



ТОЧКА ЗРЕНИЯ / POINT OF VIEW

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ENGLISH AS A MEANS OF SCIENTIFIC COMMUNICATION: LINGUISTIC IMPERIALISM OR INTERLINGUA?

*N. G. Popova**, *T. A. Beavitt**The Institute of Philosophy and Law, Ural Branch of the Russian Academy
of Sciences, Ekaterinburg, Russia,
ngpopova@list.ru

Introduction: the process of globalisation has strengthened the position of the English language as a means of communication in all spheres of life, including scientific communication. The expansion of one language not only necessitates changes in the status of other national languages and the emergence of a hierarchical relationship between them, but also significantly affects the political and economic balance of power in the world. The global dominance of English in science not only confers distinct advantages on its native speakers but also discriminates against scholars from non-Anglophone societies. As a result, a threat arises concerning the loss to humanity of unique, culture-specific ways of understanding reality.

Materials and Methods: on the basis of an analysis of modern trends and literature review, such manifestations of linguistic imperialism in the field of academic communication as the *IMRaD* format, *CLIL* teaching technologies and English academic writing centres are revealed. Subsequently, these phenomena are investigated using empirical sociological methods: in-depth expert interviews, participant observation and the content study of chemistry papers indexed in *Scopus*.

Results: it is demonstrated that the Anglophone societies use the global distribution of the English language to advance their competitive advantage in the field of science. The implementation of English language instruction in higher education and Anglophone communicative patterns in scholarly communication – particularly with regard to the representation of research results – might have a negative effect both on the development of researchers' competencies and their future effectiveness in advancing science.

Discussion and Conclusions: it is concluded that an increased awareness of potential threats caused by the dominance of the English language in scientific communication is needed among all the participants of scientific communication, including higher school lecturers. This can be achieved by using bilingual and bicultural educational approaches.

Keywords: linguistic imperialism; imported metalect; language policy; academic English teaching; *IMRaD*; scientific communication; English-language education; *CLIL*; academic writing centres; bilingualism; standardisation of scientific activity; neural networks; interlingua

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АНГЛИЙСКИЙ ЯЗЫК КАК ИНСТРУМЕНТ НАУЧНОЙ КОММУНИКАЦИИ: ЛИНГВИСТИЧЕСКИЙ ИМПЕРИАЛИЗМ ИЛИ «ИНТЕРЛИНГВА»?

Н. Г. Попова*, Т. А. Бивитт

ФГБУН «Институт философии и права Уральского отделения
Российской академии наук», г. Екатеринбург, Россия,

*ngpopova@list.ru

Введение: процесс глобализации существенно укрепил позиции английского языка как средства коммуникации во всех сферах общества, причем этот процесс особенно заметен в науке. Глобальное доминирование английского языка в науке имеет выраженные преимущества для его носителей, тем самым усугубляя существующее неравенство. В результате возникает угроза потери человечеством уникальных способов познания реальности.

Материалы и методы: основываясь на глубоко теоретическом анализе современных тенденций и широком литературном обзоре, были выделены наиболее яркие проявления лингвистического империализма в науке: формат *IMRAD* для научных статей, методики англоязычного образования *CLIL* и учреждение центров академического письма по американской модели. Данные явления анализируются с помощью социологических методов: глубинных интервью, включенного наблюдения и контент-анализа научных статей по химии, индексируемых в *Scopus*.

Результаты исследования: показано, что англофонные общества действительно получают преимущества от глобального распространения английского языка. Распространение англоязычного образования и коммуникативных паттернов, свойственных этим обществам в формах представления научных текстов, могут негативно отразиться и на формировании компетенций ученых, и на результативности их научной деятельности.

Обсуждение и заключение: делается заключение о необходимости развития осознанности всех участников научной коммуникации, а также преподавателей высшей школы о негативных последствиях данных процессов. Аргументируется важность сохранения обучения на родном языке на всех ступенях образования, а также использования билингвальных и бикультуральных подходов.

Ключевые слова: лингвистический империализм; импортированный металект; языковая политика; преподавание академического английского языка; *IMRAD*; научная коммуникация; англоязычное образование; *CLIL*; центры академического письма; билингвизм; стандартизация научной деятельности; нейронные сети; интерлингва

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Introduction

In today's digitally intermediated age, the amount of scientific information in circulation has reached epic proportions: according to some sources, around 10 thousand articles are published daily worldwide. The number of scientific journals is also growing: according to *Ulrich's periodicals*, there are currently about 200 thousand publications¹ that can be described as "scientific". Leading abstract and citation databases such as *Web of Science Core Collection* and *Scopus* index around 12 thousand and 22 thousand sources respectively; the number of open access journals listed in

the DOAJ database has reached 10 thousand. The exponential growth of information throughout the world, which began in earnest in the 1990s, created a significant problem in terms of its management. A reduction in the number of languages in which this information is encoded was one approach towards dealing with this complexity.

