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Logical Normativity and Common Sense Reasoning

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Abstract. Logic, considered as a technical discipline inaugurated by Aristotle and typically represented by the variety of the modern logical calculi, constitutes a clarification and refinement of a conviction and practice present in common sense, that is, the fact that humans believe that truth can be acquired not only by immediate evidence, but also by means of arguments. As a first step logic can be seen as a "descriptive" record of the main forms of the arguments present in common sense, but the fact that some of these patterns can actually allow for the derivation of false consequences from true premises imposes the task of making explicit what patterns correspond to a "correct reasoning" and what not. At this point logic (that contains the presentation of such patterns) appears endowed with a "normative" characteristic. This amounts to saying that logical calculi are intended to adequately mirror the intuitive notion of "logical consequence" and in this sense they cannot be totally arbitrary or conventional, but must satisfy certain basic requirements such as the conditions of soundness and (as far as possible) of semantic completeness. In such a way they are "judged" according to the fundamental requirements present at the level of common sense and appear as "idealizations" of the kinds of reasoning practiced in common sense. For this reason also several kinds of logical calculi are fully justified since they make explicit in an idealized form the concrete ways of reasoning that are imposed by the particular domain of reference of the discipline in which they are used and which are basically recognized in common sense.

Keywords: Logical normativity; intentionality; common sense reasoning; logical calculi; logical consequence.

The Founding Value of Common Sense

We intend to maintain in this paper that common sense provides the necessary framework within which to seek a normative basis for logic, understood as a discipline that is in one way or another "technical". It would be certainly important to first precisely define what is meant by *common sense*, but supplying such a definition in a satisfactory manner would be too costly in terms of space. We will, therefore, supply some initial clarification, allowing a definition to emerge gradually as the paper goes on. It seems appropriate, for such a purpose, to distinguish between two expressions which, though not present in all European languages, exist in English, Italian, French, and in the Romance languages in general: "good sense" and "common sense". "Good sense" has an essentially *practical* meaning and is characterized by those criteria by which any normal, "sensible" persons abide to manage their own

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life in the choices they make every day and which correctly guide their actions, regardless of their culture, level of education, or ideological affiliation. Conversely, the term "common sense" would suggest a series of concepts and beliefs of a *cognitive* nature which are truly "common" to men and women of a specific era and culture; they are not based on specialized skills, but are accepted as natural and self-evident, as correct *opinions*, even without any reflection that would provide a basis for these beliefs. Goethe, for example, in various passages of his works in which he discusses *Menschenverstand* (a unique term in German that covers both meanings of common sense), observed that while the first (practical) meaning indicates an innate, reliable ability shared by all normal human beings, he called for a certain wariness regarding common sense understood according to the cognitive meaning, since it can be fraught with errors and misunderstandings, and he added further that, while a work of intellectual elaboration may perturb the clarity of insight of common sense understood in its practical sense, it is essential to test the views of common sense understood at the cognitive level. It is not necessary to start a discussion on the different values assigned to these two forms of common sense (the difference seems generally acceptable, but it would be also interesting to investigate the interrelationships, which are certainly not negligible, that exist between them). We want simply to make clear that, throughout the rest of this paper, we will limit ourselves to considering the *cognitive* aspect of common sense, since it is the one of interest to the problem of logic.

A fact that is obvious at the common sense level is that we are able to support some knowledge *on the ground* of *immediate* evidence, while other knowledge is affirmed *on the ground* of *argumentation*, that is, by a particular intellectual procedure, which we call *reasoning*. We are also accustomed to say that the "strength" of such a procedure rests on the fact that such knowledge must be "logically" admissible, and in such a way we are able to discern how the notion of *logic* is also part of common sense. Obviously, one could observe that such a notion has entered into common parlance as a consequence of the construction of logic in a technical sense and, moreover, that the majority of people reason very well (that is, correctly) even with no knowledge of logic in the technical sense, whereas it is not granted that those people who have some technical training in logic reason perfectly in their daily arguments. This is not, in any event, a problem; on the contrary, this shows that "logic" in a technical sense can, through an exercise of self-reflection, be considered a sort of explication and codification of argumentative processes operating within common sense. But is this link simply of a genetic nature (logic "emerges" from common sense as a refined version of what is already present in it), or perhaps something more? We argue that it is something more: common sense remains the ultimate authority on the basis of which it is possible to *judge* the compliance of said technically defined rules. This paper intends to describe how this happens.

