

Kosmützky, Anna; Krücken, Georg

## Book Part

# Governing Research: New Forms of Competition and Cooperation in Academia

## Provided in Cooperation with:

ZBW LIC

*Reference:* In: University Collegiality and the Erosion of Faculty Authority (2023). Emerald Publishing Limited, S. 31 - 57.

<https://doi.org/10.1108/S0733-558X20230000086002>.

doi:10.1108/S0733-558X20230000086002.

This Version is available at:

<http://hdl.handle.net/11159/677444>

## Kontakt/Contact

ZBW – Leibniz-Informationszentrum Wirtschaft/Leibniz Information Centre for Economics

Düsternbrooker Weg 120

24105 Kiel (Germany)

E-Mail: [rights\[at\]zbw.eu](mailto:rights[at]zbw.eu)

<https://www.zbw.eu/>

## Standard-Nutzungsbedingungen:

Dieses Dokument darf zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden. Sie dürfen dieses Dokument nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, aufführen, vertreiben oder anderweitig nutzen. Sofern für das Dokument eine Open-Content-Lizenz verwendet wurde, so gelten abweichend von diesen Nutzungsbedingungen die in der Lizenz gewährten Nutzungsrechte. Alle auf diesem Vorblatt angegebenen Informationen einschließlich der Rechteinformationen (z.B. Nennung einer Creative Commons Lizenz) wurden automatisch generiert und müssen durch Nutzer:innen vor einer Nachnutzung sorgfältig überprüft werden. Die Lizenzangaben stammen aus Publikationsmetadaten und können Fehler oder Ungenauigkeiten enthalten.

## Terms of use:

*This document may be saved and copied for your personal and scholarly purposes. You are not to copy it for public or commercial purposes, to exhibit the document in public, to perform, distribute or otherwise use the document in public. If the document is made available under a Creative Commons Licence you may exercise further usage rights as specified in the licence. All information provided on this publication cover sheet, including copyright details (e.g. indication of a Creative Commons license), was automatically generated and must be carefully reviewed by users prior to reuse. The license information is derived from publication metadata and may contain errors or inaccuracies.*



<https://savearchive.zbw.eu/terms-of-use>

# GOVERNING RESEARCH: NEW FORMS OF COMPETITION AND COOPERATION IN ACADEMIA

Anna Kosmützky and Georg Krücken

## ABSTRACT

*Traditional studies in the sociology of science have highlighted the self-organized character of the academic community. This article focuses on recent inter-related changes that alter that distinctive governance structure and its related patterns of competition and cooperation. The changes that we identify here are contractualization and large-scale cooperative research. We use different data sources to exemplify these new patterns and discuss the illustrative role of research clusters in German academia. Research clusters as funded by the German Research Foundation (DFG) are both a highly prestigious scarce good in the competition for reputation and resources and a means of fostering cooperation. Our analysis of this German example reveals that this new institutional configuration of universities as organizations, academic researchers, and the state has a profound effect on organizational practices. We discuss the implications of our empirical findings with regard to collegiality in academia. Ultimately, we anticipate a further weakening of collegial bonds, not only because universities and the state have become more active in shaping the nature of academic competition and cooperation but also because of the increasing strategic and individualistic orientation of academic researchers. In the final section, we summarize our findings and address the need for further research and an international comparative perspective.*

**Keywords:** Academia; science; universities; collegiality; governance; competition; cooperation; research cluster; large-scale collaboration

---

University Collegiality and the Erosion of Faculty Authority  
Research in the Sociology of Organizations, Volume 86, 31–57



Copyright © 2024 by Anna Kosmützky and Georg Krücken. Published under exclusive licence by Emerald Publishing Limited. This chapter is published under the Creative Commons Attribution (CC BY 4.0) licence. Anyone may reproduce, distribute, translate and create derivative works of this article (for both commercial & non-commercial purposes), subject to full attribution to the original publication and authors. The full terms of this licence may be seen at <http://creativecommons.org/licenses/by/4.0/legalcode>  
ISSN: 0733-558X/doi:10.1108/S0733-558X20230000086002

## I. INTRODUCTION

Competition and cooperation in academia are not new phenomena in the twenty-first century, but in recent years they have taken on greater significance in science and higher education. Currently, we are witnessing an extension and evolution of new forms of competition and cooperation across different disciplines and areas of research as well as in various national science and higher education systems. In this article, we use scientific research – and in particular the relationship between competition and cooperation contained therein – as a springboard for investigating changes in academia that raise questions about governance and collegiality. This is largely because scientific research is at the core of academic activities and transcends disciplinary, national, and organizational boundaries. With our research, we complement existing investigations on academic collegiality that focus on formal and informal structures in universities as well as related legal-administrative changes. Such structures and changes will be reconstructed in our empirical analysis of scientific research clusters in German universities.

This paper is structured as follows. After this introduction, the second section deals with classical accounts and recent changes in competition and cooperation. Against the backdrop of traditional studies in the sociology of science, which have highlighted the self-organized character of the academic community, we focus on recent interrelated changes that alter that governance structure of research and associated patterns of competition and cooperation. Here we identify an emerging new institutional configuration of universities as organizations, academic researchers as strategic actors, and the state. In the third section, we use different data sources to exemplify these new patterns and discuss the role of contractualization and research clusters as a means of fostering cooperation in German academia. Research clusters as funded by the German Research Foundation (Deutsche Forschungsgemeinschaft; DFG) are a highly prestigious scarce good in the competition of universities and academic researchers for reputation and resources. The fourth section discusses the implications of our empirical findings with regard to collegiality in academia. On the basis of our analysis, we anticipate a further weakening of collegial bonds, not only because universities and the state have become more active in shaping the nature of academic competition and cooperation but also because of the increasingly strategic and individualistic orientation of academic researchers that is spurred by contractualization. In the fifth and final section, we summarize our findings and address the need for further research with an internationally comparative approach.

## II. COMPETITION AND COOPERATION: CLASSICAL ACCOUNTS AND RECENT CHANGES

Competition has traditionally played a strong role as a mechanism of self-governance in science as individual scientists vie for discoveries and the recognition they bring. Classical studies in the sociology of science have focused on competition among individual academic actors and within the scientific community at large.

They have described the race for discoveries, the emphasis on publishing, and the related recognition, all of it very similar to market competition, as a self-governance mechanism that creates systemic cohesion and is based on the norm of the individual independence of the researchers. Likewise, competition has also been acknowledged for its contribution to risk-taking by researchers in their investigation of less popular or niche topics. Thus, competition is responsible for both exploitation and exploration in science (Bourdieu, 1975; Hagstrom, 1965, 1974; Merton, 1973; von Hayek, 1968). At the same time, scientific research has traditionally fostered collaborative efforts whereby scientists become interdependent and form groups to solve problems and share data (Beaver & Rosen, 1978, 1979a, 1979b; de Solla Price, 1963; Hagstrom, 1965). While competition and cooperation might at first glance seem to be quite different or even antithetical forms of social interaction, they are often in fact intimately interconnected.

There has been an intensive debate over competition and collaboration in the traditional sociology of science (e.g., de Solla Price, 1963; Hagstrom, 1965; Merton, 1973; von Hayek, 1968), although from an empirical standpoint these studies have generally favored the natural sciences and given the humanities and social sciences far less attention. Classical studies have shown that a great deal of scientific research requires the efforts of multiple parties and that scientists often become interdependent and cooperative to win the race for discoveries and recognition. Beyond this, academics also look to the support of their colleagues to improve their knowledge and skills or to gain access to research facilities, data, and networks, which in turn will improve their chances of solving problems and ultimately achieving success individually or together (Beaver & Rosen, 1978; Hagstrom, 1965). Hagstrom (1965, p. 91) described the relationship between the competitive and cooperative mindset in his classical study as follows: “Before a man can be considered for such an agreement, he must have shown possible competitors that he can compete and can be trusted.” Scientific competitiveness in terms of reputation – as demonstrated, for example, by the number of citations or publications to one’s name – has therefore been seen as one of the prerequisites for cooperation, with trust being the other.

The fact that the organization, epistemic cultures, working styles, and academic identities in different research areas differ from each other was also the subject of later classic sociological studies of science (Becher & Trowler, 1989; Henkel, 2000; Knorr-Cetina, 1999; Whitley, 1984). Traditionally, scientific work in the natural sciences has been based on a division of labor and more collaborative than is the case in the social sciences and humanities. Scholars in the humanities, for example, have tended to work in an individualistic style rather than cooperatively in teams, which means they have generally relied on libraries, collections, and archives instead of sharing data and equipment. As for the division of labor, epistemic trust, and collective knowledge, these are subject to different conditions in the natural sciences relative to the humanities and social sciences (Klein, 1996; Mauthner & Doucet, 2008; Wagenknecht, 2016).<sup>1</sup> However, it must also be acknowledged that digitalization has changed knowledge production and scholarly communication across disciplines (Gold & Klein, 2019).

We deliberately started our investigation into new forms of competition and cooperation and the role of collegiality therein by drawing on classical accounts in the sociology of science. In these accounts, the starting point is the academic community and more specifically its self-organized character. Both competition and cooperation stem from the reputational structure and the work organization in science as a whole. While competition for new knowledge and the attendant recognition is inherent to the scientific system, independent of the discipline or research field, the need for cooperation is not equally distributed across disciplines and fields but rather bound to the concrete organization of work. In this regard, and following the aforementioned literature, the natural sciences differ profoundly from the humanities and the social sciences given that research in the former often requires the joint efforts of scientists and access to research facilities to improve the competitive position of the individual researcher. This means that competition leads to cooperation based on the necessities of autonomous academic communities.

With this in mind, we would now like to highlight broader changes that have occurred in very different national systems roughly since the 1990s. These changes – three in particular – have altered the interrelation between competition and cooperation. *First*, universities now position themselves more actively as both competitive and cooperative collective actors in their own right instead of mainly providing an organizational framework for the competitive and cooperative efforts of individual scientific actors. An important part of this new role for universities is the increasing use of target agreements with their professors. *Second*, the state is increasingly using competition as a governance instrument. In the same way as universities use target agreements with their professors, the state employs target agreements with its universities, thereby fostering a broader trend toward contractualization in science and higher education. *Third*, with regard to individual academics, more dimensions of scholarly activities (e.g., research funding, research cooperation, teaching, stays abroad, public engagement) have become scarce goods for which academics compete. Even though the last of these changes is reflected most acutely in the sociology of science and especially the field of science studies, prior research has typically paid scant attention to the university as an organizational actor with its own aims and ambitions.<sup>2</sup> Therefore, we will begin with changes at the organizational level.

