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LEXICAL FEATURES OF SCIENTIFIC STYLE: DESCRIPTION AND CLASSIFICATION

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Sheraliyeva Shirin Abdisalomovna
Doctor of Sciences (DSc),Assoc. Prof.
Uzbekistan State World Languages University
E-mail: shirin.3009@mail.ru
ORCID: 0009-0009-1210-9189
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Abstract. *The article describes the vocabulary characteristic of the scientific style and proposes an integrated classification of it on English material compared with Uzbek and Russian. Drawing on the traditions of functional stylistics, terminology studies and corpus research on academic vocabulary, the study combines descriptive, componential, comparative and functional-stylistic analysis. Four independent criteria of classification are distinguished: degree of specialisation (common, general scientific and terminological vocabulary), function in the text (nominative, logical-compositional, epistemic and attributive units), origin and word formation, and grammatical-semantic properties. It is shown that the general scientific layer, situated between everyday words and terms, is the most transferable across disciplines and the most vulnerable in translation. The proposed model can be used in teaching academic writing, in scientific translation and in compiling academic word lists for Uzbek.*

Keywords: *scientific style, academic vocabulary, general scientific vocabulary, term, metadiscourse, hedging, nominalisation, internationalism, classification.*

INTRODUCTION

The scientific style occupies a special place among the functional styles of a language. Its purpose is to transmit knowledge accurately, logically and economically, and these communicative tasks are realised above all through vocabulary. Syntax gives a scientific text its characteristic complexity, but it is the lexicon that carries concepts, marks the logical relations between statements and signals the author's attitude to the knowledge reported. Describing this vocabulary and classifying it is therefore a basic task of functional stylistics, terminology studies and the teaching of languages for academic purposes.

The vocabulary of science has been studied in several traditions. In Russian functional stylistics, M.N. Kozhina related the features of the scientific style to the abstract and generalised character of scientific thinking [13], and O.D. Mitrofanova described the lexical

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composition of scientific and technical literature, distinguishing general, general scientific and terminological strata [15]. In English stylistics, I.R. Galperin and I.V. Arnold characterised scientific prose by the prevalence of terms and the absence of emotive colouring [3, 12]. In Uzbek linguistics, the scientific style was described in the stylistics textbook by A. Shomaqsudov and co-authors [11]. Terminology studies, from D.S. Lotte to A.V. Superanskaya and her colleagues, elaborated the requirements a term must meet [14, 16].

Corpus linguistics added a quantitative dimension. A. Coxhead compiled the Academic Word List of 570 word families that account for about ten per cent of the running words in academic texts [2]; I. S. P. Nation proposed a model of high-frequency, academic, technical and low-frequency vocabulary [8]; D. Gardner and M. Davies built a lemma-based Academic Vocabulary List [4]; M. Paquot described an academic keyword list oriented to the rhetorical functions of words [9]. K. Hyland showed how hedges and other metadiscourse markers shape the relationship between writer and reader [6, 7], while D. Biber and S. Conrad related lexical choices to register and genre [1].

Despite this rich literature, the existing classifications are built on different grounds, namely the degree of specialisation, the function in the text, origin or grammatical properties, and they are rarely brought together. Teachers and translators, especially in the trilingual English-Uzbek-Russian setting of Uzbekistan, need an integrated description that shows where a given word belongs on each of these dimensions. The present article continues our earlier work on the internal differentiation of scientific texts [1] and on the translation of scientific phraseology [19].

The aim of the study is to describe the vocabulary characteristic of the scientific style and to propose an integrated, multi-criteria classification of it, illustrated by English material compared with Uzbek and Russian. The objectives are to summarise the main approaches to the description of scientific vocabulary, to establish the criteria of classification, to characterise each lexical class with examples, and to show the practical value of the classification for teaching and translation.

Materials and methods. The material consists of English research articles, monographs and university textbooks in linguistics, pedagogy, biology, physics, computer science and economics, together with comparable Uzbek and Russian texts. Academic word lists [2, 4, 9] and terminological dictionaries were used to verify the status of individual words. The examples given below are typical of the analysed texts; the quantitative data cited come from the published corpus studies referred to.

The study combines the descriptive method, used to characterise lexical classes; componential analysis, used to separate the conceptual core of a word from its stylistic and evaluative components; comparative analysis of

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English, Uzbek and Russian correspondences; and functional-stylistic analysis, which relates lexical choices to the communicative tasks of a scientific text. Four criteria of classification were applied: (1) degree of specialisation; (2) function in the text; (3) origin and word formation; (4) grammatical and semantic properties.