At the present time, English unequivocally dominates the world of science and information by virtue of its intermediation of the vast majority of communications in this sphere [for other reasons, see e.g. 1–3]. According to various sources, up to 96 % of

¹ Руководство по наукометрии: индикаторы развития науки и технологии / М. А. Акоев [и др.]. Екатеринбург: Изд-во Урал. ун-та, 2014. 250 с. URL: http://wokinfo.com/media/pdf/ru-bibliometric_handbook.pdf



the world's academic literature is published in English. The proportion of English-language articles published in European countries as indexed by the *Scopus* abstracts database is many times higher than the proportion of publications in all other national languages combined. An especially startling growth in the number of English-language articles for the period 2008–2011 was recorded, for example, in the Netherlands, Italy and Russia²; in the Netherlands, the country leader for this trend, the ratio was 40:1. If the choice to write individual articles in English is one thing, journal publishing policy is another: around 80 % of *Scopus*-indexed scientific journals now publish content entirely in English. Moreover, according to the analytical *SCImago Journal and Country Rank* resource, the world's leading 50 journals not only present content entirely in the English language, but are all published either in the UK or in the US. There is no reason to doubt that the number of English-language journals will continue to grow and – unfortunately, as they do so – displace periodicals published in national languages.

Unsurprisingly, then, the use of English as a universal tool for scientific communication has generated a lot of debate. At one extreme are the supporters of its further advancement, who see it as the pre-eminent *lingua franca* of science. They note that, in the context of the snowballing growth of information throughout the world, the use of a common language may be the only effective means for ensuring the fixation, storage, processing and access to large amounts of information [4]. Improvements in information management should, in turn, facilitate the development and promotion of scientific knowledge in general [5]. In addition, the well-known scholar David Crystal, in analysing the global operation of the English language, insists that the international community speaks in a kind of “sterilised” language, devoid of cultural identity, and therefore neutral in terms of posing a threat to the world's linguistic and

cultural diversity. In his opinion [6], English is not only distributed disinterestedly and naturally to its non-native speakers, but retains the ability to be rewritten to fit their needs.

At the other extreme, concerns are expressed about political, economic, axiological and even existential threats resulting from the dominance of one language [7; 8]. In 1992, the British researcher Robert Phillipson published a book entitled “Linguistic Imperialism” [9], in which he gave a detailed account of the phenomenon of one language's dominance over others. Summarising the contributions of previous authors, who had studied issues around cultural discrimination, sexism, neo-colonialism and imperialism, he not only provided a definition of linguistic imperialism, but also a typology of the phenomenon across different social spheres. Thus, a distinction was made between the concepts of “linguicism” (by analogy with racism, sexism and other *-isms*) and “linguistic imperialism”. In the first case, a language is used in a given society to maintain social inequality and the power positions of individual social actors. Linguistic imperialism, by contrast, is linguicism in action when the behaviour of actors is supported by an imperialistic structure specifically designed to assist one society or community to exploit another. According to Phillipson, the global dominance of the English language leads to the creation of a hierarchy, resulting in the demise of other languages as well as deepening inequality worldwide.

Yury Kobenko, a Russian researcher who analysed the sociolinguistic status of the English language in the educational space, came to the conclusion that, in Russia, it operates as an imported metalect³ [10]. This author distinguished attributes of uses of English for the purposes of linguistic colonisation that may also validly apply to analyses of scientific communication. One such attribute was designated in terms of a lack of alternatives, i.e. a pre-existing compulsion to study it. Indeed, knowledge of English is rapidly becoming the key, not

² Research trends (2012). URL: <https://www.researchtrends.com/issue-31-november-2012/the-language-of-future-scientific-communication>

³ An imported metalect is the national language of a colonising power, which has become a major element in the colonised society.

only to a scientist's career advancement, but even for preserving his or her job, since in order for an academic employment contract to be extended it is necessary to achieve publication in international indexed journals. In other words, one may speak about the absence of free choice in terms of the form of presentation of results of intellectual activity. The second attribute of linguistic colonisation, according to Prof. Kobenko, is the displacement by one language of other languages from the territory of its dominance. The adoption of the "Bologna Process" by the ruling Russian elites has, unfortunately, led to a gradual discontinuation of university-level teaching of foreign languages other than English. German and French – the traditional staples of Russian graduate schools – are nowadays studied only as specialist subjects [11]. As far as the authors of this work understand, a similar situation is observed in educational systems around the world. Hence, the third attribute consists in the use of a colonial language for ideological purposes, when it is implanted in the "periphery" to serve the political and economic interests of the "centre". A good example of this is the English-language publishing business, whose profitability is comparable to that of innovative high-tech companies. Thus, in 2014, Elsevier Publishing's profitability (profit as a percentage of revenue) was 37 %, while Springer's was 35 %; this compares to, for example, BMW – 10 % – and Apple – 29 %⁴. In 2016, Thomson Reuters announced the sale of its subdivision dedicated to the provision of information in the scientific field: the amount of the transaction was 3.55 billion dollars. In other words, we are talking about the formation of a financial oligarchy in the field of scientific publication and the inevitable domination of this oligarchy over the means by which ideological influence is carried to the population.

