

Classical Logic, Some of its Limits, and the Psychological Normality

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Abstract: *This article identifies some situations of linguistic ambiguities and how general logic tries to solve them and it analyzes the influence it can have in particular situations. Since the topic is vast, we stopped at the ambiguities of language caused by identity. First, the attempt to solve the problem was the enunciation of the laws of logic, namely the principle of identity, and we followed its limits. There are analyzed three aspects emphasizing the degree of remaining ambiguity: the relationship between intension and extension, vague terms, and symbolical-metaphorical thinking. Each of the examples given accentuated the limits of classical logic in the face of the natural language ambiguity problems. Ambiguous situations do not only have effects on logical or communicative levels; we also showed the impact on the fields of psycho-social interventions: therapy, counseling, and education.*

Keywords: *laws of logic; the principle of identity; psychological normality; fallacy vague predicate*

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1. Introduction

When in the title of an article the main reference is “language”, many sciences are tacitly pointed out. This is the reason why it is compulsory to have clear boundaries in the universe of discourse. Language is not considered just a modality of communication or a formal system, but “an important source of reality and reality-constitution itself” (Fløistad, 1986, 4). In the midst of this reality, the philosophy of language emerges. In addition, the logic has not been focused only on formal aspects but also has developed in the direction concerning natural language. In this condition, we could talk about language ambiguity, not from a purely linguistic point of view, but from a logical one, and still keep contact with natural communication and human daily realities.

Hence, we are face-to-face with a “big term” as *Logic*. The situation would not have been so complicated if we had talked about logic 70 or even 50 years ago. But today, the degree of complexity of this science has increased enormously. Due to this, it is almost impossible to speak about logic as a unified science. The heterogeneity of the answers to the “what is logic” question has given us a large area of concepts and research fields. To observe how complex this science has become, it is enough to look at the table published in the Handbook of Philosophical Logic (Gabbay & Guenther, 2001, 2018, X-XIII). And there, it is only presented a part of logic called “philosophical logic”. Another part is in complementarity and it was called “mathematical logic”.

Therefore, the perspectives on logic are large and complex. The definitions of Logic could swing between the ideas of the universal science (Russell 1903), the science of correct thinking (Boole 1854), “the study of reasoning” (de Swart, 2018, 1), “the study of arguments” (Cook, 2009, 174), or even “the study of consistent sets of beliefs” (Hodges, 1977, 13). This is one of the reasons why, in this article, we have not focused on the relationship between logic and psychology or, how a branch of logic could be used to analyse “cognitive balance” and “psychological normalcy”. We have not even developed the analyses of language, the “primary source of problems in philosophical logic” (Jacquette 2006) from a philosophical logic point of view. To illustrate, we chose a particular aspect of logic: the study of identity.

Here we will focus on the common sense of logic, the so-called “logicality”, which lies in the deep beliefs of “being logical”. In this context we could talk about logical dogmatism “paying attention to how things appear.” (Jehle & Weatherson, 2012, 95). The “logical dogmatism” is not about some theoretical aspects or directions to which inquiry will lead, but to the dogmatic persons who consider that classical logic provides universal answers. They have the subjective impression of knowing logic. Unfortunately, this is just a personal impression. Logic education is poor, and there are few real scholars in this field. Caused by the logical impact on “correct thinking” dilettantism can be very dangerous.

The clarity of communication is directly related to correct thinking. The right transmission and reception of messages is a necessary part of what is called psychological normality. But what is normality, how can we identify and define it? First of all, the idea of normality has changed, being a leitmotif of the history of psychology. It has reconfigured itself according to traditions and idiosyncratic ways of thinking, and the ethos of society as a whole. It changed course in a process of adapting to discoveries in psychology and psychiatry by introducing and withdrawing, as appropriate, new elements from the term's intension. From the point of view of extension, the definition can only be achieved statistically, considering that the average establishes normality. A deviation or two from the standard can be considered part of normality.