Logic and Psychology

Whether we are interested in understanding the relationship between common sense argumentation and logic as being of a genetic nature, or (even more so) we are interested in understanding this relation as a foundational criterion, it seems essential to rely upon a *description* and *understanding* of common sense argumentation, obtained by means of what we have already called above a "self-reflection". Who is responsible for such a task? For some time, psychology has provided the necessary tools. After a relatively long period during which "scientific" psychology (dominated by the dogmas of behaviorism) held as unscientific to concern oneself with "thought", today cognitive psychology explicitly faces such a task and in particular it examines the various inference procedures that human subjects use when they "reason" and which are reproduced in a more or less idealized way by technical systems of formal logic (especially in "logical calculi"). This is undoubtedly of great research interest, but these systems are not able to solve our problem for one simple reason: psychology can in fact descriptively illustrate how men *actually* reason but it does not tell us how they *ought to* think. In fact the task of scientific psychology is the study of the modes of reasoning that are used by a vast majority of "normal" subjects in arguments that they consider persuasive, even though they could be qualified as "logically incorrect". For example, we are naturally inclined to accept a thesis when it is shown that several true logical consequences derive from it. And yet this is a typical logical "fallacy" (cleverly exploited in many rhetorical arguments) because logic tells us that the truth of consequences is not a sufficient guarantee for the truth of the premises. Therefore, the fact that common sense readily accepts such a mode of argumentation (highlighted by the psychology of thought) does not explain how it could give rise to the logical law that prohibits the "fallacy of the consequent", and even less so how the ground for the correction of such a fallacy was established.

Shall we say then that logic should *judge* the common sense arguments by forcing the acceptance of some arguments and rejection of others? That its laws are *normative* and not *descriptive* with respect to reasoning? The answer may not be entirely affirmative nor entirely negative.

Normativity and the Descriptivity of Definitions

The problem we are meeting here is quite general, but let's first see how it appears in the context of logic, considering if this indicates how we think, or how we should think. Those who argue that logic says how we *should* think, should explain where indications as to the way in which we should think can be found (that is, indications as to the construction of logic itself). We cannot say: "let us begin to reason setting logic aside" (to see how to construct it), since we cannot try to establish how we should reason otherwise then by reasoning in some way and, even more, by reasoning "correctly". Therefore it seems that, to avoid a vicious circle, primacy is inexorably given to description, but in this way we risk going from bad to worse: if we hold that normativity should wait patiently, so to speak, for an objective, neutral description to arise, we need to clarify the type of description in question. We have already seen that this description of common sense reasoning cannot be a simple one because at the level of common sense people reason correctly and incorrectly with more or less the same frequency and same spontaneity. Therefore, we cannot imagine to put ourselves in a safe position by saying: "we do not feel entitled to dictate norms; we want to find an objective ground by "describing" reasoning, because in reality we must already be able to distinguish correct from incorrect reasoning before getting ready to describe correct reasoning, and, in this distinction, a strong normative aspect is, of course, already included.

To understand the genuine nature of the problem, we would do well to remove "imperative" connotations from the notion of normativity and understand its meaning in the simplest cognitive sense, according to which it is comparable to the formulation of a sound definition. The role of a definition is essentially that of determining a class of objects so that, once the definition has been formulated, *all* those x and *only* those x that satisfy the definition belong to the class (the definition will be the "norm" which dictates inclusion in or exclusion from the class). A complex problem, however, concerns the manner in which we arrive at this definition and evaluate its *adequacy*. When one wants to define what a certain object is, that is, what *kind of entity* it is, one must make sure that the proposed definition is not such that it excludes (from the class it determines) too many entities that our "intuition" includes, and that it also does not include too many entities that our "intuition" excludes. Therefore, we recognize that a definition presents the characteristics of *normativity* (it indicates which properties entities that belong to the respective class *should* satisfy); such properties, however, are singled out on the basis of a *descriptive* element (which we have indicated using the term our "intuition") as far as its adequacy is concerned. We note, however, that this is not pure description but rather is mixed with some form of normativity: in fact, when we try to define *explicitly* what are the beings of a certain type, we already know *implicitly* what beings must be taken into consideration, that is to say, what characteristics they should be equipped with in order to become the object of our defining endeavor (for example, we already *know* in a sense what cats are, in order to try to *define* them, by not confusing them, for example, with dogs). If we now apply this general reasoning to our problem we must recognize that we already "know" what correct reasoning is, if we decide to *define* it by ignoring the various ways of "reasoning incorrectly" that we find in everyday discourse. Consequently, we are constantly witnessing a feedback between normativity and description because, on the one hand, description contains a certain implicit normativity and, on the other hand, the explicit normativity of the definition must continually be reconciled with description and adapt to it.