A number of researchers have carried out studies into the individual manifestations of linguistic imperialism in science [Tardy, *ibid*; 12]. As primary examples,

situations are discussed in which: reviewers reject articles solely on the basis of claims concerning the quality of the language; scientific journal editors display a more indulgent attitude towards authors with "English-sounding" names; interest in topics primarily of relevance to Anglophone societies is exaggerated; and authors tend to cite English-language sources to improve the chances of publication of their manuscripts. Thus, on the one hand, there is a suspicion that the English language is not as culturally neutral and safe as is claimed by those who advocate its spread as a lingua franca, and, on the other, there is a realisation of the necessity for a deeper understanding and awareness of the phenomenon of linguistic imperialism.

In this work, in sharing the apprehension of the scientific community regarding the expansion of English in academic communications, an impartial study and critical reflection on its imperialistic function is attempted. For the analysis, three of the most striking (in our opinion) manifestations of the formation of the Anglo-imperialist structure for maintaining hierarchical relationships in the world of science were chosen: the spread of the *IMRaD* (Introduction, Methods, Results and Discussion) format in experimental articles, the introduction of *CLIL* (Content and Language Integrated Learning) pedagogical practices in higher education and the establishment of centres of academic writing in different countries on the American model.

Methods

In order to verify whether linguistic imperialism has tangible manifestations as a cultural and political phenomenon in today's scholarly communication, both theoretical and empirical methods were applied. The theoretical approach used in the study relies mainly on an extensive interdisciplinary literature review, with sources drawn from various fields dealing with diverse issues of culture, language and society in the context of globalisation.

⁴ Holcomb A. Open-access science blog. URL: <https://alexholcombe.wordpress.com/2015/05/21/scholarly-publisher-profit-update>



In order to evaluate the prevalence of the *IMRaD* format in contemporary international scientific journals compared with previous periods (in other words, to track the dynamics of the spread of the *IMRaD* format to non-English speaking countries), the authors of the present study conducted a content analysis of 200 experimental papers on chemical sciences indexed in the *Scopus* abstracts database. Chemistry was chosen as the umbrella discipline because it is in this scientific field that there is a high proportion of interdisciplinary research at the interface with biology, medicine, physics and mathematics. Based on the study of the literature, it was hypothesised that the *IMRaD* format became firmly embedded during the last thirty years; therefore, the sampling of articles was carried out at the midpoint of the last three decades, examining 50 articles published in 1985, 1995, 2005 and 2015 respectively. Important prior conditions for the selection of articles in the sample were: a) publication in a journal not lower than third quartile, guaranteeing the high quality of the material; b) authors were to be non-native speakers of English. The second requirement was connected with the fact that courses of English academic writing (where writing is also taught in terms of presentational logic) are mainly taught to non-native speakers.

The perceptions of scientists concerning the role of English in today's scientific communication were analysed using in-depth interview and participant observation methods. In 2014–2015, we carried out a study of the practices of Russian scientists working on scientific articles. A portion of the obtained results can be found in [13]. During this period, the participant observation method was used to analyse the work of 62 temporary research teams and 15 in-depth interviews were carried out with writers responsible for the creation of texts (*corresponding authors*). All articles were natural-scientific in character and ready to be published in English in peer-reviewed international journals. This sociological analysis led to important conclusions, including with regard to the attitudes of Russian authors towards the need to present scientific results in the *IMRaD* format.

Results and Discussion

The *IMRaD* Format for Experimental

Articles. As a specific form of presentation of scientific knowledge, the scientific article has undergone a long evolution. According to historians of the genre [14; 15], the emergence and development of the scientific community in the seventeenth century with the “invisible college” brought about an increasing need for the exchange of knowledge among scientists. Thus appeared the first journals, in which researchers not only had the opportunity to report discoveries and inventions, but also to assert their priority. As a result, scientific texts, which had previously only existed in the form of letters to colleagues, also began to change, adapting to the needs of the emerging scientific community. Thus, in the nineteenth century, editors of scientific journals began to formulate style requirements for the authors of manuscripts aimed not at an audience of amateurs and hobbyists but specialists in burgeoning scientific fields. In the scientific style, the language becomes depersonalised and acquires special terminology; tables and graphs start to appear. It is important to point out that, until the second half of the twentieth century, science was essentially multilingual (and many scientists themselves were polyglots): articles were published in French, German, Russian and many other languages.

Major changes in the structure and style of scientific articles took place during the twentieth century. The most important reason for this was the emergence, during the 1940s, of an information crisis associated with the rapid increase both in the sheer volume of research and the rapid development of inter- and multi-disciplinary areas; by this time, the problem of information retrieval had become acutely relevant. One response was US scientist Eugene Garfield's development in the 1960s of the Science Citation Index (SCI), an index of scientific information published in leading journals based on the frequency of citation of papers by other authors.

Naturally, the more standardised the information, the easier it is to process it using computer systems. We can assume

that this is why the scientific article (not the monograph, for example) became the “atom of scientific communication” [16], the standard means for distributing and evaluating research results, as well as a critical factor for career development in most scientific disciplines. We may note that this “standard” became precisely the English-language scientific article: starting from this period, science was to become essentially monolingual. Let us for the sake of fairness note that studies in the area of scientometrics – the discipline occupying the standardisation and processing of scientific information – were also actively conducted in the USSR. However, the scientometric – or cybernetic – approach did not receive such a widespread acceptance as in America due to its seeming incompatibility with the official ideology of the time [17].