“In any given behavior or trait, normality is being average or close to average. Scores falling within one standard deviation above or below the mean, the most average 68.3% of the population, is considered normal. Normality may extend up to two standard deviations away above or below the average for a total of 95.7% of the population. Meanwhile, abnormality is the statistical rarity, falling in between two and three standard deviations away above or below the average, which is 4.3% of the population.” (Brown, 2019)

Returning to the concept of intension, the definition of normality has been done negatively, specifying what normality is not, rather than what it is. That is why it has been defined, in many situations, concerning the contradictory term: “abnormality” (Weckonicz & Liebel-Weckowicz, 1990, Brown, 2019). In the APA definition of normality, we can observe that from five, there are three negative criteria (a, d, e) and only two positive (b, c).

“normality (*n.*) **1.** a broad concept that is roughly the equivalent of mental health. Although there are no absolutes and there is considerable cultural variation, some flexible psychological and behavioral criteria can be suggested: (a) freedom from incapacitating internal conflicts; (b) the capacity to think and act in an organized and reasonably effective manner; (c) the ability to cope with the ordinary demands and problems of life; (d) freedom from extreme emotional distress, such as anxiety, despondency, and persistent upset; and (e) the absence of clear-cut symptoms of mental disorder, such as obsessions, phobias, confusion, and disorientation.” (APA)

We consider the APA definition relevant to this paper, looking at the effects on internal conflicts, capacity of reasonable thinking, emotional distress, mental confusion, or disorientation. We deem that logic, especially logicity could have an important impact on this kind of problem. Logic is not only an abstract science but holds an important effect on our daily lives, effects that have not been studied enough.

2. Logic, identity, and ambiguity¹ in language

Since its inception, the main goal of logic has been eliminating ambiguities in thought. Clarity in thinking, the ability to identify errors, and the ability to eliminate seemingly correct judgments (sophisms or fallacies) are some of the constant efforts that can be followed throughout the history of logic. These actions were not simple theoretical speculations or mind games, they developed in response to deep needs of a *paideic* (educational) or psycho-social nature. Even today, the modern development of logic is partly a consequence of the unsolved problems that populate natural language, the relation with the future, the reports between realities and beliefs, etc. Each of them may or may not be a successful attempt to solve the problems of ambiguity.

One of the first levels of ambiguity is related to words. Through its formal structure and language, a word leaves a single imprint, a single sign². While this is the case, the decoding of this sign brings with it multiple meanings. First of all, we are talking about words with phonetic similarity and spelling, homonyms (e.g. present, right, kind, current). The homonyms with only one similarity are less sweeping: phonetic similarity – homophone (e.g. see/sea, wright/right, know/no), or spelling similarity – homograph (e.g. bow, record, does). Situations of ambiguity are also determined by paronyms, similar words from a phonetic or spelling point of view (e.g. conjuncture/conjecture, eclipse/ellipse, word/world).

For the logical approach, such ambiguities were clarified by developing universal laws of thought. Firstly, logicians identified what counts as intuitive and clear, and what is interpreted in direct relation to common sense formulas. Once this succeeded, consistency could not be denied, thus these formulas could play the role of "axioms of correct thinking". The simplest, but most important, is the “law of identity”. This can be rendered as: “A is A” or “Everything is itself”. We could consider this “either the supreme metaphysical truth or the utmost banality” (Hodges 1980, 164). However, the law of identity represents more. Briefly said it refers to the fact that, in a well-determined context (universe of discourse), when we refer to an object, situation, or phenomenon called "A", we must use the same meaning throughout. The form (the way of writing,

¹ Because it is intuitive and close to common sense we will use the term ambiguity to provide any form of random or systematic contradiction and any system-level inconsistency.

² We are primarily concerned with phonetic writing. In the case of ideograms, they partially solve the problem, the number of homographs being reduced considerably, leaving only the problem of the spoken language, homophones remaining in an important number.

or the sound) is not important, but what it signifies. The law also refers to the situations in which we use synonymous formulas. For example, if we talk about Everest (English), Sagarmāthā (Nepali), Chomolungma (Tibetan), etc., or the “Earth's highest mountain” we denote the same object. What is important is the denotation and not the form of communicating it.