These observations lead us to reconsider the common claim that definitions "are neither true nor false." This assertion is only correct regarding the so-called nominal definitions, but it is no longer true when applied to real definitions. This age-old distinction has been forgotten too quickly, and it deserves a better scrutiny. Nominal definitions are certainly neither true nor false, but only because they are simple linguistic stipulations which, in the most elementary cases, can even be conceived as "cancellation rules". In the case of the so-called "explicit definition," a certain linguistic expression (the definiens), is posited as "equal by definition" to another linguistic expression (the definiendum) with the implication that every time we want to abbreviate the discourse, we can introduce the definiendum in place of the cumbersome definiens without altering the truth conditions of the discourse and without introducing semantically new elements. Without denying the practical benefits of nominal definitions (which are not reducible to a pure shorthand role but also help to gain clarity and explicitness of discourse), it is nevertheless clear that they have a reach that is very different from that of the much more engaging, real definitions. These definitions correspond to an attempt of making explicit what our "intuition" perceives regarding various types of reality, translating the dense content of our cognitive experience in its most varied and disparate aspects and dimensions into words (and using a necessarily finite, relatively poor vocabulary and language to do so).

At this point, it may be useful to recover a concept which is very familiar to classical philosophy (and which modern philosophy had forgotten whereas contemporary philosophy has partly rediscovered): the concept of cognitive *intentionality*. The world is *intentionally present* to our knowledge. But precisely because of this presence and because the world as a presence in the mind (including either sensory perception or intellectual intuition) has a density, a thickness, an enormous richness of aspects, it is inevitable that when we retain only a few of these aspects, abundant though they may be, the result must be a strong impoverishment. Thus, the "real" definitions are able to do only that: the rest remains in this intentional presence with which we compare the content of our definition, and we find it more or less "adequate" compared to what is intentionally presented to us.

Not All Calculi Are Logical Calculi

The considerations developed thus far lead us to address the problem of the normativity of logic, the most sophisticated forms of which we can easily take into account, that is to say, the current various "logical calculi". Each one can be considered a particular “definition” of logic, and it is known that at the beginning of the past century, many scholars defended the conventional nature of such calculi, as Carnap’s famous phrase stated: “In logic, there is no morality” (that is to say, there is no normativity). With this statement he clearly wanted to emphasize the freedom with which the logician can propose and construct a particular calculus, perfectly analogous to the freedom with which, for example, a mathematician states explicit definitions (or implicit or contextual definitions, as happens when an axiomatic system is provided). In any event, even assuming that logical calculi are definitions, the question remains as to whether they should be understood as nominal definitions or as real definitions. A similar question seems very odd and, even if we want to take the question seriously, it seems obvious to answer that we are dealing with nominal definitions, given the abundance and variety of logical calculi proposed, accepted, and used. Examining the issue more deeply, however, we must realize that the nature of logical calculi is much closer to the real definitions.

An initial revealing symptom in this sense can be uncovered by asking the question: does *any* calculus deserve the denomination of *logical* calculus? In other words, even many games such as bridge, chess, and draughts consist essentially of particular sets of conventional *rules* to move and manipulate *symbols*, which allows one to call them *calculi*, and yet we do not call them logical calculi. Is there a reason for that? The reason exists, and it is certainly not that such calculi should be regarded as “illogical”, but the explanation lies rather in the fact that the calculi that we call “logical” must show an *adequacy* with respect to the intuitive notion of *logical consequence*, whereas this condition is not satisfied by those calculi to which are reducible the various “games” mentioned above. While such calculi really have the nature of “nominal” and conventional definitions, and should not possess any quality other than that of simple internal coherence, *logical* calculi must also fulfill an additional condition, that of being *logical*.

