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**Field-specific cultures of international research collaboration**

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The evaluation of research performance at European universities increasingly draws upon quantitative measurements of publication output and citation counts based on databases such as ISI Web of Knowledge, Scopus and Google Scholar (UNESCO 2010). Bibliometric indicators also inform annually published world university rankings such as the Shanghai and Times Higher rankings that have become powerful agents in contemporary audit culture despite their methodological limitations. Both league tables introduced field-specific rankings in 2007, differentiating between the natural, life, engineering and social sciences (both rankings), medicine (Shanghai) and the arts and humanities (Times Higher). But to what extent do bibliometric indicators represent research output and collaborative cultures in different academic fields? This blog entry responds to this important question raised by Kris Olds (2010) in his GlobalHigherEd entry on [Understanding international research collaboration in the social sciences and humanities](#) by discussing recent findings on field-specific research cultures from the perspective of transnational academic mobility and collaboration.

The inadequacy of bibliometric data for capturing research output in the arts and humanities has, for example, been demonstrated by Anssi Paasi's (2005) study of international publishing spaces. Decisions about the journals that enter the respective databases, their bias towards English-language journals and their neglect of monographs and anthologies that dominate in fields characterised by individual authorship are just a few examples for the reasons of why citation indexes are not able to capture the complexity, place- and language-specificity of scholarship in the arts and humanities. Mapping the international publishing spaces in the sciences, the social sciences and the arts and humanities using ISI Web of Science data in fact

suggests that the arts and humanities are less international and even more centred on the United States and Europe than the sciences (Paasi 2005: 781). Based on the analysis of survey data provided by 1,893 visiting researchers in Germany in the period 1954 to 2000, this GlobalHigherEd entry aims to challenge this partial view by revealing the hidden dimensions of international collaboration in the arts and humanities and elaborating on why research output and collaborative cultures vary not only between disciplines but also between different types of research work (for details, see Jöns 2007; 2009).

The visiting researchers under study were funded by the Humboldt Research Fellowship Programme run by the Alexander von Humboldt Foundation (Bonn, Germany). They came to Germany in order to pursue a specific research project at one or more host institutions for about a year. Striking differences in collaborative cultures by academic field and type of research work are revealed by the following three questions:

1. Could the visiting researchers have done their research project also at home or in any other country?
2. To what extent did the visiting researchers write joint publications with colleagues in Germany as a result of their research stay?
3. In which ways did the collaboration between visiting researchers and German colleagues continue after the research stay?

### **On question 1.**

Research projects in the arts and humanities, and particularly those that involved empirical work, were most often tied to the research context in Germany. They were followed by experimental and theoretical projects in engineering and in the natural sciences, which were much more frequently possible in other countries as well (Figure 1). These differences in place-specificity are closely linked to different possibilities for mobilizing visiting researchers on a global scale. For example, the establishment of new research infrastructure in the physical, biological and technical sciences can easily raise scientific interest in a host country, whereas the mobilisation of new visiting researchers in the arts and humanities remains difficult as language skills and cultural knowledge are often necessary for conducting

research projects in these fields. This is one reason for why the natural and technical sciences appear to be more international than the arts and humanities.

