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CITATION BEHAVIOR AND PLACE OF PUBLICATION IN THE AUTHORS FROM THE SCIENTIFIC PERIPHERY: A MATTER OF QUALITY?

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Abstract—This research examines the communication pattern of a selected group of Croatian scientists in the field of biomedicine related to citing articles published in domestic sources. It studies a possible difference in attitude of Croatian scientists toward domestic and international journals. The research included as analysis of references and a survey of authors. Using 1988 and 1989 Science Citation Index on compact disc, as well as a sample of domestic journals and domestic journals covered by Science Citation Index, we identified papers by Croatian authors and confirmed that the same authors apply different criteria in citing relevant literature, depending on the type (domestic or foreign) of the journal in which they are to publish their paper. Domestic literature is cited four times less often in foreign than in domestic journals, so there is a complete absence of national bias in citing earlier literature by the same authors. The relationship between citation behavior and place of publication could be related to the general approach of Croatian biomedical authors to domestic and international journals, and could be indicative of a poor quality of scientific papers published in domestic journals.

INTRODUCTION

National identity does not belong to science but to scientists. National scientific community, thus, exists only on the level of authors. The relation national—international, particularly in biomedicine, should not have any qualitative connotations.

The main hypothesis put forth in this study is that the standards of formal biomedical communication on the national level are not identical to those on the international level. It is assumed that there exist both internal and external biomedical scientific communication in a scientifically peripheral country and that they differ from each other.

Different aspects of biomedical scientific communication are examined in a sample of journals. It is widely accepted that the journal is the main source of primary scientific information in biomedicine, and thus also the main channel of the exchange of scientific ideas. The same authors publish in domestic and in foreign journals. The term domestic journal as used here refers to any journal published in Yugoslavia* regardless of whether it is a national journal by its editorial board, contributing authors, language, reviewers, and availability. Thus a domestic journal can be an international one if it has an international editorial board, contributors and reviewers, if it is published in one of the major world languages, and if it has an international readership. At the same time, a foreign journal is not necessarily an international one. The majority of biomedical journals published in Yugoslavia are domestic and national in character (Petrak *et al.*, 1990) which suggests their restricted, local availability. Having in mind this restricted circulation of domestic journals on the one hand, and the internationality of medical sciences on the other, one can claim that the distribution of the place of publication is a good indicator of a country's scientific health. Inhaber (1977) says: "If a nation's scientists hardly ever publish in their own journals, it could indicate that they perceive them as weak. If they publish ex-

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*The research was conducted while Yugoslavia existed as a political and social entity. Croatia was one of its republics.

clusively in their native land, it may indicate too much self-centeredness, and possible ignorance of work going on elsewhere" (p. 388). A research environment and its scientific journals affect each other and are interrelated in quality. Therefore the characteristics of the so-called scientific periphery, first of all smallness, the imbalance between science and the society as a whole, and the communication barrier with respect to the international science, seriously affect the scientific character of biomedical journals (Maričić, 1990). The elements of the national as opposed to the supranational nature of medical science (i.e., the independence of medical science of its national environment) do influence the scientific character of the journal after all. The possible difference in the function of domestic journals with respect to foreign ones is not relevant for this study, since the study covers only original scientific papers whose scientific character should not vary with the place of publication of the source journal. Domestic and foreign journals are treated as real categories that are distinguished by place of publication but do not presuppose a difference in quality, since one should not *a priori* accept the paradox that there exist two types of scientific communication. In the context of the supranational character of medical science, we accept also the supranationality in the behavior of authors who thus, as Penava and Pravdić (1989) said: ". . . do not make an *a priori* distinction between the journals according to their origin" (p. 78).

This research focuses on the analysis of the citation behavior of authors of scientific papers, since references are considered to be a reliable indicator of the scientific information flow. An insight into the citing patterns of a group of scientists or countries provides an opportunity to see to what an extent the scientists of a country make use of earlier research conducted at home or abroad (Frame & Narin, 1977). In this study we distinguish reference analysis from citation analysis. Throughout this study a distinction is kept between a reference and a citation according to which a reference is given and a citation is received by a paper or a monograph (Krauze & Hillinger, 1971). The distinction is an important one, since a list of references at the end of a paper ("bibliography") is an exclusive selection (i.e., judgment) of that paper's author(s) only, whereas a list of citations to a paper (or a journal) is "a collective judgment" (i.e., as a rule it is a selection made by more than one citing author).