A key factor contributing to the further standardisation of the modern format of the scientific article and its global expansion was the work of specialists in applied linguistics. Their interest was to a large extent associated with the attitude of *publish or perish*, widely prevalent in the US and European countries, which led many authors to consider how a standard scientific text should look if it is to be published in a high-impact magazine in English. As a result, different aspects of academic writing, such as the style and variety of scientific texts and the rhetorical and communication functions of the various elements of language use, have been the subject of diverse studies [e.g. 18–23]. Important conclusions concerning the structure and sequence of the presentation of information in a scientific paper later formed the basis for English language courses for special (scientific) purposes (ESP, EAP). Such courses have been included in Master’s level and postgraduate courses; consequently, the circle has been closed and the model identified on the basis of analysing the mass of articles was held up as an ideal.

The *IMRaD* model for structuring articles, initially used by researchers working

in the natural sciences (especially medical science), quickly came to dominate almost all academic fields. From the point of view of its organisation, an article in the *IMRaD* format is known to comprise the following distinct sections: Introduction, Material and Methods, Results and Discussion. After revealing the explicit form of the text, linguists then turned to an analysis of the sections of scientific articles from the point of view of their communicative function to develop special rhetorical methods for convincing the reader of the validity of the study. Thus appeared the well-known *structural move analysis* (Swales), which has subsequently [24] been described in terms of an identification of the moves and steps in the unfolding of a discourse. Among the well-known works in this area, we should mention studies on the structural organisation of experimental articles [25]; the specifics of writing abstracts [26]; and composition of the “Materials and Methods”, “Results” [27; 28] and “Discussion of Results” [29] sections.

Thus an ideal model for describing the logical presentation of information in a scientific article was created, a model that is being actively promulgated in many textbooks on academic writing today⁵. The basic principle of this model article consists in the *relative independence* of its sections from each other. The contemporary English-language scientific paper can be read starting from virtually any section, since each one of them has the character of a microtext. Even the keywords and the title are today considered as text-primitives.

It can be observed that not a great deal of creativity is required to the extent that the “recommended” moves and steps in the main sections of an *IMRAD* paper [30; 31] are followed by rote. Thus, e.g., the Introduction logic is supposed to start with reporting the relevance of the research and formulation of the research problem, subsequently followed by identification of weak areas in previous studies (a so-called research gap) and a statement of how this

⁵ See, e.g., Wallwork A. *English for Writing Research Papers* (2011); Hartley J. *Academic Writing and Publishing* (2008); Day R., Gastel B. *How to Write and Publish a Scientific Paper* (2006), Cargill M., O’Connor P. *Writing Scientific Research Articles: Strategy and Steps* (2009); and many others.



gap will be addressed. The final paragraph provides a formulation of the main thesis and a brief announcement of the results.

The results of our content analysis have demonstrated the dominance of the *IMRaD* format in the sphere of scholarly publications. Figure shows the dynamics of the *IMRaD* format distribution in chemical sciences, an area in which almost all papers published today are written according to the *IMRaD* structure (Figure). Our results (details will be published elsewhere) have

also demonstrated a high level of convergence in the studied papers in terms of the abovementioned moves and steps. In the majority of chemical papers written in 2015, the research gap was easy to detect by scanning the Introduction and selecting a sentence that contains words *although*, *despite* or *however* and other concessive conjunctions. Therefore, it can be concluded that Introductions tend to be written more mechanically than creatively.

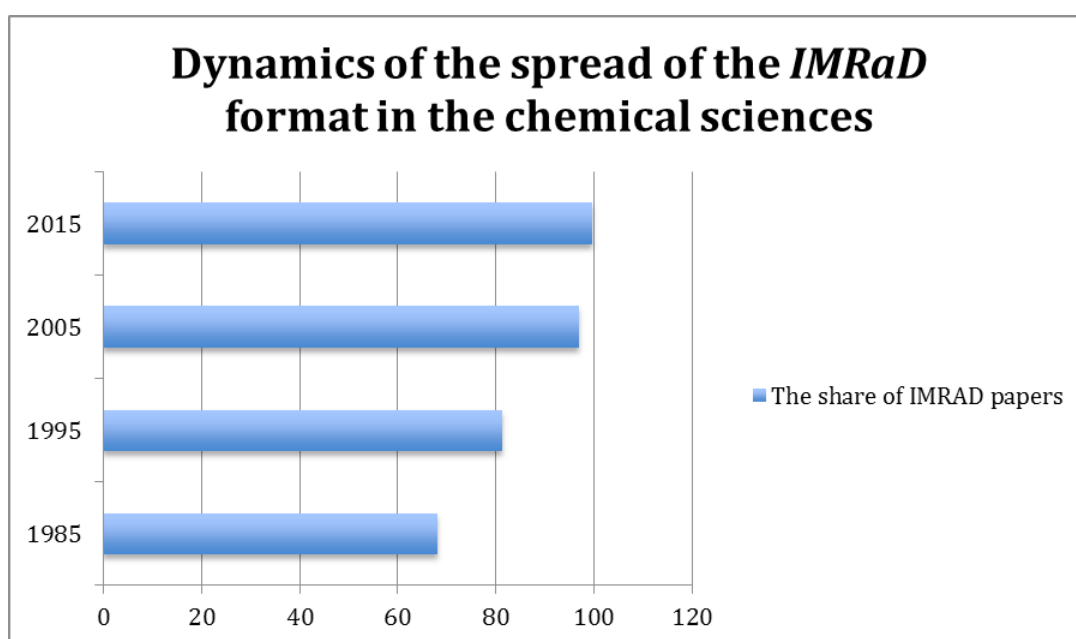


Figure. The dynamics of the spread of the *IMRaD* format in the chemical sciences, since 1985

