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Lo cuantitativo y lo cualitativo no deben asumirse como enfoques ni criterio de clasificación de las investigaciones científicas

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ABSTRACT

This article aims to provide a philosophical and methodological analysis of scientific research related to the so-called quantitative, qualitative, and mixed approaches, which are currently required when supporting a given thesis. Grounded in dialectical logic, we consider one of its foundational principles—namely, the transformation of quantitative changes into qualitative changes and vice versa—thereby sustaining the idea of their unity and rejecting the philosophical probability that any of these transformations may become a distinct underlying approach to scientific research. Likewise, referring to these transformations as "mixed" approaches within scientific inquiry appears to us as an act of profound irreverence toward the tenets of modern philosophy, reducing "mixed" to a term disguised as profound knowledge and a supposed philosophical–intellectual revelation.

Furthermore, the article substantiates the relationship between the quantitative and the qualitative, inductive–identificatory reasoning, deductive–demonstrative reasoning, and descriptive and inferential statistics, using as a pivot the typology of knowledge obtained after their application.

Keywords: qualitative; quantitative; mixed; philosophical approach; methodological approach; descriptive and inferential statistics; research methods..

INTRODUCTION

One of the most transcendental constituent parts of any research endeavor, regardless of its type, lies in the philosophical and methodological starting positions that not only underlie the research but also articulate the justification of its guiding system in terms of objectives—general and specific—and, above all, the instrumental or properly methodological design of the study, its system of execution, which is configured through the research methods employed, along with their corresponding procedures and means. In this sense, the frame of reference that explains the selection of sources used should not be overlooked, as it conditions the evidentiary or empirical arguments, as well as the conclusions of an academic work of this nature.

The analytical framework to which the general structure of scientific research must respond necessarily rests upon a given philosophical approach, which is cardinal for understanding the nodal starting points in data collection, as well as in the subsequent processing of the information gathered. This, in turn, compels us methodologically to consider the classification of research methods, generally divided into empirical, theoretical, and mathematical-statistical methods, increasingly deepening the gap and the dialectical rupture of the unity of opposites subjected to such analysis, namely, the quantitative and the qualitative.

What ideas do we intend to argue in this regard?

DEVELOPMENT

a) Quantitative and qualitative should not be considered approaches or criteria for classifying scientific research

Let us not confuse ourselves when classifying research. There should not exist research that exclusively points to either the quantitative or the qualitative. This is because, if we fully and openly commit to one of these categories, we are, without justification, adhering

solely to either the quantity or the quality of inquiry. This is methodologically questionable and scientifically inadmissible.

To legitimize quantitative research alone would mean referring to only one pole of the dialectical unity that must sustain all scientific research. Furthermore, the quantitative, insofar as it projects itself through the quantification of reality, would have to strictly refer to numerical measurement as documentary evidence to ensure the veracity of statements through statistical analysis of the examined facts. Thirdly, the foundational philosophical current sustaining such an approach is none other than positivism. This philosophy, developed primarily by the French thinker Auguste Comte in the nineteenth century, devalues scientific abstractions in their essence and advocates the measurable character of the portion of objective reality under study. However, positivism holds that true knowledge is only that which is obtained through the scientific method, proclaimed and defended by the English man of science Francis Bacon in the sixteenth century. Its conspicuous objective is to reorganize society and knowledge under scientific and rational principles. One of the epistemological pillars of positivism lies in proclaiming science as the only valid form of knowledge, derived from direct experience and empirical data.

Up to this point, everything might appear plausible. However, what positivism failed to foresee was its reductionist and partialized character in relation to reality, even though positive data converge on the concrete, the tangible, and the observable, assuming as real only that object of knowledge which reflects empirically verifiable and directly observable phenomena.

b) When the quantitative is superimposed on positivism

Positivism begins with the observation of immediate empirical facts and phenomena, tending to separate social processes from their broader historical and structural context, thereby fragmenting them. This constitutes the fundamental thesis from which we distance

ourselves. Such an approach partializes knowledge by treating each phenomenon individually, replacing explanation with description and attempting to dictate invariable laws without ascending to the genesis and ultimate causes of social problems such as economic, sociological, psychological, and pedagogical events. The dialectical interconnection with the entire system of production, including history and politics, is simply irrefutable.

True scientific knowledge does not conform to appearances but rises in search of the essence of phenomena, which is precisely what the materialist and dialectical conception of history addresses. In previous works, we have defined the parameters that must characterize the essence of scientific knowledge: the determining properties of the phenomena studied, the causes of their emergence, the laws governing their behavior, their inherent contradictions, and the tendencies of their development (Bermúdez & Rodríguez, 1996, 2001, 2017). This is far more—though not in quantitative terms—than empirically observable data.