The problems of citer motivations, which are no doubt numerous, are not relevant for the approach used in this study. Namely, even if the citer motivation is a subjective category because we cannot naively assume that authors cite only noteworthy pieces in a positive manner (Brooks, 1985), it does not vary depending on the place where the article is published. Citer motivations can be more or less objective, but from the point of view of a given author they are constant. However, here as well the national element gets interpolated into the category of the scientific, affecting the scientific behavior of authors—recent research points to national bias in citation behavior (Campbell, 1990); moreover, it considers it natural and self-explanatory. Garfield & Welljams-Dorf (1990) observe: "Not surprisingly, each nation is its own most frequent citer" (p. 14), but it would have been surprising if it were found that national bias in citation behavior greatly varied depending on the place of publication. If there is a difference in citation behavior, the question is then raised: Does the integration into the world biomedical communication demand—even in this particular aspect—different prerequisites from the ones demanded by the communication in the national community?

This research examines the communication pattern of a selected group of Croatian scientists in the field of biomedicine related to citing articles published in domestic sources. It studies a possible difference in attitude by Croatian scientist toward domestic and international journals.

METHODS

The research was conducted in two parts: (a) an analysis of references provided at the end of articles and (b) a survey of authors.

(a) Using 1988 and 1989 SCI Compact Disc Edition,* we first identified papers by

*Science Citation Index—Compact Disc Edition (CD-ROM), Institute for Scientific Information, Philadelphia, USA. This research was done with the permission of ISI.

authors from Croatia reporting research in biomedicine conducted at home. Those papers whose first author address was foreign were eliminated, since it could be supposed that they originated abroad (i.e., in different research conditions). The first authors of 188 papers found in this two-year period were selected for study of their citation behavior. The articles written by these authors in the same period were searched for in a sample of domestic (according to our definition, domestic and national) journals identified in an earlier research (Maričić *et al.*, 1986) as purely scientific* (*Acta Medica Iugoslavica*) or as moderately scientifically oriented (*Liječnički vjesnik and Arhiv za higijenu rada i toksikologiju*). All three journals are indexed in *Index Medicus* and *Excerpta Medica*.

The restriction of the time period to the same two years is perhaps a weak point in our methodology in view of the average number of articles an author publishes in a year. Nevertheless, the average number of published papers from Croatia in a year is stable. Consequently, a longer time period would not affect our results. The papers found in the above domestic journals together with the papers written by the same authors in foreign journals formed our sample 1. References at the end of these papers were analyzed.

In addition to Sample 1, which enabled comparison between domestic and foreign journals, using the same procedure we selected another sample which enabled comparison between foreign journals and those domestic journals having characteristics of international journals which are all covered by SCI: *Periodicum biologorum, Iugoslavica Physiologica et Pharmacologica Acta*, and *Acta Pharmaceutica Iugoslavica*. In contrast to the journals included in Sample 1, the journals in Sample 2 are distinguished by formal editing characteristics: great part of papers published in English, international editorial boards, foreign contributors, etc. It should also be kept in mind that the number of potential domestic authors in this group of journals is restricted by subspecialisation within a given field. It is very likely that the authors who publish in these journals are the only ones in this country doing research in these specialized areas (the above mentioned smallness is a characteristic of scientific periphery). Accordingly, one would expect that they tend to publish in journals of wide international accessibility.

The specific methodology applied makes it possible to exclude an interpretation according to which the supposed difference in citing is related to two distinct author groups—one of authors who tend to publish abroad and one of authors who publish in domestic journals. Instead, the citing pattern is directly related to the journal in which the citing paper is published. Moreover, the selected homogeneous group of authors made it possible to test our initial hypothesis that the same author applies different criteria in citing relevant literature depending on the type, domestic or foreign, of the journal in which the paper is to be published.

(b) The survey of 188 first authors with a Croatian address found in 1988 and 1989 SCI was sent out in autumn 1990. Our survey was not limited to authors from samples 1 and 2 because we expected a low response rate as another characteristic of peripheral setting (Maričić, 1990). A bigger sample could lead to more reliable data interpretation, although not depending on the first part of our study—reference analysis. That is why the survey questions do not consider only the authors' citation behavior, but also their perceptions of domestic vs. international journals and their publishing preferences. We have supposed that survey results could point out some controversies of science in a peripheral setting.