Universities have transformed themselves into strategic and competitive organizational actors, thereby causing them to move away from the traditional concept of a loosely coupled expert organization. This trend has been analyzed in detail both theoretically and empirically (Christensen et al., 2019; Krücken & Meier, 2006; Whitley, 2008). These same studies have also shown that this trend is by no means unequivocal as universities are still “specific organizations” (Musselin, 2007) and their actual strategic capacities vary broadly (Thoenig & Paradeise, 2016). At the decentralized level, then, the modern university is nevertheless more than the sum of its parts, be they individual academics, institutes, or departments. The university as a whole engages in a multitude of strategic efforts that collectively result in the construction of an individual organizational identity,

increasingly hierarchical structures, the creation of managerial capacities, and the ever-increasing formation of specialized administrative units for observing relevant environments along with their internal processes and units. Parallel to this internal dynamic, competition has become of paramount importance, and universities compete among themselves for a variety of scarce goods (e.g., reputation, personnel, financial resources, and students). For several decades, analyses of this development have concentrated on the United States (Berman, 2015; Birnbaum, 2000), but more recently their scope has expanded to Europe and other parts of the world (Musselin, 2021). As we will later see when analyzing the German case, some competitive processes initiated by the state do, however, require cooperative efforts by universities and their academic members as a prerequisite for participation.

State activities have changed. With the advent of New Public Management reforms, states have increasingly begun to use competition directly as a governance instrument. This shift has been analyzed for different European national systems (Bleiklie et al., 2017) as well as for Latin America (Pineda, 2015) and Asia (Jung et al., 2017). Naidoo (2018, p. 611) speaks of competition as an “unquestionable orthodoxy” in the British higher education system. Following Szöllösi-Janze (2021, p. 244), competition

in an orderly way creates legitimate inequality, which from the competitors as well as society as a whole is accepted as just. Competition, in other words, is a machinery for creating legitimate, socially accepted inequality.<sup>3</sup>

This argument is particularly true for state activities in the field of science and higher education, where meritocratic ideals largely prevail. It is in these very same field that failure and the resulting inequalities among individuals and universities can be expected to have a higher degree of legitimacy relative to other fields of state politics like healthcare or social welfare. One such example of these state activities is a shift from block grant funding to a more competitive allocation of resources (Whitley et al., 2018). States have likewise initiated an increasing number of competitive processes for allocating research funding at the national and supranational levels (Aagaard et al., 2020; Auranen & Nieminen, 2010; Gläser & Laudel, 2016). These developments have spurred a trend toward large-scale research projects that are often multi- or interdisciplinary, involve multiple institutions, and are internationally cooperative (Bozemann & Youtie, 2020; Kosmützky & Wöhlert, 2021; Olechnicka et al., 2019). It should be noted here that political agendas can be quite visible in states’ funding schemes for research on grand challenges (Kaldevey, 2018).

Among individual scientists, competition has grown in volume and scope. The “publish or perish” imperative, which has already been analyzed extensively in the Mertonian sociology of science (Lofthouse, 1974; Merton, 1968), has become more granular and specific as scientists increasingly compete for scarce space in highly ranked journals, related citations, and inclusion in publication databases. Starting as early as the PhD level, the publication imperative has become of central importance – including the growing debate about first authorship. Furthermore, other aspects of research like third-party funding

have become more widespread as an academic activity and performance indicator not only in the natural sciences but also in the humanities and social sciences. As a result, conducting research today is in large part a matter of designing, launching, and carrying out research projects with specifically dedicated resources (Besio, 2009; Torka, 2009), and researchers spend far more time writing grant proposals than they did in the past (Gross & Bergstrom, 2019; Serrano Velarde, 2018).

The imperative to compete also creates new requirements for cooperation. Academics build cooperative networks strategically to increase their chances of securing external funding, and they compete – not just in science, technology, engineering, mathematics, and related fields (i.e., STEM+) but also in the social sciences and humanities – for prestigious grants and the ability to participate in large-scale collaborative projects (Borlaug & Langfeldt, 2020; Ekström & Sörlin, 2022; Hellström et al., 2018). Changes like these are increasingly shifting the nature of cooperation from traditional informal cooperation and collective problem-solving without funding (or with institutional funding) to formal cooperation with competitive project funding (Georghiou, 1998; Sacco, 2020). Long ago, the seminal laboratory study by Latour and Woolgar (1979) identified the procurement of external grants as the exclusive task of the head of the laboratory, yet, in the years since, grant-seeking as an academic activity has become widespread for researchers at all levels and across disciplines. The competition for external funding has even extended to junior scientists, both for the basic ability to conduct research and as a reputation marker (Waaijer et al., 2018). For academics across the board, so it seems, self-identifying as a member of an academic community – be it a discipline or a particular school of thought – has taken a backseat compared to highlighting one's individual performance along different dimensions of competition.

Although we have described broader trends across national systems up to this point, their actual configuration is bound to specific national characteristics. For the German system, some peculiarities have to be taken into account, namely, those which limit the power of the state and the university organization over the academic profession and its individual members (Hüther & Krücken, 2013, 2018). To begin with the legal structure, one should recall that academic freedom in Germany is constitutionally guaranteed. Article 5.3 of the German constitution (Grundgesetz für die Bundesrepublik Deutschland) states, “Arts and sciences, research and teaching shall be free.” In a number of judgments, the Federal Constitutional Court (Bundesverfassungsgericht) has interpreted the freedom of research and teaching as an individual right, thereby protecting individual academics, and in particular university professors, from state and organizational intervention. Complementary to this, the vast majority of professors at public universities are civil servants (Beamte) who have lifetime tenure and cannot be dismissed by the organization with ease. However, it is possible to sanction professors who do not align their professional activities with that of the organization. University leadership can exercise control over resources (e.g., personnel, equipment), although this source of power is limited as most resources have to be acquired externally through third-party funding. Far more effective is



to incentivize professors through the new remuneration scheme (W1–3 salaries) that came into existence in 2006 and supplanted the previous, more egalitarian scheme. Under the new scheme, professors can obtain regular performance bonuses from their universities by, for example, creating new study programs or participating in cooperative large-scale research. Through this method, there are ample opportunities for the university as an organization to exercise “soft coercion” (Courpasson, 2000) in academia and to shape the research and teaching activities of its members.

Another peculiarity of the German system lies in the federal structure of higher education and science policy, which leads to the proliferation of competitive activities initiated by the state. Legal regulation and financing of universities is basically the responsibility of the 16 states (Länder). As state governance through law is not an option for the federal government, there are far fewer constraints when it comes to competitive funding, which more closely resembles both the structural constraints and related policies of the European Union *vis-à-vis* its member states. Governance through competitive funding in Germany encompasses all major activities at universities, such as research, teaching, and innovation, not to mention specific funding programs on internationalization, gender equality, family friendliness, or science communication. Large programs like the Excellence Initiative (renamed the Excellence Strategy in 2016) explicitly foster cooperation within universities and with partners from non-university research organizations.<sup>4</sup> Furthermore, the Excellence Strategy in particular spurs competition among the 16 states and universities given that individual states create competitive programs for universities at the state level in order to strengthen their competitiveness at the federal level. In Germany, the three relevant actors outlined so far – universities, individual academics, states – converge in altering the traditional configuration of competition and cooperation by their particular focus on research clusters. Their role will be elaborated in the next section.

### III. THE ROLE OF RESEARCH CLUSTERS IN GERMAN ACADEMIA

In this section, we illustrate the relationship between new forms of competition and cooperation based on developments in German academia, specifically by looking at highly competitive and collaborative research clusters.<sup>5</sup> This illustrative example aims to show that the research cluster as a scarce good is very influential in the competition for reputation and resources and in the overall competitive institutional configuration of German academia. It has also had a profound influence on recent changes in the interrelations between individual academics, universities as organizations, and the state. The increasing clustering of research spurs the contractualization of research between the German states and their universities as well as between universities and their professors.

Whereas collaborative research groups are an elemental form of collaboration and knowledge production (Hackett, 2005), research clusters are in fact a special



form of group as well as of collaboration. Research clusters are large-scale collaborative research projects designed around long-term basic research. They are organized in a modular and decentralized fashion and based on a division of labor that consists of several sub-projects with their own principal investigators (PIs). At the same time, the goals and activities of the sub-projects contribute to the overarching aims of the research cluster itself. Research clusters may be disciplinary or interdisciplinary, and, depending on the larger aims of their research, the sub-projects might be interlinked to a lesser or greater extent in terms of content and mutually (in)dependent research activities (for a more detailed description, see [Hückstädt, 2022](#)).

The most prestigious research clusters that typically bring with them the greatest gain in revenue and reputation and also determine the status position of German universities are the so-called *Coordinated Programmes* funded by the German Research Foundation (DFG), which have a highly competitive application process. We focus on such DFG programs for research clusters as an empirical example, namely, the programs for Clusters of Excellence (Exzellenzcluster; EXC), Collaborative Research Centres (Sonderforschungsbereiche; SFB), and Transregional Collaborative Research Centres (Transregios; TRR) as well as what are known as Research Units (Forschungsgruppen; FOR). Research clusters from these programs are located at German universities, but researchers from non-university organizations, such as the Max Planck Institutes, at which a considerable share of cutting-edge fundamental research in Germany is carried out, can be and are typically involved ([Buenstorf & Koenig, 2020](#)).

