STRUCTURAL FEATURES OF GERMAN MATHEMATICAL TERMINOLOGY

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Abstract: This article analyzes the **morphological, syntactic, and semantic** features of German mathematical terminology, examining their role in scientific discourse and their importance in interdisciplinary communication.

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Introduction

Alongside the development of mathematics as a science, its terminology has also evolved. German mathematical terms emerged through international scientific traditions, Latin and Greek roots, as well as the morphological and syntactic capacities of the German language. This article analyzes the **morphological, syntactic, and semantic** features of German mathematical terminology, examining their role in scientific discourse and their importance in interdisciplinary communication.

Theoretical Basis

In linguistics, terminology is studied as a distinct lexical layer. Mathematical terms are among the most essential components of scientific discourse, built upon the following principles:

Precision (unambiguity)

Conciseness (expressing complex concepts in a compact form)

International consistency (use of common roots across languages)

In German, these principles are realized through the language's unique morphological and syntactic structures.

Precision Principle

The principle of precision means that each term must denote only **one scientific concept**. This prevents confusion with everyday language and ensures logical clarity in mathematics, which is based on abstract concepts.

Fixed meaning: *Integral* refers exclusively to a mathematical operation and is not used in other senses [1].

Limited synonymy: *Multiplikation* (multiplication) exists only in this form, with no alternative variants [2].

Absence of metaphor: Figurative expressions typical of everyday language are almost absent in mathematical terminology, reinforcing scientific accuracy [3].

International consistency: Many terms are derived from Latin and Greek, appearing in similar forms across languages, which prevents misunderstandings in interdisciplinary communication [4].

examples:

Satz des Pythagoras — denotes only the Pythagorean theorem.

Logarithmus — denotes logarithm, never used metaphorically.

Unendlichkeit — denotes the concept of infinity.

Thus, German mathematical terminology strictly adheres to the principle of precision.

Conciseness Principle

Conciseness requires that each term express complex scientific concepts in the shortest possible form. This ensures efficiency in scientific discourse and facilitates memorization and usage.

Compound words: *Differentialgleichung*, *Wahrscheinlichkeitstheorie* — complex ideas expressed in single lexical units [5].

Affixation: *Unendlichkeit*, *Berechnung* — suffixes condense meaning into compact forms [6].

Latin/Greek roots: *Logarithmus*, *Algebra*, *Geometrie* — international roots provide concise, universally recognizable terms [7].

Genitive constructions: *Satz des Pythagoras* — compact syntactic expression of complex relations [8].

Examples:

Integralrechnung — "integral calculus" expressed as one compound word.

Kombinatorik — "combinatorics" in concise form.

Vektorräume — "vector spaces" expressed compactly.

Thus, conciseness in German mathematical terminology is achieved through compounds, affixation, and international roots.

International Consistency Principle

This principle ensures that terms are used in similar forms across different languages, enabling global scientific communication.

Latin/Greek roots: *Algebra*, *Geometrie*, *Logarithmus* — appear in nearly identical forms in English, French, Russian, etc. [9].

Universality: *Integral, Differential, Matrix, Vector* — widely used across languages [10].

Standardization: International organizations (ISO) emphasize consistency in terminology [11].

Interdisciplinary relevance: German mathematical terms align with courses taught in other languages, facilitating collaboration [12].

Examples:

Logarithmus — English *Logarithm*, French *Logarithme*, Russian *Логарифм*.

Matrix — English *Matrix*, French *Matrice*, Russian *Матрица*.

Vector — English *Vector*, French *Vecteur*, Russian *Вектор*.

Thus, German mathematical terminology demonstrates strong international consistency.

Morphological Features

Compounding: *Differentialgleichung*, *Wahrscheinlichkeitstheorie*
Affixation: *Unendlichkeit*, *Berechnung*
International roots: *Logarithmus*, *Geometrie*, *Algebra*

Syntactic Features

Nominalization: *Addition*, *Multiplikation*
Genitive constructions: *Satz des Pythagoras*
Word order: Strict syntactic structure ensures clarity.

Semantic Features

Precision and unambiguity
Minimal metaphorical usage
International consistency

Comparative Examples

German Term	Uzbek Equivalent	Structural Feature
Differentialgleichung	Differensial	Compound word

	tenglama	
Wahrscheinlichkeitstheorie	Ehtimollar nazariyasi	Compound + genitive
Satz des Pythagoras	Pifagor teoremasi	Genitive construction
Unendlichkeit	Cheksizlik	Derived via suffix
Multiplikation	Ko'paytirish	Latin root

Conclusion

German mathematical terminology is characterized by compound words, international roots, and strict syntactic structures. These features ensure precision, conciseness, and international consistency, making mathematical discourse clear and effective across languages. Studying these structural features at the intersection of linguistics and mathematics is of great importance for scientific research.

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