Knowledge is not merely an act of contemplation but the product of human social practical activity through which reality is both known and transformed. Positivist knowledge relies on observation, description, and experimentation, yet conceives reality as something external to the subject and merely describable through laws. This implies a passive and contemplative view of the subject in relation to knowledge. Not in vain did Lenin (1985) proclaim that the path to truth and scientific knowledge begins with living contemplation, ascends to abstract thought, and from there rises to practical activity. Pure abstraction alone is insufficient without ascending to reflective practice.

Positivism promotes scientific neutrality, an uncritical stance, and a particularly conservative posture on the part of the researcher. By focusing solely on describing facts as they are, without evaluating their genesis or social implications—such as inequality, exclusion, or alienation—positivism tends to legitimize and embellish the prevailing social order.

c) When the qualitative is superimposed on rationalism

Conversely, focusing exclusively on the qualitative in research implies defending it unreservedly under the banners of Cartesian rationalism. Although this philosophy has been central to Modernity, it leaves severe gaps in the explanation of knowledge from a materialist and dialectical perspective. These shortcomings persist due to its idealist starting point, the contemplative nature of its method, and the separation of the subject from its material and social context.

Cartesian rationalism initiates knowledge with the principle "I think, therefore I am" (Cogito ergo sum), defending it as the first absolutely certain and evident truth reached through methodical doubt (De omnibus dubitandum). This hyperbolizes pure thought as the primordial truth and source of all certainty. According to Lenin (1985), such reasoning results in abstract but empty thought, devoid of concrete content and detached from material reality and human history.

By isolating the subject as a thinking entity and granting it primacy, Descartes adopts an idealist position rejected by dialectics, which asserts that the subject cannot exist or approach reality outside of socially determined productive activity—a principle summarized by Marxist praxis theory and the conception of the human being as a social and productive entity.

Methodological Position

First

Neither Auguste Comte's positivism nor Descartes' rationalism provides sufficient rigor for scientific research.

Drawing a brief parallel with psychology, asking whether biological or environmental factors determine psychic development leads to reductionism if one is privileged over the

other. The same occurs when research is classified as qualitative, quantitative, or mixed. Only the category of activity overcame such reductionism in psychology.

Second

The only viable path to correct knowledge lies in modern dialectical philosophy, wherein quantitative and qualitative constitute a law of dialectical logic: the transformation of quantitative changes into qualitative changes and vice versa. One does not exist without the other.

e) When the "mixed" is merely a pretended philosophical–intellectual revelation

The "mixed" approach becomes an amorphous entelechy. Mixing opposites produces something entirely new, severing direct ties with its origins. As Vygotsky (1991) illustrated through the metaphor of fire and water, although consciousness emerges from the biological substrate, it obeys different laws of movement and structure. Quantitative and qualitative cannot be mixed; they are unified dialectically without empirical fusion.

The same logic applies in psychology, Gestalt theory, and neuroscience. The whole is more than the sum of its parts. Attempts to isolate or mix opposites obscure rather than clarify reality.

Third

Scientific inquiry must reason beyond observation, integrating inductive and deductive logic.

Fourth

Knowledge must be validated through both inductive logic (descriptive, measurable) and deductive logic (hypothetical, inferential).

Fifth

Inductive reasoning leads to empirical generalizations, while deductive reasoning establishes theoretical relationships and hypotheses.

Conclusive Idea

The methodological framework of research manifests through inductive–identificatory and deductive–demonstrative reasoning, processing information via descriptive and inferential statistics. Quantitative and qualitative are dialectical components of research action, not classification criteria.

f) Inductive–identificatory and deductive–demonstrative reasoning

Inductive–deductive reasoning is a philosophical entelechy (Bermúdez et al., 2024). Inductive–identificatory reasoning produces empirical knowledge, while deductive–demonstrative reasoning produces theoretical knowledge. Descriptive statistics correspond to induction; inferential statistics correspond to deduction.

g) On the Classification of Scientific Research Methods

What are the points of convergence and divergence with preceding authors regarding research methods?

First.

That knowledge has always been classified as empirical and theoretical, according to its mode of construction and the conditions required to obtain it. Hence, the classification of knowledge into empirical and theoretical.

Second.

That, to date, research methods have likewise been classified according to the empirical and the theoretical; therefore, the typology of knowledge has also become a criterion for the classification of methods.

Third.

That methods and knowledge respond to different natures. While knowledge is a reflection, an image of reality, the method is the psychic instrument through which such knowledge is obtained.

Fourth.

Consequently, by their very nature, method and knowledge are not the same thing, as they correspond to distinctly different structures and functions.

Concluding idea.

If methods cannot be classified as empirical and theoretical—although such a classification is legitimate when referring to knowledge—it becomes necessary to adopt another valid and pertinent criterion of classification.

This criterion can be found in the function fulfilled by the method—the research action—in its application. This leads us to consider that a method may be applied either to collect information or to process information that has already been collected. Consequently, research methods may be classified into information-gathering methods and methods for processing the collected information (Bermúdez & Rodríguez, 2016). Within information-gathering methods, surveys, interviews, among others, may be employed.