The DFG funding programs for research clusters were established in the 1960s to promote research in universities in select research areas. They expanded quickly on account of increasingly scarce basic state funding for universities. The shortage of state funds in the 1970s resulted in additional research in universities being funded primarily through special focus areas for cutting-edge research, especially in interdisciplinary fields and in fields of “new” technologies (e.g., microelectronics, biotechnology). This was done not only through the DFG funding programs but also by the state ministries, which established competitive programs to promote special focus areas and research priorities in universities, particularly in the form of new interdisciplinary areas and priorities ([Mayer, 2019](#)). In conjunction, the income from third-party funding at universities became a performance indicator. The German Science Council (Wissenschaftsrat, WR) pointed out in the 1980s that third-party funding is an essential element in ensuring the quality of research at universities because it is typically awarded through competitive processes ([WR, 1982, 1985](#)). In the mid-1990s the Council recommended accordingly: “Competition for third-party funding is the most important way of allocating research resources on the basis of performance. The volume of third-party funding must therefore be increased” ([WR, 1996](#), p. 10). Together these developments put universities in a mode of competition not just for basic research funding but also for cutting-edge (interdisciplinary) research priorities in the form of research clusters ([Mayer, 2019](#)).

Third-party funding along these lines – and especially DFG funding for research clusters – has therefore become more than a simple enabler of research but is nowadays also considered a key indicator of the organizational research performance and reputation of German universities (Gerhards, 2013; Mayer, 2019). In general, the third-party income of German universities tripled from public sources and quadrupled from private sources (industry and others) in the 20 years between 1995 and 2015 (Dohmen & Wrobel, 2018). German higher education institutions, especially universities with a high proportion of research, now increasingly derive their resources from third-party funding. Between 1995 and 2015, the share of third-party funding of the total budget of German higher education institutions “increased from 23% to nearly 50%,” according to Dohmen and Wrobel (2018, p. 131, see also WR, 2023). They point to the “disproportionate importance of the DFG as an additional source of income” (Dohmen & Wrobel, 2018, p. 124). As the analysis by Mergele and Winkelmayer (2022) shows the Excellence Initiative made a pronounced contribution to greater disparity in the distribution of absolute amounts of DFG funding among universities.

*Research Clusters: A Competition for Resources  
and Reputation Among Universities*

In the late 1960s, the DFG established Collaborative Research Centres (SFBs) for collaborative long-term and large-scale research of up to 12 years. These clusters were expected to strengthen research in universities and to contribute to the development of special focus areas by means of interdisciplinary and inter-institutional cooperation. A total of 56.85 million euros (converted from German marks) in funding for the first 17 research clusters was awarded in 1968.<sup>6</sup> By 1980 the number of clusters had grown to 120 (with total funding increasing to 135.2 million euros, converted from German marks) and today has reached 294 (with a total of 872.9 million euros in funding) (DFG, 1980, 2021).<sup>7</sup>

The most prestigious DFG funding program for research clusters is part of the Excellence Strategy (formerly known as the Excellence Initiative), which has decisively shifted science policy in Germany even further away from the traditional egalitarian approach and toward a competitive approach (Möller et al., 2016).<sup>8</sup> To date there have been three rounds in which Clusters of Excellence among other programs have been funded (2006–2007, 2012, 2019). A fourth round with funding decisions to be determined by 2024 has just started. Clusters of Excellence can receive funding for up to 14 years. Although only universities are able to submit proposals for this type of research cluster, the funding program also explicitly aims to foster collaboration between universities and non-university research organizations (Buenstorf & Koenig, 2020; Möller et al., 2016).<sup>9</sup>

The funding program for Research Units (FOR) has existed since 1962, which predates the Collaborative Research Centre program by several years. It provides funding to – comparatively speaking – smaller and more short-term research clusters (up to six years when the program started, nowadays up to eight years). This program therefore contributes less to the total amount of university funding from the DFG and likewise has less influence on the organizational structures of universities.

Nevertheless, it still ranks among the most prestigious and competitive third-party funding programs in Germany today.

Since the establishment of the DFG funding programs for the aforementioned clusters, they have invariably grown in number. So, too, has the competition to participate in these clusters. Fig. 1a–c provides overviews of the number of research clusters (SFB, EXC, FOR) between 1980 and 2020 and their distribution by major scientific fields. As Fig. 1a shows the number of SFB clusters grew considerably in the program's early stages and has remained fairly steady at more than 250 for the past 20 years. The Excellence Initiative and later Excellence Strategy have added many additional Clusters of Excellence since 2006 (Fig. 1b). The funding program for FOR clusters has added about 200 more research clusters in the past 20 years (Fig. 1c).<sup>10</sup>

Hand in hand with the growth of clusters, the competition for such clusters has intensified over the years. The approval rate for SFB clusters, that is, the number of approved applications in relation to the total number of applications submitted, gives an indication of the selectivity and competitiveness of a program. While 120 out of 124 total applications (97%) were approved for funding in 1980, the approval rate for SFB clusters has since declined precipitously (DFG, 1980, p. 132). It was 37% in 2008 and 25% only four years later (DFG, 2014, p. 21). The average approval rate for Clusters of Excellence is quite similar. In 2016, the DFG received a total of 195 proposals for Clusters of Excellence from 63 universities. Of these, just 57 clusters from 34 universities were eventually approved for funding in 2019 (DFG, 2019, p. 5).<sup>11</sup>

But as Fig. 1 also shows, there are stark disciplinary variations in the number of research clusters, particularly for SFB clusters. The distribution of SFB clusters across the major scientific fields has been highly uneven since the beginning of the funding program. In the early days, this unevenness was attributable to a lack of applications in certain areas, given that the highly collaborative and modular research activity of these clusters is better suited to the research style of the natural sciences than the social sciences and humanities (DFG, 1980). Nowadays, the disparity also stems from differences in the approval rate. In 2005/2006, the approval rate of SFB clusters in the humanities and social sciences was only 9% (compared to 46% in the natural sciences and 53% in engineering and 40% in the life sciences) (DFG, 2010, p. 21); but it has increased in the years between 2005 and 2012 to 25% (compared to 45% in the natural sciences and in the life sciences and 33% in engineering) (DFG, 2014, p. 17). Compared to SFB clusters, the approval rates for Clusters of Excellence do not differ that strongly between major scientific fields: 18% of the applications for Clusters of Excellence in the humanities and social sciences were approved for funding in 2018 compared to 35% in the natural sciences, 26% in the life sciences, and 21% in engineering (DFG, 2019, p. 9). The convergence of approval rates might be related to the fierce competition for Clusters of Excellence.

Research clusters in the three funding lines differ not just in terms of their selectivity of approval but also in terms of size, duration, and funding. The average funding for SFBs is about two million euros per year (DFG, 2021). The typical annual funding for Clusters of Excellence is about 8.5 to 10 million euros

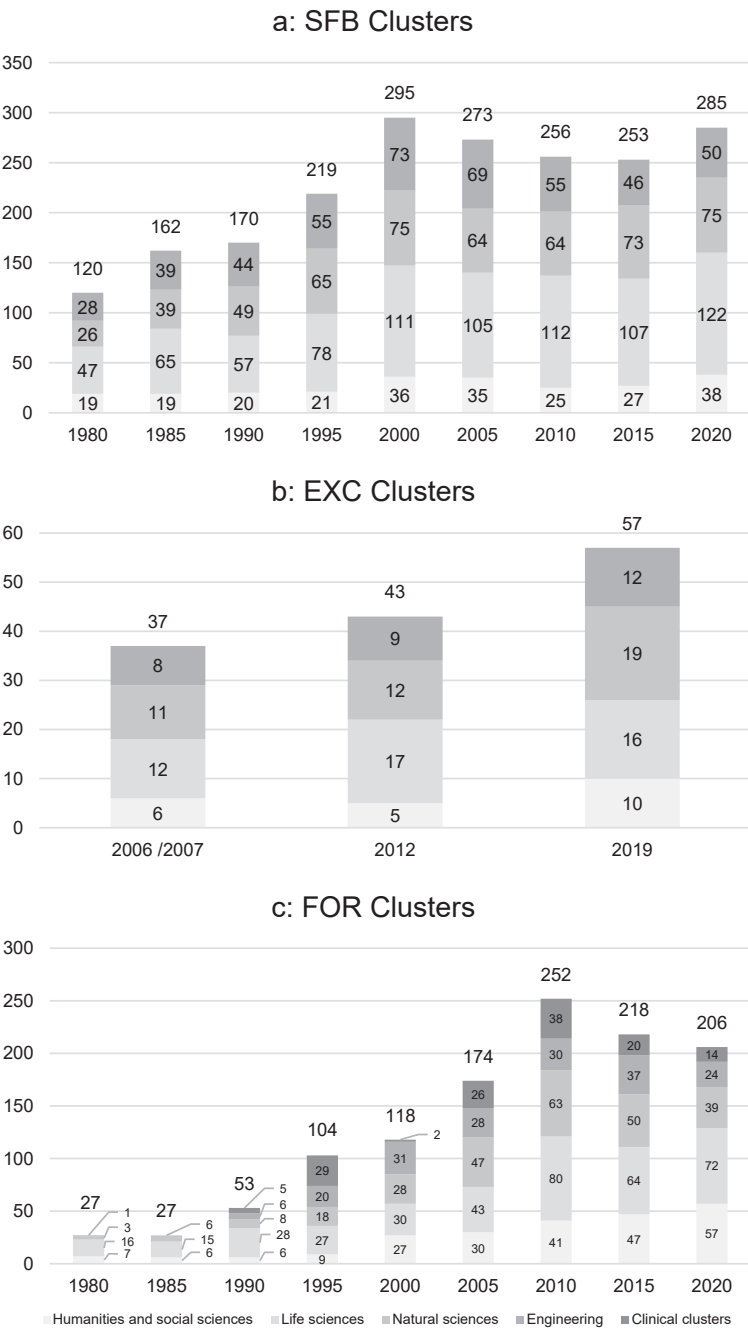


Fig. 1a–c. DFG Research Clusters (SFB, EXC, FOR) from 1980 to 2020 Grouped by Major Scientific Fields.

(DFG, 2019).<sup>12</sup> The average funding for Research Units is about 900,000 euros per year (DFG, 2021). These numbers indicate that research clusters are not just a matter of organizational reputation for universities but rather an important source of income for their research activities. Large German universities with “Excellence” status typically have two to three Clusters of Excellence and about two or three times as many SFB clusters. In addition, they are also home to several Research Units.