This symptom becomes a clear, explicit, and concrete evidence when one reflects on the fact that, regarding those calculi that we call logical, we require that, even with all the freedom of their construction, they must *satisfy* one indispensable condition and, hopefully, a second as well. The indispensable condition is the following: the rules of these calculi, though being of a purely formal, operational, physical, manipulative, conventional nature should (if the signs are interpreted in such a way as to express propositions) lead, from propositions taken as premises, *only* to other propositions that are their *logical consequence*. The binding nature of such a condition is based on the fact that it would be simply absurd to call a calculus “logical” even though it would allow us to derive from a set of premises certain consequences that *are not* their “logical consequence”. The second condition that we are attempting to satisfy is that these calculi, if applied to a set of premises, allow for the derivation of *all* their logical consequences. This is a perfectly reasonable desideratum, but which we can also be prepared to give up if proved particularly elusive.

These two conditions are expressed in two fundamental metatheorems that we try to prove regarding "logical calculi". The first is the theorem called of *soundness* (the calculus must allow for the derivation, from any set of premises, *only* of their logical consequences) and the second is called of semantic *completeness* (the calculus must allow for the derivation, from any set of premises, of *all* their logical consequences). If a calculus does not satisfy the first requirement, it cannot be accepted among the logical calculi, while the second is merely a desirable requirement which (as we know) cannot be satisfied for calculi that exceed a certain level of complexity (and therefore are called "semantically incomplete"). This knowledge is quite elementary, possessed by anyone with minimal familiarity with mathematical logic.

At the common sense level we have developed, during a long process of historical elaboration, the notion of acting according to a system of formal rules, and we have specified it, as a first step, through the abstract, general notion of "calculus". As a second step, we have also extended this idea, analogically, to the general, abstract notion of "games" (more or less in the sense of "linguistic games" of Wittgenstein). The same common sense, however, also contains elements to distinguish different "types" of games and, in particular, restrict only to some of them the prerogative of being "logical" games: games that, when interpreted in an appropriate manner, prove capable of translating our notion of logical consequence.

The Notion of Logical Consequence

Can we say then that the notion of logical consequence is a common sense notion? In a sense yes, but not in the trivial sense according to which this notion is present, clearly and *explicitly*, in the mind of any sane man. This notion corresponds to one of the fundamental categories of the mind which, as an *intentional* presence, provide the criteria for our judgments. Specifically, it supports our practice of "reasoning", that is, of connecting propositions and of judging whether or not these connections are correct. Obviously, we can attempt to verbally express such a presence and "explain it", always in terms of common sense, by saying, for example, that proposition B is a logical consequence of a proposition A if it is not possible to assert A and deny B. It is then necessary to clarify what "it is not possible" means and, still at the level of common sense, we can refer to the fact that, once A has been accepted, we feel irresistibly drawn to accept B. This response clearly alludes to a psychological situation, and, to go further, common sense opens the way to a specialized discipline (that is, psychology). We know, however, that this identification of the connection of logical consequence with a sort of spontaneous intellectual inclination has been harshly criticized and discredited as *psychologism* in the recent history of logic (considering, for example, that a subject may not feel irresistibly drawn to assert B once A has been accepted, even if B is "really" a logical consequence of A; in addition - as is the case of logical fallacies - many subjects spontaneously feel driven to accept propositions that are not really logical consequences of their premises). Here we have a significant example of how a certain *definition* of logical consequence (the psychologistic one) may prove *inadequate* in relation to its own goal (and this is typical of "real" definition). This is not strictly "wrong" because there is no doubt that, in the intentional presence to which we alluded, this psychological tendency "supports" the correct argumentation (or *perceived* as such), but we must recognize that the connection of logical consequence does not *properly* consist in such a psychological disposition.

In what does this connection consist? We cannot enter here in the consideration of the various proposals advanced on this issue, and we will limit ourselves to just one which, at least on some level of analysis, is the most *adequate*: let's say that B is a logical consequence of A if it is impossible that A be *true* and that, under the same conditions, B is *false*. The advantage of this definition of logical consequence is the fact that (as we have indicated from the beginning), argumentation is conceived, within common sense, as an instrument *in virtue of which* one can assert the truth of a proposition, even when this truth does not *immediately* present itself. We can say that this definition corresponds to a belief in common sense, but it is certainly a common sense developed and filtered through some analysis and reflection: it is not the first thing that comes to mind, but a result that is achieved after some searching, which certainly cannot be reduced to the spontaneous opinions of the individual X or Y.