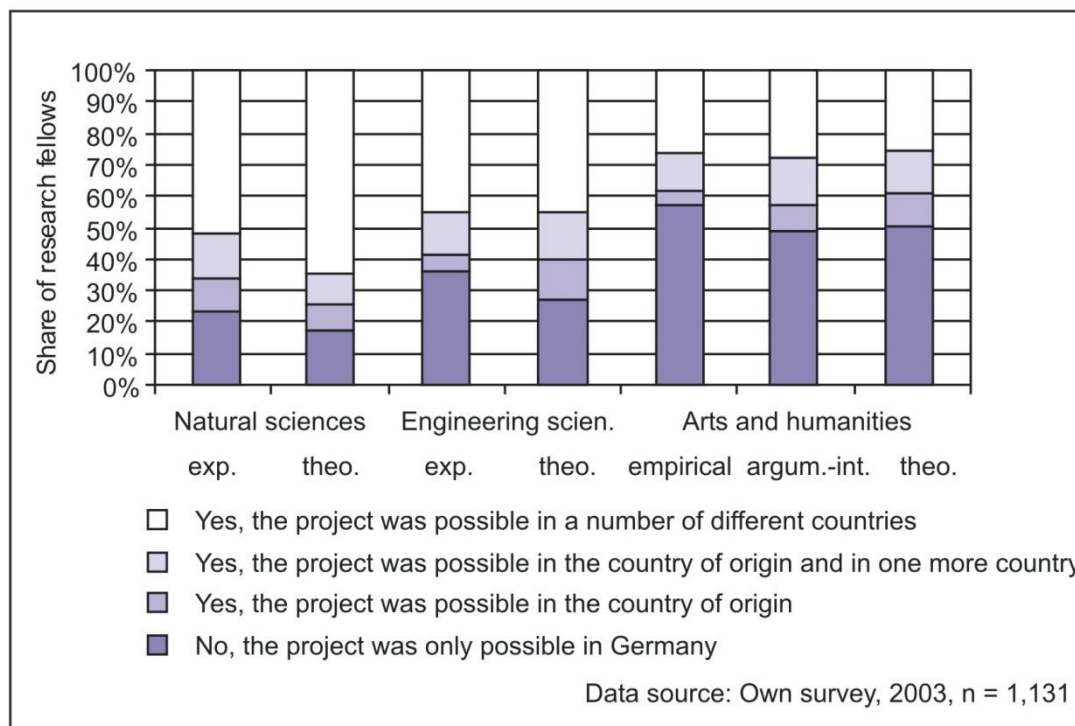


Figure 1 Possibility of doing the Humboldt research project in another country than Germany, 1981–2000 (Source: Jöns 2007:106)

**On question 2.**

Joint publications with colleagues in Germany were most frequently written in physics, chemistry, medicine, engineering and the biological sciences that are all dominated by multi-authorship. Individual authorship was more frequent in mathematics and the earth sciences and most popular - but with considerable variations between different subfields - in the arts and humanities. The spectrum ranged from every second economist and social scientist, who wrote joint publications with colleagues in Germany, via roughly one third in language and cultural studies and history and every fifth in law to only every sixth in philosophy. Researchers in the arts and humanities had much more often than their colleagues from the sciences stayed in Germany for study and research prior to the Humboldt research stay (over 95% in the empirical arts and humanities compared to less than 40% in the theoretical technical sciences) as their area of specialisation often required learning the language and studying original sources or local research

subjects. They therefore engaged much more closely with German language and culture than natural and technical scientists but due to the great individuality of their work, they produced not only considerably less joint publications than their apparently more international colleagues but their share of joint publications with German colleagues before and after the research stay was fairly similar (Figure 2). For these reasons, internationally co-authored publications are not suitable for evaluating the international attractiveness and orientation of different academic fields, particularly because the complexity of different types of research practices in one and the same discipline makes it difficult to establish typical collaborative cultures against which research output and collaborative linkages could be judged.