It may fairly be pointed out that such standardisation in science is a good thing. Indeed, the *IMRaD* format is well-suited to the communication of the results of scientific research: the logic of the text replicates the actual process, with the research questions being initially stated, then the necessary tools selected, results captured and conclusions drawn from them. In addition, such a sequence of presentation of the results of scientific research allows the presentation of scientific knowledge to be formalised and standardised. Significantly, this led to information search and retrieval processes becoming much faster and easier: under the conditions of the *big data* era and the emergence of *artificial neural*

networks (computer systems modelled on the human brain and nervous system), this has become an essential component for the proper functioning of science. Thus, the use of a common format is consistent with the imperative of universalism in science (R. Merton). Nevertheless, despite these undoubtedly positive aspects, such universalism represents a serious threat to unique culture-specific ways of understanding reality, to an examination of which we will now proceed.

One of the dangers of an increasing rigidity in the format of scientific publications can be seen in the negative effect of any kind of standardisation of human activity. On the one hand, standards, clichés and stereotypes enable a given society to structure

reality and develop those models of behaviour that will be regarded as standards of adequacy to which its members should conform. As a result, researchers are freed from having to make decisions in standard situations and the utility of scarce resources is optimised. Thus, the availability of a convenient and simple algorithm for writing a text genuinely maximises a chemistry researcher's available time for conducting experiments. On the other hand, it is no coincidence that standardisation is contrasted with creativity or taking a creative approach. Creativity involves a non-standard vision, a departure from traditional forms of thinking and a search for non-obvious solutions to complex problems; thus, it is by definition contrary to the organisational principle of bureaucracy. And, since the production of an idea and the generation of the text that expresses it are inseparable [32–34], the standardisation of text creation activities may have negative consequences for the very process of thinking.

An alternative perspective on this problem may be obtained via the practice of translation using a Computer-Assisted Translation (CAT) tool such as Wordfast. Such tools are increasingly used by professional translators, including those whose speciality is in the translation of scientific papers from Russian to English. During the course of around 8 years of professional translation experience in this area, the authors have produced 24,271 translation units (TUs), consisting of sentences and longer phrases stored in a database as corresponding pairs in both source and target languages (Ru-En). One of the advantages of using a CAT approach towards translation is that the storage of such TUs allows formulaic linguistic content to be re-used in future translations. In areas such as legal and technical documentation it is not uncommon for as much as 10–20 % of a document to consist of such repetitions, thus reducing the cost of translation. Consequently, large corporations – or agencies servicing their translation requirements – typi-

cally maintain huge TU databases, which help them not only to save on translation costs, but also maintain consistency in multilingual communication.

Perhaps surprisingly, given the formulaic approach taught to scientists writing in English, as discussed above, it is unusual for a scientific paper presented for translation in Russian to register more than a trivial number of repetitions against the TUs held in the authors' database. While many papers currently being written in Russian do not precisely conform to the *IMRaD* structure, there seems to be a tendency towards such conformity regardless of what language the article is being written in. Given a much larger TU database, perhaps stored on institutional servers, and continued progress towards conformity with the *IMRaD* format in papers written in Russian, it is quite possible that a CAT-based approach could have a similar effect in terms of translation cost and consistency to that already demonstrated in the corporate world. However, this would not remedy – but would be likely to exacerbate – the identified problem concerning a lack of basic creativity.

The dissemination of the *IMRaD* format throughout the scientific world has been accompanied by a huge increase in the volume of published scientific articles. For example, in Russia, by no means the world leader on this indicator, the number of articles indexed in *Scopus*, grew from 32,528 in 2012 to 41,234 in 2014⁶. The most impressive growth in publication activity has taken place in China, whose overall share of the global flow of scientific publications increased during the period 1996–2010 from 2.6 % to 16.3 % [35, p. 40]. It should be noted that internal Chinese policy in the sphere of science and education is aimed, not only at encouraging scientists to study academic English (the vast majority of foreign students on academic writing courses in the UK are Chinese), but also at stimulating experts in the field to come and work in Chinese universities.