To eliminate ambiguities related to the principle of identity we must then consider several norms: to mean consistently at all times, to keep the same perspective, and to pursue the same qualities in our way of referring. An example of this might be the sentences: “The Sun nourishes plants and sustains life on earth” (1). and “It is also the one that kills, scorching everything in his path.” (2) These two sentences are to some extent inconsistent with each other in an evident contradiction. But in reality, we talk about different actions and properties of the sun. Even though we talk about the same term "the sun", sunlight (in example 1) and solar heat (in example 2) are different elements with different effects on the same object. At the same time, balance (1), and excess (2) are different perspectives. We cannot speak generically about the sun by referring to it as a single element without analyzing the context. And this is a random example. There are many situations where we think there is a complicated logical ambiguity when in reality it is just a different perspective, placed in the same context. That is why it is very important to ensure that, both the sender and the receiver of the message relate to the same referent, from the same perspective. Increased attention to how key terms are received and interpreted can provide clarity in communication.

At first sight, it seems that the problem of language ambiguities caused by lack of identity has been solved. In the case of natural language, of course, total control of these logical laws cannot be achieved. Some limits cannot be crossed and, therefore, we cannot always provide total clarity.

“In a natural language, the univocity of signs is not, as in an artificial language, a condition required under all circumstances. As a result, a reinterpretation of signs is always possible, and this prevents us from deciding, once and for all, whether a thesis is true or false by means of a formal criterion.” (Perelman, 1981, 459)

Thus, the attempt to impose the principle of identity on natural language has often brought more confusion than clarity. That is why it is important that, when we refer to the principle of identity, we go beyond the limits of classical logic, to contextualise and follow the nowadays developments of logic. We will analyse some examples below.

3. Intension, the complexity of terms, and the relativity of thinking

We can identify problems of ambiguity and logical consistency even in the situation of simple and clearly defined language. One of the effects of the principle of identity is ontological. For instance, an existential (i.e. object) will always be identical to itself. Only in this situation, does the *correspondence truth* make sense. The relationship between an assertion (could be a proposition) and reality can render the truth or falsity of the proposition. From an extensional point of view, an object is an ontological component without the qualitative perspective related to the intensional aspects. Even in reality, we cannot separate objects from their qualities, in our thinking and from a logical perspective we could analyze them from different points of view. I will give a few examples.

Suppose we take a mathematical object, the angle AOB with the angular point O. It is made up of two rays OA and OB. Point O has three roles, it is the origin of the rays OA and OB and the vertex of the angle AOB. In this context the question "What does point O represent?" can be confusing. The correct answers to this question are: a) "O is the vertex of angle AOB"; b) "O is the origin of the ray OA" and c) "O is the origin of the ray OB". Among the three answers, the only obvious one that respects the context of the discussion (and implicitly the idea of the principle of identity) is a). Answers b) and c) are derivative, proving a higher way of thinking and knowing. But this is done by partially de-contextualising the discussion.

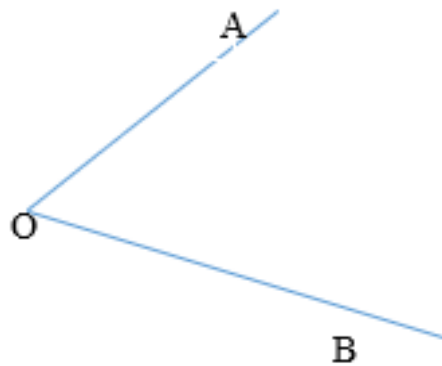


Figure 1. Angle AOB

Now, consider a mathematics class: a teacher asking this question and getting the answer b) or c). A simple "right" or "wrong" answer is insufficient and can cause major confusion at the theoretical level. If the teacher said that this answer was "incorrect", the theoretical confusion can be transferred to the psychological level, causing frustration and rebellion (if the student knew why he said this). Even when the teacher receives the answer a), it is not enough to give simple feedback, answering "correctly". In this case, on a rigorous grid test type, correctly developed, with a higher degree of difficulty, the student will not be able to give the correct answer a), b), and c) because his ability to extrapolate was limited by creating a wrong automatism.