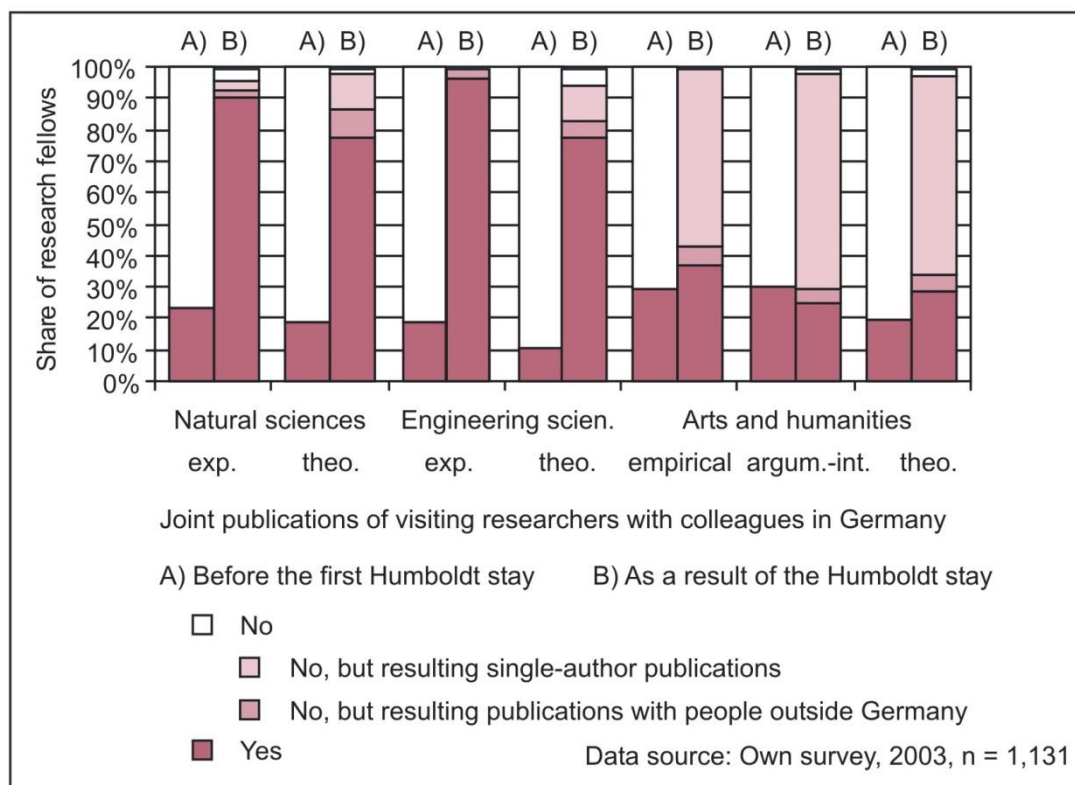


Figure 2 Joint publications of Humboldt research fellows and colleagues in Germany, 1981–2000 (Source: Jöns 2007:107)

### On question 3.

This is confirmed when examining continued collaboration with colleagues in Germany after the research stay. The frequency of continued collaboration did not vary significantly between disciplines but the nature of these collaborations differed substantially. Whereas regular collaboration in the natural and technical sciences

almost certainly implied the publication of multi-authored articles in internationally peer-reviewed journals, continued interaction in the arts and humanities, and to a lesser extent in the social sciences, often involved activities beyond the co-authorship of journal articles. Table 1 documents some of these less well-documented dimensions of international research collaboration, including contributions to German-language scientific journals and book series as well as refereeing for German students, researchers and the funding agencies themselves.

	Phys	Chem	Earth	Bio	Med	Math	Eng	Hum	Total
<b>a. Continued scientific interaction in Germany</b>									
Occasional/regular collaboration <sup>ns</sup>	58.0	51.4	67.4	53.3	50.8	57.2	51.0	53.6	54.1
Occasional/regular information exchange <sup>ns</sup>	32.9	39.0	26.7	39.6	34.2	35.1	37.8	39.1	36.9
<b>b. Contribution to German-language journals/book series</b>									
Publishing research results <sup>***</sup>	10.8	25.5	46.5	23.3	42.8	27.4	29.3	71.7	39.6
Peer reviewing <sup>***</sup>	5.6	9.2	19.8	10.4	12.3	24.8	13.8	29.6	17.0
Co-editorship <sup>***</sup>	0.4	1.2	10.5	4.2	9.6	7.7	4.8	19.2	8.6
<b>c. Refereeing</b>									
For students/researchers from Germany <sup>***</sup>	22.1	16.7	37.2	25.4	20.3	34.2	26.1	34.2	26.9
For German research funding institutions <sup>***</sup>	10.0	11.2	14.0	15.4	14.4	17.9	15.4	26.7	17.2
<b>d. Other academic services in Germany</b>									
Membership of institutional councils/boards <sup>***</sup>	5.2	6.4	10.5	7.5	13.4	6.8	8.5	16.4	10.3
Scientific consulting for the private and public sectors <sup>ns</sup>	5.2	6.4	4.7	3.8	10.2	3.4	12.2	3.4	5.7
<b>Sample size (n)</b>	<b>231</b>	<b>251</b>	<b>86</b>	<b>240</b>	<b>187</b>	<b>117</b>	<b>188</b>	<b>506</b>	<b>1,809</b>
Abbreviations: [Phys]ics, [Chem]istry, [Earth] Sciences, [Bio] Sciences, [Med]icine, [Math]ematics, [Eng]ineering Sciences, Arts and [Hum]anities including the Social Sciences.									
Statistically significant differences between disciplines: ns = not on 1% level, *** = on 0.1% level.									
Source: Own postal survey 2003.									

