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PAPER

THEORETICAL FOUNDATIONS OF THE CONCEPT OF QUANTITY AND ITS LINGUISTIC EXPRESSION

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Abstract

The concept of quantity is one of the fundamental categories of human cognition, used to express the number, volume, and magnitude of objects and phenomena in existence. This article explores the philosophical, mathematical, logical, and linguistic aspects of quantity. The study examines the historical evolution of the concept of quantity and substantiates its linguistic expression through numerals, quantifiers, and grammatical forms with examples. The article also compares the role of the category of quantity in human thought, logical reasoning, and speech processes, as well as its expression in various languages.

Key words: quantity, logical quantity, philosophical category, mathematical concept, linguistic expression, number, logic, historical evolution, linguistic means, semantics of quantity.

Introduction

The concept of quantity occupies a multifaceted place in human consciousness. When discussing the origin of quantity, we observe that numbers—as a representation of quantity—emerged in the early stages of human development due to the need to count and measure objects and phenomena. The concepts of number and form are not products of abstract speculation but are derived solely from existing reality. The fact that humans learned to count—mastering the earliest arithmetic operations—is vividly demonstrated by the use of ten fingers. However, this was not a product of free creative imagination. To determine equal quantities of different pluralities, early humans used tangible objects such as pebbles, sticks, fingers, toes, and other body parts. This was the initial stage in defining the category of quantity [1].

Quantity encompasses a broad scope as a philosophical, logical, mathematical, and linguistic concept.

As a philosophical concept, quantity describes the magnitude, volume, number, and properties of objects. In philosophy, the Pythagoreans were among the first to analyze numbers and express interest in quantity. Aristotle later articulated the idea of quantity as a distinct philosophical category [2]. Since quantity reflects the properties of existence, it forms a unity with quality. The quantitative determinacy of objects, when changed to a certain extent, leads to qualitative transformation.

Quantity serves not only as a basis for mathematical analysis but also plays a role in logical communication and the determination of objects' relative dimensions. Since this concept cannot exist without quality, the interconnectedness of these two categories holds a central place in both philosophy and logic. In logic, quantity primarily manifests as a tool for generalization and limitation. The category of quantity is crucial in defining the logical boundaries of objects. Aristotle introduced laws and rules related to this in his Analytics, defining logic as distinguishing true thought from false and clarifying vague knowledge. In Metaphysics, he analyzes reasoning as a logical unity [3]. The scholar particularly elaborates on quantification—a key indicator of logic—in Categories and Analytics.

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Quantity is one of the fundamental categories of mathematics, representing the abstract expression of measurable properties such as length, area, volume, and mass. In mathematics, quantities are divided into two groups: scalar and vector.

• **Scalar quantities** are expressed numerically without direction (e.g., temperature: 25°C, time: 3 hours, mass: 5 kg).

• **Vector quantities** have both magnitude and direction (e.g., velocity: 50 km/h northward, force: 10 N downward) [4].

The Pythagorean school (6th century BCE) advanced the idea that "numbers are the foundation of the universe,"discovering that musical consonances could be explained by numerical ratios. Euclid's Elements (13 volumes) classified quantities into discrete (integers) and continuous (segments, surfaces, volumes) [5].

Archimedes' calculations also emphasized quantity. He used infinitesimals to calculate the area of a parabola and proposed a method for expressing extremely large numbers in The Sand Reckoner [6].

Al-Khwarizmi (780–850) introduced the concept of an unknown quantity (shayʾ) in The Compendious Book on Calculation by Completion and Balancing, systematically solving quadratic equations [7].

The mathematical concept of quantity evolved from practical needs into an abstract modern notion through philosophical and theoretical inquiry, with significant contributions from the scholars mentioned above.

In mathematics, the category of quantity is closely tied to the concept of number, as quantity is expressed numerically. The historical evolution of mathematical quantity reflects humanity's quest to understand and quantify the world. From ancient practical needs to rigorous mathematical proofs, this concept has become a cornerstone of modern science and technology.

The quantitative relations of objects are studied across disciplines, including exact, natural, and social sciences, attracting scholars from various fields.

V.Z. Panfilov's research highlights the cognitive origins of quantity, suggesting it emerged after the category of quality as humans developed the ability to abstract from qualitative properties [8]. Modern languages express quantity through diverse grammatical and lexical means, influencing vocabulary and grammatical structures due to its semantic breadth (encompassing both concrete and abstract phenomena).

Linguistic expressions of quantity reflect precision, communicative goals, and cognitive processes. Each language encodes quantity uniquely:

1. Numerals (most common):

o Uzbek: "Darslikda 15 ta mashq bor."(The textbook has 15 exercises.)

o English: "She has five new books."

o Russian: "В комнате стоят 4 стула."(There are 4 chairs in the room.)

o Turkish: "Sınıfta 10 öğrenci var."(There are 10 students in the class.)

2. Quantifiers:

o Uzbek: "Darsga koʻp talabalar kelishdi."(Many students attended the lecture.)

o English: "There is enough time for discussion."

o Russian: "У меня много работы."(I have a lot of work.)

o Turkish: "Az miktarda su kaldı."(A small amount of water remains.)

3. Grammatical forms (plurality, degree, person-number):

o Plurals: "kitoblar"(books), "children,столья"(chairs).

o Comparatives: "uzunroq"(longer), "more important,менее сложный"(less complex).

The linguistic expression of quantity reflects national cognitive specificities. Cross-linguistic differences in numerical, lexical, or grammatical encoding reveal how language communities perceive the world [9].

The philosophical and linguistic interpretations of quantity are intertwined, both examining how humans perceive and express it. While philosophy grounds the ontological understanding of quantity, linguistics demonstrates its representation in speech. Quantity, as systematized through language, showcases the richness of this category via diverse expressive means.

Conclusion

The concept of quantity, as a fundamental category of human thought, lies at the intersection of mathematics, philosophy, logic, and linguistics. Research shows its origins in ancient practical needs. Philosophically, quantity represents the quantitative aspects of existence; mathematically, it serves as a universal tool for numbers and measurements. Linguistically, it is expressed through numerals, quantifiers, and grammatical forms, reflecting language-specific features.

Ultimately, the category of quantity plays a vital mediating role in humanity's understanding and analysis of the world. Central to the development of mathematics, logic, philosophy, and linguistics, it offers expansive avenues for future research.

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