The questionnaire consisted of 13 questions. In answer to the first group of questions, the respondents reported on where they usually publish their papers, explained their choice of journals in which to publish, and stated when and why they make a distinction in choosing between domestic and foreign journals. The second group of questions covered numeric indicators on the number of papers published in foreign and in domestic journals, the number of rejected papers, and the number of those accepted after correction and/or revision requested by the reviewers. The third group of questions dealt with the authors' approach to citing. The fourth group of questions covered the value the authors attach to papers

*According to their methodology, the group of purely scientific journals included *Periodicum Biologorum* and *Acta Pharmaceutica Iugoslavica*, but according to the methodology employed in our research these journals are included in sample 2.

published in foreign journals and to papers published in domestic journals, as well as the relationship between quantitative evaluation of research work and the quality of published papers. The results of the survey were used in the interpretation of possible qualitative differences in the publishing behavior of Croatian biomedical authors.

RESULTS

Reference analysis

In the 1988 and 1989 volumes of SCI, 188 authors from Croatia were identified. We searched for articles written by these same authors, during the same two-year period, in domestic journals (Sample 1) and in domestic journals covered by SCI (Sample 2). We were interested only in authors who published both in domestic and in foreign journals. We found 34 authors who published both in foreign and in domestic journals, and 28 authors who published in foreign journals and in domestic journals covered by SCI. Only 3 authors published articles in both samples in the period under survey, and 126 authors did not publish a single article in the examined domestic journals (Sample 1 and 2) in this period (see Fig. 1).

Table 1 presents the results obtained in the analysis of Sample 1. In statistical analysis a chi-square test was used. The difference in the frequency of citing domestic sources between papers published in domestic journals and those published in foreign journals is statistically significant ($p = .005$), which means that there is a relationship between the citing pattern and the place of publication.

Table 2 presents the results obtained in the analysis of Sample 2. No statistically significant difference ($0.005 < p < 0.05$) in citing domestic literature was found between these two samples.

Table 3 presents the results obtained in the analysis of author self-citations (which occurs when authors cite their own previously published papers) in Sample 1. Here as well a statistically significant difference was established ($p = .005$). Self-citations accounted for 45% and 44% of domestic references in foreign and in domestic journals, respectively. No statistically significant relationship was established between the total number of domestic references and self-citations to domestic sources.

Table 4 presents the results obtained in the analysis of author self-citations in Sample 2. The share of self-citations to domestic sources in the total number of cited domestic references in foreign journals is 37%, and in domestic journals included in SCI it is 32%. The difference in the frequency of domestic references and self-citations to domestic sources is not statistically significant ($p = 0.005$).

Survey results

We sent a questionnaire to 188 first authors of papers from Croatia identified in the 1988 and 1989 SCI. Seventy-five (40%) of the authors responded. The response rate seems

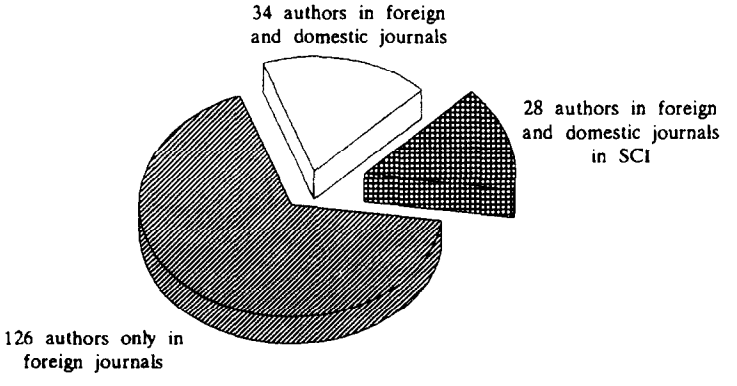

Fig. 1. Authors covered in the study according to the place of publication in 1988 and 1989.

Table 1. References to domestic sources by 34 authors from Sample 1

	In foreign journals	In domestic journals
No. of articles	101	57
Total no. of ref.	2015	1503
Ref. to domestic sources	51	167

to be expectable, since similar surveys in our peripheral setting usually have nearly the same response rate (Maričić, 1990). Fourteen questionnaires (7.5%) were returned with the notice of addressee not at this address. This is probably because some authors (graduate students, interns, etc.) used their temporary addresses (i.e., of institutions where the papers were written).