⁶ Индикаторы науки: 2016 : статистический ежегодник / Н. В. Городникова [и др.]. Москва : Высшая школа экономики, 2016. URL: <https://www.hse.ru/data/2016/02/08/1140295633/%D0%98%D0%BD%D0%B4%D0%B8%D0%BA%D0%B0%D1%82%D0%BE%D1%80%D1%8B%20%D0%BD%D0%B0%D1%83%D0%BA%D0%B8%202016.pdf>



However, according to many analysts, the increase in the total volume of publications has not been accompanied by a significant positive effect on the *quality and depth* of research. Accordingly, an increasing number of articles have been published on the need to rethink scientific publication approaches [36; 37]. Many scientists are concerned that the majority of scientific articles being published today do not meet the quality requirements of the scientific community in terms of their content. In other words, while many of these papers are in full compliance with the outward form of procedural reports, they may not convey a deep understanding of the results of scientific research. Although these conformist texts are more convenient for speed reading, they frequently fail to support honest, enriching communication between scientists: instead, contemporary writing practices increasingly contribute to the formation of a new image of the researcher, one that shirks responsibility and eschews self-doubt. As a result, a large part of the apparently impressive growth in scientific knowledge may be comprised of layers of rhetorical argument designed to effectively resist theoretical analysis.

Another consequence of the implantation of templates is the loss of “authorial voice” – and, consequently, the cultural identity of the text. Today’s articles written by non-native English speakers are virtually indistinguishable from each other (other than in terms of certain key variables) – the same formulaic phrases, the same *moves and steps* used to construct the argument. It should also be noted that many native speakers write more effectively, since they are able to utilise the full richness of academic English that is at their disposal. It is therefore only natural if, during the reviewing process, papers written by the latter are more likely to receive a positive evaluation.

CLIL pedagogical technology. A particularly “conducive” environment for the successful creation and maintenance of the English language’s ubiquity in science is the

contemporary foreign language teaching methodology *CLIL* (Content and Language Integrated Learning). *CLIL* is an umbrella term used to describe any technology for the integrated instruction in a subject (physics, mathematics, sociology, etc.) through the medium of a foreign language. However, despite these techniques supposedly involving the use of *any* language that is foreign to the students as a conduit for learning objectives, it turns out that *CLIL* is one of the types of English-language education whose ostensible goals are developed at the same time as promoting English-language competencies: during the course of extensive research, the authors of this work could not find *a single* example of the application of *CLIL* learning methods using a vehicular language other than English. Currently, *CLIL* is being aggressively promoted worldwide, including in some Russian universities.

The active development of such practices gathered pace at the beginning of this century under the auspices of the European Union at a time when the task of forming a common European space required a solid foundation for the development of a globally competitive knowledge-based economy. According to the established strategy⁷, implementing *CLIL* practices at all stages contributes to the EU’s language learning goals to fulfil a pan-European educational ambition. Moreover, the implantation of *CLIL* approaches in an institution can be facilitated by the presence of trained teachers who are native speakers of the vehicular language, i.e. the implementation of *CLIL* practices in educational institutions is likely to result in the employment of trained teachers who are also native speakers of the language used as an educational tool.

CLIL technologies have clear advantages in terms of improving language competences [38]: as a consequence of their implementation, the English language achieves presence across almost all areas of the educational process. Among the advantages of *CLIL* claimed by its supporters

⁷ Action Plan for Language Learning and Linguistic Diversity. 2003. URL: <http://eur-lex.europa.eu/legal-content/GA/TXT/?uri=uriserv:c11068>

(e.g., see works by Coyle, Hood, Marsh; Dalton-Puffer; Nikula and Smith) are: the possibility of optimising the educational programme by reducing the time allocated to explicit language study; increased motivation through the creation of a natural (as opposed to artificially-created) learning environment and a clear purpose for its study; a manifold increase in language practice opportunities; stimulation of cognitive mechanisms for learning material; the opportunity to study the subject as it is studied by native English speakers.

However, ever more numerous critics of *CLIL* [39; 40] raise concerns about potential deferred negative consequences arising from the widespread distribution of such forms of English-language education.

Firstly, many researchers question the quality and depth [e.g., 41] of subject teaching in a foreign language. If the level of growth of language skills is fairly easy to measure, then assessing the respective levels of subject attainment in the mother tongue and in English is very complicated, requiring serious longitudinal studies across different sociocultural contexts. Serious doubts remain concerning the quality of such one-sided teaching, in which students are invited to assimilate information through the “lens” of a particular language. Questions arise concerning loss of cultural-specific perceptions of reality, especially in socio-humanitarian areas of knowledge. Moreover, the national languages themselves may be irreparably damaged.

Secondly, contrary to the claims of *CLIL* supporters concerning the supposed egalitarianism of these practices [42; 43], it is far from always the case that students and teachers benefit from a level playing field. Into the category of socially discriminated may be included those students with lower language abilities, those having received weaker language training, with less well-formed cognitive skills [44], as well as native speakers of languages with structures that are significantly different from English. In addition, high-quality teachers of subjects (geography, chemistry, etc.) with limited English skills find themselves in a very disadvantageous position

as compared with teachers who may have lower-level subject qualifications but are native English speakers.

Thirdly, doubts are bound to arise concerning the introduction of any method that results in one party receiving a significant economic boost at the expense of another. The benefits from the introduction of *CLIL* for mother-tongue countries of the studied language are obvious – among them, to ensure a stable employment market for its own citizens and economic support for the powerful English teaching industries in the UK, US, New Zealand and other Anglophone countries. Conversely, the countries that implement such techniques must be prepared for significant costs involved in special training for their specialists, the maintenance of native speaking teachers and the upkeep of English-language editorial staff of scientific journals.

