it is presently and infallibly certain of the truth of such a proposition. (IV – VII – 4)

For example, the propositions “white is white” and “white is not black” are as self-evident as these two general maxims are (IV – VII – 3 – 4). Since the mind knows what the ideas of white and black are, it compares them without any help from other ideas and can undoubtedly perceive that the idea of white is the same as itself and different from the idea of black. Thus, these propositions are immediately affirmed by themselves. Once the terms in such particular propositions are understood, their truths are, without reasoning, quite apparent to everyone who has no knowledge of science, mathematics, logic, etc. Therefore, although these propositions are as self-evident as two general maxims, one difference between them unfolds: the truth of particular ones is known before these maxims, as Locke says, “before these general maxims are ever thought on” (IV – VII – 4). One who is unfamiliar with these maxims but knows the colors of white and black also knows that white is white, not black. Because we first notice identity and diversity with particular ideas.

Besides semantic analysis, it is also easy to affirm the truth of “A is A” for a person who has experienced that a thing or an idea is the same as itself, even though it seems “to say nothing.” But the self-evidence of this tautology says a lot: since the symbol “A” is immediately affirmed by itself without the need of any other proof, proposition or idea, it is not less self-evident than the principle of identity “whatsoever is, is.” Moreover, we first encounter particular ones, much earlier than the principles. It means that in order to know the truth or self-evidence of particular identity propositions like “A is A” or “white is white,” neither these general principles and general ideas are required, nor do we need to know them. We undoubtedly know the truth of “A is A” because we are capable of distinctly having the symbol A, or in Locke’s way of speaking, the idea of the symbol A.

Considering that there is no demand of any other propositions, ideas or reflection but only of themselves to be able to affirm their truths, there is nothing more self-evident

to the mind than the immediate perception of agreement or disagreement of distinct ideas (IV – VII – 4). Since we realize each idea to be the same with itself and different from another one by means of the capability of having distinct ideas, we conclude “it is impossible for the same thing to be and not to be” and “whatsoever is, is.” Thus, it is clear that particular propositions regarding identity and diversity don’t depend on these principles but that these propositions and principles depend on distinct ideas which a faculty causes the mind to have. Locke calls this ability of the mind, viz. perceiving one idea to agree with itself and distinguishing it from another one, discerning faculty.

## 2. DISCERNING FACULTY

Not only the principles of non-contradiction and identity but also our knowledge is, according to Locke, grounded on the discerning faculty of the mind. He says about its importance and function, “the evidence and certainty of several, even very general, propositions” “depends upon this clear discerning faculty of the mind, whereby it perceives two ideas to be the same, or different” (Locke, 2000, II – XI – 1) and “I grant further, that the foundation of all our knowledge lies in the faculty we have of perceiving the same idea to be the same, and of discerning it from those that are different” (IV – VIII – 3). It is not surprising that knowledge, which consists of ideas or concepts, depends on the ability that is fundamental for identifying and discerning them. Thus, the discerning faculty underlies all intellectual functions of humans. He explains having and distinguishing an idea as follows:

It is the first act of the mind, when it has any sentiments or ideas at all, to perceive its ideas; and so far as it perceives them, to know each what it is, and thereby also to perceive their difference, and that one is not another. This is so absolutely necessary, that without it there could be no knowledge, no reasoning, no imagination, no distinct thoughts at all. By this the mind clearly and infallibly perceives each idea to agree with itself, and to be what it is; and all distinct ideas to disagree, i.e. the one not to be the other: and this it does without pains, labour, or deduction; but at first view, by its natural power of perception and distinction. (IV – I – 4)

Without this faculty, there would be none of the two general maxims, no mental process or action and no intellectual functions such as thinking, reasoning, imagination, etc. So, as an illustration, to understand a sentence, we first have to be able to discern its ideas and, in addition to that, perceive their agreement and disagreement.