Within the methods for processing the collected information, intellectual methods—such as comparing, classifying, evaluating, identifying, demonstrating, among others—and mathematical-statistical methods must be considered. Mathematical-statistical methods should, in turn, be subdivided into methods consistent with descriptive statistics and those pertinent to inferential statistics (Bermúdez & Rodríguez, 2016, 2018).

Since descriptive statistics is devoted to organizing, summarizing, and presenting data in an informative manner, employing methods to describe—characterize—a sample or a population without drawing conclusions or inferences about a larger group, it is appropriate to predominantly apply measures of central tendency such as the mean, median, and mode, as well as the construction of frequency tables and graphs—histograms, box plots, among others.

An Urgent and Absolutely Unavoidable Digression

If we were to ask researchers whether it would be legitimate to think that descriptive statistics relates to inductive reasoning in the same way that inferential statistics relates to deductive reasoning, there would be a high probability of receiving a categorical denial.

What reasons might those who respond in this manner likely put forward?

While Fisher (1935) establishes a direct link between inference and induction, Carnap (1962) treats the entire body of inductive reasoning as dependent on statistical inference. Likewise, Dávila (2006), who addresses the academic context more directly, also defends the idea that induction—moving from particular data to generalizations—is the basis of statistical inference, whereas deduction is applied in description or in the application of already established models. Might such conclusions arise from the widely accepted methodological consensus in the fields of statistics and scientific research?

In numerous specialized works on statistics, it is asserted that the principal and explicit function of descriptive statistics is to summarize, organize, and simplify a set of data. Its objective is to characterize that dataset—a population or a sample—in an intelligible manner, without drawing conclusions—generalizations—about a larger group. On this point, we are in full agreement. Inferential statistics, according to the same sources, fulfills an entirely different function: to infer—deduce, extrapolate, or project—properties, conclusions, and patterns from a small sample to a much larger population from which that sample was drawn.

While descriptive statistics applies the mean, standard deviation, and graphical representations as research methods, inferential statistics employs hypothesis testing, such as *t*-tests, ANOVA, regression, and confidence intervals. Correct. While descriptive statistics asks *what is happening?*, inferential statistics asks *why is it happening and what will happen next?* In other words, while descriptive statistics is unquestionably related to inductive

reasoning, inferential statistics operates in favor of deductive reasoning, investigating causes and effects within predictive scientific knowledge. This is our position.

What Idea Do We Highlight to Support Our Inferences?

First, the simple fact of focusing not on the relationship between a smaller sample and a larger population, but rather on the path of ascent from one level of knowledge to another of higher hierarchy and extreme complexity. Moving from particular data to generalizations—abstractions—may lead us into a dead end, confusing us through an unclear or even fraudulent juxtaposition of descriptive and inferential statistics.

It is essential to admit that both descriptive and inferential statistics give rise to certain generalizations: the former at the empirical level, the latter at the theoretical or scientific level. The generalizations obtained through inductive reasoning and the application of descriptive statistics tell us *that* something is, but not *why* it is. Inferential statistics presupposes a system of hypotheses and, consequently, statistical measures that either demonstrate or refute them.

Descriptive statistics leads us to generalizations of an empirical, relative, ordinal, and preconceptual nature, whereas inferential statistics allows for the attainment of generalizations of a high level of abstraction, which not only denote the essential nature of knowledge but also possess a predictive character. That is precisely the point—prediction. Science's primary function is prediction, not explanation. What use is it to explain phenomena if one cannot regulate their occurrence, anticipate forthcoming events, or predict their origin and behavior?

It is toward this end that the highest function of scientific abstractions and the generalizations derived from inferential statistics and deductive reasoning is directed. The knowledge obtained through inferential statistics—and, therefore, through deductive reasoning—is scientific, theoretical, true, correct, absolute, universal, and complete. In

contrast, knowledge obtained through descriptive statistics may be incomplete or inconclusive, as it merely describes and summarizes existing data. Inferential statistics, however, produces generalizations—conclusions—of a higher degree of abstraction and, consequently, a greater predictive capacity, without disrupting the unity of the quantitative and the qualitative.

It should be noted that the knowledge obtained through induction, in our view, is empirical. This does not mean it is speculative; rather, it implies that the essential parameters configuring scientific knowledge are not explicitly identified and are intertwined with empirical knowledge. One cannot deny that a farmer, without having attended university, knows very well where to plant crops and obtain good harvests. This clearly demonstrates that certain parameters of the essence of scientific knowledge are present in such knowledge, even if the individual is not consciously aware of them.

CONCLUSIONS

- Quantitative and qualitative constitute a dialectical unity and are inseparable.
- They should not be used as criteria for classifying scientific research.
- They mutually presuppose and exclude one another.
- They cannot be empirically mixed; their unity is dialectical.
- Inductive reasoning, descriptive statistics, and empirical knowledge are one and the same.
- Deductive reasoning, inferential statistics, and scientific knowledge are one and the same.

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