Judging Logical Calculi

Once this "real definition" of logical consequence, based on common sense, has been accepted, it is easy to interpret the two conditions that we indicated as essential for judging whether a given formal calculus could be called "logical" (which is to say, a variant an instance of the "real" definition of logical calculus). The strong condition which cannot be waived (expressed in the soundness theorems) will be: a logical calculus is sound if, when applied to *true* propositions (under certain conditions), is able to produce *only* true propositions (under the same conditions). The desirable condition (expressed in semantic completeness theorems) will be: a logical calculus is semantically complete if, when applied to true propositions (under certain conditions), is able to produce *all* propositions that are true under the same conditions.

As we can see, there is no need to deny the legitimacy of a plurality of logical calculi, which meets the requirements of flexibility, simplicity, and practicality which are quite sensible and pursuable even by means of appropriate conventions. This is perfectly in line with the fact that we can provide various *real* definitions for the same type of reality, all of which are *adequate* as being extensionally equivalent. Each definition emphasizes certain essential aspects of the defined reality, rather than others, though it must at the same time be "faithful" with respect to this reality. Even in logic, for example, it may be useful to construct calculi that are "closer" to the usual way of reasoning (we think of the calculi of the so-called "natural deduction", if compared with calculi known as "logistic" or in axiomatic forms), but their *justification* does not depend on such closeness to major psychological processes of common reasoning but certainly on the fact that they are sound and (perhaps) complete. Moreover, it is well known that *all* calculi that are sound and complete are *equivalent* to each other from the point of view of deductions that they permit (that is, given a set of premises, *any* such calculus produces exactly the same consequences as any other).

Common Sense Reasoning

It is important to realize that, having recognized the *descriptive* basis that justifies the *normativity* of logical calculi in the commonsensical notion of "logical consequence", we have in no way demonstrated that these calculi accept common sense *reasoning* as a descriptive basis. We can verify this by taking formal Aristotelian logic into consideration. It is not at all true that even philosophers and mathematicians, when they reason, use patterns of formal logic. Euclid's *Elements* are often shown as the first and best "incarnation" of Aristotelian logic. This is a totally false view if we equate formal logic with Aristotelian logic, that is, with the syllogistic logic presented in *Prior Analytics*. Indeed Euclid's *Elements* exemplify Aristotelian *epistemology,* that is, the *doctrine of knowledge* outlined in *Posterior Analytics* (in which the process of the axiomatic method is illustrated, based on the evidence of starting points and on the execution of correct inferences). But the proofs put forth in the Euclidean test are all common sense, and it can actually be show that the majority of them cannot be expressed in the form of syllogisms (for the simple reason that the Aristotelian syllogistic is a form of *monadic* predicate logic, and therefore is unable to master the logic of *relations*, that is essential to any mathematical proof of importance). Therefore, the Aristotelian syllogism was not truly a "description" of common sense reasoning, but a highly *idealized* structure, which can be used to *reformulate* (by contortion, simplification, and reconstruction) many forms of common sense reasoning, so that when forced to conform to this sort of Procrustean bed, it becomes possible to explicitly *control* their correction (beyond the possible illusions and errors to which common sense reasoning may fall victim). All this is still true today: no mathematician proves a theorem using one of the most respected logical calculi, but rather on the basis of his normal reasoning as a mathematician (a part of common sense reasoning). When it comes time to publish a paper, the mathematicians take great care to formally edit it properly: they do away with all heuristic methods and intuitions that helped to determine the appropriate hypothesis, forget their most difficult moments spent looking for the happy artifice which at a particular point made it possible for the proof to continue, and begin instead to state hypotheses in a stylized form, outline their arguments at the end of which they write, sometimes, the ritual symbol (QED), that is, "what had to be proved." We have thus the theorem, which is already a new standardized, stereotyped display of what the real "reasoning" of the mathematician was. But even this reasoning is not really reduced to a sequence of formulas that can be handled by the methods of mathematical logic and, for example, be introduced into a computer to check it point by point via formal correction. Usually, it is necessary to later re-translate it, dissect it, and refine it, in order to proceed to such a step (in certain cases this can be extremely *useful* to discover possible hidden logical mistakes).