If one considers the distribution of authors in the survey by place of publication (see Fig. 1), which shows that 67% of the authors did not publish a single article in the domestic journals examined during the period studied, it becomes evident that this distribution is not in agreement with the structure of respondents. Namely, 57% of respondents stated that they mainly publish in foreign journals, 16% mostly in domestic journals, and 27% stated they publish equally in foreign and in domestic journals (see question 1). Table 5 shows the survey results. Answers to questions 5 and 6 are given in rank order.

DISCUSSION

With all due restraint in interpreting numeric data, it is quite certain that a great number of domestic scientists who published papers in foreign journals did not publish in domestic journals during the period considered. If we accept that the national origin of a given journal in the field of biomedicine cannot be a quality indicator, that is, its origin is not an *a priori* proof of its quality, an open question remains as to why domestic journals are thus neglected. Both the analysis of citation and survey results show that the approach of domestic scientists to foreign and domestic journals is not equal.

The analysis of references cited in papers in the samples studied has shown that there exists a direct relationship between the citing patterns and the place of publication. It is well known that cited literature is an important element considered in the evaluation of a paper in the review process. A scientific article relies on research that preceded it, regardless of whether the new findings refute the earlier ones or not. Therefore, despite the fact that in addition to scientific reasons, there are also a number of nonscientific ones that come to bear on the citing process, citing patterns should not significantly vary with the place of publication. We expect an author to have the same approach to citing regardless of where the paper is to be published. It is well known that "national bias" is present in citing (Campbell, 1990). In this study, however, we are dealing with the differences in citing patterns within the same group of scientists, depending on the place where they publish their papers. This pronounced difference was noted when we compared articles of authors who published both in foreign and in domestic journals (Sample 1). When they publish in foreign journals, domestic literature is less cited, which can be explained by the

Table 2. References to domestic sources by 28 authors from Sample 2

	In foreign journals	In domestic journals in SCI
No. of articles	46	33
Total no. of ref.	911	786
Ref. to domestic sources	35	34

Table 3. Author self-citations to domestic sources from Sample 1

	In foreign journals	In domestic journals
Total no. of self-citations	171	133
Self-citations to domestic sources	23	74

size of the national contribution to world science in relation to the contribution by the rest of the world. However, when these same authors publish in domestic journals, the share of domestic literature in their references is significantly higher. Maričić *et al.* (1982) concluded: "This cannot be explained by an interpolation of either the others' interest in these works or of someone's unknown criterion of judging the scientific merit of a paper" (p. 35). It is not probable that the underlying cause lies in the fact that authors work on several unrelated research topics. Rather, this phenomenon reflects a dichotomy in authors' publishing behavior.

However, no difference was found in authors who published in foreign journals and in domestic journals included in SCI (Sample 2). Does this mean that a domestic journal loses its negative "national-related" characteristics if it is covered by SCI? To be included in SCI means to pass a certain selection threshold, no matter how disputable. Three journals from Yugoslavia that are covered by SCI must in some way be better than other Yugoslav journals that are not. (In fact, they differ already in their editing characteristics.) We are thus assuming that inclusion in SCI gives a certain guarantee of a journal's quality. If this is so, it is important to conclude that a good quality domestic journal thereby ceases to be "domestic" and remains only a good quality journal. The authors who publish in it behave accordingly; they do not make the distinction.

It has to be stressed that our results are not influenced by the difference in the category of papers published in foreign or domestic journals, since we are dealing only with original scientific papers.

The same pattern in citing domestic and foreign literature is found in author self-citations. Domestic references that Croatian authors cite in foreign journals are often self-citations. If one compares the total number of self-citations to self-citations to domestic sources, the difference is statistically significant. Namely, when authors from Sample 1 cite their own articles in foreign journals, then in 87% of cases this is a paper published in a foreign journal. When they cite their own work in domestic journals, 56% of these self-citations are to domestic sources. In the analysis of self-citations from Sample 2—as well as in the analysis of the number of references to domestic sources—no statistically significant difference was found.

Survey results show that 86% of the respondents maintain that their approach to citing does not differ depending on the place of publication. Thus, only 14% make the noted distinction consciously. This could be explained by a bigger share of authors who publish mostly in international journals (57%). Reference analysis and survey results consequently do not match. Nevertheless, the difference in approach to domestic and international journals is quite evident from all other survey answers.