Table 1 Activities of visiting researchers in Germany after their research stay (in % of Humboldt research fellows 1954-2000; Source: Jöns 2009: 327)

The differences in both place-specificity and potential for co-authorship in different research practices can be explained by their particular spatial ontology. First, different degrees of materiality and immateriality imply varying spatial relations that result in typical patterns of place-specificity and ubiquity of research practices as well as of individual and collective authorship. Due to the corporeality of researchers, all research practices are to some extent physically embedded and localised. However, researchers working with physically embedded material research objects that might not be moved easily, such as archival material, field sites, certain technical equipment, groups of people and events, may be dependent on accessing a particular site or local research context at least once. Those scientists and scholars, who primarily deal with theories and thoughts, are in turn as mobile as the embodiment of these immaterialities (e.g., collaborators, computers, books) allows them to be. Theoretical work in the natural sciences, including, for example, many types of mathematical research, thus appears to be the most 'ubiquitous' subject: Its high share of immaterial thought processes compared to relatively few material resources involved in the process of knowledge production (sometimes only pen and paper) would often make it possible, from the perspective of the researchers, to work in a number of different places (Figure 1).

Second, the constitutive elements of research vary according to their degree of standardisation. Standardisation results from the work and agreement previously invested in the classification and transformation of research objects. A high degree of standardisation would mean that the research practice relies on many uniform terms, criteria, formulas and data, components and materials, methods, processes and practices that are generally accepted in the particular field of academic work. Field sites, for example, might initially show no signs of standardisation, whereas laboratory equipment such as test tubes may have been manufactured on the basis of previous – and then standardised – considerations and practices. The field site may be unique, highly standardised laboratory equipment may be found at several sites to which the networks of science have been extended, thereby offering greater flexibility in the choice of the research location. In regard to research practices with a higher degree of immateriality, theoretical practices in the natural and technical sciences show a higher degree of standardisation (e.g., in terms of language) when compared to theoretical and argumentative-interpretative work in the arts and

humanities and thus are less place-specific and offer more potential for co-authorship (Figures 1 and 2).

The resulting two dimensional matrix on the spatial relations of different research practices accommodates the empirically observed differences of both the place-specificity of the visiting researchers' projects and their resulting joint publications with colleagues in Germany (Figure 3): Empirical work, showing a high degree of materiality and a low degree of standardisation, is most often dependent on one particular site, followed by argumentative-interpretative work, which is characterised by a similar low degree of standardisation but a higher degree of immateriality. Experimental (laboratory) work, showing a high degree of both materiality and standardisation, can often be conducted in several (laboratory) sites, while theoretical work in the natural sciences, involving both a high degree of immateriality and standardisation is most rarely tied to one particular site.