The examples provided show us the kind of relationship that exists between logical calculi and common sense reasoning: they do not really *describe* anything in an empirical sense, even if they describe something in a much deeper sense, that is, they describe how the human mind moves about and goes in depth within the horizons of truth.

As we have already pointed out, truth is situated at two levels. The first is the *intentional presence* of certain objects to thought (what we call *immediate* truth). The second corresponds to a discovery that humans have made gradually, that is, that it is possible to *remain* in truth even when we are distant from the immediate presence. This is a wonderful fact: it is one thing to say: "I see, I see" (please don't misunderstand, it is possible to be wrong even when you're sure of what you're seeing), and it is something else altogether to leave the field of the immediate, the field of presence, and to rely on a kind of descent along a rope of logical inferences, knowing that if the piton, which is precisely the initial truth, does not yield, there will always be truth. This is precisely the sense of the great work done by logic in its millennial history.

The Proliferation of Forms of Logics

We are now in the position of approaching a different problem, that of the plurality of *logics*, not to be confused with that of the plurality of *logical calculi* (although the former usually involves the production of new logical calculi). In our common sense discourse, we are used to argue, that is, to consider the logical consequences, even outside the very simple relationship considered up to this point, and which consists in remaining within the domain of truth even when we distance ourselves from immediacy. For example, when we say that an *obligation* or a *prohibition* "follows logically" from an order; or when we say that *if* something is *necessarily* the case, *then* it is *possible* that it is the case. When we reason in these ways, we are not really considering simple truth relations, unless we wanted, so to speak, to perform a "quadratic" reasoning of this kind: "if it is true that this is an obligation, then it is true that what follows is a prohibition". Such a manner of speaking would be an unnecessary complication, like saying: "It is true that I see a watch on the table", rather than merely saying: "I see a watch on the table"; the addition of the truth predicate would actually not "add" anything.

In what sense, then, do we speak of "logical consequence" when we say: "if A is an obligation, then it follows that B is a prohibition" (or something like that)? It is clear that this logical consequence is not understood by analyzing the concept of truth, but rather the concept of obligation. This is possible because, among the categories of common sense that have been discussed previously, is included a specific noetic sphere that we can call the *deontic* horizon (that is, the horizon of *duty* understood in a broad sense). This is characterized through some basic meanings (such as those related to the concepts of "obligation", "permission", "prohibition", and others of that sort), and it is from the structure of these meanings that a specific form of logic related to a semantic domain emerges. Arguably, as traditional logic (sometimes called "classical") appears to be a major breakthrough in the noetic truth horizon, in the same way, other forms of logic (sometimes called "non classical") are a great breakthrough in the horizon of duty (deontic logic) or of modality (modal logic), or epistemic attitudes such as believing or knowing (epistemic logic), etc.

Even in these cases, something similar to what we have observed in speaking of alethic logic (or the logic of pure and simple truth) holds. We take forms of common sense reasoning into consideration, but we do not limit ourselves to "describing" them or to simply considering certain psychological connotations that accompany them. For example, a rule of epistemic logic is that you cannot believe A (that is, be sure that A is valid) and at the same time believe the opposite of A. This rule does not have a sufficient justification in terms of psychology, since some incoherent people can sometimes believe opposite propositions: this rule derives from a conceptual analysis of the notion of belief, which is "idealized" as regards the way in which people actually articulate their beliefs. It is on the ground of such a conceptual analysis that we are able to judge people who simultaneously hold opposite beliefs as "illogical". It would also be unfair to maintain that we declare them inconsistent (*normative* judgment) *because* epistemic logic prohibits such an attitude. On the contrary, epistemic logic contains a rule that excludes the assertion of opposite beliefs because this rule results from a rigorous analysis of the concept of belief as it is understood by common sense.