The basic reason for publishing in a domestic journal is, in respondents' words, the transfer of knowledge. The main role of a scientific paper is not knowledge transfer, and

Table 4. Author self-citations to domestic sources from Sample 2

	In foreign journals	In domestic journals in SCI
Total no. of self-citations	71	32
Self-citations to domestic sources	13	11

Table 5. Survey results

1. Do you publish your research results mostly in				
Foreign journals	42	57%		
Domestic journals	11	16%		
Equally in both	20	27%		
2. Do you tend to publish results you consider new in the context of international science preferably abroad				
Yes	71	95%		
No	4	5%		
3. Do you have a different approach to selecting a journal (domestic/foreign) in which to publish depending on the type of paper (scientific, review, or case report) you have written				
Yes	64	86%		
No	10	14%		
4. Do you have a different approach to citing the relevant literature depending on the place of publication				
Yes	10	14%		
No	62	86%		
5. Scientific and nonscientific motives for citing				rank
To cite results of domestic research			140	1
So as to take into account communication within the micro scientific community			107	2
To turn attention to own work			70	3
To give credit			62	4
6. What is the major reason for publishing in a foreign journal				rank
My results will be cited more often			403	1
To establish a worldwide reputation			378	2
Because of subspecialisation (competent peers can be found only abroad)			318	3
To make results of our research known abroad			300	4
To be the first to publish the findings			251	5
To meet the criteria for foreign funding			215	6
To facilitate professional advancement			212	7
To be able to build a career abroad			87	8
7. What makes it difficult to get published in a foreign journal				
Tough review procedure	56	42%		
Scarce resources for doing research	44	33%		
Poor current awareness	27	20%		
Other	5	5%		
8. Out of the total number of papers submitted to foreign journals				
Accepted with request for modification	948			
Accepted without any change	424			
Rejected	129			
Total	1445			
9. Out of the total number of papers submitted to domestic journals				
Accepted with request for modification	602			
Accepted without any change	1223			
Rejected	—			
Total	1793			
10. Major reasons for publishing in a domestic journal				
Transfer of common knowledge to domestic scientific community	57	81%		
Research topic of local relevance	9	13%		
Other	5	6%		
11. What should be changed in the editorial policy of domestic journals				
Review procedure	52	33%		
Quality of the editorial board	46	29%		
Formal editing features	36	22%		
System of funding	24	16%		
12. Should a paper be evaluated differently depending on whether it was published in a foreign or in a domestic journal				
Yes	52	76%		
No	16	24%		
13. Does quantitative evaluation of scientific papers affect quality				
Yes	51	71%		
No	21	29%		

we have already pointed out that the examined papers published in domestic journals are scientific papers. Furthermore, we asked the authors in the survey to state in open-ended comments other reasons for publishing at home. Only one stated a positive reason, "an attempt to improve the scientific level of domestic journals"; one respondent stated that he treats foreign and domestic journals equally; all the other respondents give poorer quality of a paper as the reason for getting it published in a domestic journal. In their own words, "these papers bring less important findings," "it is impossible to get them published abroad," or "it is not possible to fully resolve the problem studied due to the obsolete equipment," etc.

We examined also the reasons for publishing in foreign journals. The first three reasons, according to the respondents, are better citedness, greater recognition in the scientific community, and narrow subspecialisation. In open-ended comments the respondents also stated the following reasons: "quicker integration of their results into the world pool of scientific knowledge and faster verification of the validity and relevance of their research," "maintaining higher standards," and "international recognition." The positive aspiration towards participation in world scientific communication and the implicit acceptance of tough international standards are quite evident.

Similar conclusions could be drawn from the answers to the questions on what are the main obstacles to publishing in foreign journals and on what should be changed with regard to domestic journals. Respondents (42%), in answer to the first question, stated that the main obstacle to publishing in foreign journals is a tough review process in international journals. On the other hand, 33% of respondents thought that insufficiently tough review process is the main reason for the poor quality of domestic journals and for the penetration of "bad" science into the communication system. In open-ended comments most often mentioned are "worldwide prejudice about the supposedly low level of science in Yugoslavia," "negative stigma of a scientifically 'small' nation, minoration and distrust on international scientific community towards science produced in Yugoslavia," which all might contribute to the formation of a negative attitude of reviewers towards work from Yugoslavia. If one keeps in mind a possible bias against research conducted in Yugoslavia, would not it be natural to conclude that the results of our research seem to suggest that such a bias is justified to a certain extent? Would not one expect from scientists who publish abroad to promote "domestic" science? It seems that it is just their minorating attitude towards domestic science that encourages the minorating attitude of the international community. The latter is a consequence and not a cause.