Academic writing centres. According to R. Phillipson, linguistic imperialism exists due to the functioning of certain structures used to advance the cultural values of the “imperialist” and the subsequent extraction of benefits [Phillipson, *ibid.*]. In our observation, educational institutions known as academic writing centres play a significant role in the propagation of the English language in the scientific field today. These institutions are being actively established throughout the world today – particularly in Russia.

Academic writing centres first appeared in the United States in the early 1930s in the form of *writing labs*, having the aim of providing support to university students in the accomplishment of written assignments. However, it was only much later, in the 1970s, that they achieved significant prominence. According to Stephen North, such institutions arose not in terms of a physical space, but rather as a method, the essence of which is to carry out all the required work in the framework of the meeting between a tutor (a specialist who performs a pedagogical function) and a consultee [45]. Therefore, the role of the tutor should not be to edit and correct errors but rather to pose appropriate questions about the composition of the text, the



construction of the argument and choice of devices used to persuade the reader. Here it is assumed that such “friendly” questions will stimulate thinking and so develop the consultee’s ability to express those thoughts in a written form. Contrary to the popular perception of writing centres as auxiliary departments of universities, to which “weak” students turn to improve their language skills, experts in the field of *writing centre studies* insist that they should be *contact zones*, where it is the writers themselves who are developed and not necessarily their texts. The chief slogan of these *student-centred* institutions is: *better writers, not better writing*. Thus, their main educational function should be to develop authorial voice and help authors to understand their own strengths and weaknesses as well as to enter into a reader’s perspective and consider the text from different angles.

The idea that underlay the appearance of the *first* writing centres was certainly admirable. Indeed, contrary to the widespread belief that writing is a natural talent and cannot be trained, writing skills are formed and developed in the same way as all others. However, good ideas sometimes come to life in an unexpected form. Thus, in recent years, articles have appeared with increasing frequency in which authors have criticised practices widespread in American centres of academic writing [46–48]. For example, one of these works has the rather pointed title “Writing Centres and the New Racism”, another – “Good Intentions”. Among the main criticisms expressed by the authors, even if not explicitly, are: “one size fits all”; the implantation of non-standard, but standardised English language; the stigmatisation of variants of the English language; the assessment of texts only in terms of their compliance with existing standards, without taking into account the depth of the content.

In our view, the main difficulty involved in the formation of a writing centre that would conform to the “good intentions” formulated by C. North [45] is in the selection of tutorial staff that renders assistance to budding authors. In the US, this work is mostly carried out by gradu-

ate students – native speakers of English who were themselves previously trained in these centres and have experience of publishing in scientific journals. However, it is unlikely that these young people possess the required competencies in terms of the ability to appreciate the uniqueness and beauty of non-standard approaches to the presentation of information – such development takes years. The consequence is either a still greater imposition of stereotypes and patterns, the reduction of all of the work to mechanical aspects of punctuation, syntax and spelling, or – still worse – both. The problem of recruitment in non-English-speaking countries is exacerbated by the fact that the tutor must be proficient in English at a high level, in turn resulting in the need to hire (typically inexperienced) native English speakers.

Today, academic writing centres are being actively developed all over the world. In Western European countries, in which they are operational at almost every university, they essentially replicate the American model. In terms of tutors, either specialists are invited there to work from English-speaking countries (e.g., post-docs) or the institutions use their own graduate students having both sufficient knowledge of the English language and the necessary certification. In addition to individual counselling, students are offered courses aimed at the development of different skills – writing academic essays, articles in the *IMRaD format*, preparation of reports at scientific conferences and others. Writing centres started to appear in Russia a couple of years ago; today they are numbered in their tens.

The establishment of such centres in non-English-speaking countries takes place with the support of various public and non-governmental organisations, including those based in countries where English is the national language. For example, in 2016, under the US government programme entitled *Developing Academic Writing Centers*, 15 potential and existing managers and employees of such centres in Russia were invited to attend US institutions to participate in the development of standards and acquire the necessary

expertise in the field of academic writing in English. Similar programmes are being implemented in the UK, which is also a major developer and supplier of textbooks on English-language academic writing on the world market. Therefore, we can talk about the establishment, with the support of the governments of Anglophone societies, of an international institutional structure, the function of which is to create, broadcast and reproduce patterns of English communication in science.

Thus, we have shown how Anglophone societies use the *IMRaD format*, *CLIL* teaching technologies and English academic writing centres to advance their competitive advantage in the field of science. According to the phenomenon of unequal distribution of wealth⁸, present inequalities are likely to be further exacerbated in the near future, leading to the loss to humanity of unique forms by which reality comes to be the subject of knowledge.

Implications and future directions for research. While it is clear that the discussed examples may be seen in terms of communication tools used to advance an imperialistic agenda, it is less clear what strategies and institutions may be employed to counter this agenda without at the same time harming science – or the economies of the non-Anglophone countries thus affected. Without a scientific lingua franca, research in specialist areas risks being compartmentalised into information silos and thus rendered incapable of reciprocal interaction with other information systems. However, looming technological and societal changes likely to affect the character of scientific communication and the role of English as a lingua franca include: the trend towards open access publishing; an increasing recognition of the value of bilingualism and multilingualism in teaching environments; and the emergence of Artificial Neural Network (ANN) -based Artificial Intelligence (AI).