Logic as an Idealization of Common Sense Reasoning

The many considerations developed thus far allow us to understand how common sense can simultaneously constitute a descriptive basis and normative source for logic. This is possible because common sense must be understood not so much as a *repository* of beliefs but as a *horizon* of phenomenological evidence that should be analyzed, understood, and made explicit. This task leads to *idealizations*, which are nothing more than *concepts*, which in relation to the contents of common sense, do not have the characteristics of simple *empirical description* but, like all concepts, also display a *normative-classifier* aspect which has already been discussed. The mixture of the normative and the descriptive is actually a characteristic of concepts that derives from their being, on the one hand, universal, and on the other, non-arbitrary.

The defining characteristic of the concept is that of being, as Plato had already understood (he even attributed an ontological purport to this feature, giving ideas the status of self-sustaining entities). Putting aside the "ontologizing" excess, the substance of Plato's contribution remains: no existing horse concretely reproduces exactly the characteristics of horseness, and yet horseness is something distinct from catness and dogness, to put it in a raw, but eloquent, form. The notion of idealization is therefore of utmost importance, as it explains how, through the intellectual process of *abstraction*, which is descriptive, we do not introduce a new meaning, with respect to the individual meanings which are captured in the *sensory* experience, but we instead attain an idealized *intellectual* representation which *refers* to these same individual objects. This happens because the concretely existing individual objects are limited to *exemplifying* the concept, that is, realizing the defining characteristics only to a certain extent, and this is not (as Plato thought) because "matter resists the Idea", but more simply because any individual object exemplifies a number of distinct concepts, so it is inevitable that this could happen in an imperfect way compared with the *pure* characteristics encoded by a single concept.

It will be noted in passing that this elementary awareness allows one to refute one of the most common objections that supporters of anti-realist epistemologies level against science. How is it possible - they say - to believe that mechanics is a reliable description of the physical world? Who has ever seen a material point, a rigid body, a perfect gas, an adiabatic transformation, etc. (that is, "objects" with which mechanics concerns itself)? They are economically useful fantasies, abstract concepts constructed by theoretical physicists, but whose equivalent in "real" experience is never encountered. The fact is that these people do not realize that *any* discourse generally obeys this condition: even a small booklet on the Boxer dog, for example, necessarily describes some general characteristics, not all of which we may encounter in a concrete example of this dog. Even a single Boxer can exemplify only within certain limits the general concept of Boxer. These considerations are also useful for understanding the ideal nature of logic. For example, one can certainly relate it to psychology, but only to a certain extent, because concrete individuals reason in part logically and in part illogically. To see when they reason illogically, we can use, for example, the ideal concept of logical consequence previously introduced: thus, to those who allow themselves to be persuaded by the fallacy of the consequent (that is to say to those who believe that the truth of the consequences guarantees the truth of the premises), we can submit instances in which true consequences can be correctly drawn from demonstrably false premises. This counter-example is sufficient to show that such an inference cannot be accepted as a logical law, which does not mean that common sense reasoning is *always wrong*, but common sense arguments only *partially* exemplifies the structure of correct arguments (that is, of those arguments that faithfully reproduce the ideal structure of the connection of "logical consequence"). The task of logic, therefore, appears to be that of bringing greater clarity to this ideal structure of correct reasoning whose relationship with common sense reasoning must be taken into account, but which gets rid of its contingent features and imperfections.

Therefore, the different logics infer *ideal types* from common sense reasoning, in a sense very similar to that of Weberian "ideal types": they trace paradigms from the reasoning, inferences, and arguments that human beings put into use in the various *semantic* frameworks previously discussed. There is a reason behind the fact that different logics, sometimes called non-classical, can more meaningfully be called *intensional*. Not only because they do not confine themselves (as indicated by Frege) to considering the "truth value", that is, the *extension* of the propositions, but because they have something to do with this deep root of human knowledge that is *intentionality*. The fact is that we "intentionate" reality in various modalities, angles, and spheres, and within these spheres there are various types of inferences that are not reducible to one another (although they are partly related). Here one could introduce other considerations, which would lead one to improve our understanding of how to conceive the "strength" of logical inference. The insight provided by a single example will be sufficient: the so-called "relevant" logics do find inadequate to maintain (as does the usual, classical true/false logic) that from a false premise logically follows any conclusion, perhaps even true (as if one said "*if* the moon is made of cheese, *then* two plus two equals four"). These logics require that *significant relations* exist between the premises and the conclusions, and this requirement emphasizes that the very idea of logical consequence is deeper than the definition with which we contented ourselves previously: the *meaning* of the propositions is called into play and in such a way an appeal to *intenzion* is also made.