### *Research Clusters: Consequences at the Organizational Level*

Research clusters are not just a scarce good and highly desired object of competition. The successful application for such clusters also has far-reaching consequences within universities. Research clusters, and particularly Clusters of Excellence and SFBs, determine universities’ long-term recruitment strategies and their appointments of professorships.<sup>13</sup> In most universities, research activities in existing or planned clusters are strengthened through the reassignment and expansion of professorships. A DFG report from 2014 on the development of SFBs mentions the appointment of nine new professorships in the neurosciences related to an SFB cluster at Ludwig Maximilian University of Munich (LMU Munich), but this is clearly an exception. Typically, SFB clusters appoint just one or a handful of new professorships (ranging from W1 to W3 salary tiers) prior to establishing a cluster or during its operational lifetime (DFG, 2014). This situation is somewhat augmented for Clusters of Excellence. Although most of the newly hired scientific staff are early career researchers (e.g., PhDs and postdocs), a considerable number of new professorships are also created for EXCs. For the 37 Clusters of Excellence in the first two rounds of funding, 147 tenured professors and 55 W1 junior professors were appointed (Sondermann et al., 2010). Thus, it is not surprising that increases in the third-party funding of Universities of Excellence are concomitant with increases in the number of professors (Mergel & Winkelmayer, 2022). Nevertheless, cluster-based professorships have direct consequences for the disciplinary composition of universities, the size of departments, and their balance of power in universities. For example, research clusters as organizational units occasionally demand representation with full voting rights in the academic senate, in which traditionally the departments and disciplines of a university are represented. This indicates a shift, however slight, in the balance of power.<sup>14</sup>

In addition to direct consequences such as these, there are indirect consequences that influence the hiring criteria of professors and the organizational expectations of their roles. What we have found in our empirical investigation of competition and cooperation in the German science and higher education system is that the skills required to establish and apply for such research clusters as well as the corresponding ability to cooperate has become a typical role expectation of professors and a criterion for their appointment. This extends far beyond the appointment of professors who are specialized in the cluster’s particular area of research. It also shows a more widespread adoption of the approach commonly found in the natural sciences, where large-scale cooperation has played a strong role for decades.

To illustrate these expectations, we draw on interview material from a research project (2019–2022) that sought to investigate cooperation among German universities and more specifically how universities support and foster the research cooperation of their members.<sup>15</sup> In this project, universities were sampled, using the criteria-driven sampling method (Schreier, 2018), according to six important characteristics of German universities (i.e., socio-geographic location, age, size, type/disciplinary profile, research reputation, and state) to achieve a certain degree of representativeness of the selected cases for the German system. The data consists of 20 interviews with vice presidents of research and heads and staff of offices for research support (Forschungsförderabteilungen) in nine German universities.

When asked in the interviews how research cooperation is supported by the university, the vice presidents focused on the hiring processes and the attraction of professors. Other means and measures were also discussed, but the appointment of professors (and postdoctoral researchers to some extent), the hiring processes, and role expectations of professors were a recurring theme in the interviews. Their focus on such appointments is not entirely surprising given that universities as organizations depend on the research performance of their members when competing for research cluster funding.<sup>16</sup> What is striking, however, is their focus on what we have termed *cluster-ability*. We will use three quotes from interviews with the vice presidents to illustrate what they expect of the professors they hire and their “cluster-ability.”

One vice president mentions that the university adjusted its hiring strategies more than a decade ago and since then “it’s always about the ability for large-scale collaboration.” The same vice president goes on to explain these newer role expectations in more detail:

So, there are universities that sometimes make decidedly different appointments; they would prefer a Leibniz Prize winner, the lone wolf. For us, it is always about the willingness to get involved in large-scale research clusters, the potential for large-scale collaboration. So, this is actually a question in every appointment process.

It might be a matter of social desirability or merely a coincidence that in none of the universities that we investigated was hiring scientists with loner characteristics ever mentioned. Solitary scientists still exist, of course, but it seems that the modern professor of any discipline should work – or be willing to work – in a highly cooperative manner and should be interested in and capable of working in research clusters.

A quote from another interview expresses more precisely that a major concern is not only a candidate’s willingness and interest but also that they have the scientific reputation (referring to one’s standing in their field of research) that is needed to be part of a research cluster.

So, appointing people who would not be in a position to participate in an SFB or even better, of course, in an excellence cluster or something like that, you don’t really need to appoint them. So, we pay attention to that and the departments do that as well.

Universities that are oriented toward Clusters of Excellence favor professors with the specific ability to apply for such clusters, or at least for SFB clusters,

which are seen as a stepping stone for future Cluster of Excellence applications. The final quote that we will use to illustrate organizational role expectations of professors suggests potential tensions between organizational rationales and the research interests of individual academics. The organizational rationales that are addressed in the quote (“joining forces” with colleagues from their own university, “new collaborations,” “new topics”) point to research clusters. The willingness to get involved in such collaborations is apparently not taken for granted but is rather described as requiring a sufficient degree (“enough”) of open-mindedness:

When it comes to recruiting new professors, the focus is also placed on whether the person has the ability and willingness to either initiate such research clusters or to participate in them. So, one then also actually looks at the extent to which these people whom one hires are already networked, what prerequisites they bring with them, and then in the interview, of course, whether they are open-minded enough that they could also imagine perhaps joining forces with people who are already at the university or also, so to speak, to take a step outside, to say, yes, I am also quite willing to enter into innovative new collaborations and also to get involved in new topics, scientific topics.

About 40 interviews with university presidents and vice presidents from two ongoing research projects on competition in the German science and higher education system support these findings on the importance of cooperativeness and “cluster-ability” as hiring criteria and these new expectations as to the role of professor.<sup>17</sup> From these interviews that are particularly focused on competition among universities as organizations, we learn that although competition for hiring the professors themselves has traditionally existed in the academic system, this now has a new instrumental focus and a related legitimation pattern: At the organizational level, the competition for professors is now seen as a means to attract prestigious research clusters.

This instrumental orientation toward hiring a highly cooperative top scientist in order to secure competitive funding is also expressed by the fact that German universities often use individual target agreements with professors as part of the professorial W-salary. These agreements set incentives for certain performance benchmarks through bonuses. The research-related performance that is typically incentivized, besides that which brings in third-party funding in general, is applications for research clusters, and particularly DFG research clusters, in the role as lead PI, the ostensible spokesperson of the cluster. Should those applications be successful, universities tend to add (permanent) performance bonuses onto the individual salary or offer research bonuses as one-time payments. The following quote from a target agreement illustrates a permanent bonus that has been granted for the successful acquisition of an SFB cluster.

The Presidential Board of the University [name of university] grants Prof. [name of professor] a permanent performance bonus of 3 levels (each 220 € per month) from the month of the approval for a DFG Sonderforschungsbereich, for which Prof. [name of professor] is the spokesperson. (Target agreement with a professor of a Germany university, anonymized)<sup>18</sup>

### *Research Clusters: An Object of Competition Among the German States*

Research clusters are presently the objects of fierce competition not only among universities but also in the political arena among the 16 German states.



The expectation to cooperate and its contractualization that we have described above for universities in relation to their academic staff is also reflected in the target agreements between universities and their states. In many cases, target agreements between states and universities concern, among other things, the acquisition of Clusters of Excellence or SFBs. This is likely because Clusters of Excellence are a highly desired scarce good in the political competition between states. However, their actual distribution is exceedingly uneven. Some states (e.g., Mecklenburg-Western Pomerania, Saxony-Anhalt, Saarland) currently have no Clusters of Excellence based in their local universities at all. The development of research clusters is typically financially supported by the states, and therefore universities that are located in financially strong states have some competitive advantage. Nevertheless, states with fewer financial resources also try to incentivize research clusters and cultivate the research capacity for Clusters of Excellence in the future through target agreements. To illustrate this, we offer quotes from select target agreements between German federal states and universities.

The following quote is from the target agreement between the state of Lower Saxony and the University of Göttingen for the period 2017–2021. The University of Göttingen is a large, traditional university with a reputable scientific standing and a comprehensive spectrum of disciplines, including medicine. The university was awarded the title University of Excellence as part of the Excellence Initiative in 2006 but lost it in 2012. The state of Lower Saxony stepped in and supported the university's research projects with 30 million euros. Nevertheless, not enough Cluster of Excellence applications from the University of Göttingen were successful in the following round (2018) of the Excellence Initiative. To be eligible for University of Excellence status and its related funding, a university needs to be successful with at least two Cluster of Excellence applications, but three out of four of these applications from Göttingen were not. The following paragraph from the target agreement (excerpted from the section on research) for 2017–2021 must be considered in this context.

The goal is achieved when the University of Göttingen has applied for or extended at least five profile-building research clusters (at least 3 SFB) in existing research areas in 2021 and when the university in addition has applied for two research clusters in thematically new areas. (Universität Göttingen, 2017, p. 7)

However, the states do not sign target agreements exclusively with the large and established top research universities. Goals related to research clusters can be found in the target agreements of universities of any reputation and research capacity, albeit adjusted for scale. The following example is from the target agreement for the University of Erfurt for 2021–2025. The University of Erfurt is a small (6,000 students) and recently founded university (1993, but with historic roots in the fourteenth century) in Eastern Germany with a focus on the humanities and social sciences. In the section titled “Strategic Goals” in the “Promotion of Research Clusters” subsection of this agreement, the university declares that it “will continue to actively acquire third-party funding for research clusters in the future” (Universität Erfurt, 2021, p. 5). This declaration is quite vague but

followed by a detailed step-by-step plan for each year. Their goal by the end of 2025 includes applications to the DFG for Research Units and an SFB cluster as well as applications for less prestigious research clusters and research clusters funded by other means [e.g., the Federal Ministry of Education and Research (BMBF), European Union (EU), VolkswagenStiftung (VW)].

Application for at least eight research clusters, e.g., DFG research group, BMBF directive funding, or EU or other funding institutions (VW, etc.) as well as for the establishment of a research training group or an SFB by the DFG. ([Universität Erfurt, 2021](#), pp. 5–6)

Universities that are not yet ready to initiate clusters themselves are instead incentivized to cooperate with other universities in applications for research clusters. Universities that lack even the capacity to cooperate in research clusters are encouraged and supported to first and foremost build this capacity through targeted appointments of professors, by developing special profile areas and administrative research services, and by creating competitive intra-organizational research seed funding.