Another example can be given in the relationship that exists between the "Evening Star" and the "Morning Star". Today we know that in both cases the extension is the planet Venus, and that from this point of view, the sentence *The evening star is the same as the morning star* can be considered true. But, can we say with certainty that this sentence is true? Can we reduce a term to its extension? Does the intension of the utterer (positioning on the firmament, role, time of day it appears, etc.) mean something? We could adopt a deflationist position, but in this situation, the intension is more important than the extension. Even the name is determined by it.

We will expand on this situation by giving a similar example. It is a common situation in English comprehension tests. Can we infer from the sentence "Andrei is Dan's best friend" the truth of the sentence "Andrei is Dan's friend"? The answer is yes, from an extensional perspective. And generally, when we refer to such situations we refer to extension. It is intuitive, and part of the common sense. But, if we refer to the intension, the perspective changes. A simple friend does not have the "best friend" qualities all at once. And then, the answer to the question: "Is it true that Andrei is Dan's friend?" could be "No, Andrei is Dan's best friend" which intensionally means much more. Can we consider that the person who says that the sentence "Andrei is Dan's friend" is false because he sees the term "best friend" from the perspective of intention is thinking wrongly or, he does not know English? Indeed, they think differently than the majority of language users, but it is not necessarily an error. We could say that on the contrary, they see more. What do we do with this kind of thinking in the case of an educational system? Do we deny it or encourage it?

These examples show how carefully we must look at notions we tacitly hold and the questions that seem certain, and indubitable. Thinking is not a one-way process, and even when we know that there are elementary laws of logic, behind a presumed wrong answer can be deep analyses and interpretations. This search for the meaning of an answer becomes more important since in psychology or psychiatry "uniqueness" can be ambivalent. To be unique automatically isn't something wrong. It could be deep thinking, a different kind of thinking, or in the worst situation a deviance, or illness.

4. The vague terms and analysis levels

Now, after observing how complex the notions can be, we will further complicate the debate with the use of vague terms. First, we can highlight the nature of vague predicates. “A vague predicate is a predicate that allows for borderline cases or that is susceptible to the *Sorites* paradox.” (Cook, 2009, 305) The borderline cases take place when you cannot say for an object “a” is part of not of the extension of a notion. The *Sorites* paradoxes³ express in a different modality the same situation: if we have a series of objects $a_1, a_2, a_3 \dots a_n$ (i.e. a *Sorites* series) and a predicate Φ we could have in the same time that: (1) a_1 is a clear case of Φ . (2) It is a natural number i , if a_i is a clear case of Φ , then a_{i+1} is a clear case of Φ . (3) It is a n , that a_n is a clear case of $\sim \Phi$. In a normal situation, these three sentences could not be consistent.

The examples are predicates as "beautiful", "good", or "bad". The extension of these adjectives was formed behind generalisations, public perceptions, traditions, local ethos/spirit, etc. Thus, to the question of whether Picasso's painting *Guernica* (Urquhart 1986) is beautiful, we cannot have a universally clear, precisely univalent answer (yes or no). To solve the ambiguity of these types of notions the principle of identity is not sufficient. The other principles of Aristotelian logic (the Law of Non-Contradiction and the Law of Excluded Middle) did not solve the problem either. In the new context, the transfer is made from the notion to the proposition, and the vague notion will be predicated in a classical propositional structure of the S-P type. The fact that the predicate is a vague notion is transferred to the uncertainty of the truth value of the proposition.