Logic and the Content of Discourse

By developing this type of considerations, one can justify a further step, which seems to violate the great principle of the independence of logic from the contents of discourse, that is, its nature of an *a priori* discipline or one of *pure thought*, on the ground of which its laws could never be flawed in certain domains. However, if we strictly apply certain laws of a given logical calculus, we encounter difficulties in the treatment of certain areas of reality. The most typical and famous example is that of quantum mechanics, which led to the construction of "quantum logic". The most serious misunderstanding regarding these logics was to claim that they amount tp a kind of "falsification" of classical logic and that they are being proposed as an alternative to it. The problem, however, must be looked at differently: it is not about a "change of logic", but rather a definition of some new, formal rules that, given special epistemic conditions according to which one can seek to understand the microphysical world, are more consistent with the ways in which we can actually argue and make inferences in such an area. We note, however, that something very similar can be said regarding probability theory: if, instead of using Kologorov probability, we use another type of probability, it is possible (as specialized studies demonstrate) to resolve some paradoxes of quantum mechanics, without recourse to the principles of linear superposition and to other similar principles.

Conclusions

Our observations, which are necessarily cursory and rhapsodic, seek to emphasize the *descriptive* aspect of logic, understood as an idealization of *types* of argument that are employed by common sense in various thematic domains, that can differ according to the type of semantic field involved, and also vary according to the objects to which the discourse refers. In all this no implicit concession to relativism is implicit, not even to a negation of the *normative* character of logic: if it is true that according to the contexts in which our discourse moves, we may need different formal instruments to argue correctly, this means that, for each context, we seek the *appropriate* form of logical normativity. Thus, it follows that the connection between common sense and logic as the *foundation* of the latter is confirmed: it is precisely by common sense, in fact, that we invest in the "intentioning" of reality according to different categorizations, and it is among these categorizations that we develop our argument. The different forms of argumentation can be idealized and made explicit more or less successfully and more or less adequately through various forms of technically understood logic, which have different periods of maturation. Luckily, logic did not emerge perfectly from the brain of Aristotle as Athena from Zeus's brain: so there is still time, and there will always be, for logic to continue to develop, but its sense, and its deep roots of non conventionality reside, among other things, precisely in this continual process of *adaptation*, consisting in codifying and expressing through norms the reasoning of common sense.

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Resumo. A lógica, considerada como uma disciplina técnica iniciada por Aristóteles e tipicamente representada pela variedade de cálculos lógicos modernos, constitui um esclarecimento e refinamento de uma convicção e prática presentes no senso comum, ou seja, o fato de que os seres humanos crêem que a verdade pode ser adquirida não apenas por evidência imediata, mas também por meio de argumentos. Como uma primeira aproximação, a lógica pode ser vista como um registro "descritivo" das principais formas de argumento presentes no senso comum, mas o fato de que alguns desses padrões possam realmente permitir a derivação de consequências falsas a partir de premissas verdadeiras impõe a tarefa de tornar explícitos que padrões corespondem a um "raciocínio correto" e quais não. Nesse ponto, a lógica (que contém a apresentação de tais padrões) parece ser dotada de uma característica "normativa". Isso equivale a dizer se pretende que os cálculos lógicos espelhem adequadamente a noção intuitiva de "consequência lógica" e que nesse sentido eles não podem ser totalmente arbitrários ou convencionais, mas devem satisfazer certos requisitos básicos tais como as condições de correção e (tanto quanto possível) de completude semântica. Em tal forma eles são "julgados" de acordo com os requisitos fundamentais prsentes no nível do senso comum e aparecem como "idealizações" das espécies de raciocínio praticadas no senso comum. Por essa razão também vários tipois de cálculos lógics são inteiramente justificados uma vez que tornam explícitos, de uma forma idealizada, os modos concretos de raciocinar que são impostos pelo particular domínio de referência da disciplina na qual são usados e que são basicamente reconhecidos no senso comum.

Palavras-chave: Normatividade lógica; intencionalidade; raciocínio de senso comum; cálculos lógicos; consequência lógica.