#### IV. DISCUSSION: CHANGES IN GOVERNANCE AND THEIR IMPACT ON COLLEGIALLY IN ACADEMIA

We began our investigation into the relationship between competition and cooperation in academia by focusing on theoretical and empirical research conducted in the sociology of science. These studies highlighted the strong role of competition and cooperation and their interrelatedness in academia. While cooperation is by and large seen as an uncontested aspect of academia, the role of competition in academia provokes highly charged debates among proponents as well as critics who see competition as a cause and effect of managerialism. Both fall short of acknowledging that – compared to public administration, for example – competition is not something entirely new that had to be instilled from the outside into universities and its members ([Krücken, 2021](#)). What *is* new, however, is the configuration of governance actors (i.e., state, universities, and academic researchers) and the related modes of governing research. [Table 1](#) summarizes the broader changes in research governance and the role and relevance of research clusters therein as analyzed in Sections II and III.

The competition for research clusters can be seen as the primary mode that shapes the competitive institutional configuration in German academia. It is embedded in a broader process of the construction of competitive actorhood in academia, one that goes hand in hand with the individualization of both academics and universities and loosens collective and normative ties between them.<sup>19</sup> As the example of large-scale collaborative research in German universities has shown, this highly competitive format for scientific cooperation does not stem solely from academic communities and their self-organized character. Rather, this format is driven to a large extent by universities as organizational actors and new funding opportunities provided by the state. Both changes are accompanied by contractualization. They induce systemic changes in governance and likewise

**Table 1.** Summary of Main Findings.

Broader Changes of Research Governance	Role and Relevance of Research Clusters
Competition as a governance instrument of the state; shift toward competitive research funding; contractualization	Fostering of research cluster competition and cluster-ability of universities
Universities as strategic and competitive organizational actors; contractualization	Clusters as a highly valued scarce good (funding and reputation), fostering of research clusters and cluster-ability of professors
Increased competition among individual academics	Clusters as a highly valued scarce good (funding and reputation); strategic and individualistic orientation

have an impact on collegiality in academia. The overall amount of competitive funding for cooperative research has increased significantly in recent decades, and the currently very prominent Excellence Strategy is only the result of a much longer process. We have traced the beginnings of competitive large-scale collaborative research funding back to the 1960s, and its evolution over this period has gradually given rise to increasing competition among universities and researchers for those funds. From the point of view of both universities and researchers, large-scale collaborative research is seen as a rich font of resources at a time when there is far less non-competitive block funding for universities from the state and funding for researchers provided directly by their universities is also on the decline. At the same time, highly competitive mechanisms like the three different DFG funding lines for research clusters are a strong symbolic indicator of scientific reputation both at the organizational and individual level.

Universities use these reputation markers in their dealings with the state but also to distinguish themselves from other universities, to build their profiles, and to aid in their recruitment processes of academic staff, professors in particular. Individual researchers meanwhile use these markers when negotiating with their universities for additional financial and personal resources. And, naturally, the German states use them in the ever-increasing political and economic competition among themselves. As we have shown in Section III, all disciplines and fields of research are presently involved in the competition for research clusters, even if the statistical chances of securing this type of funding are much lower in the humanities and the social sciences than in the natural and life sciences. The strong focus on research clusters as a scarce and highly desired good also affects traditional forms of collegiate governance. In some universities, research clusters and their representatives have a seat in the academic senate, a traditional collegiate decision-making body that should ideally contribute to the unity of academia by giving an equitable voice to various departments and disciplines. Likewise, in many universities, the university leadership has created informal and influential groups that give advice on universities' overall research strategies. They consist of professors who are held in high esteem for their research, namely, heads of research clusters. Such practices are obviously shifting the balance of power in universities.

At the interface of the organization and individual academics, the recruitment of professors is of particular interest. There is ample literature on the professor's

habitus, their fit into the department, and the expected role of new professorial recruits (e.g., Bourdieu, 1988; Musselin, 2009; Teichler et al., 2013). What we described in Section III are, however, characteristics that constitute “the good colleague” given the fundamental importance that university leadership places on cooperation and “cluster-ability.” Here, the willingness and ability to work with other departments and research organizations is highly sought after in the hopes of attracting prestigious research clusters and their related funding. This expectation is clear and can once again be found across all disciplines and fields of research. Although we did not investigate this aspect further, we assume that this expectation might produce tensions between both individual and organizational research agendas. It could also generate friction between the university leadership and the departments that field the search committee and where internal “rules of appropriateness” (March & Olsen, 1989, p. 2) concerning the “good colleague” prevail. While university leadership fosters new professorial recruits that are expected to play a strong role in large-scale research clusters that typically span departmental and disciplinary boundaries, at the departmental level other characteristics define the “good colleague.” Relevant characteristics in this respect are a commitment to teaching, participating in academic committees, and upholding disciplinary standards as well as being a good match with local colleagues, their way of “doing things here,” and not standing out too much compared to her or his colleagues.

Where competition and cooperation in academia are concerned, the shift toward a plurality of governance actors is accompanied by a shift in the mode of governance. Instead of collegial norms that largely remain implicit and are conveyed via long-term generational and socialization processes among the members of academia, we can see a contractualization of the expectation to cooperate. As part of this process, the main instrument the state uses to foster cooperation on behalf of universities is the same as the one, which universities employ with their members: target agreements. As we have shown in Section III, target agreements at both the organizational and the individual level encourage the pursuit of competitive yet collaborative large-scale research funding and the reputation that comes with it. Typically, the primary target of these formal agreements is applications for DFG-funded research clusters, which generate considerable financial resources and garner elevated status for all parties involved. Though applications are the aim, what is perhaps most interesting is that their success is not always an explicit goal.

Given the high degree of individual academic freedom in Germany noted in Section II, the power of university leadership over its members is limited, although target agreements under the new remuneration scheme clearly incentivize research cluster applications. In addition, there is a structural asymmetry between universities and their members. Universities as organizations depend on the research performance and the active participation of their members in the broader competition for research clusters because they can only succeed on the basis of these factors. On the individual level, the situation is rather different. Individuals can pursue their research agendas independently, including applications they might make for prestigious cooperation projects, thereby bypassing

the organization. However, competitive funding for research clusters increasingly requires the application to come from the university proper, not individuals or a group of researchers, as in the case of research clusters funded by the Excellence Initiative and the subsequent Excellence Strategy. Furthermore, as research clusters come bundled with a large amount of resources and a high degree of academic prestige, individual researchers themselves have a vested interest in applying for research clusters, even if this happens to be mostly at the organizational level.

We remain skeptical about whether these new forms of competition and cooperation in German academia might lead to a renewal of academic collegiality. On the contrary, they might serve to weaken collegial bonds instead. To be sure, research clusters, which often are interdisciplinary in character, do foster academic exchange and understanding across fields, disciplines, and departments. As a result, horizontal collegiality and related aspects concerning academic life might experience a renewal on an interdisciplinary level.<sup>20</sup> A sense of belonging to a vibrant research community that transcends disciplinary and departmental boundaries can certainly evolve among those involved. This might also facilitate intra-university discourse. However, the question of what happens when funding lapses remains open. As the motivation of all actors (i.e., individual academics, universities, states) to participate is rather strategic, driven by an individual and organizational means–end rationality and supported by means of contractualization, we do not expect long-term commitment to common goals to emerge beyond the research cluster itself. Under these premises, individual academics, as the basic units of academic collegiality, are rather prone to pursuing their own strategic agendas by focusing on new topics and related opportunities for cooperation, both within and beyond the organizational boundaries of their universities.

When we turn our attention to vertical collegiality, the picture is less clear. All competitive funding for prestigious research clusters heavily involves the academic community, especially through peer review in the selection process of clusters. At the same time, governance actors have multiplied and changed. The university as an organizational actor has become a powerful player, and by initiating and shaping competitive processes that also involve some degree of cooperation, the state has become a more active player. This kind of interrelated, multilevel governance structure is certainly more heterogeneous and open to external influences than traditional academic self-governance.

## V. CONCLUSION

Although the sociology of science has investigated the interrelation between competition and cooperation in academia for some time, the nature of this dynamic and its associated forms have undergone considerable change in the past few decades. A competition imperative has changed the institutional configuration of science and higher education systems around the world. By the same token, the proportion of competitive research funding has increased in many countries. In Germany specifically, competitive research funding has not only significantly increased but third-party funding in general has also become a leading

performance indicator for universities as organizations. As we have shown, the mode that most actively shapes the overall competitive institutional configuration of German academia is the competition for highly selective and prestigious cooperative research clusters funded by the German Research Foundation (DFG). Competition in Germany means to compete for prestigious grants for cooperative research clusters, a process in which both universities and individual academics take part to acquire ample resources for research and bolster their respective scientific reputations. The German states also have a vested interest in prestigious research clusters as they are themselves in political and economic competition with each other. They therefore strongly support and fuel the competitive processes in academia.

This competition for prestigious research clusters is not without consequences within German universities. Our analysis points to nascent changes in traditional power balances in universities as a result of what one might call *cluster professorships*. Furthermore, candidates' "cluster-ability" has become a significant criterion in hiring processes and an organizational role expectation of professors in all disciplines and fields of research. This indicates changes at the organizational level but also points to potential related changes in professional roles and identities. Last but not least, the mode of contractualization for such clusters between universities and states as well as universities and individuals might further cultivate individualization and competitive actorhood. One can easily imagine that such changes would also impact collegiality – most likely in ways that could alter or weaken rather than strengthen it.