But, even through this change, the problem remained open for more than two millennia, until the 20th Century when approaches that belong to what we can generically call non-classical logic appeared. One of the pioneers in non-classical logic is Lukasiewicz (1913) who presents an intermediate variant between true (1) and false (0). But, as he observed in 1920, introducing this value is not enough to resolve the vagueness (Simons 2023). An unlimited number of variations can be entered between 0 and 1.

This was the beginning of multi-values logic and the first steps to fuzzy logic. Zadeh (1965, 1971, 1975) adapt fuzzy thinking to logic. The truth values that can be rendered numerically that $[0,1]$ have continuous unlimited intermediate values. That could be understood as true, very true, not very true, etc. From here, fuzzy logic was developed in multiple scientific directions with an important impact on society.

“Fuzzy logic and set theory have been enormously successful as tools in engineering and artificial intelligence, and many intelligent control systems from elevators to washing machines have been designed using fuzzy logic. However, as an approach to vagueness it has not been widely accepted in the philosophical community. Part of the resistance may be due to the fact that without the ‘fuzzy linguistic values’ the approach imputes too much precision to vague contexts, and on the other hand the ‘fuzzy linguistic values’ seem too unclear and undeveloped to be philosophically respectable. It is also possible that philosophers lack the mathematical sophistication to fully appreciate the approach”

In our vision, such solutions offer alternatives and reduce ambiguity at the general level. However, at the individual level, the problems remain. This could not be an answer to the epistemological, ontological, or even psychological questions.

Thus, adjective-like predicates are not the only vague terms. Most of the terms that correlate with the axiological universe, or that constitute topics of debate for social, economic, political, or, even, natural sciences are not clearly defined. These terms with vague meanings could be identified in every debate, de Swart comments on this:

“An essential ingredient for a good discussion is that all discussants involved know what they are talking about. Nevertheless it rather frequently happens that people talk past each other. The cause is then that the topic of the discussion is extremely vague and therefore has a different meaning for everyone involved. Examples of words with a vague meaning are: democracy, slavery, intelligence, socialism, capitalism, power, green, sustainable.” (de Swart 2018, 500-501)

³ To explain the *Sorites* paradox we adapted the explanation of Cook (2009, 305).

Sometimes the appeal to statistics could be a way to solve the problem. One of the examples was the definition of the sense of the term “normality”, which we presented in the introduction. But this is not enough. This problem of vagueness was equally important. It was so important that philosophy introduced its most radical self-censorship, analytic philosophy. The Vienna Circle, whose vision was so well expressed by Carnap (1932), wants to eliminate all ambiguities of language. This meant a philosophical discourse without relative, vague, or abstract terms, limiting philosophy to defining terms for the natural sciences. Thus the methodology specific to the natural sciences or mathematics became a model for philosophy. Within logical empiricism and analytical philosophy, formalisation becomes an important tool for the development of thought by and large.

But, of course, the problem of vague terms was not solved. A characteristic of vague notions is relativity and contextualisation. The reference to them varies from one person to another and from moment to moment, depending on the context. At this point logic shows its limits, leaving other sciences (such as psychology) to establish causes and perhaps regularities (laws).

5. Symbolic-metaphorical thinking, identity, and hermeneutic ambiguity

The statement of logical principles represents the moment when metaphoric-symbolic thinking is separated from the structures of classical logic. Magical, mythical, religious, and poetic thinking, are just a few forms that we find of the forms of thought in which the principle of identity does not operate. The example of prelogical thinking given by Lucien Lévy-Bruhl (1910, 21) and reiterated by Anton Dumitriu (1969, 16-17) shows how this type of thinking operates. In the case of the Bororo Tribe, the identity of a person with the tribe totem, Arara parrot, was total. He was a human being and a parrot at the same time.