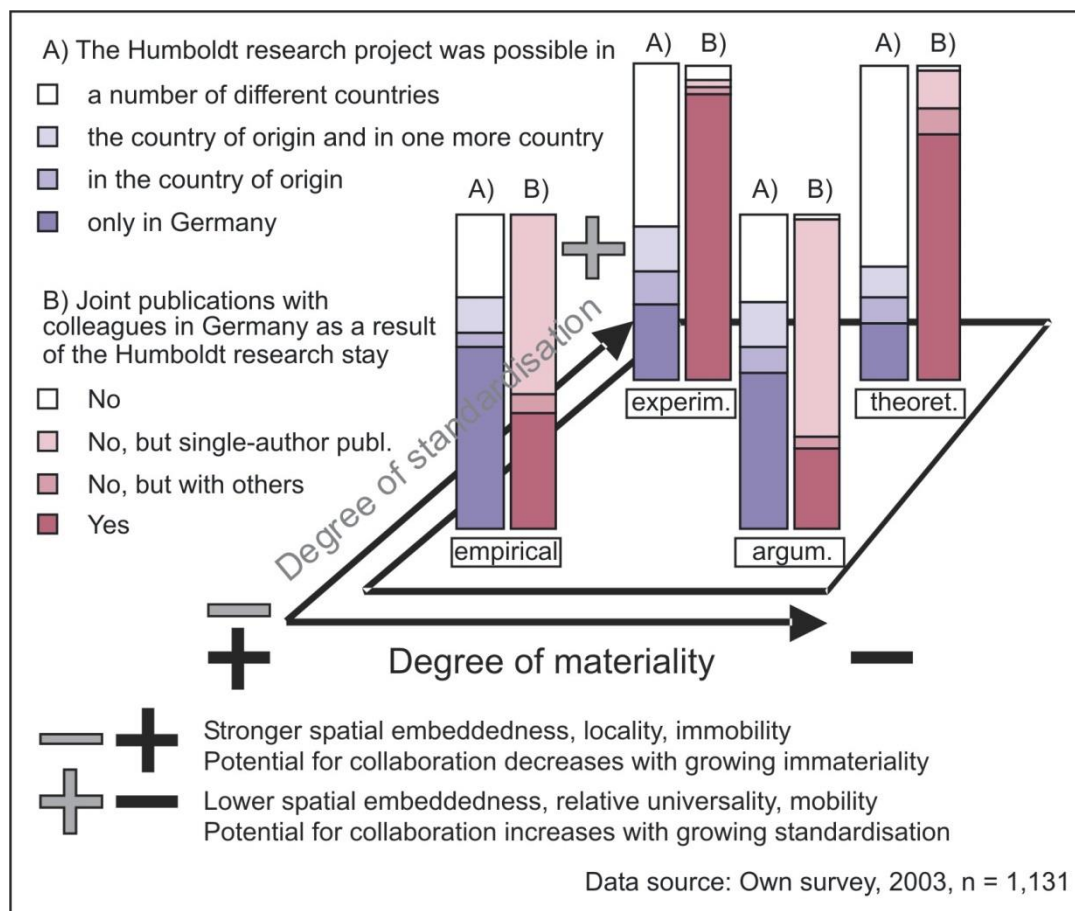


Figure 3 A two-dimensional matrix on varying spatial relations of different research practices (Source: Jöns 2007:109)



The fewest joint publications were written in argumentative-interpretative work, where a large internal (immaterial) research context and a great variety of arguments from different authors in possibly different languages complicate collaboration on a specific topic. Involving an external (material) and highly standardised research context, the highest frequency of co- and multi-authorship was to be found in experimental (laboratory) work. In short, the more immaterial and standardised the research practice, the lower is the place-specificity of one's work and the easier it would be to work at home or elsewhere; and the more material and standardised the research practice, the more likely is collaboration through co- and multi-authorship.

Based on this work, it can be concluded – in response to two of Kris Olds' (2010) key questions - that international research collaboration on a global scale can be mapped - if only roughly - for research practices characterised by co- and multi-authorship in internationally peer-reviewed English language journals as the required data is provided by citation databases (e.g., Wagner and Leydesdorff 2005; Adams *et al.* 2007; Leydesdorff and Persson 2010; Matthiessen *et al.* 2010; UNESCO 2010). When interpreting such mapping exercises, however, one needs to keep in mind that the data included in ISI Web of Knowledge, Scopus and Google Scholar do itself vary considerably. Other research practices require different research methods such as surveys and interviews and thus can only be mapped from specific perspectives such as individual institutions or groups of researchers (for the application of bibliometrics to individual journals in the arts and humanities, see Leydesdorff and Salah 2010). It might be possible to create baseline studies that help to judge the type and volume of research output and international collaboration against typical patterns in a field of research but the presented case study has shown that the significance of specific research locations, of individual and collective authorship, and of different types of transnational collaboration varies not only between academic fields but also between research practices that crisscross conventional disciplinary boundaries. In the everyday reality of departmental research evaluation this means that in fields such as geography, a possible benchmark of three research papers per year may be easily produced in most fields of physical geography and some fields of human geography (e.g. economic and social) whereas the nature of research practices in historical and cultural geography, for example, might make it difficult to maintain such a high research output over a

number of subsequent years. Applying standardised criteria of research evaluation to the great diversity of publication and collaboration cultures inevitably bears the danger of leading to a standardisation of academic knowledge production.

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