On the basis of our findings for German academia, one might ask how these new forms of competition and cooperation unfold in the institutional configuration of other national science and higher education systems. Moreover, one might also inquire as to how they might affect academic research in different disciplines and research fields. While competitive research funding now plays an increasingly strong role in many different national systems, the specific way performance is measured and reputation is assigned differs by country. Other European systems measure performance and assign reputation less through collaborative large-scale research and more through publications and societal impact, such as the UK with its Research Excellence Framework (REF) procedures (Watermeyer, 2016). Therefore, we assume that the interrelation between competition and cooperation in academia in the UK differs from other countries to some degree. Here, the traditional, individualistic style of scientific work that has long been associated with the humanities might be still valued more – as long as one can point to prestigious publications and demonstrate societal impact. Similarly, it is reasonable to assume that different patterns of cooperation are stimulated by the competitive institutional configuration of academia in the United States. There, the dominant form of competition among universities seems to be for resources and revenue from tuition fees and endowment funds, whereas the competition for third-party funding is only of real importance in the natural sciences (Berman, 2015; Brint, 2018). This type of configuration might lead to an emphasis on the natural sciences in the competition for resources for research. Conversely, across all disciplines it might also lead to greater emphasis on cooperation in teaching and

graduate education. Other interesting comparative cases would be post-socialist countries such as Poland or Latin American countries such as Brazil, which come from a tradition of strong state control of science but are also now moving toward a more competitive institutional configuration (Etzkowitz & Leydesdorff, 2000). Likewise, countries that have emerged as strong global economic players in recent decades and, in an effort to catch up with leading scientific countries and world-class universities, have invested fiercely in their science and higher education systems (e.g., Korea, China; Altbach & Umakoshi, 2004; Braun Střelcová et al., 2022; Leydesdorff & Wagner, 2009) would be very intriguing cases for comparison. The same holds true for universities in Africa, where research agendas are heavily shaped by international organizations (Cloete et al., 2018; Mkandawire, 2011). The country-by-country differences in these institutional configurations would shed additional light on how they shape the interrelation between competition and cooperation in academia as well as the related modes of governance and collegiality.

## NOTES

1. Although the division of labor has traditionally distinguished the natural sciences from the humanities, exchange, and cooperation have played a strong role in the latter as well, for example, in institutes for advanced studies or in discussion and reading groups (Ekström & Sörlin, 2022; Fleck et al., 2019).

2. For an analysis of the global development towards organizational actorhood, see Lee and Ramirez (2023, Vol. 86).

3. All quotes from German sources have been translated by the authors.

4. For an analysis of the effects of the Excellence Initiative launched by the French government, see Harroche and Musselin (2023, Vol. 87).

5. From this point onward, we use the term *collaboration* to denote a specific type of cooperation among the large-scale research clusters. In all other cases, we use the term *cooperation* as an umbrella term for various kinds of joint activities in science and higher education.

6. Adjusted for inflation, the funding spent in 1968 would today be 236 million euros; the funding spent in 1980 would today amount to 342 million euros.

7. Today, Collaborative Research Centres (SFBs) can be funded for up to 12 years. Many of the early clusters were funded for 15 years, some up to 17. Up to the late 1990s, SFBs were located exclusively in one university (or neighboring universities), but in 1999 the TRR program was established. It allows researchers from up to three locations to work together in a research cluster (DFG, 2010). TRRs are counted as SFBs in Fig. 1.

8. The German Excellence Strategy is jointly funded by the German federal and state governments and organized by the DFG and the German Council of Science and Humanities (Wissenschaftsrat). Within the Excellence Initiative/Strategy, there have been three funding lines: graduate schools promoting doctoral researchers, Clusters of Excellence, and institutional strategies that advance development on a university level (known as Universities of Excellence). The funding program for graduate schools was discontinued in the third round of funding (Imboden et al., 2016).

9. The 37 excellence clusters approved in 2018 cooperate in total with 43 Max Planck Institutes, 12 Fraunhofer-Gesellschaft institutes, 14 from the Helmholtz Association, 17 from the Leibniz Association, as well as 30 other non-university research institutions (DFG, 2019).

10. We compiled the data for Fig. 1 from DFG annual reports and from the DFG database GEPRIS. We would like to thank Joelle Wirtz for assisting with the data collection.



11. At the core of the selection process in all three DFG research cluster programs is a peer review process involving national and international peers. The decision process for all three programs is organized as a two-step procedure. In the first step, the cluster initiative submits a concept paper or short proposal, for which the DFG organizes a peer review process. If successful in the first step, the cluster initiative submits a full proposal in the second step for which the DFG organizes an on-site review (DFG, 2010, 2019). The DFG does not regularly report first-stage applications in their annual reports. Therefore, we had to rely only on the DFG's own calculations of approval rates for the programs.

12. Additionally, a program overhead allowance of 22% is granted to all three forms of research clusters. Universities can also apply for a university allowance of one million euros for a Cluster of Excellence (750,000 euros for the second cluster, 500,000 for each additional cluster) to strengthen the governance and the overall strategy of the university (DFG, 2022).

13. For an analysis of changes in the job requirements of German professors, see Gerhardt et al. (2023, Vol. 86).

14. In some universities, research clusters demand seats with voting rights in the academic senate. At the University of Jena, for example, such demands have led to three seats for professors from the university's so-called profile lines: light, life, and liberty (Universität Jena, Grundordnung, 2019).

15. Funding for the project "Relational Quality: Developing Quality through Collaborative Networks and Collaboration Portfolios" (Q-KNOW) was awarded by the Federal Ministry of Education and Research (Bundesministerium für Bildung und Forschung; BMBF) (grant number 01PW18011A). We would especially like to thank Sarah-Rebecca Kienast for her contribution to conducting the interviews and analyzing the data. We would also like to thank Eva Schick for her support in preparing the interview transcripts for analysis.

16. Unlike in the interviews with vice presidents, hiring processes do not play a role in the interviews with the heads and staff of offices for research support. They focus primarily on the various research funding measures initiated and implemented by their office.

17. Both projects are part of the "Multiple Competition in Higher Education" (FOR 5234) Research Unit, which is funded by the DFG, the "Multiple Competition in Research and Teaching" project, and the "Competitive Positioning of Universities and Their Members" project. For further information, see <https://www.uni-kassel.de/go/FG-multiplier-wettbewerb>.

18. The amount granted for achieving each level is regularly adjusted according to state salary regulations. It typically increases over time.

19. Here one can identify a strong link to theoretical and empirical investigations of the global construction and proliferation of actorhood in neo-institutional studies (Hwang et al., 2019; Jepperson & Meyer, 2021). For an early account on actorhood and competition, see Hasse and Krücken (2013). According to neo-institutional research, actorhood and social embeddedness are by no means antithetical to each other. On the contrary, modern actors can only be understood by reconstructing "their practical embeddedness in taken-for-granted culture and relationships" (Meyer, 2009, p. 39). This implies that individual actorhood in academia is strongly associated with the current emphasis on cooperation but not with loner characteristics.

20. For the distinction between horizontal and vertical collegiality, see Sahlin and Eriksson-Zetterquist (2023, Vol. 86).

## ACKNOWLEDGMENTS

We thank Ulla Eriksson Zetterquist, Hampus Östh Gustafsson, Kerstin Sahlin, and Francois van Schalkwyk for their most helpful comments on a draft version of our paper.

## REFERENCES

- Aagaard, K., Kladakis, A., & Nielsen, M. W. (2020). Concentration or dispersal of research funding? *Quantitative Science Studies*, 1(1), 117–149. [https://doi.org/10.1162/qss\\_a\\_00002](https://doi.org/10.1162/qss_a_00002)
- Altbach, P. G., & Umakoshi, T. (Eds.). (2004). *Asian universities: Historical perspectives and contemporary challenges*. Johns Hopkins University Press.
- Auranen, O., & Nieminen, M. (2010). University research funding and publication performance – An international comparison. *Research Policy*, 39(6), 822–834. <https://doi.org/10.1016/j.respol.2010.03.003>
- Beaver, D., & Rosen, R. (1978). Studies in scientific collaboration: Part I. The professional origins of scientific co-authorship. *Scientometrics*, 1(1), 65–84. <https://doi.org/10.1007/BF02016840>
- Beaver, D., & Rosen, R. (1979a). Studies in scientific collaboration: Part II. Scientific co-authorship, research productivity and visibility in the French scientific elite, 1799–1830. *Scientometrics*, 1(2), 133–149. <https://doi.org/10.1007/BF02016966>
- Beaver, D., & Rosen, R. (1979b). Studies in scientific collaboration: Part III. Professionalization and the natural history of modern scientific co-authorship. *Scientometrics*, 1(3), 231–245. <https://doi.org/10.1007/BF02016308>
- Becher, T., & Trowler, P. (1989). *Academic tribes and territories: Intellectual enquiry and the culture of disciplines* (2nd ed.). Open University Press.
- Berman, E. P. (2015). *Creating the market university: How academic science became an economic engine*. Princeton University Press.
- Besio, C. (2009). *Forschungsprojekte: Zum Organisationswandel in der Wissenschaft* (Science Studies). Transcript Verlag.
- Birnbaum, R. (2000). *Management fads in higher education: Where they come from, what they do, why they fail*. Jossey-Bass.
- Bleiklie, I., Enders, J., & Lepori, B. (Eds.). (2017). *Managing universities: Policy and organizational change from a Western European comparative perspective* (Palgrave Studies in Global Higher Education). Palgrave Macmillan. <https://doi.org/10.1007/978-3-319-53865-5>
- Borlaug, S. B., & Langfeldt, L. (2020). One model fits all? How centres of excellence affect research organisation and practices in the humanities. *Studies in Higher Education*, 45(8), 1746–1757. <https://doi.org/10.1080/03075079.2019.1615044>
- Bourdieu, P. (1975). The specificity of the scientific field and the social conditions of the progress of reason. *Social Science Information*, 14(6), 19–47. <https://doi.org/10.1177/053901847501400602>
- Bourdieu, P. (1988). *Homo academicus*. Stanford University Press.
- Bozemann, B., & Youtie, J. (2020). *Strength in numbers: The new science of team science*. Princeton University Press.
- Braun Střelcová, A., Christmann-Budian, S., & Ahlers, A. L. (2022). The end of “learning from the West”? Trends in China’s contemporary science policy. *Observations*, 2022(6). <https://doi.org/10.17617/2.3407491>
- Brint, S. G. (2018). *Two cheers for higher education: Why American universities are stronger than ever—and how to meet the challenges they face*. Princeton University Press.
- Buenstorf, G., & Koenig, J. (2020). Interrelated funding streams in a multi-funder university system: Evidence from the German Exzellenzinitiative. *Research Policy*, 49(3), 103924. <https://doi.org/10.1016/j.respol.2020.103924>
- Christensen, T., Gornitzka, Å., & Ramirez, F. O. (Eds.). (2019). *Universities as agencies: Reputation and professionalization* (Public Sector Organisations). Palgrave Macmillan. <https://doi.org/10.1007/978-3-319-92713-8>
- Cloete, N., Bunting, I., & van Schalkwyk, F. (2018). Research universities in Africa. *African Minds*.
- Courpasson, D. (2000). Managerial strategies of domination. Power in soft bureaucracies. *Organization Studies*, 21(1), 141–161. <https://doi.org/10.1177/0170840600211001>
- de Solla Price, D. J. (1963). *Little science, big science*. Columbia University Press. <https://doi.org/10.7312/pric91844>
- Deutsche Forschungsgemeinschaft (DFG). (1980). *Tätigkeitsbericht 1980*. DFG.
- Deutsche Forschungsgemeinschaft (DFG). (2010). *Monitoring des Förderprogramms Sonderforschungsbereiche*. DFG. [https://www.dfg.de/download/pdf/dfg\\_im\\_profil/geschaeftsstelle/publikationen/dfg\\_monitoring\\_sfb\\_2010.pdf](https://www.dfg.de/download/pdf/dfg_im_profil/geschaeftsstelle/publikationen/dfg_monitoring_sfb_2010.pdf)