Results and discussions. *Classification by degree of specialisation.* The most widely accepted division of scientific vocabulary distinguishes three strata, which correspond broadly to the high-frequency, academic and technical levels in I. S. P. Nation's model [8, 15]. They can be seen even in a single sentence:

Eng: *The results indicate that the proposed algorithm significantly reduces computational complexity.*

Uz: *Natijalar taklif etilgan algoritm hisoblaş murakkabligini sezilarli darajada kamaytirişini körsatadi.*

Ru: *Результаты показывают, что предложенный алгоритм значительно снижает вычислительную сложность.*

Here *the* and *that* belong to the common stratum; *results*, *indicate*, *proposed*, *significantly* and *reduces* are general scientific words that could appear in a paper in any field; *algorithm* and *computational complexity* are terms of computer science. The characteristics of the three strata are summarised in Table 1.

Table 1. Strata of scientific vocabulary by degree of specialisation

Stratum	Main features	English	Uzbek	Russian
Common vocabulary	Function words and high-frequency lexis; the grammatical and lexical «frame» of the text	*the, of, use, make, show*	*va, uçun, foydalanmoq, körsatmoq*	*u, для, использовать, показывать*
General scientific vocabulary	Shared by all disciplines; names general scientific notions, operations and relations	*analysis, hypothesis, data, method, factor, indicate*	*tahlil, faraz, ma'lumot, usul, omil, körsatmoq*	*анализ, гипотеза, данные, метод, фактор, указывать*
Special (terminological) vocabulary	Terms of a particular discipline; defined, systemic, stylistically neutral	*phoneme, enzyme, algorithm, inflation*	*fonema, ferment, algoritm, inflyatsiya*	*фонема, фермент, алгоритм, инфляция*

Common vocabulary forms the largest part of running words, but it is not stylistically neutral in every respect: scientific texts prefer its more formal members (*obtain* rather than *get*, *examine* rather than *look at*). General scientific vocabulary is the core of what Coxhead called academic vocabulary [2]; its words are polysemous in general language but narrow their meaning in scientific use. Terms, finally, are expected to be monosemous within their system, stylistically neutral, motivated and supported by a definition [14, 16].

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The boundaries between the strata are permeable. Common words become terms through terminologisation: *cell* in biology, *field* in physics, *bug* and *mouse* in computing, *hujayra* and *maydon* in Uzbek. The opposite process, determinologisation, brings terms into general use, as with *virus*, *ecosystem* or *feedback*. A classification by stratum therefore describes the status of a word in a given text rather than a permanent property of the word.

Classification by function in the text. The second criterion groups words according to the role they play in organising scientific communication. Four functional classes can be distinguished (Table 2).

Table 2. Functional classes of scientific vocabulary

Class	Function	English	Uzbek	Russian
Nominative units	Name objects, notions and processes of science	*theory, sample, variable, photosynthesis*	*nazariya, tanlanma, özgaruvçi, fotosintez*	*теория, выборка, переменная, фотосинтез*
Logical-compositional units (metatext)	Mark sequence, addition, contrast, cause, conclusion	*firstly, moreover, however, therefore, thus*	*birinçidan, bundan taşqari, biroq, demak, şunday qilib*	*во-первых, кроме того, однако, следовательно, таким образом*
Epistemic units: hedges and boosters	Express the degree of certainty of a claim	*may, appear, suggest, likely; clearly, demonstrate*	*ehtimol, aftidan, taxmin qiliş mumkin; şubhasiz, aniq*	*возможно, по-видимому, вероятно; очевидно, доказывать*
Attributive (reporting) units	Introduce and evaluate the claims of other authors	*argue, claim, propose, note, state*	*ta'kidlaydi, ilgari suradi, taklif etadi, qayd etadi*	*утверждает, полагает, предлагает, отмечает*

Nominative units carry the conceptual content and coincide largely with terms and general scientific nouns. Logical-compositional units belong to what K. Hyland calls interactive metadiscourse: they guide the reader through the argument [7]. Epistemic units are especially important. K. Hyland showed that hedges such as *may*, *appear* and *suggest* are not signs of vagueness but a means of presenting claims with appropriate caution and of anticipating the

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reader's objections [6]. Reporting verbs differ in their evaluative force: *note* and *state* are neutral, *argue* and *claim* signal that the reported position is open to debate, and *demonstrate* presents it as established. A translator who renders *claim* and *show* by the same Uzbek verb *körsatadi* erases this distinction.