Furthermore, due to the discerning faculty, the mind is capable of noticing an idea. Locke says:

Concerning the simple ideas of Sensation, it is to be considered,—that whatsoever is so constituted in nature as to be able, by affecting our senses, to cause any perception in the mind, doth thereby produce in the understanding a simple idea; which, whatever be the external cause of it, when it comes to be taken notice of by our discerning faculty, it is by the mind looked on and considered there to be a real positive idea in the understanding...(II - VIII - 1)

In Locke’s view, the discerning faculty plays an essential role in identifying and knowing an idea as well as in distinguishing it from another. To discern an idea or a thing means to notice it and, at the same time its limit to what it is not. When we perceive a thing in a place at a time by our senses, we discern it from everything that isn’t there at that

time and also know that it is at the same time not in another place because we can't perceive or think two things of the same kind to be in the same place at the same time.<sup>10</sup> So, we recognize its existence as related to a definite time and place. Since thereby any other thing is spatiotemporally excluded, the mind has a distinct idea of that thing and perceives it to agree with itself. When then we perceive the same thing again at another time, the mind discerns a new idea, then it compares<sup>11</sup> the new one with the former one, and we perceive them as the same.

In conclusion, discerning faculty is first applied to particular ideas which we gain by senses (IV – I - 4) and, beginning from its first practices, our conception of identity and diversity is constituted by perceiving each thing to agree with itself, disagree with another. In this way, as in the previous chapter indicated, we immediately recognize, without reasoning or any other proof, the self-evidence of particular propositions regarding identity and diversity and the principles of identity and non-contradiction.

So far, I accept Locke's explanations about the principles' foundation. From this point on, I would like to forward his inquiry about this origin regarding human perception to its biological backgrounds with the help of the fact that the discerning faculty is a faculty not only of the human mind but also of the perception of other living beings.

### 3. EVERY LIFE FORM DISCERNs

The human is not the only living being that is able to discern; indeed, every living being that perceives things can do it, whether it has a mind, thinking, or cognition that only humans have or not. This is a common fundamental function<sup>12</sup> of perception, also reception and sensation, from the unicellular organisms to humans (Halliday, 1998, pp. 4 – 5). For example, due to its memory and perception, a cat, which doesn't have an understanding as a human has, can recognize its owner by distinguishing him from other people. Or even a cell can identify via cellular receptors its perceptibilia.

For every living being which has the abilities of growth, reproduction and response to stimuli (Martin & Hine, 2008, "stimulus"), it is vitally important to have useful information on changes in its environment and itself. Thereby, its sensory receptors, organs or organelles play an essential role in identifying these changes (Smith, 2008, p. 33). Moreover, every living being, a human, a mammal, a fish, a plant or a cell, discern its perceptibilia in various ways. While a cat can perceive a mouse by sensing different visual sensory information like size, shape and color with their eyes and by comparing its former experiences with the mouse (Frings, Müller, 2014, p. 8), some protozoans, which are unicellular organisms can detect only the presence and direction of light (Alters, 2000, p. 317), that is, distinguish the presence of light from its absence and its different directions, by their

photoreceptive organelles, namely photoreceptors which convert the light to chemical processes (Khanna, 2004, p. 67). By means of their cells that sense various information about the internal or external environment, plants can internally discern the status of their health, growth, water, etc. and externally the direction, quality and intensity of light, temperature, the time of the day and year, concentrations of some gases and direction of gravity (Buchanan & Gruissem & Jones, 2015, 18.1).

In Biology, sensation is defined as raw data acquired by sensory organs or receptors. It starts with the reception, which is, as the first step of sensation, the process of receiving stimuli, which are an organism's internal or external environmental changes that are able to activate the receptors of the organism, that is, can be discerned by them. Through this activation, the changes are converted into raw sensory information, viz., mechanical, electrical or chemical signals. Finally, in the next step, which is called perception, this data or information is interpreted by taking into account previous experiences. Thus, according to this information, of which the organism is aware not in reception but in sensation and perception, it responds to its environment (Martin & Hine, 2008, "sensation" & "perception"). For example, the reception is that the vibrations in the air caused by ringing a doorbell are received by the hearing organ, cochlea, in the ear. Then, the sensation is hearing a sound, and the perception is an interpretation of what is heard, viz., recognizing it as a doorbell ringing: it is not neighbors' but my doorbell, so I'll go to open the door.