- Deutsche Forschungsgemeinschaft (DFG). (2014). *Daten zur Entwicklung des Programms Sonderforschungsbereiche (2014)*. DFG. [https://www.dfg.de/download/pdf/foerderung/programme/sfb/bericht\\_daten\\_entwicklung\\_sfb\\_2014.pdf](https://www.dfg.de/download/pdf/foerderung/programme/sfb/bericht_daten_entwicklung_sfb_2014.pdf)
- Deutsche Forschungsgemeinschaft (DFG). (2019). *Exzellenzstrategie des Bundes und der Länder: Statistische Übersichten zu den Förderentscheidungen zu Exzellenzclustern* (September 2018). DFG. <https://doi.org/10.5281/zenodo.2682217>
- Deutsche Forschungsgemeinschaft (DFG). (2021). *Jahresbericht 2021. Aufgaben und Ergebnisse*. DFG. [https://www.dfg.de/download/pdf/dfg\\_im\\_profil/geschaeftsstelle/publikationen/dfg\\_jb2021.pdf](https://www.dfg.de/download/pdf/dfg_im_profil/geschaeftsstelle/publikationen/dfg_jb2021.pdf)
- Deutsche Forschungsgemeinschaft (DFG). (2022). *Clusters of excellence funding line: Guidelines*. DFG. [https://www.dfg.de/formulare/exstra100/exstra100\\_en.pdf](https://www.dfg.de/formulare/exstra100/exstra100_en.pdf)
- Dohmen, D., & Wrobel, A. (2018). *Entwicklung der Finanzierung von Hochschulen und Außeruniversitären Forschungseinrichtungen seit 1995*. FIBS. [https://www.fibs.eu/fileadmin/user\\_upload/Literatur/FIBS\\_DHV\\_Hochschulfinanzierung\\_erweiterte\\_Fassung\\_final.pdf](https://www.fibs.eu/fileadmin/user_upload/Literatur/FIBS_DHV_Hochschulfinanzierung_erweiterte_Fassung_final.pdf)
- Ekström, A., & Sörlin, S. (2022). The integrative humanities—and the third research policy regime. In M. Benner, G. Marklund, & S. Schwaag Serger (Eds.), *Smart policies for societies in transition: The innovation challenge of inclusion, resilience and sustainability* (pp. 189–212). Edward Elgar Publishing.
- Etzkowitz, H., & Leydesdorff, L. (2000). The dynamics of innovation: From national systems and “mode 2” to a triple helix of university–industry–government relations. *Research Policy*, 29(2), 109–123. [https://doi.org/10.1016/S0048-7333\(99\)00055-4](https://doi.org/10.1016/S0048-7333(99)00055-4)
- Fleck, C., Duller, M., & Karády, V. (Eds.). (2019). *Shaping human science disciplines: Institutional developments in Europe and beyond* (Socio-Historical Studies of the Social and Human Sciences). Palgrave Macmillan. <https://doi.org/10.1007/978-3-319-92780-0>
- Georgiou, L. (1998). Global cooperation in research. *Research Policy*, 27(6), 611–626. [https://doi.org/10.1016/S0048-7333\(98\)00054-7](https://doi.org/10.1016/S0048-7333(98)00054-7)
- Gerhards, J. (2013). *Der deutsche Sonderweg in der Messung von Forschungsleistungen*. Wissenschaftspolitik im Dialog, 7/2013. Berlin-Brandenburgische Akademie der Wissenschaften (BBAW).
- Gerhardt, L.-M., Goldenstein, J., Oertel, S., Poschmann, P., & Walgenbach, P. (2023). The managerialization of higher education in Germany and its consequences: Changes in job advertisements for professorships in German universities, 1990 to 2010. In K. Sahlin & U. Eriksson-Zetterquist (Eds.), *University collegiality and the erosion of faculty authority* (Vol. 86, pp. 59–85). Emerald Publishing Limited.
- Gläser, J., & Laudel, G. (2016). Governing science: How science policy shapes research content. *European Journal of Sociology*, 57(1), 117–168. <https://doi.org/10.1017/S0003975616000047>
- Gold, M. K., & Klein, L. F. (Eds.). (2019). *Debates in the digital humanities 2019*. University of Minnesota Press.
- Gross, K., & Bergstrom, C. T. (2019). Contest models highlight inherent inefficiencies of scientific funding competitions. *PLOS Biology*, 17(1), e3000065. <https://doi.org/10.1371/journal.pbio.3000065>
- Hackett, E. J. (2005). Essential tensions: Identity, control, and risk in research. *Social Studies of Science*, 35(5), 787–826. <https://doi.org/10.1177/0306312705056045>
- Hagstrom, W. O. (1965). *The scientific community*. Basic Books.
- Hagstrom, W. O. (1974). Competition in science. *American Sociological Review*, 39(1), 1–18. <https://www.jstor.org/stable/pdf/2094272.pdf>
- Harroche, A. & Musselin, C. (2023). How to remain collegial when pressure for change is high? In K. Sahlin & U. Eriksson-Zetterquist (Eds.), *Revitalizing collegiality: Restoring faculty authority in universities* (Vol. 87, pp. 29–50). Emerald Publishing Limited.
- Hasse, R., & Krücken, G. (2013). Competition and actorhood: A further expansion of the neo-institutional agenda. *Sociologia Internationalis*, 51(2), 181–205. <https://doi.org/10.3790/sint.51.2.181>
- Hellström, T., Brattström, E., & Jabrane, L. (2018). Governing interdisciplinary cooperation in Centers of Excellence. *Studies in Higher Education*, 43(10), 1763–1777. <https://doi.org/10.1080/03075079.2018.1520476>
- Henkel, M. (2000). *Academic identities and policy change in higher education*. Jessica Kingsley Publishers.
- Hückstädt, M. (2022). Competition between frenemies—interrelations and effects of seven collaboration problems in research clusters. *Scientometrics*, 127(9), 5191–5224. <https://doi.org/10.1007/s11192-022-04472-w>

- Hüther, O., & Krücken, G. (2013). Hierarchy and power: A conceptual analysis with particular reference to new public management reforms in German universities. *European Journal of Higher Education*, 3(4), 307–323. <https://doi.org/10.1080/21568235.2013.850920>
- Hüther, O., & Krücken, G. (2018). *Higher education in Germany—Recent developments in an international perspective*. Springer. <https://doi.org/10.1007/978-3-319-61479-3>
- Hwang, H., Colyvas, J. A., & Drori, G. S. (Eds.). (2019). *Agents, actors, actorhood: Institutional perspectives on the nature of agency, action, and authority* (Research in the Sociology of Organisations, 58). Emerald Publishing Limited. <https://doi.org/10.1108/S0733-558X201958>
- Imboden, D., Lütjen-Drecoll, E., Bargmann, S., Casper, G., Gächter, S., Kratky, C., Nahrstedt, K., Bech Nosch, M., Pauss, F., & Scheidegger, D. (2016). *Internationale Expertenkommission zur Evaluation der Exzellenzinitiative—Endbericht*. Internationale Expertenkommission Exzellenzinitiative. [https://www.bmbf.de/bmbf/shareddocs/downloads/files/endbericht\\_internationale\\_expe-kommission\\_exzellenzinitiative.pdf?\\_\\_blob=publicationFile&v=2](https://www.bmbf.de/bmbf/shareddocs/downloads/files/endbericht_internationale_expe-kommission_exzellenzinitiative.pdf?__blob=publicationFile&v=2)
- Jepperson, R. L., & Meyer, J. W. (2021). *Institutional theory: The cultural construction of organizations, states, and identities* (1st ed.). Cambridge University Press.
- Jung, J., Horta, H., & Yonezawa, A. (Eds.). (2017). *Researching higher education in Asia: History, development and future*. Springer Singapore. <https://doi.org/10.1007/978-981-10-4989-7>
- Kaldewey, D. (2018). The grand challenges discourse: Transforming identity work in science and science policy. *Minerva*, 56(2), 161–182. <https://doi.org/10.1007/s11024-017-9332-2>
- Klein, J. T. (1996). *Crossing boundaries: Knowledge, disciplinarity, and interdisciplinarity*. University Press of Virginia.
- Knorrr-Cetina, K. (1999). *Epistemic cultures: How the sciences make knowledge*. Harvard University Press. <https://doi.org/10.2307/j.ctvxw3q7f>
- Kosmützky, A., & Wöhlert, R. (2021). Varieties of collaboration: On the influence of funding schemes on forms and characteristics of international collaborative research projects (ICRPs). *European Journal of Education*, 56(2), 182–199. <https://doi.org/10.1111/ejed.12452>
- Krücken, G. (2021). Multiple competitions in higher education: A conceptual approach. *Innovation*, 23(2), 163–181. <https://doi.org/10.1080/14479338.2019.1684652>
- Krücken, G., & Meier, F. (2006). Turning the university into an organizational actor. In G. S. Drori, J. W. Meyer, & H. Hwang (Eds.), *Globalization and organization: World society and organizational change* (pp. 241–257). Oxford University Press.
- Latour, B., & Woolgar, S. (1979). *Laboratory life: The social construction of scientific facts*. Sage Publications.
- Lee, S. S., & Ramirez, F. O. (2023). Globalization of universities as organizational actors? In K. Sahlin & U. Eriksson-Zetterquist (Eds.), *University collegiality and the erosion of faculty authority* (Vol. 86, pp. 87–104). Emerald Publishing Limited.
- Leydesdorff, L., & Wagner, C. (2009). Is the United States losing ground in science? A global perspective on the world science system. *Scientometrics*, 78(1), 23–36. <https://doi.org/10.48550/arXiv.0911.1042>
- Lofthouse, S. (1974). Thoughts on “publish or perish.” *Higher Education*, 3(1), 59–80. <https://doi.org/10.1007/BF00153992>
- March, J. G., & Olsen, J. P. (1989). *Rediscovering institutions: The organizational basis of politics*. Free Press.
- Mauthner, N. S., & Doucet, A. (2008). ‘Knowledge once divided can be hard to put together again’: An epistemological critique of collaborative and team-based research practices. *Sociology*, 42(5), 971–985. <https://doi.org/10.1177/0038038508094574>
- Mayer, A. (2019). *Universitäten im Wettbewerb: Deutschland von den 1980er Jahren bis zur Exzellenzinitiative* (Wissenschaftskulturen. Reihe III: Pallas Athene, 52). Franz Steiner Verlag.
- Mergele, L., & Winkelmayer, F. (2022). The relevance of the German Excellence Initiative for inequality in university funding. *Higher Education Policy*, 35(4), 789–807. <https://doi.org/10.1057/s41307-021-00233-1>
- Merton, R. K. (1968). The Matthew effect in science: The reward and communication systems of science are considered. *Science*, 159(3810), 56–63. <https://doi.org/10.1126/science.159.3810.56>
- Merton, R. K. (1973). *The sociology of science*. University of Chicago Press.