Finally, despite the fact that one should evaluate the paper and not the national origin of the journal, our scientists obviously attach different value to journals depending also on their origin. Maričić *et al.* (1982) say that ". . . papers they publish in domestic journals do not meet the criteria of international scientific production" (p. 35), but there is an opposite view held by Penava and Pravdić (1989) that ". . . authors do not make an *a priori* distinction between the journals according to their origin" (p. 78). Our survey results show that the authors do make such a distinction *a priori*. This is confirmed by the fact that 95% of the respondents would publish findings new in the context of world science in a foreign journal. Eighty-one percent of the respondents said they would publish their paper in a domestic journal to improve transfer of knowledge, which means that they would publish at home first and foremost their clinical experiences that give support to the application of already known facts and to the diffusion of knowledge (works describing "our experience with . . ." and the like). The respondents (76%) would also attach different value to articles depending on whether they are published in domestic or in foreign journals. The fact that a large number of biomedical scientists in Croatia, 126 out of 188, did not publish a single article in domestic journals is also very revealing, and it could be supposed that it partly reflects the attitude of the authors towards domestic journals. Furthermore, it is significant that the reason for which the authors publish in foreign journals is not merely the lack of an appropriate journal in a highly specialized area of research. The difference also exists due to the fact that the review procedure is not on the international level, and the majority of journals, as one respondent states, "has a very low impact factor and almost no influence." Two thirds of the respondents think that domestic journals

do perform quality evaluation and use review process. Answers on the total number of accepted and rejected papers for publication in foreign and in domestic journals contradict the above authors' belief. According to the survey results in domestic journals, only 0.4% of the total number of papers submitted gets rejected.

Different evaluation of articles published in domestic and in foreign journals is caused not only by the already mentioned factors inherent to science, but also by a number of factors that have origin in the social context, that is, outside science. Much has been written on this subject in this country (Lacković & Petrak, 1991). The evaluation of research results based on quantitative and not on qualitative indicators of published work is stimulative in the wrong direction (Rumboldt, 1986) on at least two levels: on the level of individual scientific advancement and on the level of funding scientific research and scientific journals. The results of the survey show that 71% of the respondents think that quantitative evaluation affects the quality of published papers.

We can site an interesting case we came across in this research. The same author published in a domestic journal from Sample 1 five papers whose formal characteristics (authors, titles, references) corresponded to those of the papers he published in the same period in foreign journals. The papers published in the domestic journal are in Croatian. In the analyzed cited literature we have noted two pairs of papers: one in which the cited literature was identical and one in which the cited literature differed in two references to domestic sources that were omitted from the paper published in the foreign journal.

In spite of independent samples, results are basically the same. Croatian authors do have a different approach to domestic and international journals. It remains open whether this difference has any significant qualitative connotation.

CONCLUSION

Different standards of external and internal biomedical scientific communication in Croatia have been established related to the practice of citing relevant domestic sources. The noted author dichotomy in publishing in foreign and in domestic journals indicates that domestic literature is cited four times less often in foreign journals than in domestic journals. The obvious conclusion is that there is a complete absence of national bias in citing earlier literature by the same authors from a scientifically small country who, if they want to participate in world scientific communication, have to publish their papers in foreign journals. The relationship between citation behavior and place of publication could be related to the general approach of Croatian biomedical authors to domestic and international journals, and could be indicative of a poor quality of scientific papers published in domestic journals. A possible explanation lies in the phenomenon of the communication barrier characteristic of the scientific periphery: A paper published in a domestic journal in a national language is not subject to wider international verification, and thus is not bound by international scientific norms. Similarly, this same paper, even when it is cited in a paper published in a foreign journal, most often remains inaccessible to reviewers and to a wider scientific community.

Therefore, scientific communication in medicine as a supranational scientific discipline is left with an open dilemma: If science is viewed in the broader cultural context of a nation, it is difficult to advocate giving up scientific communication in the national language despite the fact that the use of the national language is a restrictive factor that hinders wider international recognition of the national scientific production.

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