Classification by origin and word formation. Scientific vocabulary is markedly international. In English, a large share of general scientific words and terms are of Greek and Latin origin: *hypothesis*, *analysis*, *phenomenon*, *criterion*, *datum*. Some retain classical plurals (*hypotheses*, *phenomena*, *criteria*, *data*), which creates grammatical difficulties for learners and translators. Word formation relies on productive affixes (*-tion*, *-ity*, *-ism*, *-ology*, *-ise*/*-ize*; *bio-*, *micro-*, *inter-*, *poly-*), on compounding (*greenhouse gas*, *feedback loop*), on multi-word terms (*natural language processing*) and on abbreviations and acronyms (*DNA*, *PCR*, *AI*).

In Uzbek, three layers of scientific vocabulary can be distinguished by origin. The first consists of words of Arabic and Persian origin that have long served Uzbek scholarship: *ilm*, *tahlil*, *natija*, *nazariya*, *xulosa*, *tajriba*. The second consists of internationalisms borrowed mainly through Russian: *metod*, *analiz*, *gipoteza*, *termin*, *funksiya*. The third is formed by native word formation: *aniqlik*, *tilşunoslik*, *adabiyotşunoslik*, *terminlaştirmoq*, *raqamlaştiriş*. The coexistence of synonyms from different layers (*usul* and *metod*, *faraz* and *gipoteza*) is a characteristic feature of Uzbek scientific vocabulary and a frequent source of inconsistency in translated texts.

Classification by grammatical and semantic properties. The vocabulary of scientific texts is dominated by nouns, especially abstract nouns and verbal nouns. M. A. K. Halliday and J. R. Martin explained this through grammatical metaphor: processes are turned into things, so that *costs fell rapidly* becomes *the rapid reduction of costs* [5]. Nominalisation allows a writer to pack information densely and to treat processes as objects of further reasoning. It is accompanied by verbs of general meaning combined with nominal complements: *carry out an analysis*, *make an assumption*, *conduct research*; in Uzbek *tahlil ötkazmoq*, *faraz qilmoq*, *tadqiqot olib bormoq*; in Russian *проводить анализ*, *делать допущение*.

Semantically, scientific vocabulary shows reduced polysemy and restricted synonymy within a text, since every variation in wording may be read as a variation in meaning. It excludes or strongly limits emotive and expressive words, colloquialisms, slang, dialect words and archaisms, apart from fixed terms [3, 12, 15]. Evaluation is not absent, but it is expressed by a narrow set of conventional adjectives and adverbs: *significant*, *novel*, *robust*, *crucial*, *considerably*.

The four criteria are independent, and each word occupies a position on all of them at once. *Hypothesis* is a general scientific, nominative, Greek-derived abstract noun; *however* is a common-

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stratum, logical-compositional unit; *suggest* is a general scientific verb that may function both as a hedge and as a reporting verb.

The classification also has practical consequences. For teaching, the general scientific stratum is the most valuable, since it is shared by all disciplines and is rarely taught explicitly. For translation, the same stratum is the most vulnerable: its words look familiar and invite literal rendering. Typical errors include false friends (*actual* rendered as *актуальный* or *aktual*, *accurate* as *аккуратный*), the loss of hedging when *may suggest* becomes a categorical statement, and inconsistent alternation of Uzbek synonyms of different origin. For Uzbek lexicography, the results point to the need for an academic word list of Uzbek adapted to the updated Latin alphabet, which would standardise the general scientific layer in the same way that terminological dictionaries standardise terms.

Conclusion. The vocabulary characteristic of the scientific style is heterogeneous and cannot be described by a single criterion. The study proposes an integrated classification based on four independent criteria. By degree of specialisation, common, general scientific and terminological strata are distinguished, with permeable boundaries maintained by terminologisation and determinologisation. By function, nominative, logical-compositional, epistemic and attributive units are distinguished. By origin, scientific vocabulary is markedly international, and in Uzbek it combines Arabic-Persian, Russian-international and native layers. By grammatical and semantic properties, it is characterised by nominalisation, verbs of general meaning, reduced polysemy and the exclusion of emotive and colloquial words. The general scientific stratum proves the most transferable across disciplines and the most vulnerable in translation. Further research may focus on a corpus-based academic word list of Uzbek and on the disciplinary variation of general scientific vocabulary in the three languages.

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