The term "inferior" used in the title of Lévy-Bruhl's book (which has no meaning in contemporary discourse) would lead us to the idea of an archaic and outdated system of thought that you can no longer find today. On this, the example given by Boghossian (2006) brings to the front the situation from 1996: the New York Times article (22nd of October 1996) "Indian Tribes' creationists Thwart Archeologists" mentioned the intervention of Cheyenne River Sioux official, Sebastian LeBeau in the evolutionism-creationism debate. The Sioux consider themselves to come from buffalos. They are Buffalo People. We can remark on how a new kind of thinking brings an unexpected middle ground to the dichotomous debate: are we created by God, or have we evolved from apes?

Within these systems of thought, classical logic loses its importance. As I stated before, reducing natural language to a logical-formal one is not possible. This attempt is yet another form of the search for the perfect language that has accompanied the world since the beginning of its history (Eco 2002). Knowing the language in which there was a perfect correspondence between word and object/action gave the "magician", who would have possessed it, absolute power.

Since the classic version no longer worked, a repositioning of logic was sought concerning these types of thinking. One of them is that of the logic of Hermes (Noica 1986, Dima 1994) where the classical logic is replaced by a hermeneutic logic. In this new context, vague takes on a different meaning and statistics no longer have a role in its identification. In this logic, Socrates (Aristotle's example) is no longer mortal because is not an unknown person. He became a *holomer* (an individual that change the universal/general). We can present face-to-face cultural immortality with physical mortality. This new logic has a huge potential. There are new kinds of thinking and new kinds of syllogisms. Noica (1986) identified six modalities of judgments called *synaethic*.

But these limits are related to types of reasoning. If we return to the problem of identity and the object-subject relationship, we realise that the interpretive potential is almost unlimited. Let us recall the arguments of Umberto Eco (1962, 1990) who presents how in different contexts the same message can be interpreted in a multitude of variants. De-contextualisation exponentially increases the number of possible interpretations. In the case of psycho-social interventions such as counselling or therapy, the interpretation component plays a fundamental role. The ability to contextualise, personalise, and correctly interpret the message is paramount. The limits of rigid

classic logic, applied theories, and techniques must be overcome, openness based on experience helps, in many situations, to find the best solutions.

6. Conclusions

The problem of language ambiguities is a common problem that we encounter daily and it is often neglected in many crucial situations. At best, it causes communication inadequacies and confusion in the reception of messages. Neglecting the confusions can amplify the negative effects causing wide communicational breakdowns. In the case of predispositions or the existence of prior social integration problems, we can observe an exponential amplification of cleavages with negative effects on the person's psycho-social integrity. We can consider that "language ambiguities" represent a problem that is not limited to confusion in communication but has a wide impact on the integrity of the person.

If we consider that the amplitude of a communication problem represents the difference between the transmitted message and its decoding by the receiver, concerning language ambiguity its negative impact is directly proportional to the amplitude. The less clear the message, the more likely it is that we will not understand and that the receiver will not have the ability to decode what was transmitted. In the same ratio is the difficulty of identification and the depth of the effects. Therefore, to avoid negative effects, everyone has to identify ambiguities and stabilise the communication approach.

This is not easy, nonetheless. Common sense is not enough to identify and solve these problems. The appearance of logical correctness is a habit in natural language. The very way in which reasoning is structured allows this. Read tells us on this:

“It is well known that such a theory of validity has some unintuitive consequences. For example, it follows that all arguments with a necessarily true conclusion, and all those with inconsistent premises, are valid.” (Read, 2010, 19-20)

In this case, sophisms accompany speeches, debates, controversies, and value judgments. Related to identity we can think of the *authority argument*, *hasty generalisations*, *the use of double meaning*, the *straw man fallacy*, etc. What can we do in these situations? First of all, knowing elementary logic helps. It strengthens common sense and develops a heightened awareness of common errors. But this basic knowledge must be accompanied by caution. Dilettantism doubled by too much confidence is as dangerous as ignorance. As I have demonstrated throughout this article, classical logic has shown its limits in many situations, and knowing current developments in logic is a complex matter of professionalism. That is why we recommend caution, openness, understanding and, if necessary, calling a specialist when faced with language conundrums that seem hopeless.

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