For a better understanding of the nature and origin of the discerning act in reception, it would be helpful to dwell on receptor-ligand interaction. As a unicellular organism or the smallest unit of many organisms, a cell perceives its environment through its receptors. A cellular receptor, which is a large protein molecule inside a cell or on its surface, as its name indicates, basically receives the information (signal) from its receivables (ligand) and sends this signal to the cell through biochemical reactions which are caused by their coupling (molecular recognition) (Lackie, 2013, p. 559). The messenger (signaling) molecule, called the ligand, like a hormone or a neurotransmitter (Lackie, 2013, p. 242), is bound to a receptor only if its surface is consistent with that of the receptor (Frings, Müller, 2014, p. 68). In addition, as one key on a key ring that holds diverse keys can unlock the lock, although some of them may fit into the lock<sup>13</sup>, only the corresponding ligand can trigger stimulation of the receptor that it binds to (Matthews, 1993, p. 33). The receptor detects its object (its specific ligand(s)) independently of the organism's consciousness<sup>14</sup> and distinguishes it from the others that are not one of the members of its perceptibilia. In other words, before sensation and perception, such a basic unconscious distinction is involved in the reception. Therefore, I assume that reception is the discerning faculty's

<sup>10</sup> Or in other words, it is not possible to perceive or think a thing to be and not to be in the same place at the same time. Locke (2000) says,

For we never finding, nor conceiving it possible, that two things of the same kind should exist in the same place at the same time, we rightly conclude, that, whatever exists anywhere at any time, excludes all of the same kind, and is there itself alone. (II – XXVII – 1)

<sup>11</sup> For the purpose of this text, it isn't relevant to discuss according to which criteria both ideas are seen as the same.

<sup>12</sup> The function to distinguish things which reception, sensation and perception involve shouldn't be confused with the discerning faculty, which belongs only to perception. It will be discussed in this chapter.

<sup>13</sup> Although there are other explanations regarding ligand-receptor binding or ligand recognition, e.g., the induced-fit model of Koshland, I mention here one of the essential explanations: The analogy "key and lock" was proposed in 1894 by Emil Fischer.

<sup>14</sup> I take consciousness in this text as awareness which every life form (from a cell to a human being) has in different degrees. E.g., cellular consciousness is not as a human has but means that a cell is aware of the internal and external environment. Margulis and Sagan (1995) say, "Not just animals are conscious, but every organic being, autopoietic cell is conscious. In the simplest sense, consciousness is an awareness of the outside world" (p. 122).

-and so principles'- earliest<sup>15</sup> biological origin which depends on chemical and physical processes like molecular recognition in receptor-ligand interactions and mechanical detection of vibrations within the cochlea of the ear. However, since the organism is unaware of the sensory information in reception, discerning faculty is not a faculty of reception. Neither it belongs to sensation. Because, in spite of the fact that an organism starts to discern within sensation, the sensory information is brought to the organism's attention for further processing, such as deciding a response only within perception. On these grounds, I take the discerning faculty as a faculty of perception.

Considering the earliest development stage of a human being, a zygote<sup>16</sup> which is one diploid cell that arises from the fusion of a male's sperm and a female's egg receives, senses, perceives and discerns like any cell a long time before her or his cognition arises. Moreover, an adult human body which consists of a hundred billion cells also has similar but more complicated processes from reception to perception. For example, the human eye's light-sensitive cells, called photoreceptors, detect light through chemical changes. Only after electrical signals that the photoreceptors convert these changes into are sent to the brain for visual processing do we sense the light and then perceive the object(s), e.g., a lamp, and the "ideas" of the light and the lamp at this moment come into the question. Briefly stated, the photoreceptors distinguish light (receptibilis) from dark without our awareness, and then we discern the light, lamp and other objects (sensibilis, perceptibilis) within sensation and perception. That is, discerning faculty works similarly for every living being, even though the complexity of these processes is diverse from a cell to a human.

Of course, not all living beings have been mentioned above. Nevertheless, the fact that mentioned ones other than humans can also discern their perceptibilia implies that discerning is a faculty that belongs not only to the mind or perception of humans but also to the perception of every living being.

#### 4. FOUNDATIONS OF THE PRINCIPLES OF NON-CONTRADICTION AND IDENTITY

As indicated in the previous chapter, a common faculty of perception of every living being is to discern its perceptibilia. Thus, every living being devoid of cognition that humans own has, to varying degrees, a similar act, like a human's simple perceiving the one to be the same with itself and not to be another, which is the basis of the principles. However, why is it for the sake of these principles' foundation so relevant to prove that every living being owns the discerning faculty and a similar perception of agreement and disagreement?