- Meyer, J. W. (2009). Reflections: Institutional theory and world society. In G. Krücken & G. S. Drori (Eds.), *World society. The writings of John W. Meyer* (pp. 36–63). Oxford University Press.
- Mkandawire, T. (2011). Running while others walk: Knowledge and the challenge of Africa's development. *Africa Development*, 36(2), 1–36. <https://www.jstor.org/stable/24484703>
- Möller, T., Schmidt, M., & Hornbostel, S. (2016). Assessing the effects of the German Excellence Initiative with bibliometric methods. *Scientometrics*, 109(3), 2217–2239. <https://doi.org/10.1007/s11192-016-2090-3>
- Musselin, C. (2007). Are universities specific organizations? In G. Krücken, A. Kosmützky, & M. Torka (Eds.), *Towards a multiversity? Universities between global trends and national traditions* (pp. 63–84). Transcript Verlag. <https://doi.org/10.1515/9783839404683-004>
- Musselin, C. (2009). *The market for academics*. Routledge. <https://doi.org/10.4324/9780203863060>
- Musselin, C. (2021). University governance in meso and macro perspectives. *Annual Review of Sociology*, 47, 305–325. <https://doi.org/10.1146/annurev-soc-090320-012708>
- Naidoo, R. (2018). The competition fetish in higher education: Shamans, mind snares and consequences. *European Educational Research Journal*, 17(5), 605–620. <https://doi.org/10.1177/1474904118784839>
- Olechnicka, A., Ploszaj, A., & Celinska-Janowicz, D. (2019). *The geography of scientific collaboration*. Routledge. <https://doi.org/10.4324/9781315471938>
- Pineda, P. (2015). *The entrepreneurial research university in Latin America: Global and local models in Chile and Colombia, 1950–2015*. Palgrave Macmillan. <https://doi.org/10.1057/9781137540287>
- Sacco, T. (2020). The good, the bad, and the ugly: Dimensions of success and failure in research collaboration. *Sociological Forum*, 35(2), 488–510. <https://doi.org/10.1111/socf.12591>
- Sahlin, K., & Eriksson-Zetterquist, U. (2023). Introduction. In K. Sahlin & U. Eriksson-Zetterquist (Eds.), *University collegiality and the erosion of faculty authority* (Vol. 86, pp. 1–27). Emerald Publishing Limited.
- Schreier, M. (2018). Sampling and generalization. In U. Flick (Ed.), *The Sage handbook of qualitative data collection* (pp. 84–98). Sage Publications Ltd. <https://doi.org/10.4135/9781526416070>
- Serrano Velarde, K. (2018). The way we ask for money... The emergence and institutionalization of grant writing practices in academia. *Minerva*, 56(1), 85–107. <https://doi.org/10.1007/s11024-018-9346-4>
- Sondermann, M., Bukow, S., & Simon, D. (2010). Dauerhaft exzellent? Personalrekrutierung und Modelle nachhaltiger Karriereentwicklung im Kontext der Exzellenzinitiative. *WSI-Mitteilungen*, 63(5), 271–276. <https://doi.org/10.5771/0342-300X-2010-5-271>
- Szöllösi-Janze, M. (2021). Archäologie des Wettbewerbs: Konkurrenz in und zwischen Universitäten in (West-)Deutschland seit den 1980er Jahren. *Vierteljahrshefte für Zeitgeschichte*, 69(2), 241–276. <https://doi.org/10.1515/vfzg-2021-0015>
- Teichler, U., Arimoto, A., & Cummings, W. K. (2013). *The changing academic profession: Major findings of a comparative survey*. Springer. <https://doi.org/10.1007/978-94-007-6155-1>
- Thoenig, J.-C., & Paradeise, C. (2016). Strategic capacity and organisational capabilities: A challenge for universities. *Minerva*, 54(3), 293–324. <https://doi.org/10.1007/s11024-016-9297-6>
- Torka, M. (2009). *Die Projektförmigkeit der Forschung*. Nomos. <https://doi.org/10.5771/9783845220864>
- Universität Erfurt. (2021). Ziel- und leistungsvereinbarung für die Jahre 2021 bis 2025. [https://wirtschaft.thueringen.de/fileadmin/th6/wissenschaft/ZLV/UE\\_ZLV\\_2021-25\\_mit\\_Anlagen\\_und\\_Unterschrift.pdf](https://wirtschaft.thueringen.de/fileadmin/th6/wissenschaft/ZLV/UE_ZLV_2021-25_mit_Anlagen_und_Unterschrift.pdf)
- Universität Göttingen. (2017). Zielvereinbarung 2017–2021. [https://www.mwk.niedersachsen.de/download/142100/Universitaet\\_Goettingen.pdf](https://www.mwk.niedersachsen.de/download/142100/Universitaet_Goettingen.pdf)
- Universität Jena. (2019). Grundordnung der Friedrich-Schiller-Universität Jena vom 27. Februar 2019 (Thüringer Staatsanzeiger 11/2019, Art. Nr. 80, S. 560) unter Berücksichtigung der Ersten Änderung vom 29. Juli 2019 (Thüringer Staatsanzeiger 33/2019, Art. Nr. 228, S. 1280). <https://www.hanfried.uni-jena.de/vhbmedia/dezernat-I-studierende/aktuelle-lesefassung-grundordnung.pdf>
- von Hayek, F. A. (1968). Der Wettbewerb als Entdeckungsverfahren. *Kieler Vorträge*, 56, 1–20.
- Waaaijer, C. J., Teelken, C., Wouters, P. F., & van der Weijden, I. (2018). Competition in science: Links between publication pressure, grant pressure and the academic job market. *Higher Education Policy*, 31(2), 225–243. <https://doi.org/10.1057/s41307-017-0051-y>

- Wagenknecht, S. (2016). *A social epistemology of research groups: Collaboration in scientific practice*. Palgrave Macmillan. <https://doi.org/10.1057/978-1-137-52410-2>
- Watermeyer, R. (2016). Impact in the REF: Issues and obstacles. *Studies in Higher Education*, 41(2), 199–214. <https://doi.org/10.1080/03075079.2014.915303>
- Whitley, R. (1984). *The intellectual and social organization of the sciences* (1st ed.). Oxford University Press.
- Whitley, R. (2008). Universities as strategic actors: Limitations and variations. In L. Engwall & D. L. Weaire (Eds.), *The university in the market: Proceedings from a symposium held in Stockholm, 1–3 November 2007* (pp. 23–37). Portland Press.
- Whitley, R., Gläser, J., & Laudel, G. (2018). The impact of changing funding and authority relationships on scientific innovations. *Minerva*, 56(1), 109–134. <https://doi.org/10.1007/s11024-018-9343-7>
- Wissenschaftsrat (WR). (1982). *Empfehlungen zur Forschung mit Mitteln Dritter an den Hochschulen*. WR. [https://www.wissenschaftsrat.de/download/archiv/5734-82.pdf?\\_\\_blob=publicationFile&v=1](https://www.wissenschaftsrat.de/download/archiv/5734-82.pdf?__blob=publicationFile&v=1)
- Wissenschaftsrat (WR). (1985). *Empfehlungen zum Wettbewerb im deutschen Hochschulsystem*. WR. [https://www.wissenschaftsrat.de/download/archiv/B035\\_85\\_Wettbewerb.pdf?\\_\\_blob=publicationFile&v=1](https://www.wissenschaftsrat.de/download/archiv/B035_85_Wettbewerb.pdf?__blob=publicationFile&v=1)
- Wissenschaftsrat (WR). (1996). *Thesen zur Forschung in den Hochschulen*. WR. [https://www.wissenschaftsrat.de/download/archiv/2765-96.pdf?\\_\\_blob=publicationFile&v=1](https://www.wissenschaftsrat.de/download/archiv/2765-96.pdf?__blob=publicationFile&v=1)
- Wissenschaftsrat (WR). (2023). *Strukturen der Forschungsfinanzierung an deutschen Hochschulen*. Positionspapier. WR. <https://doi.org/10.57674/pms3-pr05>