For example, the technology company Google, in announcing its new Google Neural Machine Translation (GNMT) system, claimed that its network must be encoding “something about the semantics of the sentence rather than simply memorizing phrase-to-phrase translations”, interpreting this “as a sign of existence of an interlingua in the network”⁹. Given such advances, combined with the highly formalised structure of *IMRaD* with its rigid sequence of moves and steps, while English will certainly persist as a scientific lingua franca for the foreseeable future, the day may not be so far away when scientists can write a paper in any one of the 104 languages covered by GNMT and instantly publish it in an open access journal to be retrieved and (hopefully) cited by other researchers whose mother tongue may also be any one of the 104 languages covered by GNMT. Anonymised peer review, having come under increased pressure in recent years, may give way to open peer review approaches. According to this emerging vision, science itself becomes a kind of neural network, with the individual entities (researchers, institutions, articles and journals) interacting in a way that suggests neural units connected by axons (citations, peer review).

On the other hand, such developments as GNMT hardly invalidate efforts to teach additional languages (such as English) to scientists. However, critics of the *monolingual bias* in second language acquisition (SLA) research have proposed an *additive bilingual approach* [49]. As Sridhar pointedly remarks: “Given that the aim of SLA is bilingualism, one would expect SLA theories to build on theories of bilingualism and use the natural laboratory of bilingual communities worldwide”. At any rate, if the aim is to output research papers for open access publication, written in a standardised format and following a prescribed sequence of moves and steps, it seems likely that the cognitive and pedagogical processes

⁸ The Matthew Effect, analysed by R. Merton, reads as follows: the side that has the initial advantage will continue to accumulate and multiply, while the other, initially limited, becomes deprived by an even greater degree and, therefore, has an even smaller chance of success.

⁹ Zero-Shot Translation with Google’s Multilingual Neural Machine Translation System, 2016. URL: <https://research.googleblog.com/2016/11/zero-shot-translation-with-googles.html>



underlying such efforts will in the long run be better informed by bilingual than monolingual perspectives.

Conclusion

In conclusion, it should be noted that the authors are in no way calling for isolationism in science, the abolition of the English language as a means of international communication, the closure of centres of academic writing or the “exit” of Russian-language journals from international citation indexes. On the contrary, the positive effects from the use of a common language in academic communication are entirely conclusive; the possibilities for progress in any national science separately undertaken today would be greatly reduced in its absence. At the same time, it should not be forgotten that the ethos of science is based on the value of critical interpretation of the facts or “organised scepticism” (R. Merton).

Our research has shown that the distribution of English language instruction in higher

education and the implementation of Anglophone communicative patterns in scientific communication – particularly with regard to the representation of research results – may have a negative effect on the development of young researchers’ competencies – and, consequently, their future effectiveness in advancing science. In the long run, this process threatens the existence of unique culture-specific ways of scientific cognition. Therefore, only informed, balanced and sensitive uses of the contemporary linguistic tools of scientific communication can allow non-English-speaking societies to benefit from the advantages and avoid the negative consequences of their widespread implementation. Our proposed strategy for achieving this is based on increasing the awareness of these potential threats among all the parties to scientific communication, including higher education teachers, along with encouraging and facilitating bilingual and bicultural teaching approaches.

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About the authors:

Natalia G. Popova, Head of Foreign Languages Department, The Institute of Philosophy and Law, Ural Branch of the Russian Academy of Sciences (16 Sofia Kovalevskaya St., Ekaterinburg 620990, Russia), Ph.D. (Sociology), **ORCID: <http://orcid.org/0000-0001-7856-5413>**, ngpopova@list.ru

Thomas A. Beavitt, Senior Researcher, English Language Instructor, Foreign Languages Department, Institute of Philosophy and Law, Ural Branch of the Russian Academy of Sciences (16 Sofia Kovalevskaya St., Ekaterinburg 620990, Russia), tommy@globalvillagebard.org

Contribution of the authors:

Natalia G. Popova – concept advancement, literature review, research methodology, data collection, data analysis, the first draft of the paper.

Thomas A. Beavitt – critical review, commentary revision, interpretation of findings, future research directions, final proofreading.

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Об авторах:

Попова Наталья Геннадьевна, заведующая кафедрой иностранных языков ФГБУН «Институт философии и права Уральского отделения Российской академии наук» (620990, Россия, г. Екатеринбург, ул. Софьи Ковалевской, д. 16), кандидат социологических наук, **ORCID:** <http://orcid.org/0000-0001-7856-5413>, ngpopova@list.ru

Бивитт Томас Александр, старший лаборант кафедры иностранных языков ФГБУН «Институт философии и права Уральского отделения Российской академии наук» (620990, Россия, г. Екатеринбург, ул. Софьи Ковалевской, д. 16), tommy@globalvillagebard.org

Заявленный вклад авторов:

Попова Наталья Геннадьевна – разработка концепции, обзор литературы, методология исследования, изучение и анализ данных, написание черновика статьи.

Бивитт Томас – критический обзор с комментариями, интерпретация данных, направления будущих исследований, прочтение финальной версии статьи.

Все авторы прочитали и одобрили окончательный вариант рукописи.