In the second chapter, we have also seen that the self-evidence of the principles of identity and non-contradiction, according to Locke, is related not only to these principles themselves but also and foremost to particular distinct ideas which, before abstract ideas, the mind firstly deals with. That is to say, the identity propositions such as "white is white" are as self-evident as the maxim "whatsoever is, is." Because the self-evidence of these principles and all propositions

regarding identity and diversity is rooted in the ability to perceive the agreement of an idea with itself and its disagreement with others, namely in the faculty of the mind by means of which is to know an idea and discern it from others.

Likewise, for the other living beings that have no such "ideas" as the human mind has, discerning faculty underlies the identification and negation "a perceptibilis is the same with itself and not another one" in their perception. These living beings, which are capable of neither constituting identity propositions nor inducing<sup>17</sup> the maxims of identity and non-contradiction, nevertheless discern particular instances (perceptibilia) and, thereby, perceive, in various degrees, their identity and diversity. For example, a cat that can recognize the person who domesticated it knows its owner and "its owner is not the other one" when it meets him or her, although it cannot constitute, express or understand these propositions as a human can. In a more primitive manner, with the help of sensory receptors which can distinguish the bright light from the dim light, some protozoans perceive the dim light, bright light and "the bright light is not the dim light" and, with their photoreceptors, plants perceive day, night and "the day is not the night."

Similar cases are also encountered in reception and sensation. In a much more primitive way and independent of an organism's consciousness, for a cellular receptor, its ligand is not non-its-ligand, viz., its ligand is not the ligand that does not correspond to it; thereby, all other ligands are excluded. In other words, in the reception of a cell, the ligand is what the ligand is and not another one. While, for the thermoreceptors, which are temperature-sensitive cells in the human skin (Martin & Hine, 2008, "thermoreceptor"), cold is not warm, for the photoreceptor cells in the human eye, light is different from the dark. As mentioned, not in reception, but only beginning from sensation, we are aware of this information, so sense and discern the light or cold. Thus, even in our sensation, the cold or light is the same with itself and not another one, not hot, not dark. In the perception, we know that the lamp, which is an artificial light source, is the same with itself and not the other one<sup>18</sup> and that, therefore, the mind has, with Locke's concepts, the "distinct ideas" of the light, cold and related objects, lamp, air, etc.

Discerning faculty which underlies the principles "it is impossible for the same thing to be and not to be" and "whatsoever is, is" belongs not only to the human mind but also to the perception of every living being. Even though the other living beings cannot induce these maxims from their particular experiences as a human does, regarding their perceptibilia, they are, in different degrees, able to perceive the identity and diversity of particular instances, namely that it is what it is and it is not the other. Since even those that lack a cognition as a human has are capable of discerning their perceptibilia and thereby perceiving their agreement or disagreement without any need of reasoning, although these principles have been matured in the human mind, their foundations lie not in it but in perception's discerning faculty whose biological origins are reception and sensation.

<sup>15</sup> The biological origins of the discerning faculty won't be handled further in this work.

<sup>16</sup> "Zygote: Diploid cell resulting from the fusion of male and female gametes at fertilization" (Lackie, 2013, p. 724).

<sup>17</sup> Other living beings cannot induce the principles of non-contradiction and identity, although most animals are capable of inductive and deductive reasoning. For inductive and deductive reasoning in animals, see "Inductive Reasoning" in *Encyclopedia of Animal Cognition and Behavior* (Sauce & Matzel, 2017).

<sup>18</sup> I assume that these processes happen in a healthy person who isn't misperceiving or hasn't illusions in this case.

## 5. CONCLUSION

I have started with the question of why a simple tautology “A is A” is obvious and tried to answer it with Locke’s point of view: the self-evidence of this tautology, a particular identity proposition and the principles of identity and non-contradiction are based on the same origin, that is, having distinct ideas which are possible through the discerning faculty.

However, this ability doesn’t belong only to the human mind. Every living being should be able to be as aware of its inner and outer environment as possible in order to survive. This fact imposes on each of them certain similarities, which the faculty underlies, such as identifying and distinguishing things. Therefore, for a living being, the discerning faculty is the sine qua non and not only faculty of the human mind or perception, but of perception of every living being, in fact, which is rooted in reception and sensation.

Consequently, considering the facts that this faculty and thereby the identifications and negations are even basically found in the perception of every living being devoid of cognition, which a human has, I conclude that the foundation of the principles is neither the human mind nor thought, but perception whose earlier biological origins lie on reception and sensation which depend on physical and chemical processes.

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